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INVESTIGATING RESOURCE STRUCTURE AND HUMAN
MOBILITY: AN EXAMPLE FROM FOLSOM-AGED BISON KILL
SITES ON THE U.S. SOUTHERN GREAT PLAINS

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MOBILITY: AN EXAMPLE FROM FOLSOM-AGED BISON KILL
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A DISSERTATION APPROVED FOR THE
DEPARTMENT OF ANTHROPOLOGY

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ABSTRACT

Modern and prehistoric bison teeth from the Southern Plains are analyzed to assess the interrelatedness of *Bison antiquus* – an extinct form of the North American buffalo - and human movements between 10,800 and 10,200 years ago. This study uses Laser Ablation Inductively Coupled Plasma/Mass Spectrometry (LA-ICP/MS) to examine the down-tooth distribution of trace elements in enamel of modern *Bison bison* from Colorado, Kansas, New Mexico, Oklahoma, and Texas to define the geographical limits and concentrations of specific minerals. In addition, *Bison antiquus* teeth from Early Paleoindian locales on the Southern Plains are analyzed. The modern bison enamel provides an elemental map upon which the movements of extinct herds are assessed. *Bison antiquus* herd movement and structure can be linked to human adaptive strategies on the Southern Plains. Human hunting tactics shifted from a moderately specialized approach to highly specialized bison hunting around 11,000 B.P. The presence of predictable migratory and residential bison herds in the Southern Plains was likely a catalyst for specialized bison hunting.

CHAPTER 1: UNDERSTANDING HUMAN-PREY RELATIONSHIPS

We need not look far to discover that the connection between humans and animals is so embedded in our religions, cultures, and ideals that when we stop to look we find that information regarding such relationships abound. It makes sense then that scientists have taken an interest in observing and explaining past and present symbiotic human and animal behaviors. Archaeologists, specifically, have diligently produced a boundless number of inferences about past humans and their dealings with nature across the globe.

In his book, *Survival by Hunting: Prehistoric Human Predators and Animal Prey*, Dr. George C. Frison (2004:xiii) expressed concerns about young archaeologists who would not have “an intimate knowledge of animal habitats and behavior, expertise in the use of weaponry and tools, and experience acquired through both hunting and predator control” from which to understand past procurement strategies (**Figure 1.1**). Human and animal behaviors (as well as the interaction between them), though, have changed over the course of human occupation in North America, so it is to our benefit as archaeologists that we are able to couple our personal experiences with fine scale analyses of prey animals to infer past procurement strategies.



Figure 1.1 Confused archaeologist having trouble with identifying the difference between and the nature of the bison and the cow.

This thesis examines the trace minerals in Folsom-age (10,800-10,200 radiocarbon years before present (B.P. from this point forward)) bison teeth to determine where geographically these animals grazed over the period of tooth development over approximately one year. The results of this analysis are used to develop a model of human mobility that addresses the degree to which early hunter-gatherers on the U.S. Southern Great Plains (**Figure 1.2**) structured movements around bison. By meshing the early concepts of cultural ecology with human adaptive strategies, I provide a detailed example of how humans spatially and seasonally organize themselves to acquire resources. A study of this nature is of specific interest to the numerous disciplines concerned with reconstructing past ecological relationships and predicting future global changes.

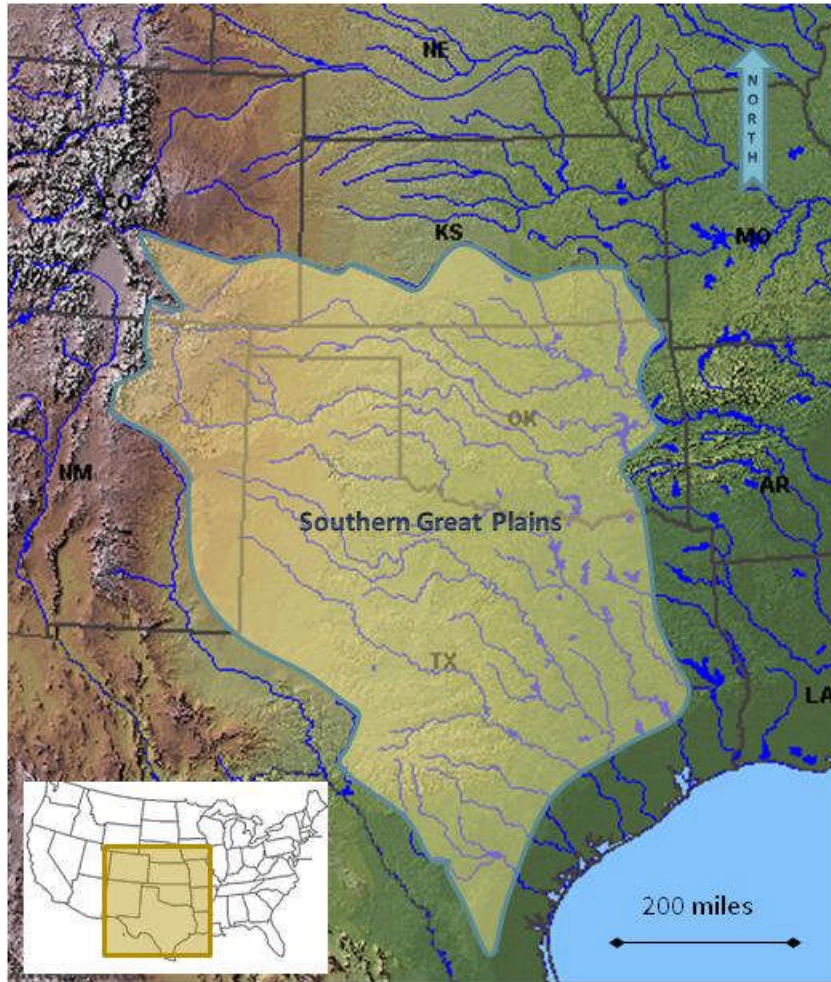


Figure 1.2 The U.S. Southern Great Plains study area.

THE PARADIGM

The manner in which anthropologists choose to view human movement has profound effects on how models of present and past human settlement systems are observed. The current study is interested in linking resource structure to human mobility, and therefore, only works if the decisions humans make are in some way related to the environment in which they live. Interest in the relationship between human culture

and the environment has been of primary interest to many social scientists (e.g., Daniel 1950; Kroeber 1939; Steward 1955; Worsaae 1849; Wissler 1926). In anthropology, the interest in understanding how prehistoric cultures operated in relation to their natural environment has its roots firmly planted in early Functionalist thought. From the mid-1800s to present day, a group of Scandinavian archaeologists have studied archaeological finds as they relate to paleoenvironmental settings in an effort to identify how changing environments effected flora, fauna, and human land use (Trigger 1989:247-250). Consistently identifying the relationships between a group of humans and their environment, however, has been difficult for anthropologists (Kelly 1995:39). Early theoretical paradigms focused on subsistence technology and how this technology changed in relation to different environmental conditions and yielded the obvious conclusion that a society will adapt to its natural environment. Kroeber (1939:1) noted, however, that cultures would not be produced by a given natural environment. More recent studies have focused upon making explicit use of how evolutionary processes structure human societies in response to environmental conditions (e.g., Boone and Smith 1998; Smith and Winterhalder 1992; Winterhalder and Smith 1992), and are the focus of the following discussion.

Our cultural capabilities rely on learning and experience within a given environment. Assuming humans forage optimally within that environment, the mechanisms for human adaptive optimization are rational choice and natural selection (Winterhalder and Smith 1992:20). Rational choice pertains to “a powerful element of human adaptation” that implies that there are preexisting preferences for options with high-payoffs stemming from a history of natural selection (Winterhalder and Smith

1992:21). Using an optimal foraging research approach can relate behavioral patterns to ecological factors. Clearly, a correlation can be made between behavioral variability and the environment.

A major critique of evolutionary ecology theory by some social scientists is that by applying environmental factors to explain human behavior, anthropologists are in fact supporting environmental determinism. No aspect of the environment solely determines human behavior (Winterhalder and Smith 1992:20). The environment does not limit human behavior; rather, it establishes the payoffs of certain behavioral patterns. Winterhalder and Smith (1992:20) believe that great contributions to our understanding of process in cultural evolution will be made by archaeological studies focusing on the adaptive level of human populations within specific environmental contexts that take into consideration different variables such as technology, social structure, and economic organization will make real contributions to our understanding of process in cultural evolution.

One major difficulty anthropologists have had in applying evolutionary concepts to socio-cultural phenomena is that cultural traits are not bound to genetic mechanisms; hence, different rules govern the rate, direction, and mode of their transmission. Natural selection influences behavioral patterns through genetic and cultural evolution. Most anthropologists believe that genetic differences among individuals do not seem to affect their foraging behaviors (Winterhalder 1981a:16). Behavioral variability appears to be consciously or unconsciously adopted by individuals

(Winterhalder 1981a:16). Thus, the adaptive effect will remain the same, regardless of whether the change is biological or cultural.

Optimal foraging theory is frequently criticized for not taking into account those food items collected for their non-food value (Kelly 1995:110). Cultural traditions can outrank an optimal resource. Optimization models make predictions about the value and return rates for certain resources. Consequently, if an animal was not exploited for subsistence purposes, their purpose for being in the archaeological record may not be fully understood. For example, dogs often were utilized as a food source and as beasts of burden (Kelly 1995:110). Therefore, the optimization model used to evaluate their utility as a resource would have to be based on their optimal value as food source as well as their optimal value as a pack animal (Kelly 1995:110).

Ideally, optimal foraging theory analyses should evaluate behaviors over a relatively long time interval in order to accurately represent their aggregate effect on the organism (Winterhalder 1981a).

Evolutionary ecology theory is used to make sense of particular aspects of human adaptation that are distinct steps toward reaching a goal, which in this case is the economic specialization on bison. Identifying species of plant and animals exploited by a group of people in a specific region only provides part of the information needed to assess cultural-ecological relationships. No environment is completely constant from year to year, and people cope with these variations in resource availability in different ways. Optimal foraging theory is applicable to many aspects of human behavior. Among the variables that directly affect optimal adaptation are group size,

climate, physiography, the abundance of resources, and butchering patterns which, in the present case, are all related to procuring bison.

Particular human behavioral adaptations can be employed optimally to support a population dependent primarily on exploiting bison. According to Bamforth (1988:16), people will form special task groups in order to successfully obtain food for a larger social group and those people will come to rely on seasonal food storage. Additionally, because different foods become available at different seasons, both hunter-gatherer and agricultural or pastoral society group size can vary seasonally (Driver 1990:13). The communal (a group size increase) bison hunt was an integral part of a seasonal subsistence pattern for almost all of the groups of people who once resided on the Plains.

Bamforth (1988) offers a useful summary of various ethnographic, ethnohistorical, and archaeological research of the practice of communal hunting on the Plains.

“In preparation for the communal hunt, a large number of people gathered into a camp at a predetermined location under the direction of a shaman or other temporary leader. At least in recent times these hunts occurred primarily in the fall. The locations for these gatherings were chosen because they were close to specific places that were well-suited to mass kills of bison, either because of convenient topography or because traps had been constructed there. There is evidence people “geared up” in preparation for these aggregations by visiting quarries and manufacturing the projectile points and butchering tools needed for the hunt. Activities in the communal encampment

included both a wide range of social and ritual activities and the preparation for the kill. This preparation included such activities as sending scouts out as much as 40 to 50 miles to locate and lure in the herds and preparing the equipment needed to process the huge volumes of meat and hides to be produced. Once the drive was accomplished, using any of a variety of relatively well-known methods of entrapment, it was necessary to kill the animals that had not died in the stampede and then to butcher the carcasses. Butchering at the immediate site tended to remove the major meat units for transport to a secondary processing area or to a camp to be prepared and dried; this meat was often wrapped in the animal's own hide for transport. Processing the products of even a relatively small kill took several days" (Bamforth 1988:9).

Knowing that a group of people communally hunt bison only tells archaeologists part of the story—understanding this adaptation is also revealed by a specific pattern of bison exploitation at a particular time and place on the Plains. In order to focus on the predictability of an animal resource, understanding whether large numbers of bison or just one or two bison were taken during a single hunting episode is necessary. If hunting is a successful part of a human subsistence strategy, surplus animal resources must be returned and shared. This can be accomplished by being a more efficient killer of a single prey, killing large prey, or killing more prey per single hunting episode (Steele and Baker 1993:24). Multiple predation occurs when a task force or communal hunting group takes multiple animals in order to increase the number of animal resources exploited in the most efficient manner possible.

One must also consider the importance of varying search and handling time costs could among different groups of people at different times because local patterns of productive resource distribution can vary from season to season and from year to year. There are time constraints on hunting and foraging excursions. When travel time is high the amount of field processing will be low and either a smaller amount of the load will be processed, or, to a lesser extent, the entire load will be processed (Metcalf and Barlow 1992:351). Therefore, when a resource such as bison are procured at greater distances we can assume mixed loads of processed and unprocessed bones will be transported back to the residential camp or village.

The paradigm, whether one calls it evolutionary ecology, behavioral ecology, or what have you, provides a framework from which to determine how ecological and social factors influence and shape behavioral flexibility within and between human populations. Literally thousands of anthropologists have explained and summarized behavioral ecology, and numerous recent studies are available regarding the topic (see the Human Behavioral Ecology Bibliography maintained by Kermyt G. Anderson, <http://faculty-staff.ou.edu/A/Kermyt.G.Anderson-1/HBE/>), so this manuscript will refrain from providing yet another lengthy lecture. What this paradigm offers to the current study is a methodology that will help us understand how “hunter-gatherers made decisions about interacting with their environment and how those decisions affect the transmission of cultural traits (Kelly 1995:63).”

Evolutionary ecology theory has great potential for addressing many micro-economic optimization questions about how foragers arrive at certain subsistence decisions.

Some archaeologists have adopted an evolutionary ecological approach to help explain human behavior, particularly emphasizing approaches associated with optimal foraging theory, because this approach examines the interrelationships between environmental factors and human adaptations. The physiography and climate of a specific environmental region will determine the kinds, numbers, distributions, and adaptations of plants and animals in that region, making it possible to predict spatial and temporal patterns of resource availability (Bamforth 1988:17). Temporal patterns refer to both seasonal and annual changes of availability, and spatial patterns refer to where in a given area those resources can be found (Bamforth 1988:17). The tasks of obtaining resources require that decisions must be made about how, when, and where a group of people should direct their procurement activities, and will thus determine the nature of their subsistence economy (Jochim 1981:114).

Optimal foraging theory provides anthropologists with models aimed at reconstructing the “on-the-ground decision-making process of foraging” (Kelly 1995:97). This theory is concerned with these often overlapping questions:

- Diet breadth and choice of items;
- Optimal patch choice or where in the spatial environment the forager will seek food resources;
- Optimal patterns of movement and time allocation during foraging; and
- Foraging group size, meaning the circumstances in which foragers will form groups for pursuit of food resources (Winterhalder 1981a:14).

Regarding resource acquisition, optimization pertains to the efficiency, in time or energy costs, with which subsistence activities are performed, with the assumption that increased efficiency relative to a standard of performance leads to an increase in fitness (Winterhalder 1981a:15). Predictions about human adaptations based on energy optimization assumptions provide archaeologists with a realistic approach to analyzing food-getting behavior.

Models of optimal diet are concerned with selectivity (Winterhalder 1981a:23). A forager can be a “specialist” or a “generalist” when faced with selecting widely or narrowly within the realm of potentially exploitable resources (Winterhalder 1981a:23). Optimal diet models can identify, analyze, and rank forager resource selectivity to reveal decisions people made about which resources to exploit in order to maximize their net rate of energy gained within specific environmental and cultural settings (Winterhalder 1981a). Optimal foraging theory recognizes a clearly defined set of concepts that describe environmental conditions. Three general characteristics used to describe environmental conditions include patchiness, productivity or abundance, and predictability (Bamforth 1988).

Optimal diet models must define the grain patchiness of the environment. An environment can be either patchy, having heterogeneous or a mosaic of resources, or it can be uniform, having well-mixed, similar, evenly distributed resources (Winterhalder 1981a:23). Winterhalder (1981a:23) defined grain as a relative measure determined by comparing environments or assessing the behavior of an organism or population. Winterhalder (1981a:23) explains that humans take advantage of their

environment in a fine-grained manner by structuring their daily activities so as to encounter and exploit different patches in proportion to which they occur. Humans that exploit their environment in a coarse-grained manner choose to take specific resources from a heterogeneous environment in an unbalanced way (Winterhalder 1981a:23). By assessing the behavior of a population in a specific environment, the selectivity of procuring a resource can be determined.

Productivity or abundance is measured by the total floral and/or faunal biomass produced in a region (Bamforth 1988:17). This total may fluctuate for various reasons, including the time of year (seasonality), climate changes, and the nutritional condition of the biomass, which may not coincide with the actual population of a particular local biomass (Bamforth 1988). On the Plains, bison are a high-quality protein resource, and archaeological evidence reveals the importance and abundance of this particular faunal biomass. Bison population densities are determined by regional forage production, and these animals will move over the course of the year to familiar areas, depending on the seasonal distribution and density of their preferred forage (Bamforth 1988:52). The degree to which resources are clumped rather than dispersed in space is directly related to the patchiness of their environment.

In this study, the concept of patch as a spatial unit whose productivity varies from season to season and from year to year is used. Bison herd composition varies according to the patchiness of a particular region. The patchiness of an environment can be due either to “differences in the number of areas suitable for occupation by a herd or by differences in ungulate adaptations causing differing degrees of

aggregation” (Bamforth 1988:19). As a result, the degree of patchiness is likely to vary on a seasonal basis.

Predictability refers to the temporal pattern of resource distribution in a particular region (Bamforth 1988:18). Foragers do not randomly search an area for food; instead, they know where they are going before they leave the village in search of subsistence resources. People do not have the ability to constantly predict the environment on a day-to-day basis; instead, they operate with “complete information” about their environment by acting in terms of strategies that they think will have a high probability of success (Kelly 1995:97-98). They have a knowledge base that is sufficient to allow them to predict with a certain amount of probability the outcome of a particular choice (Kelly 1995; Winterhalder 1981a). For example, fall is the season when bison herds are at their peak of good health; thus, hunting bison in the fall would predictably be the best time for acquiring the highest quality protein yields.

High quality protein acquired by an individual is often determined by the availability of resources. One paradigm, the diet breadth model, offers archaeologists a way to predict what resources were exploited to what degree in order to increase the reproductive fitness of the individual and their exploitive strategies. Hunter-gatherer diets are the products of a decision-making process that takes the cost of acquiring resources into account (Kelly 1995). Resources are ranked based on the amount of energy received in relation to the time and energy necessary to acquire them (Bettinger 1991; Winterhalder 1981a, 1981b). Hunter-gatherers made choices about

what kind of food to procure and eat by determining the net energy value of each item to reveal subsistence information, such as the relative proportions of various foods.

In order to increase, population size increases force people to travel farther in order to obtain adequate resources, so the efficiency of individual foragers to maximize their energy must also increase. If resources are mobile and clumped, such as bison, the optimal strategy is aggregation of the foraging population at a central location (Winterhalder 1981a:31). In this case, increase of travel does not refer to the entire society following mobile resources from location to location. Rather, as populations aggregate into larger residence groups, resources are procured over a larger area by means of using some sort of group-hunting strategy.

Group organization is an optimal behavioral solution to an adaptive problem. There are many advantages to using a group foraging strategy to procure a particular resource. One such advantage is that a group can more effectively exploit large prey, such as bison, by using cooperative search and pursuit methods (Winterhalder 1981a:30). In addition, a group can better defend their territory for exclusive use of particular resources (Winterhalder 1981a:30). Another potential advantage is that a specialized foraging group could monitor a larger area and then exchange information regarding resource composition and distribution at a central location (Winterhalder 1981a:30). According to Winterhalder (1981a:32), when the distribution of a resource—such as bison—is aggregated and mobile, their location is unpredictable. Hence, being able to obtain information regarding herd location at one central place would be advantageous to the success of those foragers.

Behavioral ecology aids in our understanding of environmentally-based decisions by defining analytical limits, or assumptions, to a unit of interest. Under this paradigm one may identify adaptive goals, significant environmental features, and the kinds of behavioral optimization decisions specific to a human group by assuming that organisms focus on consuming the most energy while expending the least amount of energy. The immediate goal of the current study, then, is to identify how the spatial and temporal distribution of bison shaped the behavior of Folsom-age hunter-gatherers by assuming these past humans made decisions to minimize cost and maximize profit. Obviously, cultural traditions can outrank a behaviorally optimal decision. Franz Boas (1955:9) wrote,

“No people known to us, however hard their lives may be, spend all of their time, all of their energies in the acquisition of food and shelter, nor do those who live under more favorable conditions and who are free to devote to other pursuits the time not needed for securing their sustenance occupy themselves with purely industrial work or idle away the days of indolence”.

Although Boas was initiating discussion regarding esthetic values, a very strong point is made that humans make decisions independent of basic biological needs. For this study, though, by assuming bison were a key resource to Folsom-age hunter-gatherers and these people made decisions based on the procurement of bison because the behavior was optimal, we may evaluate whether or not optimization was indeed occurring.

WHAT ARE THE BIOLOGICAL ADVANTAGES OF MOBILITY?

This investigation assumes that there is a direct cause and effect relationship between land use strategies and the distribution of resources across landscapes, and that these decisions would be optimal. Although little attention has been given to the benefits of human spatial organization to reproduction and fitness (survival), a consideration of optimal behavior has to be that the decisions are largely advantageous biologically. Movement patterns evolve among animal species in response to diverse ecological pressures (Dobson 1982). The fitness of an individual is dramatically influenced by its selection of a place (Alcock 1977), and particular movement patterns will be selected if they are imperative to reproduction or survival (MacArthur 1972). Pease and Lande (1989) stated the biogeography of a species is determined by evolution and movements of populations. They suggested the distribution of a species is often more malleable than its morphology or environmental tolerance.

There are several types of population movement or distribution as discussed by biologists: dispersal, migration, limited migration, and dispersion and convergence. Dispersal is an important process for improving a population's ability to respond to changing environments. Dispersal has been defined as: (1) travel by individuals beyond their home range boundaries when they do not return (at least in the short term) as they would after brief excursions (Stenseth and Lidicker 1992); (2) individual movements out of an area larger than a home range with no predictable return (Bunnell and Harestad 1983); and (3) one-way movement by a population with no predictable direction (Sinclair 1992). Dispersal plays a major role in population

regulation (Lidicker 1975) and spatial distribution (Taylor and Taylor 1977). Species that disperse with a low rate of return likely subsist in habitats subject to a high deterioration rate, but low movement cost, possibly due to short distances between suitable habitat niches (Baker 1978). According to Murray's "rule of dispersal" (Murray 1967), individuals move no further than the first suitable uncontested site and no further – assuming the disperser spends no longer than necessary searching for an empty location because of the risk of travel or cost in time – or they disperse to avoid sharing home ranges. Selection favors non-dispersal in the absence of competition, but when competition exists, individuals are pressured to disperse (Waser 1985). Instead of attributing dispersal to a single cause, Dobson and Jones (1985) stated that even if there is one primary cause, other factors may contribute to the magnitude of dispersal. For dispersal to be advantageous, fitness gained from exploiting new areas must exceed the costs of moving.

Migration, another type of movement, is the incursion from one spatial unit to another (Baker 1978). A definition that includes a return component is used most consistently by vertebrate biologists (Stenseth and Lidicker 1992), thus distinguishing it from dispersal. To be adaptive, migratory movements must involve a change in environment, or travel over an "ecological distance" from one environment to another (LeResche 1974). Species with a high incidence of return migration should be those adapted to spatially separate habitat types that fluctuate in relative suitability (Baker 1978). Many ungulates have evolved in grassland, desert, or tundra regions where food availability is highly seasonal or erratic because of drought or snow cover. Messier et al. (1988) considered the increasing energy expenditures for migration as a

possible regulatory factor for the expanding George River caribou herd. In African grasslands, mammal diversity is low, large concentrations of animals are typical, and long distance seasonal migrations are common (Baker 1978). In transitional zones between grassland and forest (i.e. savannah), species diversity is relatively high, animals are not highly concentrated, and migration is rare. When it does occur, migration is for relatively short distances. Species such as wildebeest (*Connochaetes taurinus*), and caribou/reindeer (*Rangifer tarandus*), which are known for long distance mass migrations, typically also have populations that remain sedentary (McNaughton 1985). Migrants may share ranges with residents at certain times of the year. In the Ngorongoro Crater, Tanzania, there are abundant year-round food and water resources and resident wildebeest do not seem compelled to migrate (Talbot and Talbot 1963).

Many migrations occur during transitions between seasons (winter/summer at high latitudes and wet/dry seasons in the tropics) indicating this may be a response to changes in resource availability. Rapid, long distance movements are characteristic of large herbivores that evolved in grassland ecosystems. McNaughton (1985) described the Serengeti region of East Africa, comprised of 27 ungulate species of over three million individuals. The open grasslands receive low annual precipitation that support shortgrass, whereas wooded grasslands receive higher rainfall that support tall, highly lignified grasses. The primary grazers are wildebeest, zebra, Thomson's gazelle (*G. thomsonii*), buffalo and topi (*Damaliscus korrigum*). Annual movements occur in nomadic herds of wildebeest, Plains zebra (*Equus burchelli*) and eland (*Taurotragus oryx*). Although most gazelle (*Gazella spp.*) are nomadic, they travel shorter

distances. Buffalo, topi and gazelle occur as resident herds throughout the savannas. Impala, topi, hartebeest (*Alcelophus buselaphus*) and giraffe (*Giraffa camelopardalis*), which include browse in their diet, remain in wooded grasslands year-round (Baker 1978). Some eland also remain, while others migrate with zebra herds. Among seasonal migrants, relatively little mortality occurs through starvation, but non-migrants such as impala, giraffe, kudu (*Tragelaphus strepsiceros*) and waterbuck all experienced considerable starvation mortality at the end of a dry season in South Africa (Hirst 1969). Wildebeest migrate to open grassland for the wet season to feed on shortgrasses, which are easily digestible and nutrient rich (Fryxell et al. 1988). When water sources evaporate during the dry season, and the food value of tropical grasses declines (Sinclair 1974), wildebeest must migrate to wooded grasslands for water and green grass. Migration during the dry season by White-eared kob (*Kobus kob leucotus*) in Boma National Park, Sudan, allowed access to green grass and water when these resources were scarce elsewhere in ecosystem (Fryxell and Sinclair 1988b). Because Lechwe antelope (*Kobus spp.*) feed on floodplain grasses and herbs, movements coincided with the annual expansion and contraction of flood waters across broad river basins (Fryxell and Sinclair 1988b). These animals disperse during flooding, and then converge when waters subside. In southern California, migratory female Mule deer (*Odocoileus hemionus*) used habitats with higher forage quality than non-migratory deer (Nicholson et al. 1997). However, migrants were exposed to increased predation during the seasonal movements and experienced higher mortality during dry years. Moose typically converge on a common range during winter and disperse into separate ranges during summer

(Hundertmark 1998). For example, an eastern European Tundra moose population formed in the 1950s (Pulliainen 1974) spent the summer on the arctic coast then migrated south to find adequate vegetation for sustenance during winter. In southeastern Norway, migrating moose used habitats of lower quality but higher quantity browse than resident moose (Histol and Kjeljord 1993). No data exists to indicate which strategy provided a nutritional advantage.

Opportunities to use a complementary range of habitats with limited migration distance are afforded in areas with sharp ecological gradients such as mountains. Altitudinal migration is a feature of the seasonal ecology of many ungulate species throughout western North America. Bison (*Bison bison*) use altitudinal gradients in Yellowstone and similar landscapes but used other gradients such as the prairie-parkland transition in the Northern Great Plains (Morgan 1980). The occurrence of migration in many ecosystems around the world suggests there may be common underlying causes (Fryxell et al. 1988). Large herbivores appear to migrate primarily to access high quality food and/or avoid predators, but also as an effective strategy to avoid thermal stress, insect harassment, and contact with disease and parasites.

Dispersion is defined as the internal distribution pattern of a population (Odum 1971), or the distribution of animals in space, ignoring time, since birth (Bunnell and Harestad 1983). As the mean distance between individuals increases through dispersal, changes in dispersion may result in greater clumping, increased randomness, or more even spacing (Stenseth and Lidicker 1992). Convergence decreases the mean distance between individuals. Often, a population undergoes

dispersion when departing on a migration, and convergence on return. If an animal migrates as a herd, then disperses into smaller social units at the destination, herding behavior is assumed to reduce the cost of migration (Baker 1978). Natural selection appears to favor dispersion in animals when food availability is low, or convergence when food availability increases (Leuthold 1977). However, if water or other point resources are limiting, selection seems to favor convergence, whereas dispersion is favored when water becomes less limiting. Males increase reproductive success through contact with many females, which can often be achieved through greater mobility. In most monogamous mammals, both males and females disperse (Dobson 1982). In Georgia, sexual competition among male white-tailed deer (*Odocoileus virginianus*) appeared to be the primary stimulus for dispersal (Kammermeyer and Marchinton 1976). Most dispersers were young subordinate bucks of breeding age. Nelson and Mech (1999) suggested the recent range expansion and establishment of new wintering areas of White-tailed deer in North America resulted from dispersal of yearlings. Male dispersal occurs in species that live in permanent herds, such as impala (*Aepyceros melampus*; Murray 1982), or African buffalo (*Synerus caffer*; Sinclair 1977). Sinclair (1977) found an increasing tendency for male buffalo to depart from mixed herds as they grew older, and those greater than ten years were permanently displaced by dominant breeding bulls. According to Prins (1989), rutting activities in mixed herds diminished a male's physical condition, while males in bachelor herds improved their condition. Distant movements of male muskoxen (*Ovibos moschatus*) on the Seward Peninsula probably improved their prospects for breeding whenever social competition was intense (Smith 1989). In monogamous and

territorial species such as dikdik (*Madoqua rhynchtragus*) and Roe deer (*Capreolus capreolus*), all offspring of both sexes disperse to find mates (Bobek 1977). Also, both sexes (although mostly males) disperse in species with loose social organization, such as Black-tailed deer (*Odocoileus hemionus columbianus*; Bunnell and Harestad 1983). Conversely, female Uganda waterbuck (*Kobus ellipsiprymus*) are the most active in dispersal, searching new areas for awaiting males (Spinage 1982). Female dispersal has been observed in Red deer (Clutton-Brock and Albon 1985) and Roe deer (Bobek 1977). An increase in population density stimulates dispersal of White-tailed deer bucks (Nelson and Mech 1984), but not females (Nixon et al. 1991, Nelson and Mech 1992). Social organization of a species influences dispersal rates (Baker 1978). In ungulates that occur in moderate sized herds, such as elk (*Cervus elaphus*), females disperse in small groups, splitting off from the group and establishing an adjacent home range. Wildebeest typically occur in large herds and may disperse in large groups (Sinclair 1992).

DOES THIS WORK FOR HUNTER-GATHERERS?

These biological classifications for movement do not differ much when compared to anthropological discussions of human mobility (**Table 1.1**). Anthropologists (Murdock 1967; Varien 1999) often classify human movement in terms of fully nomadic (comparable to dispersal), semi-nomadic (comparable to migratory), semi-sedentary (comparable to limited migration), and household or community movement (comparable to dispersion and convergence).

Table 1.1 Summary of the different types of movement and benefits to mobility.

Types of Mobility	
Animals	Humans
migration	semi-nomadic
dispersal	fully nomadic
limited migration	semi-sedentary
sedentary	fully sedentary
dispersion and convergence	household mobility/sedentism
Benefits (cultural/reproductive/survival) of Mobility	
Animals	Humans
ecological pressure	ecological pressure
finding mates	finding mates
disease	disease
predation	warfare
competition for resources	competition for resources
high quality food	high quality resources
thermal stress	thermal stress
insect harassment	insect/pest harassment
inbreeding avoidance	inbreeding avoidance
lack of group fidelity	lack of group fidelity
	<u>cultural transmission</u>
	hunting technique
	prey choice
	hunting technology
	social gathering
	procurement
	knowledge exchange
	trade

DEFINING HUMAN MOVEMENT

Human movement is often defined as a continuum with mobile and sedentary groups at opposite ends of the spectrum (Kelly 1992:44). In other words, highly mobile groups are those where residential mobility is frequent, whereas fully sedentary settlement systems are those in which at least part of the population remains in the same geographic location year round. Eder (1984), however, posits that mobility and

sedentism are not on either ends of a continuum. This statement is clear when one considers a circumstance by which residential place decreases and logistical mobility increases within a group (see Varien's (1999:11) example below). The mobility of residential location and individual mobility are two completely different movement strategies. While there appears to be some sort of mobility continuum, a definition of mobility may not be determined without considering the scale of movement.

Binford (1980) was one of the first researchers to define mobility in terms of both individual and group movement, but in this construct sedentism is observed as a group rather than individual characteristic (Varien 1999:10). For example, Varien (1999:11) points out that, in Binford's (1980) model, once group movement is fixed for the entire year they are defined as sedentary, and mobility is organized by individuals or task groups. Sedentary individuals who move supra-annually are unaccounted for by most definitions of mobility (see Varien 1999 for an exception).

Clearly, defining concepts of mobility is no simple task. A single meaning eludes us because anthropologists choose to examine human movement in a number of different ways. Those interested in examining more mobile individuals or groups define mobility in terms of how much or how little humans move individually or in groups seasonally or annually. When discussing less mobile or sedentary individuals or groups, one must define how one wants to examine the variability of movement within a complex settlement system. For example, some individuals may be quite mobile while their group or certain other individuals may only move once every five years. So, if the definition of mobility is highly dependent upon the topic of interest

(i.e., how frequently people move, how infrequently people move, or how people move in relation to their group or other individuals), how do these definitions affect how anthropologists model mobility?

Generally, models of mobility are constructed based on how modern humans structure their movement around their subsistence economy and environment (Binford 1978, 1980; Kelly 1983, 1992:46-48, 1995; see also Varien 1999:29). The primary subject of concern for these models is how often individuals and groups move. Touched on briefly above were the concepts of residential versus logistical mobility. To generalize, residential mobility is movements of the entire group from one camp to another, whereas logistical mobility is movements of a subset of the whole, generally task groups from a residential camp (Binford 1980). Using these classifications, Binford (1980) went on to describe hunter-gatherer settlement systems in relation to subsistence and environment. These systems categorized foragers and collectors where foragers are found in nonseasonal environments and generate residential bases and foraging locations and collectors are found in seasonal environments and create residential bases, locations, field camps, stations, and caches. These models have seemingly worked well for predicting hunter-gatherer movement at a group level (Berry 1982; Euler et al. 1979; Dean et al. 1985).

THE ADVANTAGES OF HUMAN MOBILITY

The advantages of movement are somewhat hidden in the discussion above. Why do humans move residentially and logistically? What could possibly be the root cause of

making optimal or biologically advantageous decisions regarding moves on an individual or group level? The answer, quite simply and perhaps obviously, is subsistence. It should come as no surprise that, as appeared in our discussions of dispersal, migration, limited migration, and dispersion and convergence, that species, first and foremost, make mobility decisions based on the location, availability, abundance, and regularity of food (and water). It follows that eating is an advantageous behavior benefitting reproduction and fitness.

The primary focus of this research is to determine how humans structure themselves in relation to the environment by defining the role bison movement plays in the structure of Folsom mobility. A behavioral ecological paradigm posits that “despite their possession of exceptional characteristics humans are not immune to ecological constraints” (Dunlap 1980:8), and that “adaptation to the environment plays a major (but by no means singular) role in conditioning the variability seen in hunter-gatherer societies” (Kelly 1995:35; see also Binford 1980, 1983; Jochim 1981; Smith and Winterhalder 1981). This approach allows aspects of modern hunter-gatherer behavior to serve as analogs to Paleoindian adaptations because living and ancient foragers operate under the same general structure of evolutionary principles. This is not to say that the first occupants of the western hemisphere are identical to modern hunter-gatherers, but understanding the relationships between environmental and cultural variables aids in reconstructing the past (Kelly 1996). Variables relevant to the structure of advantageous human mobility are of interest to this study.

A REVIEW OF PALEOINDIAN MOBILITY

Many of the current views of Paleoindian mobility stem from Kelly and Todd (1988). They envision late Pleistocene foragers engaged in a “system in which residential groups moved from kill to kill” (Kelly and Todd 1988:236) and would “begin an almost immediate search for further resources” following a kill event (Kelly and Todd 1988:238). Regular encounters with bison eliminated the need for intensive processing and result in frequent residential moves over long distances.

Folsom hunter-gatherers employed such residential moves and “may have been the most mobile pedestrian hunter-gatherers to inhabit the globe (Amick 1996:411).” This observation is based on lithic raw materials present in Paleoindian assemblages, and particularly those of Folsom, that have been transported over huge distances, not uncommonly exceeding 400 km (e.g. Amick 1994a, b, c, 1996; Hester and Grady 1977; Hofman 1999; Hofman et al. 1991). This pattern is especially well documented for Southern Plains Folsom sites, but evidence for the long distance transport of lithic raw materials is present in sites in the Northern Plains and Rocky Mountains as well (e.g. Frison 1982; 1984; Jodry 1999; MacDonald 1999; Root 2000; Waguespack et al. 2002). Folsom mobility is, then, seen as an adaptation to the hunting of bison among a highly mobile, gregarious species.

Amick (1994a, 1996, 2000) sees Folsom hunter-gatherers as mimicking the supposed east-west migrations of bison from the Southern Plains in the warm season to the sheltered basins of New Mexico in the cold season. Based on the regular occurrence of central Texas Edwards Plateau chert in Folsom sites in the New Mexico Basin and

Range, Amick believes Folsom peoples regularly “geared up on Edwards chert sources, then exploited the grasslands of the Southern Plains during summer and early fall and then moved on to winter in the intermontane Rio Grande Valley (Amick 1996:417).” He suggests that the total annual residential mobility of some Folsom groups in this region could have exceeded a distance of 1,400 km (Amick 1996:418). Using ratios of projectile points to preforms and ratios of point bases to tips compiled by region, Amick (1994a; 2000) further argues that Folsom hunters logistically exploited the Southern Plains and small basins and uplands of the Basin and Range, while frequent residential moves and limited logistical forays were used in the larger Tularosa, Albuquerque, and Northern Jornada del Muerto basins.

Hofman (1999) suggests a similar pattern of movement for Southern Plains Folsom groups to that of Amick (1994a, 1996, 2000), but instead argues for a redundant pattern of land use, independent of region: “Folsom technology was sufficiently conservative and efficiently organized to enable similar patterns of mobility and group movement throughout and across diverse terrains (Hofman 1999:403).” He further suggests that Amick’s data may be problematic due to the latter’s reliance on data from private collections, in which Folsom preforms are often underrepresented because they are not as readily identifiable as finished points (Hofman 1999:401). Folsom points from the Southern Plains were also used by Hofman (1994; 1999) whereby he noted consistent patterns of transport of lithic raw materials. In particular, Edwards chert, the raw material of choice for Southern Plains Folsom peoples, is most often transported to the north and northwest of the source area located in central Texas, up to a distance of 600 km. Alibates silicified dolomite from the panhandle of

Texas tends to have been moved north, northwest, and east, but notably it very rarely occurs in the form of Folsom points in central Texas (Hofman 1994).

Hofman (1999a:403-407) proposes that Southern Plains Folsom bands acquired Edwards Chert during the winter. In the cold season, he suggests that residential mobility was reduced while groups wintered in the Dissected Plains, off the high Llano Estacado, relying on “sheltered settings, diverse resources, and dispersed bison herds...” (Hofman 1999:405). Winter was a time for hunkering down and replenishing and repairing toolkits. He does not, however, believe that winter residential mobility would always have been restricted. Depending on the responses of bison to climate, Folsom groups may have utilized all areas of the Southern Plains during all seasons. During severe winters, however, Folsom groups and bison would have retreated to more sheltered settings (Hofman 1999:405-406; see also Greiser 1985). Support for this model is based on seasonality estimates for the bison kills at the Folsom, Lipscomb, Lake Theo, and Cooper sites, all late summer to early fall kills falling on the margins of the Southern High Plains (Hofman 1999:404).

Subsistence is often considered the driving force behind Paleoindian mobility for a number of reasons. Most notably is the long held inference that Folsom point users were bison hunting specialists (Cassells 1983:69; Collins 1999:30; Hofman 1992:198; Hofman and Todd 2001; Sellards 1952:149). The first Folsom sites were found because of the presence of bison bones in association with Folsom points (Meltzer 1993:293-294). In addition, Folsom sites are usually regarded as such when a Folsom point – a hunting tool – is found. The immediate assumption when Folsom sites were

initially examined was that bison hunting was of primary concern to the makers of Folsom points (e.g., Roberts 1936:37). Historically, bison were seasonally migratory on the Plains, and successful hunting required following herds (Epp 1988; Hofman and Ingbar 1988:346). The conclusion, therefore, was that Folsom point users were highly mobile bison hunters.

High mobility is commonly directly inferred from a curated tool design (Hofman 1991) and the direct procurement of non-local toolstone (e.g., Amick 1994:423, 1996:417-420; Hofman 1992:197; LeTourneau 2000) derived from sources ranging from 100 km to 900 km (Tankersley 1989:268-270). Based on ethnographic and archaeological research, when toolstone is scarce curation becomes necessary to maximize the efficient use of materials (Kelly 1988:719). For Folsom, high tool-to-debitage ratios and depleted tools reflect the maintenance and long use of tools (LeTourneau 2000:21). In addition, bifacial cores have been argued as the primary artifact, suggesting a curated Folsom lithic technology (e.g., Amick 1999:2; Bement 1999:149; Kelly and Todd 1988:237; Wyckoff 1999). Bifacial cores would have been useful for highly mobile people because they were portable, and one could continuously remove flakes from the core for both informal and formal tools (Goodyear 1989:3; Kelly 1988; Parry and Kelly 1988). LeTourneau (2000), however, argues that there is a lack of evidence to support a bifacial core technology during Folsom settlement, but he does agree that Folsom used a curated toolkit composed of a few small bifacial cores and flake blanks. Bamforth (1986:40) has noted (based on ethnographic and archaeological data), though, curation can be present under conditions of either high or low mobility.

Curating artifacts if widely accepted for Folsom behavior, as it is generally argued that reliance on trade would have been risky for highly mobile bison hunters (Hofman 1992:198). In addition, LeTourneau (2000:280) concludes that 66 percent of all Folsom artifacts are made of non-local toolstone, and exchange cannot explain the distribution. Thus, the movement of non-local toolstone from sources ranging from 100 km to 900 km (Tankersley 1989:268-270) is evidence of the long distance movement of Folsom people, and not contact between groups at that distance.

Tracking the movement of toolstone and the degree of rework/reuse has been at the forefront of Folsom mobility models (Amick 1996; Bement 1999; Ellis and Lothrop 1989; Hofman 1992; Holen 2001; see also Montet-White and Holen 1991). These studies often use distance-to-source interpretations, artifact curation, or retooling schedules to identify and interpret Paleoindian mobility. The general focus of these investigations is to identify the direction, scale, and frequency of human movement.

Hofman (1991) for example, discusses the distance from sources of Edwards chert and projectile point rejuvenation relative to Folsom mobility. He concludes that a weak negative relationship exists between the percentage of Edwards chert Folsom points and increasing distance from source, and a strong positive relationship between the percentage of reworked Folsom points made of Edwards and distance from source. In addition, Hofman examines the percentage and distance from source of multiple lithic types used for projectile point manufacture at southern Plains Folsom sites. He suggests Folsom movement was east-to-west and west-to-east between the Llano Estacado and lower Rolling Plains. Movement on the Llano Estacado is

suggested to have occurred from south-to-north. While Hofman's (1991) model addresses the direction of human movement to some degree, it alone cannot accurately account for variation that occurs during the use of a Folsom point due to interaction with the environment (Hofman 1992), or determine the direction of seasonal movements (Bement 1999).

Although the movement of toolstone indicates the possible range of Folsom mobility, the distribution of lithic material alone cannot explain why people would move such long distances when they could occupy areas at or adjacent to those lithic sources that were seemingly very important. Kelly and Todd (1988:235) suggest Paleoindians "made use of the landscape in a short-term and redundant fashion" due to "regionally abundant, but locally unpredictable, game animals coupled with a low density of hunter-gatherer groups." Following this model, then, Folsom hunters would have had to balance their need for toolstone with the seasonal and geographic availability of terrestrial fauna. Because bison were a resource used by Folsom hunters, the decision to move away from a lithic source must have been, in part, due to the availability and location of bison. Other resources or predetermined aggregation locales may also have motivated Folsom hunter-gatherers to move hundreds of kilometers away from a lithic quarry, but the role bison played in shaping such movements is of specific interest here.

A KNOW BISON MODEL NOT A NO BISON MODEL

Folsom hunters used numerous subsistence resources in the past, all contributing some degree to the mobility decisions made. Recent studies of Paleoindian economies have emphasized a generalized subsistence (see Bamforth 1991; Grayson 1988; Meltzer 1993). These discussions are supported by the realization of site recognition, sampling, and preservation biases, as well as arguments indicating the human tolerance of protein is limited (Hofman and Todd 2001:200-201). In addition, Bement (2003) posits that large bison kills with limited butchery and associated ritual during the late summer or early fall is evidence for aggregation, but not total dependence on bison by Folsom groups. Bement's argument implies that a predetermined location was selected, and multiple groups joined to conduct social activities. Consequently, because bison are mobile and unpredictable to exact location (Bamforth 1988; Epp 1988), long distance movement may occur primarily for social reasons.

Bison have been a key resource on the Plains from the late Pleistocene until historic times (Bement and Buehler 1997; Frison 1991). Humans cannot live on meat alone (Speth and Spielmann 1983), but bison can provide enough fat, fluids, vitamins, and technological materials to live for several seasons on a combination of meat, fat, marrow, blood, and rumen content (Todd 1991). So, while specialized hunting may be a rare form of subsistence (e.g., Kornfeld 1996; Meltzer 1993; Pianka 1983:266), it is not entirely out of the question. Is there evidence, though, that specialization did in fact occur during early Paleoindian occupation?

Specialization may be defined as an economy that is “based on the variety and intensity of species used” (Hofman and Todd 2001:201). Amick (1994) reviews the evidence for early Paleoindian subsistence and concludes that while the diet was much broader than previously thought, bison was probably the most used economic resource. Because bison hunters must be adequately prepared, trained, knowledgeable of bison behavior, and technologically capable, they cannot successfully hunt on a whim (Frison 1974, 1987, 2004). Further, knowledge of the location and timing of bison movement, as well as group cooperation becomes even more important during seasons when bison are hunted in large numbers (Hofman and Todd 2001:204).

Determining seasonality is reliant on finding plant and animal remains that, by proxy, provide seasonality. The season of kill is obtained by determining the age at death of the young animals at the site and relating that age to the calving season. The age is determined by a method describing the tooth-eruption sequence and wear pattern derived from modern bison (Reher and Frison 1980; Todd 1991). This technique is generally accurate to a two-month period (Bement 2003). Once the age is determined, it is related to the calving season to obtain the season of death. In the Southern Plains, the bison calving season generally occurs in April (Bement 2003). The season of death is determined by adding the age at death in months to the calving month. An animal determined to be 0.3 years (4 months) old at the time of death would have died in August or September (April plus 4 months).

The numerous large early Paleoindian kills on the southern Plains (see Bement 2003:30) indicate that during the late summer/early fall considerable effort was

invested in hunting bison. While early Paleoindian hunters may have had a generalized economy for some part of the year, archaeological evidence points toward a specialization focused on bison hunting during at least one season. Thus, Paleoindian mobility during at least one season of the year can be attributed to bison herd dynamics. Identifying the geographic location of bison throughout the year, then, becomes important in identifying human settlement on an annual scale.

Based on the foregoing discussion the following problem statement is generated: Assuming Folsom peoples were at least seasonally specialized bison hunters, detailed study of bison behavior and placement will shed light on Folsom mobility and subsistence structure. In this study, kill sites are used because they place people at points on the landscape at particular seasons of the year. The season is determined by the tooth eruption and wear sequence. Only people using Alibates and Edwards chert are considered in an attempt to narrow the number of players. Finally, the elemental analysis results of the bison teeth, and the spatial implications of the element analysis will be used to define patterns of bison/bison hunter organization, timing, and movement on the southern Plains.

ORGANIZATION OF THE STUDY

The following three chapters deal with the relevant Late Pleistocene/Early Holocene environmental proxy data, the techniques for examining where bison traversed at that time, and its application. Chapter 2 provides a paleoenvironmental and cultural historical background to the study. I define the spatial and temporal ranges of Folsom

on the Southern Plains and identify trends in technology, subsistence, and mobility leading up to and during the Folsom Period. In Chapter 3, I give a discussion of the pilot studies used to formulate the current study and provide the methodology for the current study. Chapter 4 presents the analytical results for the trace element analysis on bison tooth enamel using laser ablation techniques.

A case study is presented in Chapter 5 that incorporates the site specific data from known Folsom-age archaeological sites with the location and behavior of bison herds based on the trace element data. The discussion presents the results of the analysis and a model for Folsom mobility. Chapter 6 concludes the discussion.

CHAPTER 2: CLIMATE, GRASSES, BISON, AND HUMANS ON THE U.S. SOUTHERN GREAT PLAINS DURING THE EARLY PALEOINDIAN OCCUPATION (11,900 – 10,200 B.P.)

This chapter evaluates the impact that changing climate, vegetation, and fauna between 11,900 B.P. and 10,200 B.P. ultimately had on human adaptive strategies on the Southern Plains at the onset of the Folsom Period (10,800 B.P.). Climatic conditions are suggested to have shifted from cool and moist to colder and drier around 11,000 B.P. (Haynes 1993 226-232; Holliday 1997:2-4). Vegetation is thought to have shifted from a diverse flora consisting of numerous arboreal and some grass species to a homogenous steppe environment at 11,000 B.P., followed by the expansion of the grassland by around 10,000 B.P. Many terrestrial faunal species between 11,900 B.P. and 10,200 B.P. went extinct (Martin and Klein 1984), homogenizing the Southern Plains. I hypothesize that human adaptive strategies on the Southern Plains shifted from a moderately specialized approach to highly specialized around 11,000 B.P. There is a clear relationship between environmental change and human adaptation on the Southern Plains between 11,900 B.P. and 10,200 B.P. This relationship is the central focus of the current study.

The end of the Wisconsin Glacial Maximum (18,000 B.P.) saw a warming trend and rapid deglaciation in many parts of the world. The environmental conditions leading up to and including the Younger Dryas (YD) climatic event (11,900 – 11,000 B.P.) were highly variable, permitting the extinction of 33 genera of mammals (Martin and Klein 1984), and the complete colonization of the New World (Guthrie 1984).

Between 11,000 B.P. and 10,200 B.P. the YD brought with it a return to colder conditions. The effects of the gradual warming at the end of the Wisconsin Glacial Maximum, followed by the abrupt onset of the YD, had on the temperature, precipitation, flora, fauna, and human adaptive strategies on the Southern Plains is discussed below.

PROXY DATA

Sites on the Southern Plains from which data could be acquired are presented in **Figure 2.1**. The sedimentologic, pollen, and isotope data derived from each of these sites is discussed in detail below.

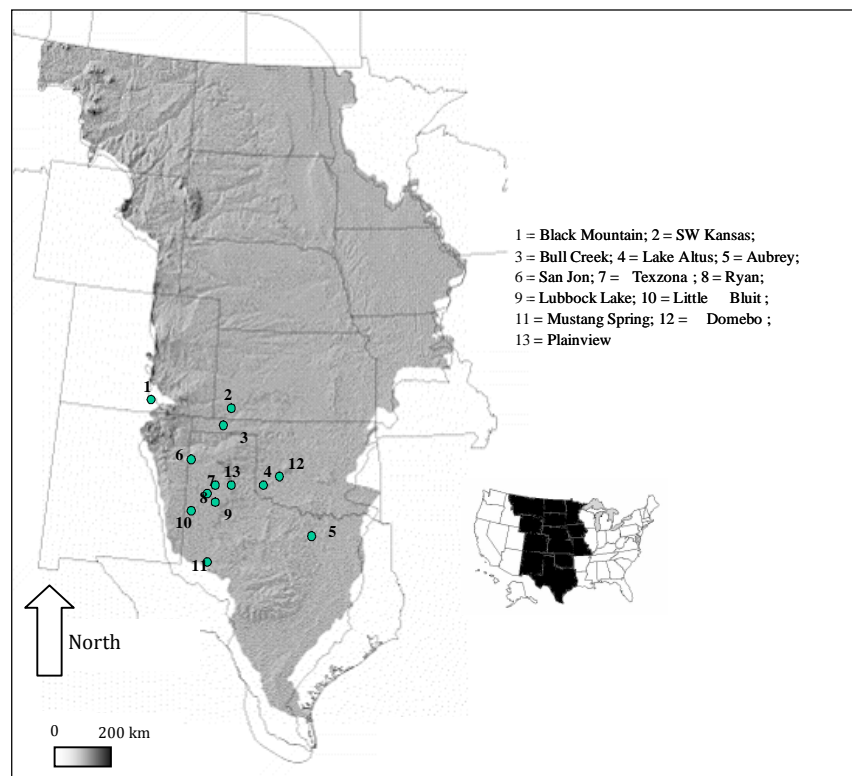


Figure 2.1 Southern Great Plains archaeological sites discussed in Chapter 2.

SEDIMENTOLOGY

Depositional history data of the Southern Plains has largely been derived from the Llano Estacado in the Texas Panhandle. Draws and sand dunes have received the most attention and have provided evidence of environmental change during the latest Pleistocene and early Holocene (Holliday 2000:2). Late Quaternary fill in the draws (after 12,000 B.P.) indicate a shift from flowing water to standing water and then the accumulation of eolian sediment (**Figure 2.2**; Holliday 1995:29-45,1997:52). The contact between alluvial and lacustrine sedimentation is well dated for the Southern Plains at around 11,000 B.P. and was followed quickly by palustrine conditions between 10,500 and 9,000 B.P. (Haynes 1993 226-232; Holliday 1997:2-4). Identifying moisture regimes during the late Pleistocene and early Holocene are the primary focus of research in the draws.

More recently, extensive investigations at Bull Creek (Bement and Carter 2005; Carter and Bement 2004) have provided environmental data along the High Plains – Great Plains Border (Bement et al. 2007). The deposits at Bull Creek mirror trends observed for the Llano Estacado. Short-term deposits of wind-blown silts, indicating a brief drying episode, are known to have accumulated no later than 11,070 B.P., just before returning to alluvial/colluvial deposition of sands, indicating a wetter period by 10,850 B.P. (Bement et al. 2007:42). By 10,400 B.P. stable soils had formed at the Bull Creek site (Bement et al. 2007:42).

Holliday (1997:12) describes the lunettes on the Southern High Plains as localized accumulations of eolian sediment deflated from playas in the Late Pleistocene. These lunettes are located on the northeast, east, and southeast sides of playas. Dunes have also been examined to describe the amounts of late Quaternary precipitation because dune activity is generally associated with drier conditions. Early Holocene-aged dune fields formed on the High Plains and likely originated from the Pecos Valley, west and northwest of the Llano Estacado (Holliday 1997:12). The orientation and sedimentation of lunettes and dunes on the Southern High Plains indicate a multidirectional wind pattern, with lunettes forming during the winter when playas are dry, and dune fields reflecting dominant northwest-to-southeast winds of the earliest Holocene (Carlisle and Marrs 1982).

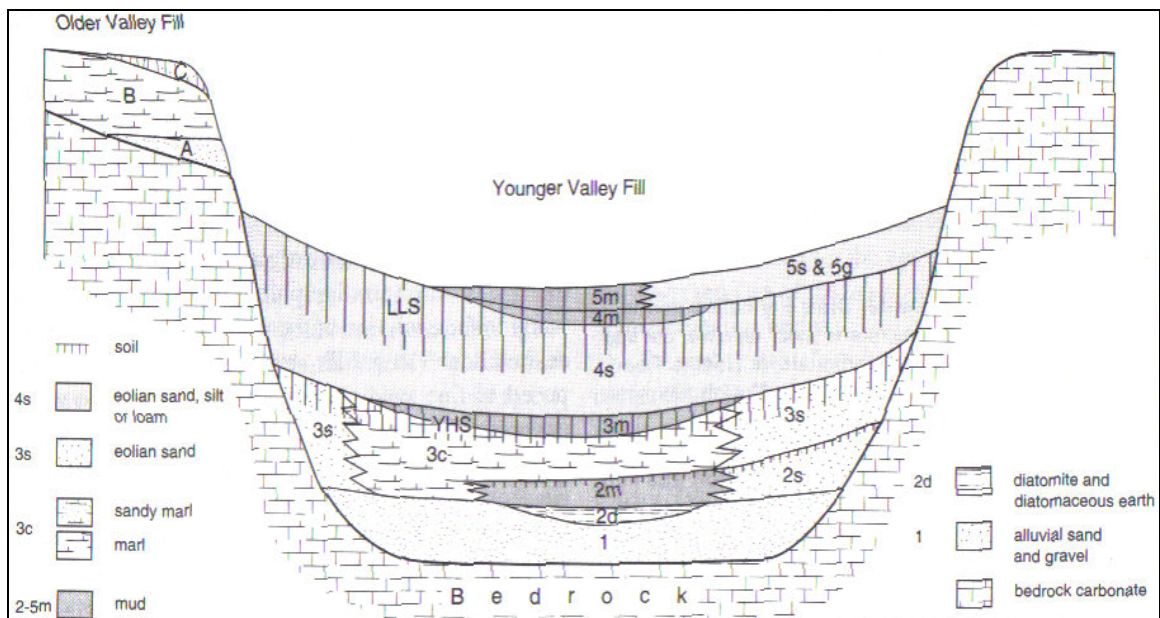


Figure 2.2 Generalized stratigraphic profile of the Southern Plains draws (from Holliday 1995:14).

POLLEN

Pollen data for the Southern Plains is derived from Bull Creek (Oklahoma), Black Mountain (Colorado), and Domebo (Oklahoma) (**Table 2.1**). Pollen records from the Bull Creek locality in the Oklahoma panhandle indicate a change from a landscape supporting an open mesic sage scrubland mixed with hardwoods and an understory of mixed grasses and shrubs prior to 11,000 B.P., to one containing more oaks and grassy meadows (Bement et al. 2007:48). By 10,850 B.P., open grasslands dominate the landscape at the Bull Creek locality (Bement et al. 2007:48). Arboreal pollen from the Black Mountain site in south-central Colorado increases from 32 percent to 45 percent between 11,600 B.P. and 11,000 B.P. After 11,000 B.P. total arboreal pollen percentages decline from 45 percent to 30 percent (Jodry 1999:31). At this time grass pollen (*Poaceae*) increases slightly from 5 percent to 10 percent. Limited pollen data from the Domebo site indicates a shift in the grassland composition from 44 percent *Poaceae* at 11,045 B.P. to 66 percent at 10,123 B.P. (Leonhardy 1966:47). *Poaceae* is likely overrepresented in the Domebo sample, but the data seemingly indicates a shift in the vegetation composition of the locality over time.

Table 2.1 Pollen percentages from Southern Plains localities.

Bull Creek	¹⁴ C yr B.P.	Poaceae	Arboreal	Cheno-Am	Artemisia
	7,660	5%	5%	40%	15%
	10,400	30%	10%	15%	1%
	11,070	10%	30%	10%	1%
Black Mtn					
	10,140	10%	30%	2%	40%
	11,000	5%	45%	5%	30%
Domebo					
	10,123	66%	?	2%	?
	11,045	44%	?	5%	?

ISOTOPES

Isotope data for this study is derived from numerous sites on the Southern Plains, and are determined from organic carbon (**Table 2.2**). Carbon isotope ratios from Bull Creek, southwest Kansas, and Lake Altus indicate an abrupt shift to cooler (-8°C) temperatures at 11,000 B.P. followed by a continued warming trend (Bement et al. 2007:44). Isotopes from Black Mountain (Jodry 1999:28), Plainview (Holliday 1995:56), and Southern High Plains lunettes and playas (Holliday 2000:4) are also lower prior to 11,000 B.P. and higher after 11,000 B.P. Isotope signatures from Aubrey (Humphrey and Ferring 1994:205), Mustang Springs, and Lubbock Lake Landfill (Holliday 1997:80 Figure 5.3), however, are higher before 11,000 B.P. and lower after 11,000 B.P.

Table 2.2 $\delta^{13}\text{C}\%$ from Southern Plains localities.

^{14}C yr B.P.	Bull Creek	SW Kansas	Lake Altus	Aubrey	Ryan	San Jon	Texzona	Little Bluit	Black Mtn	Mustang	Lubbock	Plainview	lunettes	playas
9,850	-17.5													
10,350	-20													
10,400	-20.4													
10,850	-22.1													
11,070	-19.7													
9,730		-18.9												
13,200		-19.5												
9,660			-17.4											
10,200			-20.4											
8,210				-18.5										
10,750				-18.9										
11,475				-18.6										
12,650				-17										
10,650					-16.2									
11,450						-27.3								
11,670							-14.2							
10,660								-10.5						
10,350									-26.8					
11,640									-30					
9,500										-22				
10,075										-21				
9,000											-20			
10,250											-20			
10,500											-16.5			
8,860												-16.4		
10,940												-17.9		
11,970												-19.2		
10,750													-10	-15
11,250													-15	-27

PRE-YOUNGER DRYAS

Climate change between 11,900 B.P. and 10,200 B.P. clearly restructured vegetation communities on the Southern Plains. A review of the data presented above indicates that an abrupt switch from moist to dry conditions occurred around 11,000 B.P. based on pedology. In addition, dune orientation and deposition reflect dominate northwest winds throughout the Pleistocene/Holocene transition with strong winter southerly and easterly winds when lunettes are accreting.

GRASSLANDS

Limited pollen data indicate a dominant presence of arboreal pollen with some grass pollen prior to 11,000 B.P., and Poaceae pollen dominance on the Southern Plains by around 10,500 B.P. Stable carbon isotopes show relative stability between 11,900 and the onset of the YD followed by an increase around 10,500 B.P.

The pre-YD climate on the Southern Plains has long been described as cool and moist (Graham 1987; Sellards 1952:152). Southern Plains sedimentology, to date, indicates higher annual precipitation before and lower precipitation after 11,000 B.P. The stratigraphic abruptness described by Haynes (1984:345) and Holliday (1997:2-4) at 11,000 B.P. indicates a significant climate change whereby pre-YD precipitation was much higher than that of the YD.

Dune field orientation and deposition corroborate this evidence. During the Late Pleistocene northwest winds were accompanied by southerly and easterly winds causing a cool (more so than present), moist climate with less seasonal variation. Lunettes during this time were likely stable (Holliday 1985), indicating the presence of playa water year-round. The insolation increase on the Southern Plains during warmer months between 11,900 B.P. and 11,000 B.P. was seemingly accompanied by strong northwest (or weaker southeast) winds causing cool summers (**Figure 2.3**). During the winter, weaker northwest (or stronger southeast) winds dominate and produce storm track precipitation (see also Kutzbach and Webb 1993:9) keeping the draws and playas wet (**Figure 2.4**).

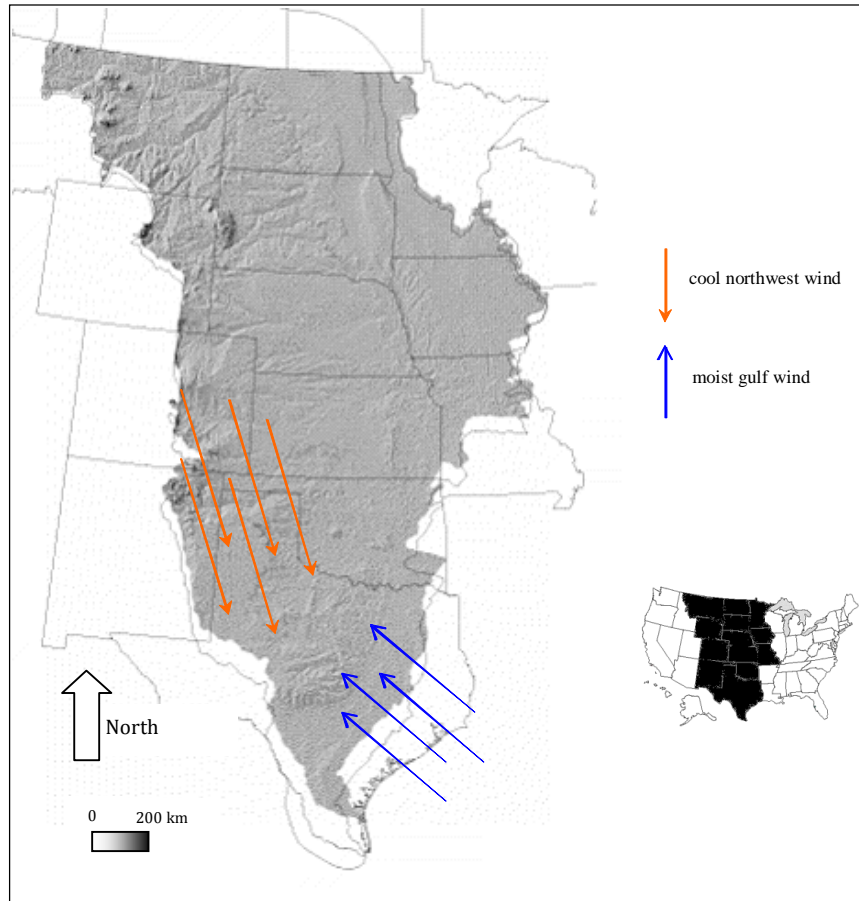


Figure 2.3 Generalized summer wind patterns on the Southern Plains between 11,900 and 11,000 B.P.

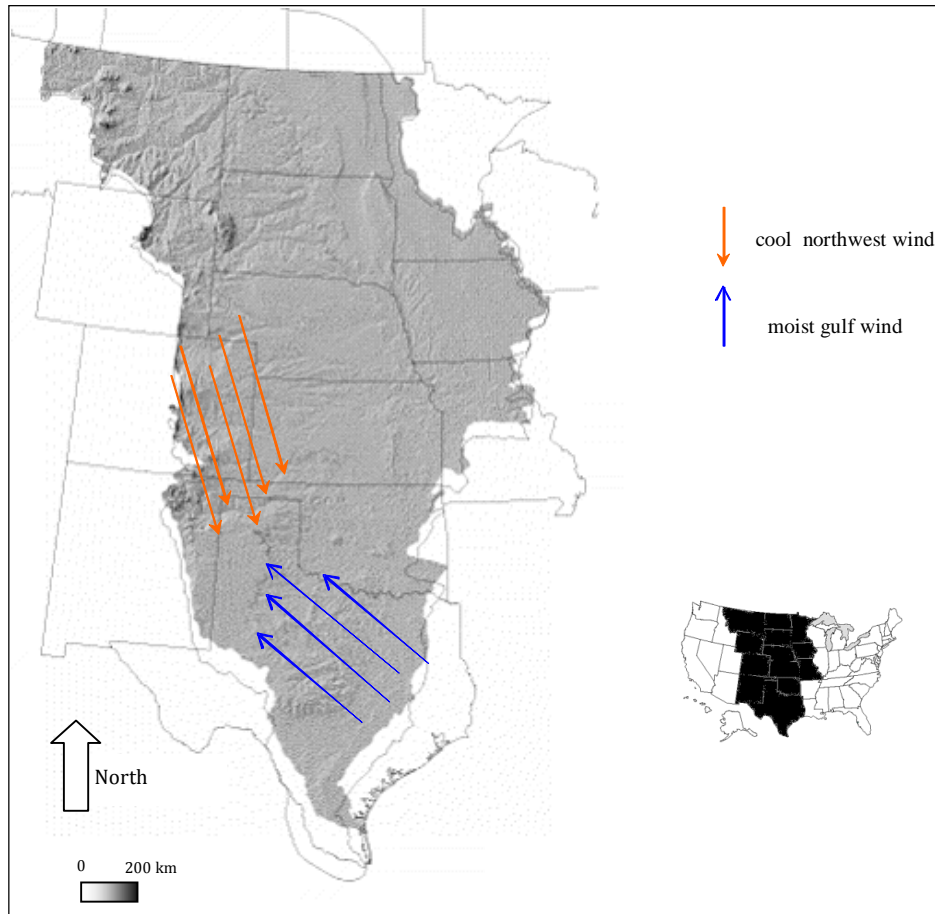


Figure 2.4 Generalized winter wind patterns on the Southern Plains between 11,900 and 11,000 B.P.

In addition to cool, moist, and less seasonal climates, the vegetation between 11,900 B.P. and 11,000 B.P. was composed of higher percentages of arboreal species and a moderate amount of grassland cover on the Southern Plains. Further, stable carbon isotopes show a dominance of C3 plants and trees (plants = -22 to -24; trees -24 to -28) near lakes, and a mix of C3 and C4 (-9 to -17) plants during this time. The data correspond to the climatic reconstruction presented above because C3 species have been shown to thrive under cool, moist conditions (see Epstein et al. 1997; Risser

1985; Tieszen et al. 1997), and prefer winter precipitation (Paruelo and Lauenroth 1996).

FAUNA

The temperature and precipitation regime of the pre-YD environment promoted greater diversity and a wider dispersal of vegetation patches and thus supported a diverse fauna (FAUNMAP Working Group 1996). However, between 11,900 and 10,200 B.P. numerous species went extinct, but the bison (and several Cervids) did not (**Figure 2.5**). The longer growth season (as a result of cool, moist climates) before 11,000 B.P. favored higher diversity of plant, and therefore animal species. Most large herbivores made use of a broad range of habitats within a near homogenous landscape (Guthrie 1984:267). Bison during the Late Pleistocene were larger than extant bison (Frison 1991; McDonald 1981), and the herd size and range of bison presumably was not as extensive as later in time (FAUNMAP Working Group 1996). Less seasonality and more evenly distributed annual precipitation promoted short-lived C4 summer and winter forage. Winter precipitation encouraged the growth of C3 grasses that are important to providing enough nutrients to nursing cows in the spring (Peden et al. 1974:494). Bison herd populations were likely restricted due to small, but widely dispersed grassland regions (Chambers 1998).

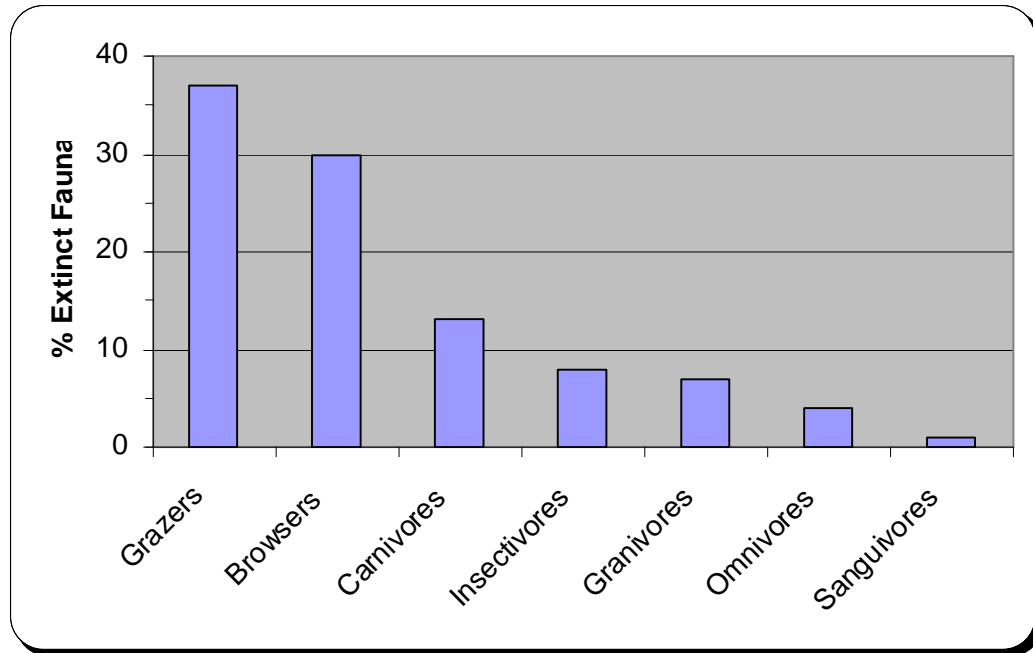


Figure 2.5 Comparative percentages of extinct mammals by trophic class (data from Graham and Lundelius 1984:235).

POST-YOUNGER DRYAS (11,000 – 10,200 B.P.)

GRASSLANDS

The Post-YD period has long been described as a dry period accompanied by the extension of the grassland (see Borchert 1950:36). This assertion is supported by ongoing pedologic analyses. More recently, the YD event itself (11,000 B.P.) has been characterized as a brief return to glacial-age temperatures (Rooth 1982). Lunettes during the YD were accreting (Holliday 1995), and dune field activity indicate sustained northwest winds causing a cooler and drier annual climate (compared with the Late Pleistocene) on the Southern Plains (**Figure 2.6**).

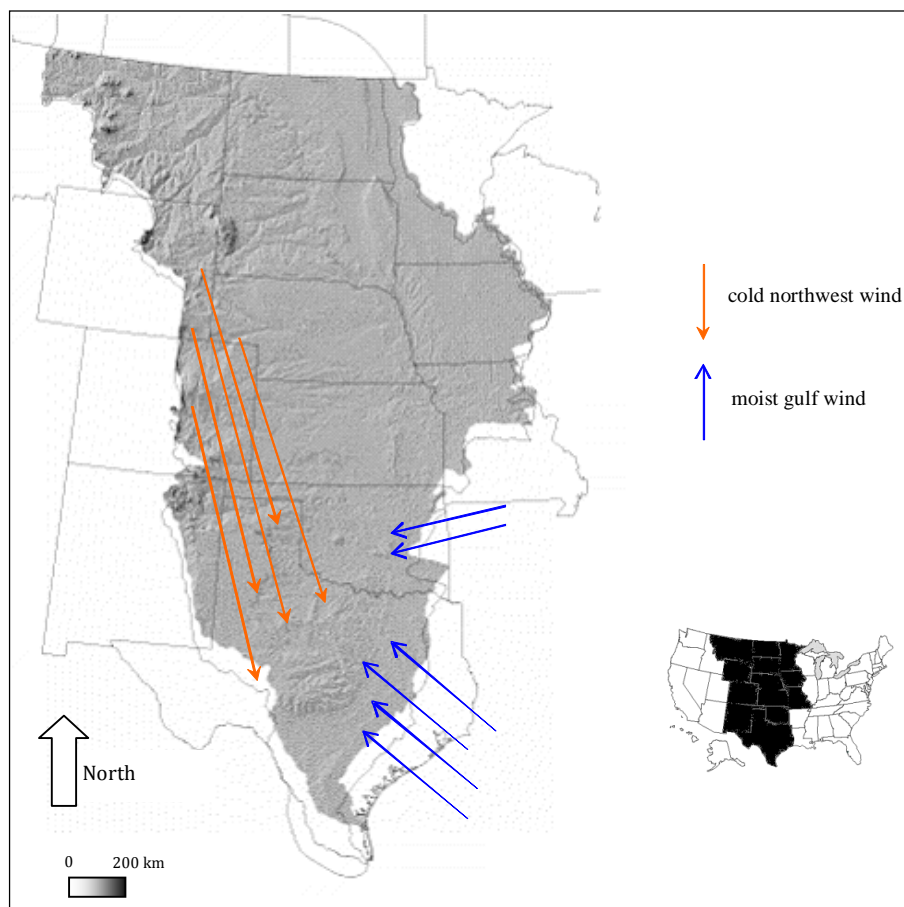


Figure 2.6 Generalized Younger Dryas wind patterns on the Southern Plains.

Pollen data for the Southern Plains during the YD event indicate a dramatic decrease in the percentage of arboreal pollen and an increase of grass pollen (see also Axelrod 1985:181). Under cold and dry conditions, the data presented here show that many C3 trees were unable to compete with the C3 and C4 species creating a steppe environment composed of grasses, composites, chenopods, and some woody plants (Bement et al. 2007; Guthrie 1984:266; Jodry 1999:31). Some playa sites observed in this study do not indicate an increase in carbon isotope ratios, signifying little change in vegetation. Presumably, the Aubrey and Mustang Spring locales remained wet

year-round during the YD. Overall, though, floral species diversity was decreased (primarily a decrease of many mesic species) as a result of decreased precipitation (Axelrod 1985:181) and shorter growth seasons (Guthrie 1984:282) on the Southern Plains following the YD.

FAUNA

Drying after the YD event encouraged the expansion of the grassland community and homogeneity in flora and terrestrial fauna on the Southern Plains. The warming and drying trend after the YD no doubt had lasting effects on bison herds that had adapted to the grasslands during the Late Pleistocene. The expansion of herds was likely due to bison occupying a number of ecological niches opened after the full extinction of other herbivore species (Graham and Lundelius 1984), as well as the homogenous expansion of grasslands across the Great Plains (Chambers 1998). In addition, seasonal food availability in different locations may have led to a more structured movement of bison herds (Bement 1999). Bamforth (1988) and Epp (1988) suggest modern bison are seasonally predictable in range location, but unpredictable in exact location. Similarly structured bison migration and wandering is suggested to have occurred in the past (see Chisolm et al. 1986), and paleontological archaeological data indicate that bison grazed in specific regions (FAUNMAP Working Group 1996).

Extinctions continued following the YD event and it was at this time that bison populations increased compared to that of other terrestrial species. After 11,000 B.P., the increased summer solar radiation and the winter arctic fronts amplified seasonal

temperatures (Broecker et al. 1988). Increased seasonality coupled with decreased precipitation caused a shift to shorter growing seasons and greater biotic zonation. The Post-YD climate favored *Bison antiquus* over a number of large herbivores that went extinct for reasons discussed below:

- 1) Bison are better adapted to grazing a specific habitat and less selectively graze the dominant grasses on a landscape (Hartnett et al. 1997:79; Knapp et al. 1999:41; Peden et al. 1974:495; Reynolds et al. 1982:986) than other herbivores. The cold, dry climate of the YD decreased floral diversity creating a steppe environment that was lacking the nutrients needed to carry a diverse fauna. Bison's four-chamber digestive track is adapted to rendering nutrients from low grade graze.
- 2) Bison have shorter gestation periods and higher protein milk than the herbivores that went extinct. Guthrie (1984:283) proposes that herbivores having gestation periods greater than nine months and milk protein less than 4 percent went extinct. These two factors are used to describe conservative ungulate life strategies. More conservative life histories (gestation > 9 months, milk protein < 4 percent) do not do well in short growing seasons because of their "inability to capitalize on a short nutrient flush" (Guthrie 1984:283). The less conservative strategy employed by bison allowed the species to take advantage of seasonal abundances of

vegetation rather than requiring high quality forage throughout the year.

Whether or not these are the two driving factors for the success of bison during the YD, the fossil record indicates the extinction of many herbivores and the increase in bison population on the Southern Plains (FAUNMAP Working Group 1996). Biological and behavioral adaptive strategies likely contributed to bison survival. The increase in bison population on the Southern Plains no doubt had lasting effects on the smaller fauna, as well as predators still present in the region.

SOUTHERN PLAINS FOLSOM SUBSISTENCE

As a predator, Early Holocene hunter-gatherers presumably had a generalized terrestrial fauna-based hunting strategy throughout the period between 11,900 and 10,200 B.P. (Kelly and Todd 1988). Oftentimes, these early hunter-gatherers are termed big-game hunting specialists (see Amick 1994; Waguespack and Surovell 2003). Archaeological evidence supports this assertion on the Southern Plains. Mammoth, horse, camel, and bison are all known to have been frequently procured on the Southern Plains (e.g., Johnson 1991:222). Highly specialized hunting would involve the acquisition of a single species, while less specialized procurement focus on a variety of resources. The following paragraphs will describe the adaptive strategies made by humans before and after 11,000 B.P. as a result of changing climate, flora, and fauna.

One may only assume that predators would have a number of animal species to prey upon, based on the evidence presented earlier (that cool, moist climates supported diverse flora and fauna),. The human predators between 11,900 B.P. and 11,000 B.P. on the Southern Plains seemingly favored several large herbivores. The stone tool technology and faunal procurement strategies attest to a moderate degree of efficiency, if not specialization, by these individuals.

Pre-YD peoples (Clovis) employed a stone tool technology composed of high quality raw material, cores, blades, bifaces, and caches (Collins 1999). The distribution of raw material during this time across the Southern Plains suggests high mobility (Holen 2001). However, caches seem to indicate more predictable subsistence rounds whereby groups would return to an area and collect stored blades and bifaces (Collins 1999:30). Collins (1999:14) has also described the Clovis tool kit as utilitarian. Comparatively, the pre-YD tool kit was more extensive and probably limited mobility more so than during the YD. Add other tools such as bone and ivory, and one has even more to carry.

Faunal procurement on the Southern Plains usually was diverse pre-YD, when kill and campsites are composed of several species of large herbivores, mammoth generally having the highest NISP and MNI (Agenbroad 1984). In addition to mammoth, humans are known to have hunted horse, camel, giant bear, giant armadillo, and bison on the Southern Plains (Johnson 1991:222). Small mammals are rarely discovered and aquatic species are absent from Clovis assemblages further suggesting a moderately specialized subsistence.

The data presented in this chapter characterizes the YD as a period of decreased temperatures and precipitation. The climate favored competitive C3 and C4 species, and hurt mesic tree populations on the Southern Plains. Bison (and some Cervids) were able to survive the abrupt climate and floral change due to biological and behavioral characteristics not found in many Late Pleistocene grazers and browsers that went extinct. During the YD, human groups on the Southern Plains had the choice of either migrating to adjacent areas with more diverse flora and fauna, or staying on the Plains and intensifying use of the fewer available resources. Based on the stone tool technology and subsistence practices on the Southern Plains during the YD, it appears that some groups stayed and intensified.

YD peoples (Folsom) on the Southern Plains used high quality raw material, like their predecessors, to make tools. The tool kit changed, however, consisting of versatile bifacial cores and highly specialized dart points (Collins 1999; Wyckoff 1999). Such technology is thought to have encouraged high mobility and allowed unpredictable treks across the landscape. In addition, Folsom dart points during the YD, unless lost, could be easily rejuvenated and used multiple times.

Most Folsom sites on the Southern Plains are kill locations. The YD period on the Southern Plains is the first time in the New World that we begin to observe the specific targeting of large herds of animals. Prehistoric bison procurement developed within a context of short grass prairie ecology, bison demographics, and human technological and subsistence organization (Bamforth 1985; Binford 1980; Bonnischsen et al. 1987; Cassells 1983; Collins 1999; Hofman 1991, 1992; Hofman

and Todd 2001; Holen 2001; Hughes 1977; Johnson 1987; Kelly 1983; Kelly and Todd 1988; Reher and Frison 1980; Roberts 1936; Sellards 1952). Bison kill sites are a common site type on the Great Plains of North America (Dibble and Lorrain 1968; Davis and Wilson 1978; Bement 1986, 1994, 1997, 1999; Bement and Buehler 1994, 1997; Speth 1983; Hill and Hofman 1997; Hofman et al. 1991; Frison 1970, 1974, 1987, 1991, 1996, 2004; Frison and Todd 1987; Johnson 1997; Reeves 1978; Stanford 1978, 1984; Todd 1987a; Verbicky-Todd 1984; Wheat 1967, 1972, 1978). Reasons for conducting these kills include 1) the acquisition of a storable food source to supplement periods of perceived food shortages, such as overwintering; 2) the quick procurement of a sufficient food supply to meet the needs of a large, short-term aggregation of people such as seen at multiple band aggregations for ceremonial or social purposes (Bement 1999; Fawcett 1987; Verbicky-Todd 1984; and 3) to take advantage of a highly mobile food resource as it is available during herd migration through an area (Driver 1990). These various reasons are not necessarily mutually exclusive.

The processing of bison kills varies according to transport and subsistence decisions in answering basic questions such as: is the meat meant for immediate consumption or to be processed for storage; are the animal products to be transported long distances to the habitation site, or are the people going to move their camp to the area of the kill (Binford 1978, 1980); and, is a processing camp necessary before the products are transported to the habitation site? Models have been proposed that deal with ancient hunter-gatherer mobility strategies, settlement patterns, and non-bison resource exploitation. Among these are Kelly and Todd's (1988) model of

Paleoindian mobility strategy, Hofman's (1990, 1991, 1992, 1999) proposed Folsom mobility as reconstructed by lithic sourcing, and Bamforth's (1985) subsistence model on small kills (see Chapter 1 for descriptions of each). Following the steps of the earliest cultural ecologists many of these models examine subsistence technology in an effort to understand mobility, and therefore how humans organize themselves in relation to the environment. A better approach may be to first understand how the environment is structured.

CONCLUSIONS

Clovis and Folsom subsistence is generally based on a behavioral ecological construct that assumes the environment plays a large role in conditioning past and present hunter-gatherers. As evidenced by paleoecological and archaeological data, the environment between 11,900 B.P. and 10,200 B.P. encouraged Clovis on the Southern Plains to move frequently but predictably, and hunt a number of large terrestrial species of animals. Folsom on the Southern Plains while able to retain high mobility and a big-game focus, were forced to move more erratically, and hunt one of the only large herbivores left in the region as a result of the YD climate. These inferences are by no means an attempt at explaining all of the characteristics of the Clovis and Folsom "cultural complexes." Latitudinal, longitudinal, and elevation differences no doubt alter the adaptive strategies of Clovis and Folsom groups. The inferences made from one geographic region should not be expected to be the same in areas where climate, vegetation, and fauna are different, even if the variation is seemingly minor.

This chapter has identified the current thinking regarding adaptive strategies based entirely upon environmental change. Alternative or supplementary explanations certainly exist for Early Holocene culture change that go unforeseen today by the archaeologist. The concurrence of climatic, floral, faunal, and human alteration at 11,000 B.P., however, is not likely a simple coincidence. Furthermore, I am not proposing a large-scale restructuring of human subsistence strategies on the Southern Plains at the onset of the YD climatic event. Clovis and Folsom peoples on the Southern Plains were both highly mobile hunters of large terrestrial fauna. The YD event simply decreased the amounts and kinds of terrestrial fauna available to hunters possibly requiring Folsom to more intensively specialize on the remaining species.

The archaeological record presents bison as a prime candidate for this study because human adaptive strategies on the Southern Plains shifted from a moderately specialized approach to highly specialized bison hunting around 11,000 B.P. The following chapter describes a technique of extracting dietary data from bison tooth enamel to understand the relationships between bison movement and Folsom strategies for harvesting bison.

CHAPTER 3: THE ISOTOPIC AND ELEMENTAL ARCHAEOLOGICAL RECORD: PILOT STUDIES AND METHODS FOR GETTING THERE

Isotopic research indicates that intra-tooth sequential sampling is an effective method for reconstructing the dietary history of animals (Balasse 2002; Fricke and O’Niel 1996; Gadbury et al. 2000; Sharp and Cerling 1998; Wiedemann et al. 1999), and the composition of isotopes in skeletal remains can measure the geographic mobility of animals (Beard and Johnson 2000). Recent studies conducted at the University of Oklahoma and the University of Texas indicate that trace element analysis of teeth by electron beam and LA-ICP/MS methods also is appropriate for examining animal movement. These preliminary studies have shown that the dietary uptake of *Bison bison* and *Bison antiquus* may be directly related to the elemental concentration of the associated bedrock geology. Because modern bison are restricted residential herds, the isotopes and elements in modern bison teeth provide a map from which *Bison antiquus* herd movement may be reconstructed. Kill sites are nodes on the landscape where humans and bison interacted. Based on bison tooth eruption and wear schedules we can determine the season of such interactions. The toolstone used to make the projectile points found at kill sites identifies the region or territory of the hunters. The proposed study will reveal the dimension of hunting structure reflected in the use of migratory or resident bison herds to understand seasonal variability in human/bison interactions.

Bison, the target of the ancient hunters, provide the key to understanding the mobility and timing aspects of hunting groups on a seasonal scale. The examination of elemental compositions of soils, plants, and water across a region would require years of sample collection and testing and would cost several hundreds of thousands of dollars. This same information can be obtained by analyzing modern bison teeth from individuals raised in different areas of the Southern Plains. The widespread raising of bison over the last decade presents numerous samples from all regions. The teeth of modern bison provide a short cut in determining the differential distribution of trace elements around the Southern Plains. In much the way bison serve as proxies for establishing the seasonality of the kills through the study of the eruption and wear patterns on bison dentitions (Frison and Reher 1970), so too might these same dentitions provide the data to track bison movements across the plains. Mature bison tooth enamel is almost entirely composed of hydroxylapatite, a crystalline compound predominately of calcium and phosphate with the general formula: $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$. Enamel consists of isotopes and trace elements that are incorporated into the matrix during mineralization (Schneider and Blakeslee 1990). The trace element content in teeth and bone can be correlated with the trace element content of associated soils, plants, and water (**Figure 3.1**; Harper and Reed 1964). Because the enamel in this study is not remodeled once formed and not appreciably altered by diagenesis (Molleson 1988), the elemental composition reflects that of the diet, and by inference, the region inhabited during enamel mineralization.

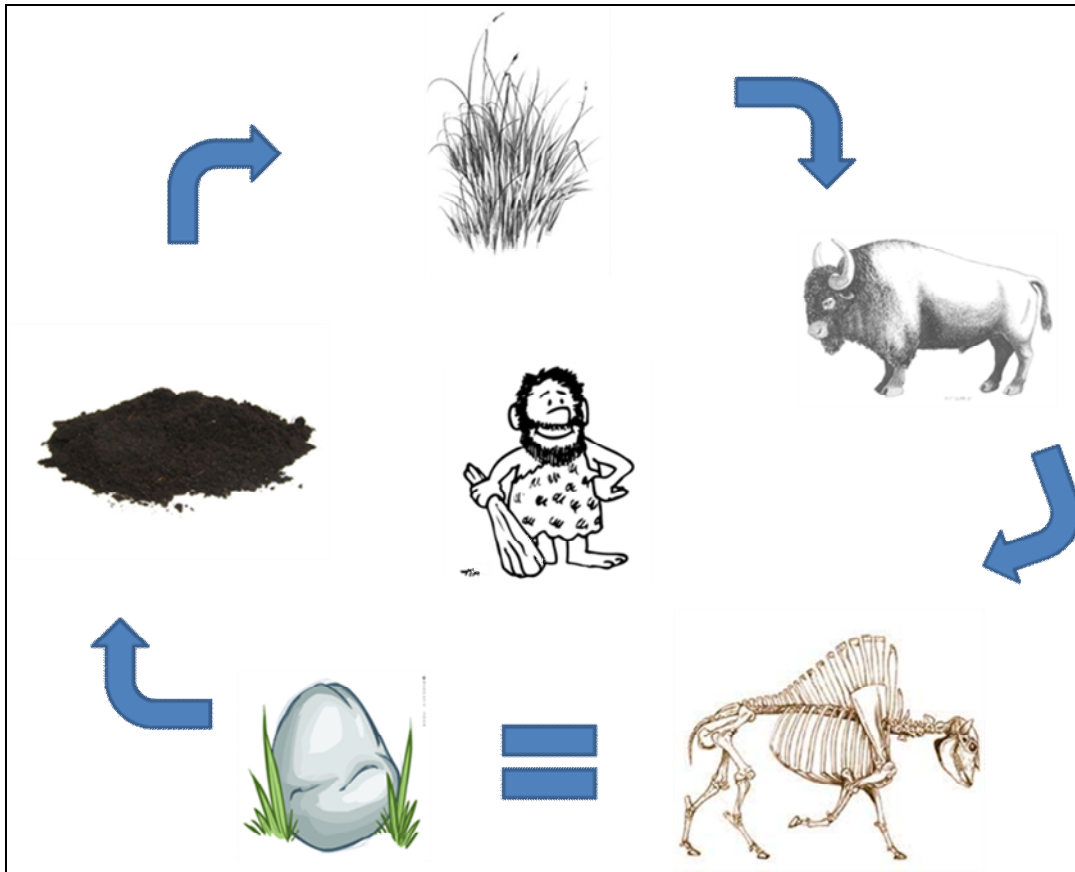


Figure 3.1 The movement of trace elements through the biogeosphere. Minerals move from their geological source into soil, plants and animals and retain elemental concentrations and isotope ratios that reflect, but may not be exactly the same as, the source rocks. This provides a mechanism for linking bison to the region where they obtained their food.

The formation and mineralization of enamel (amelogenesis) is a complex process (Balasse 2002:156-157) that generally begins at the occlusal surface of the tooth and proceeds downward to the cementum-enamel junction (CEJ). This results in a down-tooth record of changing isotopic and elemental concentrations driven by dietary uptake (**Figure 3.2**). Most teeth in the bison dentary form prior to weaning. Only the mandibular fourth premolar (P4) and third molar (M3) undergo amelogenesis during

the third year of life (**Figure 3.3**). At this age, the elements for enamel production are obtained through ingestion of plants, soil on the plants, and water, rather than through the biofilter that produces mother's milk. These trace elements and stable isotopes reflect the compositions of the soil, grasses, and water where the bison grazed during the period of amelogenesis. Once initiated, enamel placement takes approximately 300 days and begins at the top of the tooth and progresses towards the root. Samples taken down the tooth at 5mm intervals would analyze enamel content at roughly 60 day (2 month) intervals. If distinct regions of the Plains contain specific suites of trace elements and grassland compositions, then analyzing the elements and isotopes in the tooth enamel would provide a geographical link. By comparing the elements in bison teeth obtained from kill sites with the geographical distribution of these elements, I will determine if the bison were resident and were killed in the area where amelogenesis occurred, or were migrant and were killed in an area different from that where amelogenesis occurred.

A hypothetical model may best describe how the proposed study will work. Three basic theoretical cells describe the proportional relationship between any two trace elements within a region. These are: element A occurs in greater amounts than element B; element A occurs in lesser amounts than element B; element A and B are equal. Additional relationships that modify the basic relationships include: The environment is depleted in both elements A and B or the area is enriched in both elements A and B. The regional diversity found in the soils, bedrock, water, and plant life indicate the Southern Plains contains subregions reflecting each of these element relationships. The hypothetical model describing the relationship of bison enamel

element and isotopic composition found at a kill site and the geographical distribution of those elements across the Southern Plains is provided in **Figure 3.4**.

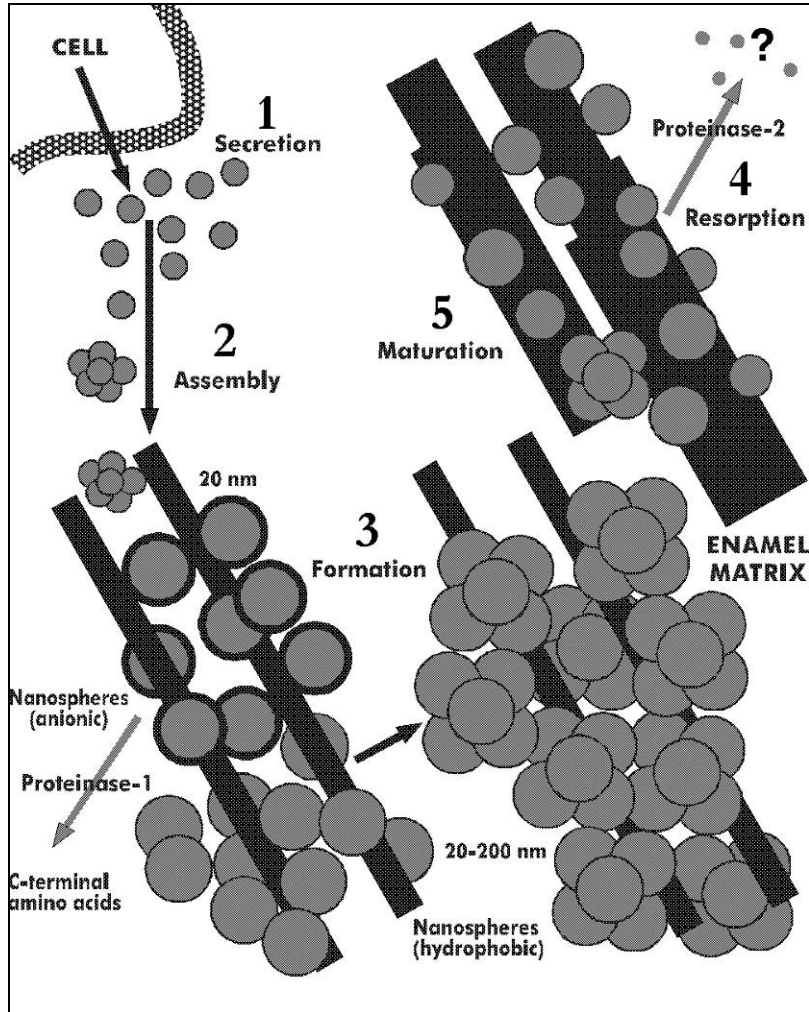


Figure 3.2 Schematic diagram of enamel biomineralization. Note that at the formation stage (stage 3) enamel is only lightly mineralized. Full mineralization (expansion of crystallites) only occurs during the maturation stage (stage 5). Redrawn from Fincham et al. 1999.



Figure 3.3 Three year old bison mandible showing full enamel placement of an unerupted P4 premolar.

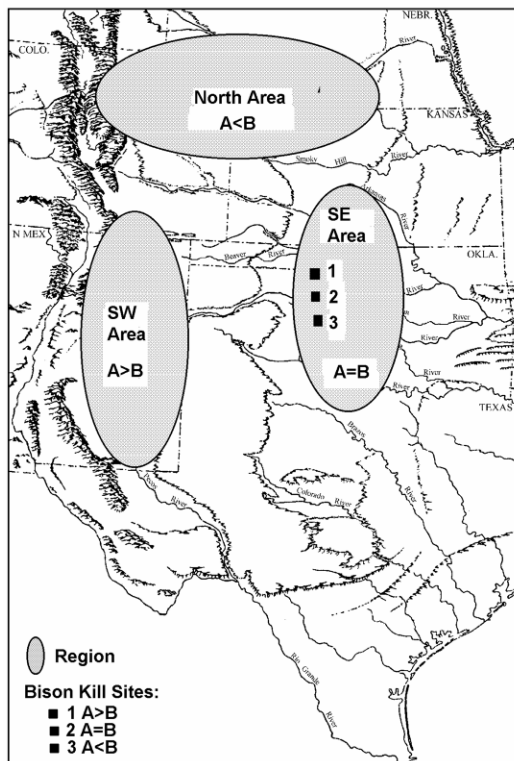


Figure 3.4 Hypothetical model of the distribution of two elements (A and B) in three regions of the Southern Plains and three bison kill site locations with different element compositions.

The hypothetical Kill Site 1 tooth analysis revealed the element relationship of $A > B$, indicating the bison was in the SW area during tooth enamel amelogenesis, and that it had moved into the SE area. Kill site 2 enamel contained equal amounts of elements A and B which is also the pattern in the area containing the kill site. Thus, site 2 contains local or resident animals. Site 3 enamel contained element A in lesser quantities than B and thus that animal had moved southward from the north area. Sampling of different layers on the tooth over the course of enamel amelogenesis provides a way to track the movement of bison across multiple regions. For example, if measurements are taken at increments down the tooth enamel and the results were: Increment 1 $A = B$, 2 $A < B$, 3 $A > B$, and 4 $A = B$, then this would indicate the animal had traversed the plains in counter-clockwise direction beginning and ending in the SE area during the period of enamel amelogenesis (approximately 1 year).

THE ELECTRON MICROBEAM PILOT STUDY

Following the hypothetical model, Graves, Bement and Morgan (2003) set out to determine the elemental composition of the P4 enamel by employing the electron microprobe. An advantage of the microprobe is that the tooth did not need to be divided into samples but instead strips of the enamel and root could be analyzed in increments from top to bottom. In 1998, microbeam analysis was performed on two modern bison teeth from Garden City, Kansas, two modern bison from Lawton, Oklahoma, and two ancient bison from the Cooper site, Oklahoma (**Figure 3.5**). Two mandibular P4 premolars were extracted from one individual from Kansas (K1-1, K1-2), and one mandibular P4 was taken from a second Kansas individual (K2), two

Lawton individuals (W1, W2), and two Cooper site bison (CM, CL). From each tooth a section of enamel approximately 0.5 cm in width was cut, using a Dremmel wafering saw, from the occlusal surface of the tooth down to the CEJ. The Kansas samples were placed in an epoxy, and the Oklahoma samples were embedded in thermoplastic. The difference in these mounting types is not known to alter quantitative chemical analyses.

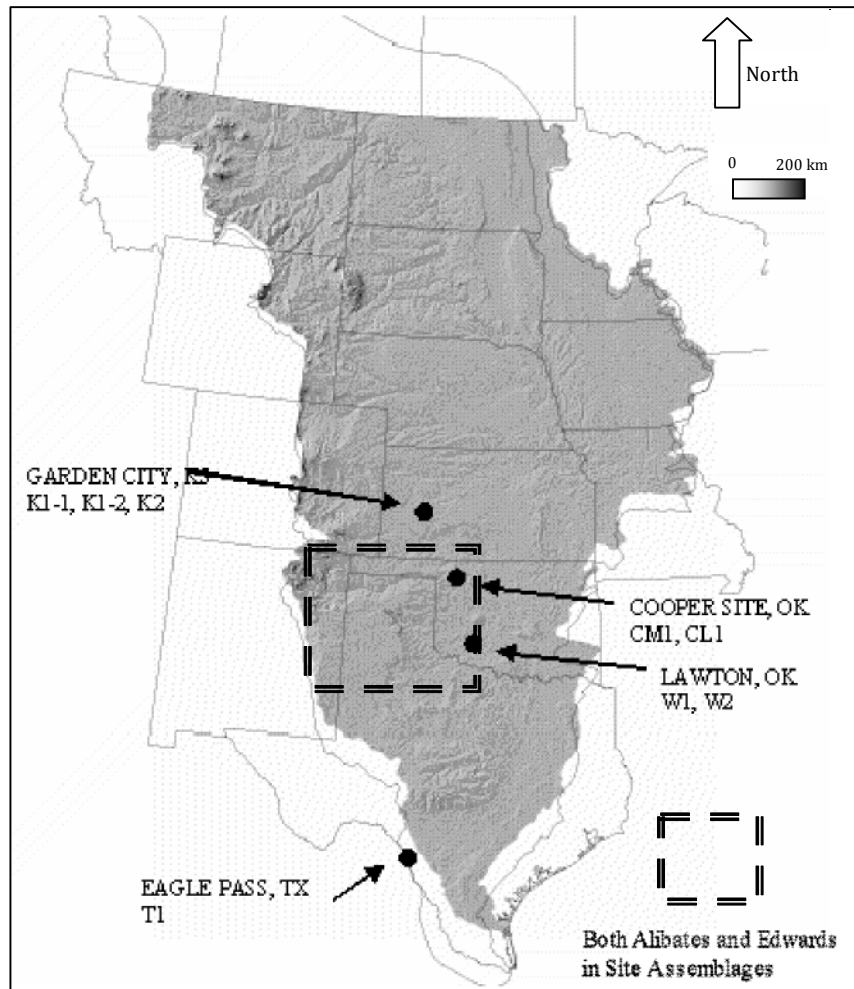


Figure 3.5 Locations of selected bison tooth samples used in the pilot studies.

During grinding and polishing, samples were examined under a binocular microscope to determine the quality of surface finish before proceeding to the next lapping stage. After polishing, the samples were made conductive by C-coating. All analyses were executed with a Cameca SX50 electron microprobe at the University of Oklahoma. Qualitative phase identification was accomplished by backscattered electron imaging coupled with Energy Dispersive X-ray Analysis using 20 kV acceleration voltage and 5 nA beam current. Images were acquired digitally into 1024 x 1024 pixel arrays. Electron Microprobe Analysis was performed by Wavelength-Dispersive Spectrometry (WDS) using first order x-ray emission lines. Intensity acquisition for all elements except Sr used a two-point linear background model; for Sr, a single point and slope model assuming a linear background was used. Elements that were examined (Sr, Pb, Ca, Mg, Mn, Fe, P, Se, Al) were analyzed using 20 kV acceleration, 20 nA sample current (measured at the Faraday cup), and a 20 μ m spot size. Oxygen was not analyzed directly but was calculated by stoichiometry on the basis of inferred/known cation charges for the elements. Selected elements have been shown to be effective in determining subsistence in bone and teeth (Schneider 1986) and were chosen because of their presence in enamel, their detectability, and their nutritional role. Testing points were selected every 0.5 mm from the CEJ to the occlusal surface for the Kansas samples, whereas points at 5 mm increments down the tooth were analyzed for the Oklahoma specimens. These results were then averaged and plotted against depth below the occlusal surface of the tooth. For the enamel, each 5mm increment is separated from the next by the time equivalent of amelogenesis of approximately two months.

Analytical totals derived from the study (avg. 91.3-91.6 wt. percent) were significantly less than 100 percent. Numerous factors may cause low analytical totals including: unaccounted for elements, low density/porosity, x-ray interference (overlap), valence problems, beam alteration of samples, dead time, or differences in background shape between the standard and unknown. As mentioned previously, no overlaps were determined. In addition, the only multivalent cations that may cause low analytical totals are Fe and Mn, but these are below detection level. An examination of counting statistics does indicate, however, that peak intensities are lower than 10,000 cps and significant differences are not observed in the backgrounds of the unknowns and standards.

With the elimination of the counting procedures above, the primary causes of low analytical totals for this study probably include the presence of light elements not analyzed for and low density/porosity. Among the light elements (C, H, F, Li, Be, B), only C and H are readily taken up by hydroxyapatites. Hydrogen is much too light an element to be analyzed by the microprobe. The samples were not baked during preparation and the organics had not entirely decomposed. Thus, the abundance of C likely contributed to lower analytical totals than expected in this study. In addition, the porosity of enamel may affect analytical totals. A void in the excitation volume results in low analytical totals (when more dense materials are used for the intensity calibrations). The apatite used as the Ca and P standard was a single crystal. Tooth enamel, however, does not represent a single crystal that is larger than the beam excitation volume, but is comprised of numerous prisms or rods that are composed of apatite crystals in varying sizes and shapes. So, the intergranular space between the

small crystals represents void space (and has other related surface effects such as x-ray scattering and diffraction) that will reduce the emitted x-ray intensity.

The results can be viewed at different scales. The most general level is the enamel as a whole where all down-tooth readings are averaged and provide a single assay for the entire tooth. At a finer scale, each series of readings at each of the 5 mm increments can be plotted against depth below occlusal surface and thereby provide a series of assays at points in the amelogenesis during the development of the tooth. The latter scale provides the opportunity to track changes in the inclusion of trace elements at different times of the year and thus potentially provide information on changing amounts of elements and their corresponding distribution in the grasses, soils, water, or all three. If the distribution of some of the elements incorporated during amelogenesis is found to be patchy with definite regional delineations, then the fine scale analysis may provide a means to identify how far and in what direction an animal moved during the season of P4 enamel development.

Quantitative analysis of the tooth enamel yielded results below the minimum levels of detection for most of the trace elements examined. Only Ca, P, Sr, and Mg could be detected by the methods used here. Because Ca and P make up most of the enamel structure, Sr and Mg are of interest for this study to identify diet. The results for the P4 premolars indicate that variations occur in Sr and Mg concentrations throughout the formation of the enamel (**Figure 3.6**). Presumably, the changes are a reflection of individual diets.

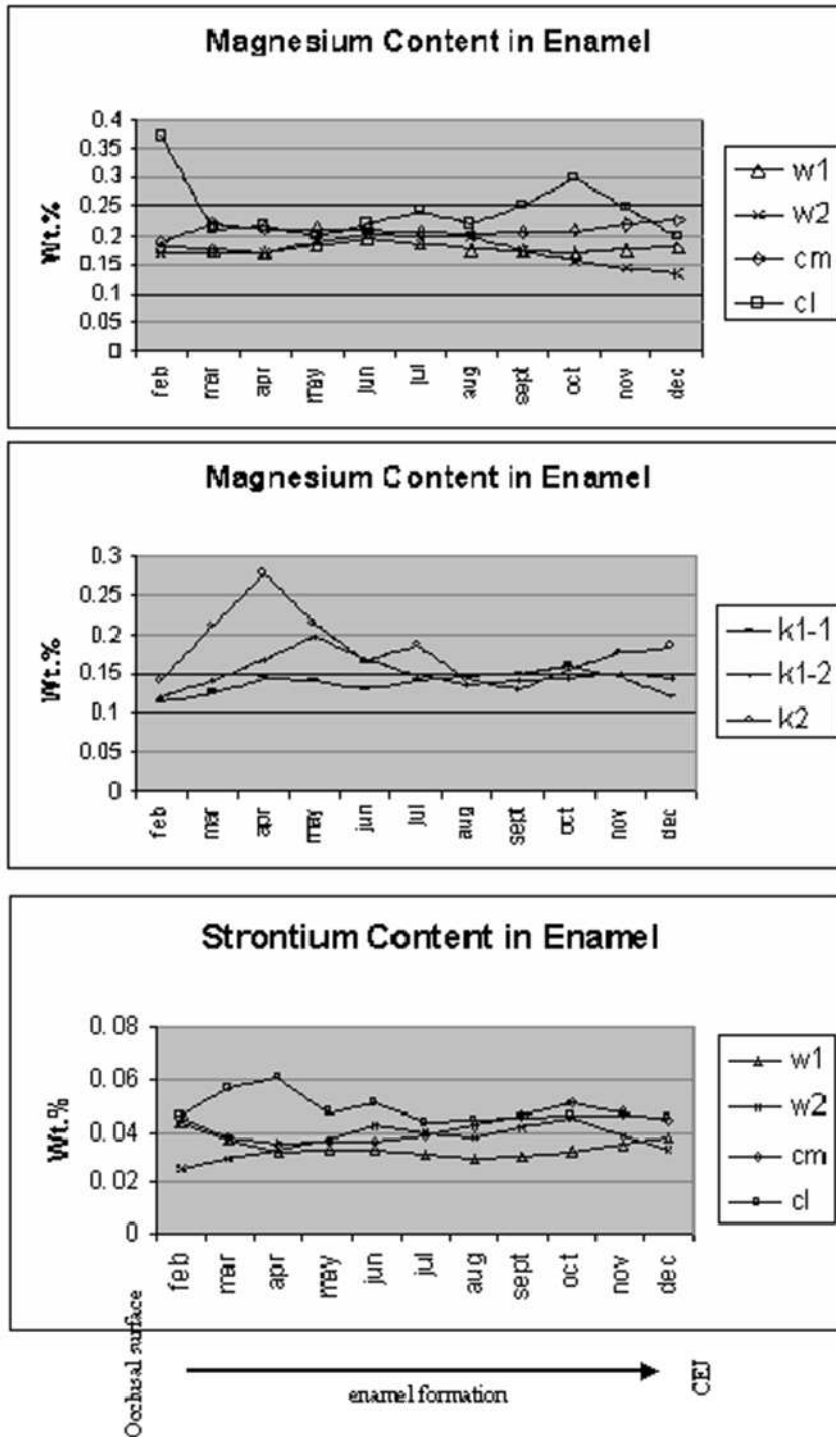


Figure 3.6 Results of the electron microprobe analysis indicating the Mg/Ca and Sr/Ca ratios in bison enamel. W1 and W2 are Wichita Wildlife refuge bison; CM is a Cooper middle kill and CL is a Cooper lower kill individual; K1-1, K1-2, and K2 represent two Kansas bison.

The analysis of bison teeth by microbeam methods is validated by this pilot study. The Kansas individual from which two mandibular dentitions were retrieved indicated remarkably similar down-tooth concentrations. However, a peak in Mg occurs in the K1-2 sample approximately 5-7.5 mm (April and May) that is not observed in K1-1. The discrepancy can be explained by a problem with the analysis of the testing points between 5 and 7.5 mm of the K1-1 premolar. The analytical totals (total weight percentages) for these points were significantly lower than totals for any other testing point (89 wt. percent versus 91-92 wt. percent). In addition, Ca and P were lower for the K1-1 premolar for the points between 5 and 7.5 mm. The missing Mg peak in the K1-1 signature is likely due to a problem with the beam focus during analysis resulting in low values for the elements. Thus, the concentrations for K1-1 between 5 and 7.5 mm should resemble the K1-2 content making the entire down-tooth record nearly identical.

The two Kansas individuals also exhibited similar Mg concentrations. Again, a large peak in the Mg concentration occurs early in the formation of the K2 enamel. Analytical totals for all of the testing points for the K2 specimen range from 90.613 to 92.498 wt. percent, so the Mg content likely reflects a variation in diet between the K1 and K2 individuals during the spring months. A complete dietary history for the Kansas bison is unknown, and the individuals could have been bought and sold to different ranches at different times during the formation of the enamel, causing elemental discrepancies. Any interpretation, however, is entirely speculation. The fact remains, though, that the elemental concentrations are alike throughout the majority of the K1-1, K1-2, and K2 enamel formation.

Overall, the Kansas specimens had lower concentrations of Mg than the modern and prehistoric samples from Oklahoma, and no Sr content. One factor that might explain the difference is the affect of the Dakota Aquifer in Kansas (Macfarlane 1996). The aquifer introduces high sodium bicarbonates and fluorine concentrations, causing the Mg and Sr content to be low in west central Kansas. There is, however, a significant increase of Mg in soils at the Kansas-Colorado border and a gradual increase towards Oklahoma (Macfarlane 1996). The dietary uptake of *Bison bison* from western Kansas and western Oklahoma resembles that of the associated soils.

Prehistoric trace elemental contents in soils have yet to be determined, but should resemble modern distributions. Magnesium and strontium concentrations within the prehistoric samples from Oklahoma are similar during the late summer/early fall (when herds would have been in the area based on the season of death for the Cooper bison) to modern bison from Oklahoma, and so, one may reconstruct bison movements based on modern distributions of trace elements. For the purposes of this pilot study, western Kansas may be defined as an area with lower Mg and Sr content, while western Oklahoma has higher levels of Mg and Sr.

There is some degree of variation in the elemental content of modern residential herds from Kansas and Oklahoma (StDev = 0.007-0.02 for Mg, 0.005 for Sr), but only the Kansas 2 (K2) and Cooper Lower (CL) samples exhibit a high degree of variation of Mg (StDev = 0.042 and 0.05). It may be inferred, then, that the Cooper Middle (CM) individual represents a residential herd. I will concentrate the remainder of this discussion on CL because the K2 individual could have been transported to a number

of locations during the time of enamel formation. After the initial formation of the P4 enamel, the CL individual moved into an area with lower Mg and higher Sr concentrations by April, while the other individuals had similar diets with lower Mg and Sr concentrations. By the early fall, CL moved into an area with similar Mg concentrations as encountered in the spring, but decreased Sr content. The CL individual then moved back into an area with similar Mg and Sr concentrations as when enamel mineralization began.

A plot of the Sr levels in the P4 enamel from the CL sample, the CM sample, two modern bison P4s from the western Oklahoma (Wichita Mountains Wildlife Area), and two modern individuals from Garden City, Kansas, shows variation in the amount of Sr incorporated in the enamel over the course of amelogenesis (approximately 1 year). The greatest difference is seen in the Sr level of the CL sample. The CL sample Sr is between one third and one half greater than that contained in any of the other Oklahoma samples at 5 and 10 mm below occlusal surface, suggesting that this animal grazed in an area with substantially greater amounts of Sr than was contained in any of the grazing areas covered by the other three animals during this stage of amelogenesis. The 15 and 20 mm below occlusal surface measurements indicate that the CL and CM individuals were in areas with comparable levels of Sr in the months just prior to their deaths in northwestern Oklahoma. The CM animal had Sr levels comparable to that of the modern Wichita Mountains Wildlife Area animals for most of the period of amelogenesis, suggesting the Middle Kill Cooper animal grazed areas similar to the Wichita Mountains Wildlife Refuge area. The two Kansas individuals yielded no detectable Sr, but exhibited similar Mg concentrations throughout the bulk

of enamel formation. The differences are a reflection of very different elements being consumed by western Kansas bison than those of the Oklahoma animals.

The pilot study presented here indicates that trace element analysis of teeth by microbeam methods is appropriate for examining bison movements. In addition, modern geographical trace element distributions may resemble prehistoric concentrations. The primary result of the pilot study is that quantifiable elemental components exist in the enamel of bison P4s and that bison from various kill episodes can differ from each other, can differ from modern samples, or can overlap with modern samples. Spatial inequalities are known for the distribution of some of the elements that could occur in bison enamel. Matching the regional distributions of select elements with their occurrence in bison enamel promises to shed light on the movement of bison during the time of P4 enamel amelogenesis.

The uncertainties revealed by this study are artifacts of counting statistics. Hydrogen and carbon were not analyzed, and many of the elements analyzed had values below the minimum levels of detection. Increasing the beam current and/or increasing the counting time could potentially improve the detectability of the elements but would risk damaging the samples and be time consuming. The alternative was to find a technique with better sensitivity for minute amounts of trace elements.

THE LA-ICP/MS PILOT STUDY

The electron microprobe provides significant data on Mg, Sr, P, and Ca abundances in tooth enamels, but many other potentially diagnostic elements (e.g. Na, Fe, Mn,

Ba, Pb, U, Cu, Zn, V, K, Al, Se) are likely to be present at concentrations below the detection limit for the electron beam method. A necessary, and logical, extension of this analysis was to use another technique, Laser Ablation – Inductively Coupled Plasma Mass Spectrometry (LA-ICP/MS), which can attain (sub-) ppm detection thresholds and still provide fine spatial resolution on the sample.

LA-ICP/MS (University of Texas, Austin) analysis was performed on the Middle Kill Cooper, the Wichita Mountains Wildlife Area bison, the Kansas sample, and a mandibular P4 premolar from Eagle Pass in southwest Texas (**Figure 3.5**). The teeth were placed directly onto the laser ablation sample stage (not embedded in epoxy or thermoplastic) and analyzed for Na, Mg, Ca, P, Fe, Mn, Sr, Ba, Pb, U, Cu, Zn, V, K, Al, and Se elemental content. Selected elements were chosen because of their presence in enamel, their detectability, their nutritional role, and their probability of being geographical indicators. Testing points were selected every 5 mm from the CEJ to the occlusal surface for each of the tooth samples. Data were calibrated to parts per million using the NIST glasses, with ^{43}Ca as an internal standard.

Quantitative analysis of the bison teeth detected the presence of each of the trace elements except Na, Cu, K, Al, and Se. The LA-ICP/MS results for the P4 premolars indicate that variations occur in Mg, Fe, Mn, Sr, Ba, Pb, U, Zn, and V concentrations throughout the formation of the enamel. Presumably, the changes are a reflection of individual diets and, therefore, geographical range.

The analysis of bison teeth by LA-ICP/MS methods is validated by this pilot study. The Cooper Middle, Wichita, and Kansas individuals indicated remarkably similar

down-tooth elemental concentrations for both the microbeam and LA-ICP/MS analysis. The Kansas sample has less Mg and Sr content than the Wichita and Cooper samples. The Cooper enamel examined by LA-ICP/MS, however, does not mirror the microbeam analysis of the same sample. Instead, the Cooper Middle sample analyzed by LA-ICP/MS has a similar elemental signature as the Cooper Lower specimen examined by the microbeam. Further testing is required to explain the cause of the similar elemental content.

Each of the samples analyzed by LA-ICP/MS methods exhibited distinct elemental concentrations suggesting that geographical differences exist. The results show that southwestern Oklahoma is moderately richer in elemental content of Sr, Mg, U, Mn, and V than western Kansas and southwestern Texas. In addition, Ba is much more abundant, and Zn content is lower in the Wichita sample than the Kansas and Texas specimens. Western Kansas is indicated to be a region with higher Pb and Fe content, and lower amounts of Ba than southwestern Oklahoma and southwestern Texas. The Texas sample shows that southwestern Texas may be defined as an area with lower Fe and Mn, and much less V content than southwestern Oklahoma and western Kansas. Based on this geographical data, then, the movements of prehistoric bison may be assessed.

A major assumption of this study is that modern elemental data can be correlated to the prehistoric trace mineral content of the Southern Plains. The similarities between the Cooper and Wichita samples (also seen using the microbeam methods) during the time of year that Paleoindian-aged bison herds are known to be traveling to western

Oklahoma is rather remarkable. Further, it is apparent that middle Cooper individual grazed in areas with very different elemental content throughout the formation of the enamel. During initial enamel formation, the Cooper bison was in a region with elemental content unlike any of the sampled geographical areas, but by the late summer/early fall had moved to an area similar in elemental content to the modern Oklahoma sample. Inferred from the data, then, is that middle kill Cooper bison ranged farther than the modern samples, and the area grazed prior to moving to western Oklahoma could not have been western Kansas or southwestern Texas.

The pilot studies presented here indicate that detecting trace elemental differences of teeth by microbeam and LA-ICP/MS methods is appropriate for examining bison movements. In addition, modern geographical trace element distributions may resemble prehistoric concentrations. Based on these two pilot studies, it was determined that LA-ICP/MS provided better resolution of a wider array of trace elements and was chosen for use in the rest of the study. Additional trace element data are needed to 1) determine the modern elemental composition of the entire Southern Plains grasslands; 2) confirm the relationship between modern and prehistoric trace mineral contents of specific geographical locations; and 3) identify the movements of *Bison antiquus* and their seasonality so that early Paleoindian mobility strategies may be modeled.

THE SAMPLE

To fulfill these three goals, modern and prehistoric bison samples were collected from and around the southern Plains (**Figure 3.7**). Thanks to the growing interest in bison husbandry that the plains is experiencing today, obtaining modern teeth from animals with well-documented histories for this project was fairly easy (**Figure 3.8**). Twenty-two samples were obtained from managed bison herds on public and private lands including the Wichita Mountains Wildlife Refuge in Oklahoma, Vermejo Park Ranch in New Mexico, Medano-Zapata Nature Conservancy in Colorado, Hugh S.H.A.P.E. Bison Ranch in Texas, Konza Prairie, in Kansas, Smoky Hill Bison Company in Kansas. Coincidentally, the development of the P4 in the third year of life corresponds with the age at which many animals are selected for butchering. Hence, if teeth were not collected from the original bison owners, teeth from the animals have been obtained from regional taxidermy and butcher shops. As with cattle, bison are shipped to a feedlot for finishing prior to butchering. The fattening up of the animals often requires special feeds and nutrients. However, because the enamel amelogenesis is complete prior to slaughtering age, and once complete the enamel does not undergo replacement, the special feedlot diet will not affect the analytical usefulness of the samples as long as individuals selected are at least three years old.

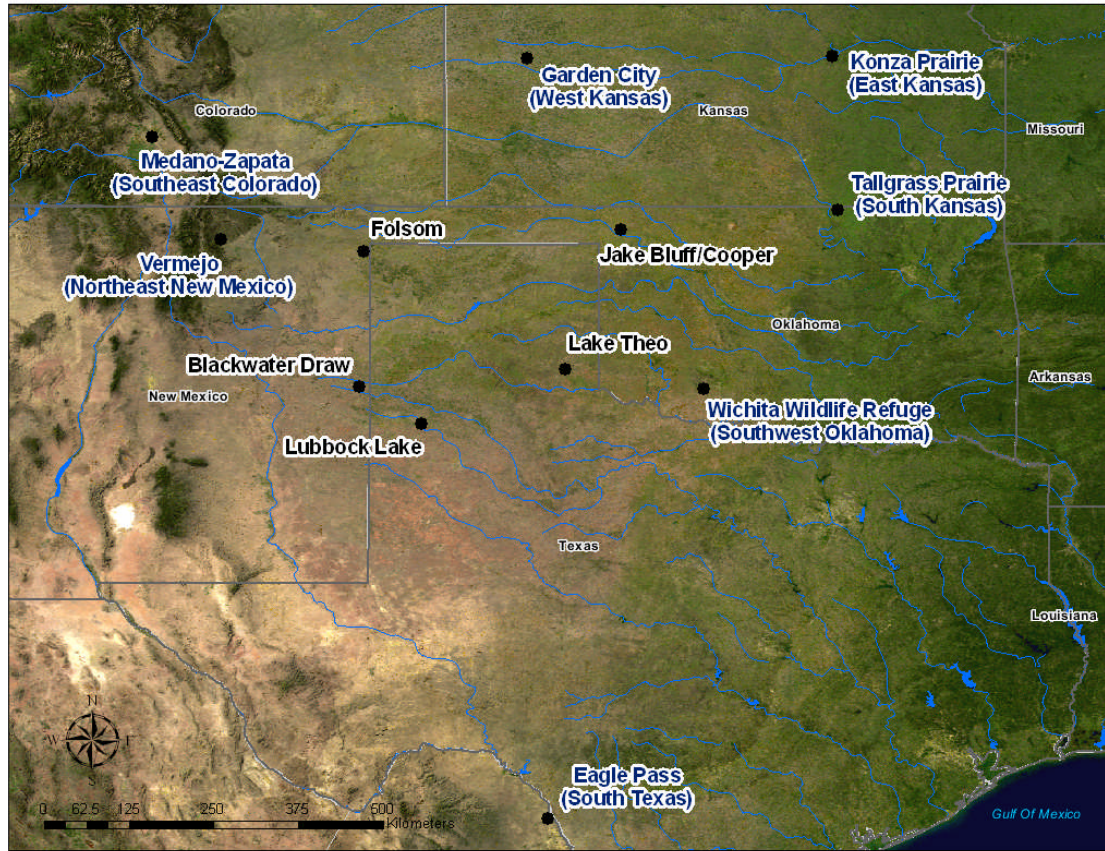


Figure 3.7 Locations from which modern (blue) and prehistoric (black) bison teeth derived for this study.



Figure 3.8 Modern bison mandibles and teeth collected for this study.

Bison teeth derived from Southern Plains sites that are Folsom-age (10,800-10,200 B.P.) and are accompanied by coeval artifacts of Alibates and Edwards chert were sampled. The use of Alibates and Edwards as toolstone by Paleoindian hunter-gatherers is temporally and spatially specific, enabling us to narrow the number of groups involved in bison hunting on the Southern Plains. The prehistoric samples included animals from the early Paleoindian Cooper and Jake Bluff sites (stratified bison kills in northwestern Oklahoma); the Folsom site, New Mexico; Lubbock Lake, Texas; Blackwater Draw, New Mexico; and Lake Theo, Texas (**Table 3.1**). These

sites were chosen because they are all found in the same general area of the plains (similar to that in the hypothetical model presented in Figure 3.4). Fifteen Folsom samples were selected for analysis. These samples were sought from a variety of regions of the plains because they possessed the potential to give a broad spatial characterization of the elemental composition of bison from a variety of regional settings. Most samples were the complete, unworn P4 from three to four year old animals. However, in order to assure adequate sample size, the P4 from older animals were accepted and the elemental results averaged for inclusion in the analysis.

Table 3.1 Table of Prehistoric Sites and Radiocarbon Dates Examined in this Study.

Radiocarbon Sample	Radiocarbon Years BP	Material	Source
Jake Bluff	10,806	bone	Bement and Carter in Press
Cooper Lower	10,600	bone	Johnson and Bement 2009 Johnson and Holliday
Lubbock Lake	10,540	charcoal	1987:12
Cooper Middle	10,530	bone	Johnson and Bement 2009
Cooper Upper	10,505	bone	Johnson and Bement 2009
Folsom	10,490	bone	Meltzer 2006
Blackwater Draw	10,332	charcoal	Haynes et al. 1992
Lake Theo	9,685	humates	Johnson et al. 1982

THE MODERN CONTROL SITES

MEDANO-ZAPATA (SOUTHEAST COLORADO)

The Medano-Zapata Ranch is located in southeast Colorado in the San Luis Valley near the town of Mosca. The ranch comprises 100,000 acres and is the largest Nature Conservancy preserve in the state of Colorado. This preserve lies within a high-elevation (2,286 meters) basin flanked by two mountain ranges: the San Juans and

Sangre de Cristos. The San Luis Valley harbors the Great Sand Dunes National Park (visible from the Medano-Zapata Ranch).

The San Luis Valley of southern Colorado has been called the highest, largest, mountain desert in North America (Trimble 2001). The San Luis Valley is part of the Rio Grande Rift system that extends from central Colorado southward through New Mexico and West Texas into northern Mexico (Knepper and Marrs 1971). The rift system began to form in the Oligocene at the same time that tremendous volcanic eruptions and associated intrusions built up the San Juan Mountains to the west and intrusions took place to the east (Knepper and Marrs 1971). The magnitude of structural movements is demonstrated by more than 9 kilometers of Oligocene-Holocene sedimentary and volcanic fill beneath the floor of the valley juxtaposed with surrounding ranges rising more than 1,800 meters above the valley floor (Knepper and Marrs 1971). Since the creation of the valley, large alluvial fans have accumulated against the mountain front (Knepper and Marrs 1971).

Great Sand Dunes National Monument is located in the San Luis Valley adjacent to the Sangre de Cristo Mountain range. Rising 230 meters above the valley floor, these are the tallest dunes in North America (Johnson 1971). The sand dunes cover an area of about 100 square kilometers, and are situated at approximately 2,500 meters elevation. The sand is blown by prevailing southwesterly wind from alluvial sediments of the San Luis Valley (Johnson 1971). Sand mineralogy indicates that much of the sediment was derived from volcanic rocks of the San Juan Mountains, transported by the Rio Grande, and deposited in the river's huge alluvial fan on the

western side of the valley (Johnson 1971). From there sand, was blown downwind eventually piling up in the Great Sand Dunes. At the mountain front, sand accumulates where the wind is funneled across a low portion of the mountain ridge at three passes: Medano, Mosca, and Music (less than 3,000 meters) (Johnson 1971). The mountain ridge rises to more than 4,000 meters elevation to the south (Blanca Peak) and north (Crestone Peak).

The Rio Grande drains the southern part of the valley through a gorge in volcanic rocks along the Colorado-New Mexico border (Emery 1971). In vicinity of Great Sand Dunes, however, the San Luis Valley is a closed depression with no surface outlet for drainage (Emery 1971). Surface runoff from the Sangre de Cristos soaks into alluvial fans, and ground water migrates toward the low point at San Luis Lake (less than 2,300 meters altitude) (Emery 1971). Abundant ground water gives rise to many ephemeral lakes, wetlands, springs and flowing wells, and supports considerable irrigation in the valley (Emery 1971). Throughout most of the San Luis Valley, depth to ground water is less than four meters (Emery 1971). Ground water is produced from two major aquifers within the valley (Emery 1971). Excessive use of surface water has led to waterlogging of soils in many parts of the valley. Waterlogged soils have become alkaline, and ground water has become highly mineralized from concentration of salts (Emery 1971).

Although closely surrounded by mountains, the San Luis Valley has semiarid to steppe-type climates along the valley floor. The natural vegetation varies from bunch grass and shrub in the open to cottonwood and willow along the streams. Agriculture

in the San Luis Valley is generally concentrated around the Colorado towns of Alamosa, Monte Vista, and Center. Principal crops include potatoes, head lettuce, and barley. The barley grown here is the main supplier for Coors beer company. Less favored areas with shorter growing seasons and less access to water rights tend to be devoted to alfalfa and grazing. Uncultivated land is often covered with "chico," low brush such as rabbitbrush, greasewood and other woody species. Cropland is typically irrigated with large (1/4-mile diameter) center-pivot irrigation systems.

Five bison teeth representing three animals between the ages of two-and-a-half and four years (MZ1 through MZ5) were sampled for this study. Each of the individuals was born and raised on the Medano-Zapata Ranch and did not receive nutritional supplement.

VERMEJO (NORTHEAST NEW MEXICO)

Vermejo is the largest contiguous deeded ranch in New Mexico, comprising 588,000 acres in northeastern New Mexico and southern Colorado. The ranch lies in the Raton Basin, a structural basin about 97 kilometers long and as much as 1.6 kilometers wide that extends from Cimarron, New Mexico, northeastward to Huerfano Park, Colorado, (Woodward 1987). The basin formed during Laramide deformation between about 70 and 50 million years ago as the San Luis Highland rose to the west (Pillmore and Flores 1987). Erosion of the highlands during and after uplift provided sediment that filled the basin (Pillmore and Flores 1987). As the Cretaceous seas receded eastward away from New Mexico, the coastal margin also migrated eastward

(Pillmore and Flores 1987). The Raton Formation, the floodplain and alluvial-plain deposits, were deposited unconformably on top of the Trinidad Sandstone (Pillmore and Flores 1987). The Raton Formation is of Late Cretaceous (about 66 m.y.a.) to Paleocene (about 57 m.y.a.) age and consists of about 335 meters of sandstone, siltstone, mudstone, coal, conglomerate, and carbonaceous shale (Pillmore and Flores 1987). The Vermejo Ranch has elevations ranging from two kilometers in the Raton Basin to four kilometers in the Sangre de Cristo mountains to the west. The region is drained by the Vermejo River that flows southeast to the Cimarron River. Over 60 percent of Vermejo Park is comprised of classic southwestern Ponderosa pine forest, with the southern portion around Cimarron (the location where samples derived) being short grass prairie.

Three bison teeth representing three animals between the ages of 2 and 3 years (V1 through V3) were sampled for this study. Each of the individuals was born and raised on the Vermejo Ranch and did not receive nutritional supplement.

EAGLE PASS (SOUTH TEXAS)

Eagle Pass is in the northwestern section of the Rio Grande plain region in southwest Texas. Elevations range from 165 meters to 183 meters. The Midway Group comprises the major geologic unit of the area and outcrops as a thin arc-shaped belt of sandstones and shales (Roy 1984). It unconformably overlies the marls of the Upper Cretaceous Navarro (Escondido) Formation and is in turn overlain unconformably by the sandstones and shales of the Wilcox Formation (Roy 1984). Due to overlap by

younger formations, usually the Wilcox, the Midway outcrop is not continuous (Roy 1984). Exposures are poor and occur mainly in the vicinity of major streams (Roy 1984). Topography around Eagle Pass exhibits slightly undulating terrain. Native grasses are short and mixed grasses. Less than one percent of the land is considered prime farmland. The Rio Grande drains the area. The principal source of water for domestic and agricultural use is the Rio Grande. Scattered mesquite, some live oak, cat's claw, huajilla, cenizo, and prickly pear are the predominate flora. (Ochoa 2010).

Two bison teeth representing one animal that died at the age of two-and-a-half years (T1 and T2) were sampled for this study. The bison was born and raised on the S.H.A.P.E. Ranch outside of Eagle Pass, Texas and did not receive nutritional supplement.

WICHITA WILDLIFE REFUGE (SOUTHWEST OKLAHOMA)

The 59,020 acres that comprise the Wichita Wildlife Refuge is composed of two rugged ranges of granite mountains that trend nearly east-west and enclose a natural prairie. The first known geologic event in this region took place 550 to 600 million years ago (Early of Middle Cambrian time). The land from northern Texas to north of the present Wichita Mountains sank, forming a basin that filled with sea water. Rivers carried clay, sand, and gravel into this sea, and thick layers of sediments formed. These rocks have been penetrated by deep wells both north and south of the Wichitas, but within the mountains, the only remnants are small outcrops of Meers quartzite. Small masses of this altered sandstone are exposed along Medicine Creek north of

Mount Sheridan and along the road north of the Refuge's Meers entrance. Sometime after the deposition of the sediments, hot lava formed at considerable depth below the surface in the Wichita area. The liquid was forced up into the overlying sediments and spread out between the sedimentary beds. In the Meers area, the lava tore off large fragments of the roof sandstone and altered it to dense compact quartzite. The lava cooled slowly, forming a dark gray to black igneous rock known as gabbro. There are several large outcrops of this rock in the Wichita Refuge. One outcrop straddles the northern boundary, extending 12 miles northwest from west of Lake Lawtonka to North Mountain. Another outcrop, approximately one square mile in area, is present in Cutthroat Gap where it also forms the lower part of the valley walls. A large outcrop of this dark rock occurs north and west of Quanah Parker Lake and extends three miles west to north of the Fish Lakes. An extension of the band may be seen around the Refuge headquarters and Kiowa Lake. After the solidification of the gabbro lava, the area was uplifted thousands of feet. This uplift was accompanied by erosion and the overlying sediments were removed, with the exception of the small remnants of Meers quartzite. The erosion continued exposing the gabbro at the surface and even stripped away part of this rock (U.S. Fish and Wildlife Service 2009).

The next major geologic event took place in the Middle Cambrian time (500 to 550 million years ago). Hot granitic lava developed at considerable depth below the surface and was forced upwards through the overlying gabbro and also in part reached the surface through volcanic vents. The cooling of this hot liquid at depth formed red granite which is the most extensive rock in the Refuge. This contact can

be traced northwest for several miles and dips to the south. The granites were intruded at the contact between gabbro and its own volcanic pile (the Carlton rhyolite), perhaps with minor sediment cover on the gabbro. (U.S. Fish and Wildlife Service 2009).

The mountains of the Wichita region were formed some 300 million years ago (Pennsylvanian period). They were created by a tremendous uplift accompanied by large folds and faults. Some of the faults were miles in length and produced large blocks. Some of these settled with respect to others, and the large flat areas bordering the Scenic Highway in the central part of the Refuge probably originated by faulting. The mountains originally were considerably higher than the present ones as erosion has stripped off the upper parts and deposited this material in the intervening flats, reducing the relief. Most of this erosion took place in Permian time (some 250 million years ago) and produced extensive gravel deposits. Remnants of these gravels may be seen north of Crater Lake, north of Lake Elmer Thomas, east and south of Lost Lake, and in several other parts of the Refuge. Granite is the dominant rock of the Refuge, and the gravels formed by erosion are mainly composed of granite fragments. There are unconsolidated well-rounded boulders 6 to 18 inches in diameter, known as cobblestones, surrounded by yellow-to-brown clay. Below the weathered surface they are well cemented (U.S. Fish and Wildlife Service 2009).

The main geologic event that has taken place since is the erosion of most of the Permian gravels that once covered this area. In recent times, some newer gravels have been deposited along the small streams and in the flats. These can be seen around

Lake Lawtonka, along Sandy Creek, Wolf Creek, and in other areas of the Refuge. Boulder slides in the drainage depressions are common on many of the steep slopes. One of the best examples of boulder accumulation is the "River of Boulders" on the south side of Mount Scott (U.S. Fish and Wildlife Service 2009).

Approximately 20,000 acres of the Wichita Wildlife Refuge are open mixed grass prairie, with the remainder being forest and rock outcroppings. The grasslands are dominated by little bluestem, with Indian grass, big bluestem, switchgrass, sideoats grama, hairy grama, and blue grama having a large percentage of the overall species composition. The forested areas are dominated by post oak, blackjack oak and eastern red cedar. (U.S. Fish and Wildlife Service 2009). Generally speaking, drainages and creeks of the Wichita Wildlife Refuge flow south to the Red River.

Two bison teeth representing two animals that expired at the ages of three and four years (W1 and W3) were sampled for this study. The bison were born and raised on the Wichita Wildlife Refuge and did not receive nutritional supplement.

TALLGRASS PRAIRIE (SOUTH KANSAS)

The Tallgrass Prairie Preserve is located approximately 24 kilometers north of Pawhuska, Oklahoma and comprises approximately 230,400 acres. Two hundred to 300 million years ago the gray and white limestone and chert (the latter commonly called "flint") began to form on the Permian Sea floor. The Flint Hills, as they have come to be known, cross east central Kansas from the north near the Nebraska border and extend south into Oklahoma, where they are called the Osage Hills. The region

consists mainly of alternating layers of limestone and shale. The unique, stair-step landscape of the Flint Hills was formed through a geological process called differential erosion. The limestone, with concentrations of flint, is harder and more erosion resistant than the softer layers of shale in between. The tougher limestones and flint form prominent benches on the hillsides and cap the hilltops, while the softer shales in between are slowly worn away, making thin, gravelly soil. The Flint Hills region is characterized by thin soils, limestone outcrops, vegetation-covered shale intervals between the limestones, and deeply cut valleys, exposing the geology beneath the soil. The Tallgrass Prairie consists of big bluestem, little bluestem, switchgrass, and Indiangrass with oaks and cedars along larger order drainages. Sand Creek drains the Preserve and flows east to Bartlesville, Oklahoma (The Nature Conservancy 2010).

Four bison teeth representing four animals that expired at 2 ½ (TGP#18), 13 ½ (TGP#6), 3 (TGP#3), 3 ¾ (TGP#2), and 5 (TGP#12) years of age were sampled for this study. TGP#18 is a female and was transferred from the Wichita Wildlife Refuge to the Tallgrass Prairie at the age of six months. She was killed by a vehicle. TGP#6 is a female and was born in Lovell, Wyoming. She was transferred from Bartlesville, Oklahoma to the Tallgrass Prairie at the age of 11.5 years and died of unknown complications. TGP#3 is a female and was transferred from Bartlesville, Oklahoma to the Tallgrass Prairie at the age of 1.5 years. She died giving birth. TGP#2 is a male and was transferred from Bartlesville, Oklahoma to the Tallgrass Prairie at the age of 2.5 years and died in a chute accident during roundup. TGP#12 is a male and was transferred from Bartlesville, Oklahoma, to the Tallgrass Prairie at the age of 2.5

years and was hit by lightning causing its immediate death. None of these animals were provided supplement.

KONZA PRAIRIE (EAST KANSAS)

The Konza Prairie is located in the Flint Hills region of northeastern Kansas, approximately 10 kilometers south of the city of Manhattan. Konza is an 8,600 acre native tallgrass prairie preserve owned by The Nature Conservancy and Kansas State University and operated as a field research station by the Kansas State University Division of Biology. The Flint Hills are steep-sloped and overlain by shallow limestone soils unsuitable for cultivation. The Konza Prairie has a continental climate characterized by warm, wet summers and dry, cold winters sufficient to support woodland or savanna vegetation; consequently, drought, fire and grazing are important in maintaining this grassland. The vegetation at Konza is primarily (greater than 90 percent) native tallgrass prairie, dominated by perennial C4 grasses, such as *Andropogon gerardii*, *Sorghastrum nutans*, *Panicum virgatum* and *Schizachyrium scoparium*. The geology causes a relatively complex hydrologic system, but surface waters drain north to the Kansas River (Konza Prairie Biological Station 2010).

Two bison teeth representing one two and a half (EVA 2.5) and one three year old (EVA 3) were sampled for this study. The bison were born and raised on the Konza Prairie and received nutritional supplement (Vigortone No. 32S Plus), which is known to contain calcium, phosphorus, salt, magnesium, potassium, copper, selenium, and zinc.

GARDEN CITY (WEST KANSAS)

Garden City is located on the Arkansas River in southwestern Kansas. The Arkansas River Lowlands follows the course of the Arkansas River through southwest and south central Kansas, and dissects the High Plains in and around Garden City. The broad floodplain contains large quantities of Quaternary sand and silt carried from the Rocky Mountains by the river (Mandel 1994:46, 49). The ancestral Arkansas River has meandered for millions of years, leaving reworked alluvium in its many abandoned channels (Mandel 1994:49). North of the Arkansas River, the underlying rocks are part of the Pennsylvanian system, consisting mostly of shale, frequented by intervals of limestone beds and some sandstone (Fenneman 1938:606-607). To the south, limestone is scarce and the Permian sandstones thicken (Fenneman 1938:607). Sand dunes occur on the south side of the plain formed by the prevailing winds from the glaciers to the north during the Pleistocene. The dominant vegetal species in the area is sand sagebrush. (Hulett et. al 1988). *Sporobolus cryptandrus*, *Bouteloua gracilis*, and abundant annuals characterize the understory vegetation (Hulett et. al 1988). The area is drained on the surface by the Arkansas River and is underlain by the Ogallala Aquifer.

Four bison tooth samples from three individuals between three and seven years of age (GCK1 through GCK4) were sampled for this study. The bison were born and raised in Garden City and received no nutritional supplement. The samples were obtained from a taxidermist in Yukon, Oklahoma.

THE ANCIENT KILL SITES

FOLSOM

The Folsom site, in Colfax County, New Mexico, is one of the most widely known archaeological localities in North America. The Folsom site is located at an elevation of 2,109 meters. The local bedrock is Smoky Hill shale of Cretaceous age (Scott and Pillmore 1993). The shale is unconformably overlain by late quaternary sediments. These include the Folsom Formation overlain by the McJunkin Formation and the Wild Horse Formation (Anderson and Haynes 1979). M. Balakrishnan et al. (2005) posit C4 plant communities made up the majority of vegetation in the area at the time bison were killed in the arroyo.

Thirty-two bison were trapped and killed in two areas of the Folsom site: the paleochannel of Wild Horse Arroyo, and a steep-sided tributary that fed into it (Meltzer 2006). The site is dominated by low-utility bone elements and broken projectile points (Meltzer 2006). The bison remains in the tributary are mostly in primary context, and underwent rapid burial beneath fine-grained (dominantly aeolian) sediments, which in turn were subsequently armored by shingle shale (Meltzer 2006). The small lithic assemblage is dominated by projectile points and comprised of material mostly from two sources in the Texas panhandle (Alibates and Tecovas) (Meltzer et al. 2002:28), several hundred kilometers southeast of the site. It also includes stone obtained from sources at comparable distances north and northwest of the site (Meltzer 2006). Multiple radiocarbon assays on bone amino acids from different individuals in the bison herd indicate an average age of

approximately 10,500 14C yr B.P. (Meltzer et al. 2002). Patterns of bison dental eruption and wear suggest that the kill occurred in the fall (Hofman 1991).

Two bison tooth samples from two individuals (M17-24-141 and M17-24-97) from the Folsom site were analyzed for this study.

BLACKWATER DRAW

The Blackwater Draw site, in Curry County, New Mexico, is often referred to as the “Clovis type-site” and is one of the most significant Plains Paleoindian localities (Boldurian and Cotter 1999, Haynes 2002:62; Holliday 1997:59). The majority of rocks and sediments that make up the Llano Estacado, the primary landform that comprises the Southern High Plains, are Cenozoic deposits (Holliday 1997:10). The Blackwater Draw site is located in a paleobasin cut into the Late Quaternary Blackwater Draw Formation found across the Southern High Plains and is the major surficial eolian deposit overlying and often cutting into the Miocene-Pliocene Ogallala Formation (Haynes 1997:11, 59). The Blackwater Draw site is located in a tributary paleobasin characterized by an abundance of diatomaceous muds indicative of reduced water velocity or stream discharge in which the water level seasonally fluctuated (Boldurian and Cotter 1999:22; Holliday 1997:69, 89, 182). Boldurian and Cotter (1999:22) suggested, that as a result of global climate changes from the late Pleistocene to the early Holocene, these basins or ponds were probably few in number and by the end of Folsom times (10,000 B.P.) developed into marshy slack-water environments. The Late Quaternary fill observed at Blackwater Draw revealed a

hydrologic shift from flowing water to standing water to the almost complete disappearance of surface water and the accumulation of eolian sediment (Haynes 1997:51-52). During the late Paleoindian period, environmental research suggests the Paleoindian habitat at Blackwater Draw was warm and dry, spring discharge was reduced to a minimum and surface water disappeared for extended periods causing desiccation that thinned vegetation and fauna and increased eolian activity creating dune field and sand sheets. The once active draws, such as Blackwater Draw, became choked with eolian sediment (Boldurian and Cotter 1999:23). Generally speaking, the Folsom period is characterized by lush vegetation around shallow water and the presence of early Holocene fauna of aquatic and terrestrial species that included *Bison antiquus*. The natural vegetation of the Llano Estacado is mixed-grass prairie grassland dominated by short-grass native plants such as grama (*Bouteloua sp.*) and buffalo grass (*Buchloe dactyloides*) (Holliday 1997:9).

The large lithic assemblage is dominated by projectile points of several material types. The Clovis period inhabitants of Blackwater Draw Locality No. 1 primarily used Alibates agate, while the Folsom period inhabitants preferred Edwards chert as the principal material utilized for their stone tools. In addition, throughout the Paleoindian occupation of Blackwater Draw, orthoquartzites and Tecovas jasper were used, but to a much less extent (Boldurian and Cotter 1999:23). Alibates agate, Edwards chert, and Tecovas jasper are primarily restricted to the eastern margins of the Llano Estacado while the orthoquartzite material comes from the nearby Dakota formation (Boldurian and Cotter 1999:23).

Blackwater Draw Locality No. 1 Clovis and Clovis-age (11,630-11,040 BP) features yielded eight mammoths (*Mammuthus columbi*), two *Bison antiquus* bone beds, and two campsites all located near spring conduit or outlet channels (Boldurian and Cotter 1999:22; Haynes 2002:62, 64, 190; Holliday 1997:64-67). Folsom and Folsom-age (10,500-10,000 BP) features contained *Bison antiquus* bone beds, Folsom projectile points, and unfluted projectile points (Boldurian and Cotter 1999:27; Holliday 1997:67-69). The Paleoindian hunters at Blackwater Draw exploited small bison groups of six or fewer animals that they ambushed near lake edges. No season of death has been ascertained (Bement 1999:6). The Folsom-age bone bed deposits contained a minimum number of individuals of two to five *Bison antiquus* (Bement 1999:159).

Folsom-aged bison tooth samples from two individuals (LA3324-1 and LA3324-2) from the Blackwater Draw site were analyzed during this study.

LUBBOCK LAKE

The Lubbock Lake site is located just outside the city of Lubbock in Lubbock County, Texas. The majority of rocks and sediments that make up the Llano Estacado are Cenozoic deposits (Holliday 1997:10). Lubbock Lake is in, and above, an entrenched meander of lower Yellowhouse Draw that cuts through the Late Quaternary Blackwater Draw Formation and into the Pliocene Blanco Formation, the latter of which forms the local bedrock (Holliday 1997:76). Yellowhouse Draw consists of alluvial sand and gravel fill (Holliday 1997:78). Lubbock Lake sediment

consists of Pliocene clays that had been exposed at the surface for approximately 6,000 years prior to being buried by middle-Holocene sediments. Surface erosion and bioturbation caused mixing of Late Quaternary occupation debris into the Pliocene bedrock (Holliday 1997:79). Like Blackwater Draw, Lubbock Lake sediment consists of diatomaceous mud deposited under standing lake waters (Holliday 1997:83). Unlike Blackwater Draw, Lubbock Lake is not located within a paleobasin, but is instead within a draw (Holliday 1997:89). Generally speaking, the Folsom period is characterized by lush vegetation around shallow water and the presence of early Holocene fauna of aquatic and terrestrial species that included *Bison antiquus*. Today, the natural vegetation of the Llano Estacado is mixed-grass prairie grassland dominated by short-grass native plants such as grama (*Bouteloua* sp.) and buffalo grass (*Buchloe dactyloides*) (Holliday 1997:9).

The small lithic assemblage recovered from Lubbock Lake suggests the Paleoindian inhabitants almost exclusively used Edwards Plateau chert as their toolstone source (Bement 1999:160; Johnson 1997:55). The Lubbock Lake site contained multiple bone bed features within a gravelly point bar that contained various animal remains, some of which exhibited evidence of butchering, and include mammoth (*Mammuthus columbi*), extinct bison (*Bison antiquus*), extinct horse (*Equus mexicanus* and *Equus francisci*), extinct camel (*Camelops hesternus*), extinct giant armadillo (*Holmesina septentrionale*), and extinct short-faced bear (*Arctodus simus*) (Holliday 1997:78-79). Like Blackwater Draw, the Paleoindian hunters at Lubbock Lake exploited small bison groups of six or fewer animals that were ambushed near lake edges (Bement

1999:6). Lubbock Lake Folsom-age deposits contained a minimum number of individuals of three *Bison antiquus* (Bement 1999:159).

Three separate Pleistocene occupations have been identified at Lubbock Lake. The earliest occupation, dating from 11,700 to 11,100 B.P. contained human modified bison bones, which based on mandibular dental eruption and wear patterns, suggested the bison were between 3.6 years and 5.6 years or older indicating a fall death (Johnson 1997:51). The second Pleistocene occupation, dating to 11,100 BP, contained seven megafaunal species, that included bison, exhibiting human modification, but no season of death could be ascertained (Johnson 1997:51-52). The third Pleistocene occupation, dating to 10,500 to 8,000 B.P., contained repeatedly used bison kill and butchering locales exhibiting human modified bison bones, which indicated at least one Folsom-age fall-winter kill (Johnson 1997:52-53).

One Folsom aged bison tooth sample (41-LU1) from the Lubbock Lake site was analyzed during this study.

LAKE THEO

The Lake Theo site, located in Briscoe County, Texas, is the only Folsom bison kill site located in close proximity to a high-quality chert source, Tecovas Jasper (Buchanan 2002). The Lake Theo site is on the Rolling Plains immediately east of the High Plains escarpment (Buchanan 2002:122-123; Holliday 1997:48), and on a Holocene terrace at the southern edge of the artificial Lake Theo, created by the damming of Holmes Creek (Buchanan 2002:122). The terrace is composed of Late

Quaternary alluvial, floodplain, and eolian deposits situated within the “breaks” ecotone (Buchanan 2002:124). The “breaks” refers to the regional Paleozoic and Mesozoic sedimentary rocks deposited across the Permian and Triassic-age redbeds that are severely eroded and exposed along the eastern escarpment of the Southern High Plains (Buchanan 2002:124). Generally speaking, the Folsom period is characterized by lush vegetation around shallow water and the presence of early Holocene fauna of aquatic and terrestrial species that included *Bison antiquus* (Holliday 1997:183-184). The environment of the region, during Folsom occupation, was savannah like (cooler and drier than during the Clovis period) with perennial streams and freshwater ponds. The water level of ponds fluctuated seasonally, producing diatomaceous muds that by the end of the Folsom period evolved into muddy marshes (Holliday 1997:183-184). Today, the natural vegetation of the Southern Plains is mixed-grass prairie grassland dominated by short-grass native plants such as grama (*Bouteloua* sp.) and buffalo grass (*Buchloe dactyloides*) (Holliday 1997:9).

Lake Theo contains two distinct bone beds and a large lithic assemblage. The lithic assemblage suggests the inhabitants primarily used Edwards Plateau chert as their toolstone, with lesser amounts of Alibates and Tecovas jasper (Buchanan 2002:122). The lower bone bed contained extinct bison and Folsom artifacts (ca. 11,000-11,900 BP) and the upper bone bed contained extinct bison and Plainview artifacts (ca. 5,500 BP) (Buchanan 2002:125-126; Holliday 1997:48). The Folsom-age bone bed contained a minimum number of individuals of 12 *Bison antiquus* and the

reconstructed season of death indicated a fall kill (Bement 1999:159; Buchanan 2002:142).

One Folsom aged bison tooth sample (THEO) from the Lake Theo site was analyzed for this study.

JAKE BLUFF

The Jake Bluff site is located in Harper County, Oklahoma, and is a stratified Paleoindian site within and adjacent to a paleo-arroyo. Jake Bluff is located at an elevation of 610 meters (Bement and Brosowske 1999:17). The site is located on a small hill on a dissected toeslope within the Beaver River floodplain (Bement and Carter 2010:10). The arroyo cuts into the Permian Redbeds, or Cloud Chief Formation, which are overlain by the Tertiary age Ogallala Formation. The more recent Quaternary age alluvium derived from the Ogallala Formation contains Pleistocene to Holocene deposits that constitute the dune sediments observed across the region (Bement, Schuster, and Carter 2007:4). Between 11,000 and 9,800 B.P. sediments consisted of fine sand alluvium with “a short-duration aeolian event” (Bement and Carter 2010:7). These sediments supported a plant community that consisted primarily of C4 (Chloridoidae and/or Panicoid) grasses and members of the sunflower family (High-spine Asteraceae) (Bement and Carter 2010:7).

In contrast to the small opportunistic bison kill sites located near water sources such as Blackwater Draw and Lubbock Lake, Jake Bluff exemplifies Paleoindian hunters deliberately trapping greater numbers of bison in an arroyo trap (Bement and Carter

2003:7). The Jake Bluff site was a steep-walled, dead-end arroyo trap of nearly two dozen bison. The Clovis component at Jake Bluff has an average date of 12,838 cal B.P., whereas the Folsom component has not yet yielded a reliable date (Bement and Carter 2010:22, 24).

The Jake Bluff site bone assemblage contained a minimum number of individuals of 22 *Bison antiquus* and one bear (*Ursus americanus*) (Bement and Carter 2010:18). Based on analyzing tooth eruption and wear patterns of 13 mandibles, bison from the Clovis component at Jake Bluff were killed during the fall, or more specifically late September or October (Bement and Carter 2010:19). The Clovis component lithic assemblage at Jake Bluff was dominated by Alibates chert, while the Folsom component contained a projectile point of Edwards chert (Bement and Carter 2010:15-18, 28).

Two Clovis age bison tooth samples from two individuals (34HP60 and 34HP102) from the Jake Bluff site were analyzed during this study.

COOPER

The Cooper site is located in Harper County, Oklahoma, in a paleo-arroyo along the floodplain margin on the Beaver River (Bement 1999:7). The arroyo cuts into the Permian Redbeds, or Cloud Chief Formation, which are overlain by the Tertiary age Ogallala Formation. The more recent Quaternary age alluvium derived from the Ogallala Formation contains Pleistocene to Holocene deposits that constitute the dune sediments observed across the region (Bement, Schuster, and Carter 2007:4).

Between 11,000 and 9,800 B.P. sediments consisted of fine sand alluvium with “a short-duration aeolian event” (Bement and Carter 2010:7). These sediments supported a plant community that consisted primarily of C4 (Chloridoideae and/or Panicoid) grasses and members of the sunflower family (High-spine Asteraceae) (Bement and Carter 2010:7).

The Cooper site consists of three discrete *Bison antiquus* bone bed deposits in a paleo-arroyo dating to 10,900 to 10,200 B.P. (Bement 1997; Bement 1999; Bement and Brosowske 1999). Folsom hunters carried out three separate kills during the late summer to early fall trapping bison in a steep-sided arroyo (Bement 1997:95; Bement 1999:127; Bement and Brosowske 1999:40; Bement and Carter 2003:4). The total number of *Bison antiquus*, based on minimum number of individuals, for the Upper, Middle, and Lower Kills at the Cooper site is 29, 29, and 20, respectively (Bement 1999:127). The presence of completely articulated skeletons suggests a gourmet style of butchering in that the meat was filleted from the carcass (Bement 2003:29). The raw materials represented in the lithic assemblage at the Cooper site are highly variable. Of 33 Folsom projectile points discovered at this site, the Upper Kill contained primarily Alibates (n=10, 77 percent), the Middle Kill contained seven points all of Edwards Plateau chert, and the Lower Kill contained almost equal numbers of Edwards (n=4, 57 percent) and Alibates (n=3, 43 percent) (Bement 1999:138,141-142).

Six Folsom age bison tooth samples, two individuals from each kill level at the Cooper site (34HP45-494, 34HP45-671, 34HP45-837, 34HP45-718, 34-HP45-856, 34HP45695) were analyzed during this study.

THE ABLATION ANALYSIS

Each tooth was analyzed for 65 elements across five increments separated by 5mm from the top of the tooth to the CEJ to identify inter-tooth variability (**Appendix A**). In addition, each tooth was analyzed as a bulk sample, averaging the entire down-tooth elemental content to assess intra-tooth geographical differences. The GBC Optimass orthogonal time-of-flight (TOF) ICP-MS and New Wave 213 LUV Laser Ablation System housed at The Institute for Integrated Research in Materials, Environments, and Society (IIRMES), California State University, Long Beach, was used for the current study. The TOF mass discriminator system provides for essentially simultaneous analysis across the mass spectrum. Although uncertainties are known, this form of analysis is advantageous where the element signal is highly transient but needs to be resolved temporally. Further, the technique causes only minute damage to tooth samples (**Figure 3.9**). The instrument has an attached New Wave 213LUV Laser Ablation system that permits solid sample, in-situ analysis of samples. The laser was fired at a repetition rate of 5 Hz. The laser Gaussian beam was then focused, using a x15 objective (reflective) or x1.75 silica lens, on a sample placed in a cell located on a manual X-Y-Z mechanical stage. Such focusing yielded ablation pits of 50 μm (x15 objective, first and third ablation sessions) to 200 μm

(x1.75 silica lens, first ablation session) in size on inclusions and glasses analyzed in single-point mode. Pulse energy of 1.3 mJ/pulse (using the x15 objective for inclusions) to 7.5 mJ/pulse (using the silica lens for reference glass) was applied during the first ablation session. Pulse energy of 2 mJ/pulse (with the objective) was used for the analysis of enamel during the second session. Pulse energy of 1.5 mJ/pulse (with the objective) was used to analyze reference glasses in the third ablation session. The 65 elements were measured with dwell times of 10 ms. The total acquisition time for one complete analysis was about two minutes. Whole teeth were placed in the laser chamber. The laser chamber was large enough to hold a premolar or a molar, and in some instances two premolars. A raster drawn on every surface was pre-ablated to remove potential contaminants on the enamel surface. After the pre-ablation pass, data collection was initiated on the ICP-MS. Data from two glass standards (NIST SRM 612 and 614 glass) were recorded before and after each set of samples in the laser chamber, in order to provide precise calibrations that compensate for instrumental drift. Data were calibrated to parts per million using the NIST glasses, with ^{43}Ca as an internal standard. In most cases, the SRM614, with concentrations of most elements less than 1 ppm, was used for calibration.

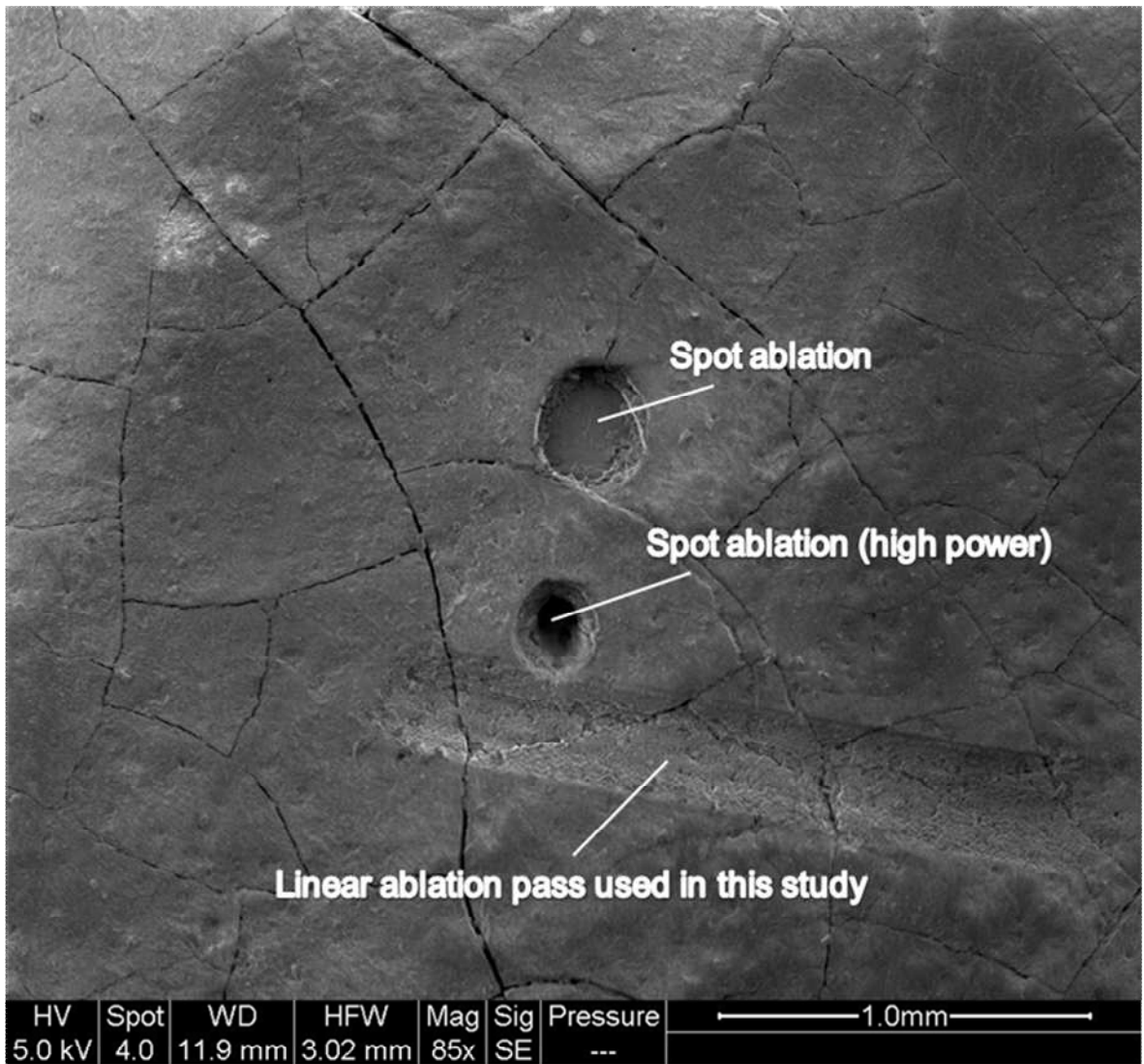


Figure 3.9 Degree of damage that can occur to enamel during ablation.

CHAPTER 4: THE PERIODIC TABLE, THE NUMBERS, AND THE BLENDER

The purpose of examining a wide variety of elements is to identify potential minerals whose distribution is limited, not abundant, or not well known, and from a suite of signature elements that compose a spatial landscape on which to impose prehistoric tooth elemental composition data. The results of such an undertaking reveal thousands of lines of data that are not useful for this study because the elemental signatures do not reflect diet, or because they tell us nothing about potential post mortem diagenetic effects. However, the basic approach to identifying trace elemental compositions on a landscape and where bison herds were during the mineralization of their enamel is simple: Reference groups are defined among the unknowns, and sources for the various unknown groups are then determined by sampling knowns and comparing them to the unknown groups by determining the abundance of minerals, or by determining regional geologic variation. In our sample, the modern bison teeth samples provide information about the abundance of minerals in a wide geologic setting. Complexity is introduced by the nature of prehistoric unrestricted bison herds whose movement may cause the abundance of minerals in their teeth to vary significantly from modern bison samples that expired in similar geographic regions but in very different environmental and temporal settings. A further difficulty, which is the primary focus of this chapter, is the mathematical pattern recognition techniques employed to segregate the unknown bison tooth samples. Thus, analytical

approaches should be referenced to the nature of the samples analyzed and the assumptions of multivariate techniques.

DATA TRANSFORMATIONS

Transformations can be applied to the data so they will more closely follow a normal distribution or to eliminate the effect of greatly differing magnitudes of the elemental concentrations (Neff 2002:16). Log transformations are justified in part by the argument that the distributions of many elements are so skewed that transformation to log concentrations produces more near normal distributions, which are assumed by many statistical procedures (Ahrens 1965; Baxter 1994; Beiber et al. 1976; Harbottle 1976). In some cases, what seems to be log normality may be an artifact of detection limits of particular techniques, which may cut off the lower range of an element's observed concentration range (Neff 2002:16). Baxter (1994:46-47) argues that normality is not an essential requirement of most multivariate methods used in compositional data analysis, and that multimodal distributions of elemental concentrations due to the presence of multiple compositional groups would make it difficult to judge the utility of taking logarithms. However, for data analysis in which trace elemental concentrations are employed, some form of scaling is necessary to keep the variables with the larger concentrations from having excessive weight in pattern recognition and statistical analysis (Neff 2002:17). Using transformations that equalize the magnitude of the measurements and the amount of variation is in keeping with one of the premises of numerical taxonomy. That is, no individual variable should assume more weight than another in an analysis involving the calculation of

resemblance (Harbottle 1976; Sneath and Sokal 1973). All elemental concentrations were log transformed for the purposes of this study.

STATISTICAL ANALYSIS

According to Neff (2002:15), a data matrix produced by instrumental neutron activation analysis usually contains at least 25 metric variables (elemental concentrations) determined for an even larger number of observations (bison teeth). Each observation is also described by a number of descriptive variables, which may be metric or nonmetric and may pertain to both the tooth's archaeological context and to its inherent properties (Neff 2002:15). Quantitative analysis in a provenance investigation aims to extract structure from the data matrix in such a way that as many as possible of the individual teeth will be assigned a specific source location in geographic space (Neff 2002:15).

One method used to search for structure in a data matrix is characterized as "analysis of variance" (Neff 2002:15). This approach focuses on interrelationships among variables in the data rather than similarities among the observations (Neff 2002:15). In a univariate approach, t-tests may be employed to compare elemental concentration means and standard deviations from the two contexts, with an inference of variation in source composition drawn if the t-tests suggest statistically significant differences. An "Each Pair, Student's t" computes individual pairwise comparisons applying a test that is sized for individual comparisons. To compare these tests across several data matrices of numerous teeth samples, a circles plot is used as a visual representation of

group means. The illustration in **Figure 4.1** shows the alignment of comparison circles with the confidence intervals of their respective group means for the Student's t comparison. Other comparison tests widen or shorten the radii of the circles.

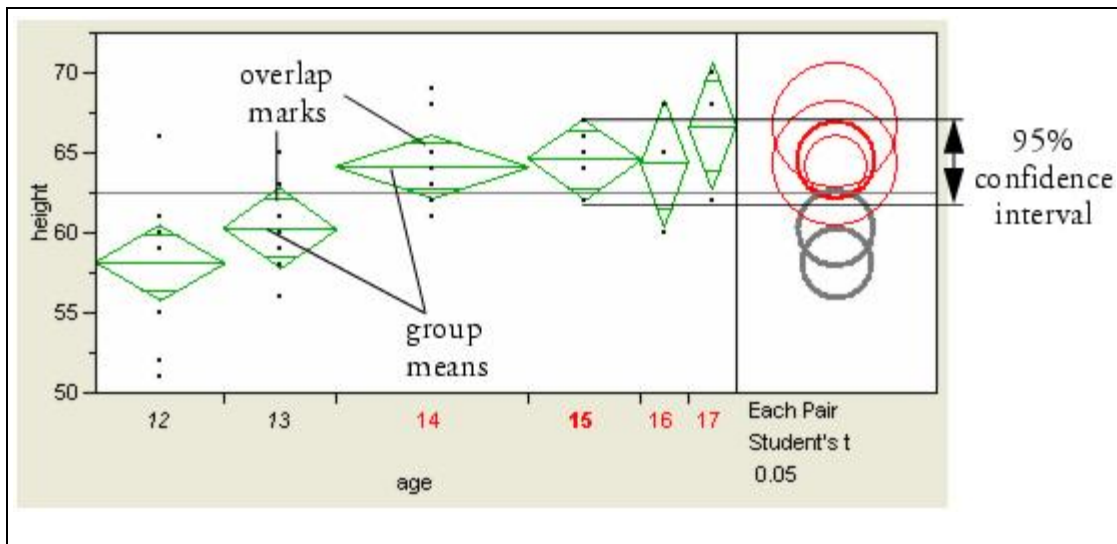


Figure 4.1 Visual comparison of group means.

One can compare each pair of group means visually by examining how the comparison circles intersect. The outside angle of intersection illustrates whether group means are significantly different (**Figure 4.2**). Circles for means that are significantly different either do not intersect or intersect slightly so that the outside angle of intersection is less than 90 degrees. If the circles intersect by an angle of more than 90 degrees or if they are nested, the means are not significantly different. More elaborate examples of the “analysis of variance” employ multivariate analysis and examine interactions among descriptive categorical variables such as location and time period in determining the structure of chemical variation. A variant of this

approach is to calculate linear discriminant functions for groups defined purely on the basis of descriptive categories (Neff 2002:15).

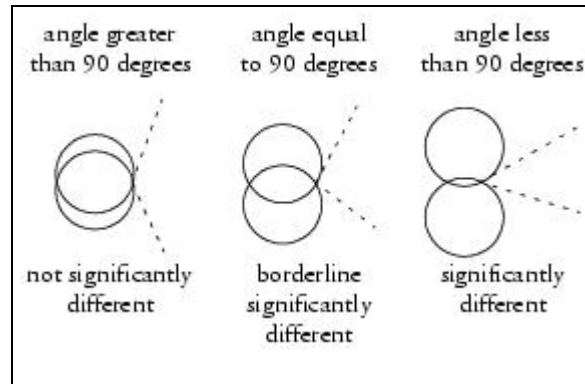


Figure 4.2 Angle of intersection and significance.

The current study employed multivariate analysis to define interrelationships among elemental concentrations among both modern and prehistoric samples to assess which elements may reflect diet, diagenesis, or metabolic composition; and among only the modern bison tooth samples to define geographic distributions across the landscape. Analysis of all samples revealed a set of isotopes and elements that proved more useful to determining diet and bison movement. These observations are boron (B), sodium (Na), chlorine (Cl), potassium (K), zinc (Zn), strontium isotope ratio ($Sr87/Sr86$), and lead (Pb). How these elements are distributed across the landscape will be discussed later.

Elemental composition is thought to be a factor of a metabolic presence within teeth for those elements not usually known to indicate diet while showing a linear and very trace distribution among both modern and prehistoric tooth samples. These elements are titanium (Ti), gallium (Ga), bromine (Br), molybdenum (Mo), iodine (I), cesium

(Cs), and cobalt (Co). A greater understanding of how elements move through the lithosphere and how these elements are distributed in bone and teeth may help identify some of these elements as useful indicators of bison diet and movement in the future. Observations that revealed modern teeth samples to have an absence or very low concentrations of a particular element while prehistoric teeth indicated a high presence of the same element are thought to represent diagenetic change of the older samples over time. Elements that make up this group include arsenic (As), rubidium (Rb), yttrium (Y), zirconium (Zr), tin (Sn), antimony (Sb), tungsten (W), mercury (Hg), and uranium (U), as well as the rare earth elements dysprosium (Dy), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), samarium (Sm), europium (Eu), and gadolinium (Gd). Future studies that closely examine how and when minerals are incorporated into bone and teeth post mortem may also assist in identifying some of these elements as dietary or geographical indicators. Also, elements such as uranium may prove to be excellent indicators for obtaining absolute dates on bison teeth as preliminary data observed during this study shows a gradual increase of U over time.

T-tests of only the modern teeth for the elements B, Na, Cl, K, Zn, Sr88/Sr87, and Pb showed some very interesting patterns regarding the distribution of these elements across the landscape (**Figures 4.3 through 4.9**).

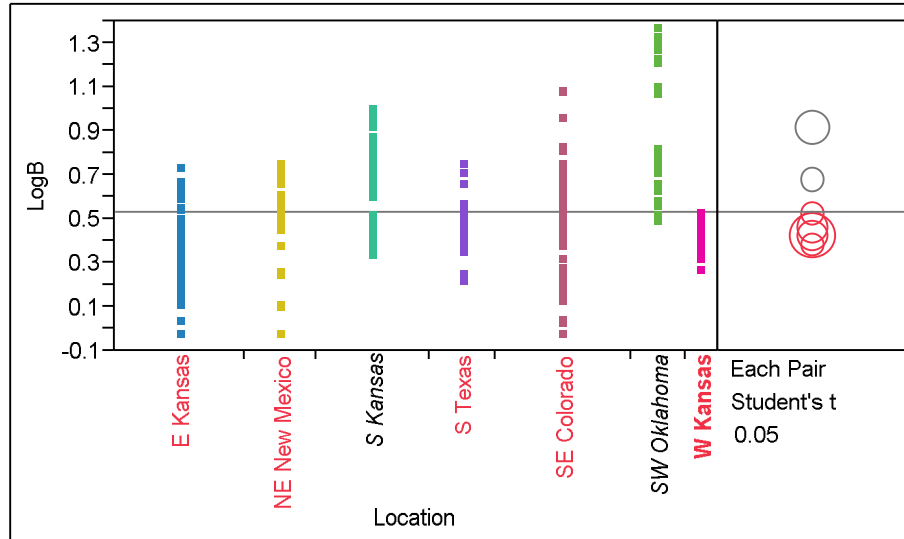


Figure 4.3 Oneway analysis of LogB by location, and t-test diagram. This plot shows the southern Kansas samples and southwestern Oklahoma samples are significantly different from the remaining samples.

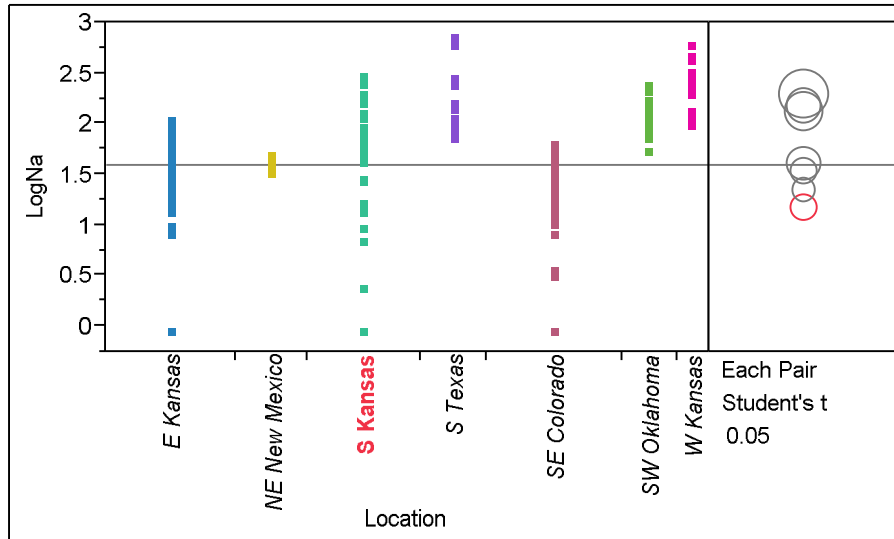


Figure 4.4 Oneway analysis of LogNa by location, and t-test diagram. This plot shows that nearly all of the samples have a unique elemental signature with western Kansas, southwestern Oklahoma, and south Texas clustering together; and northeastern New Mexico and eastern Kansas clustering together.

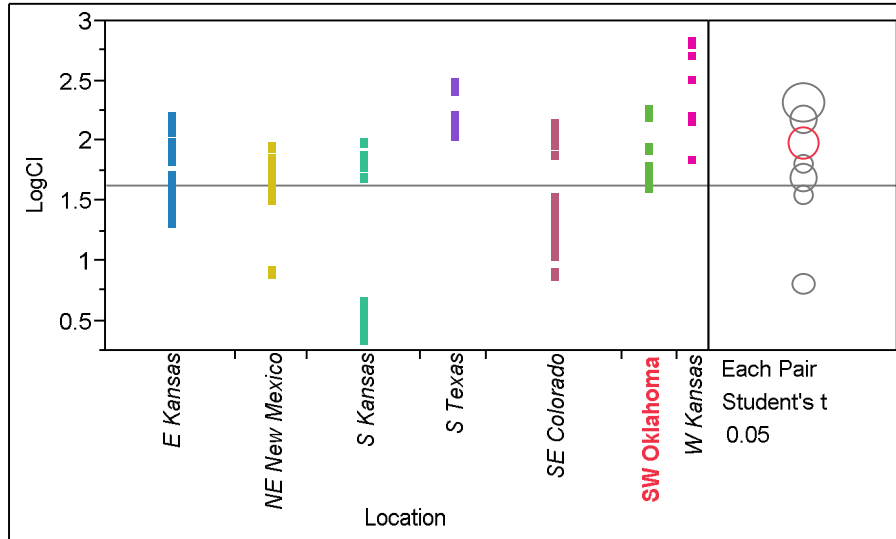


Figure 4.5 Oneway analysis of LogCl by location, and t-test diagram. This plot shows that nearly all of the samples have a unique elemental signature with western Kansas and south Texas clustering together; and northeastern New Mexico and eastern Kansas clustering together.

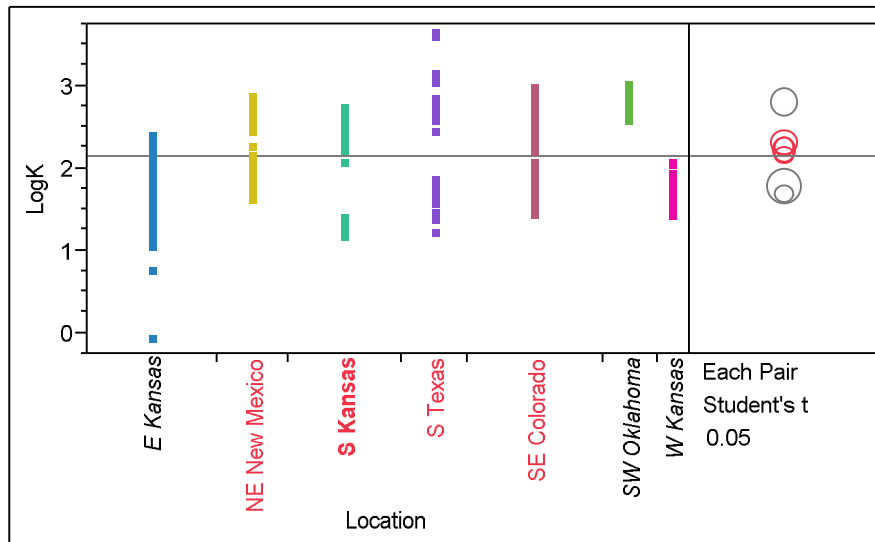


Figure 4.6 Oneway analysis of LogK by location, and t-test diagram. This plot shows that northeastern New Mexico, south Kansas, south Texas, and southeastern Colorado have similar elemental signatures .

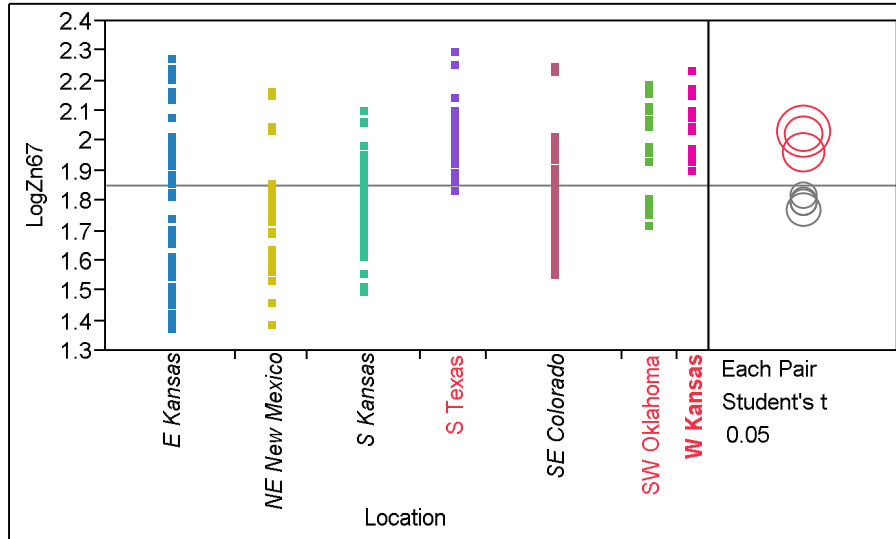


Figure 4.7 Oneway analysis of LogZn by location, and t-test diagram. This plot shows that southern Texas, southwestern Oklahoma and western Kansas samples have similar elemental signatures .

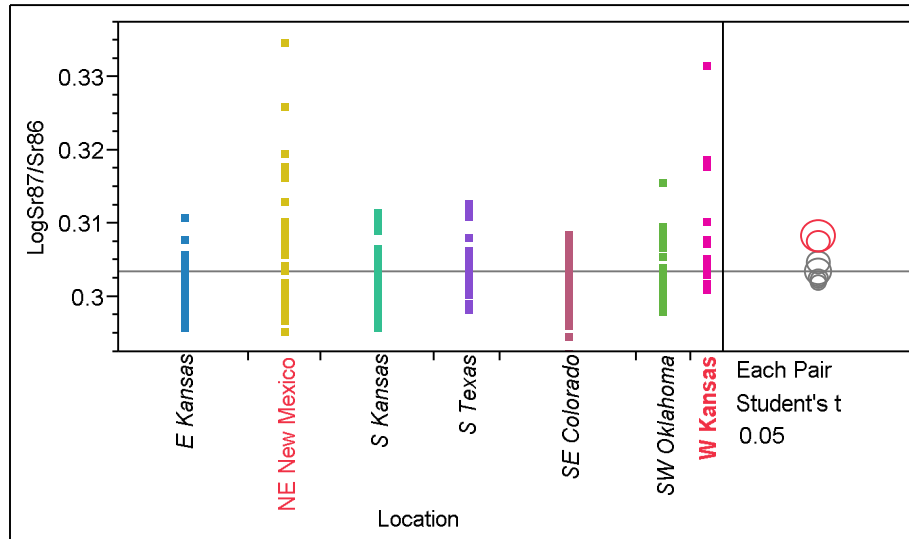


Figure 4.8 Oneway analysis of LogSr87/Sr86 by location, and t-test diagram. This plot shows that northeastern New Mexico and west Kansas samples have similar elemental signatures .

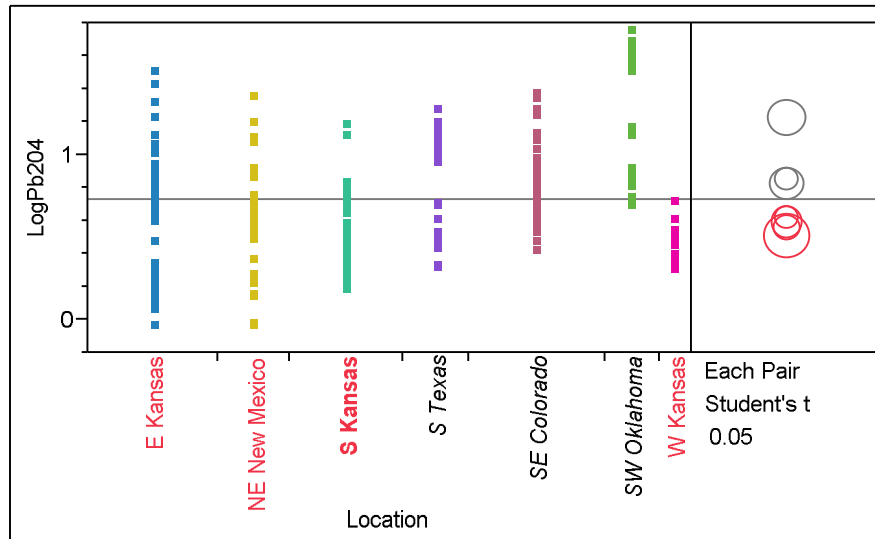


Figure 4.9 Oneway analysis of LogPb by location, and t-test diagram. This plot shows that eastern Kansas, northeastern New Mexico, southern Kansas, and western Kansas samples have similar elemental signatures .

The B t-test shows that we may expect to find higher concentrations of B in places like south Kansas and southwestern Oklahoma that are markedly different from the other places sampled during this study. T-tests for Na and Cl indicate similarities in how these elements are distributed across the landscape and many of the locations are unique in the concentration of these elements. K elemental concentrations are shown to be significantly higher for southwestern Oklahoma samples, and significantly lower for east and west Kansas than the remaining samples. South Texas, southwestern Texas, and west Kansas show significantly higher concentrations of Zn than the other samples. Sr87/Sr86 concentrations are highest in northeastern New Mexico and west Kansas, while east Kansas, south Kansas, and southeastern Colorado show the lowest concentrations. East Kansas, northeastern New Mexico,

south Kansas, and west Kansas have significantly low Pb concentrations and southwestern Oklahoma stands out with very high concentrations.

T-tests were also used to determine interrelationships among each prehistoric site and the modern samples to compare elemental concentration levels and variation (**Appendix B**). Sr87/Sr86 serves as an example to illustrate the kinds of patterns observed in the data matrix (**Figures 4.10 through 4.17**).

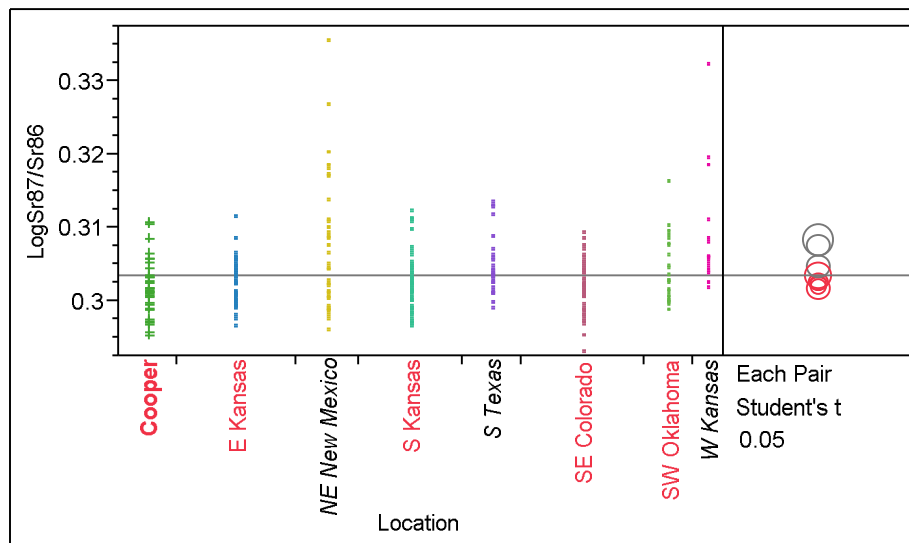


Figure 4.10 Oneway analysis of LogSr87/Sr86 by location (modern and Upper Kill Cooper samples) and t-test diagram.

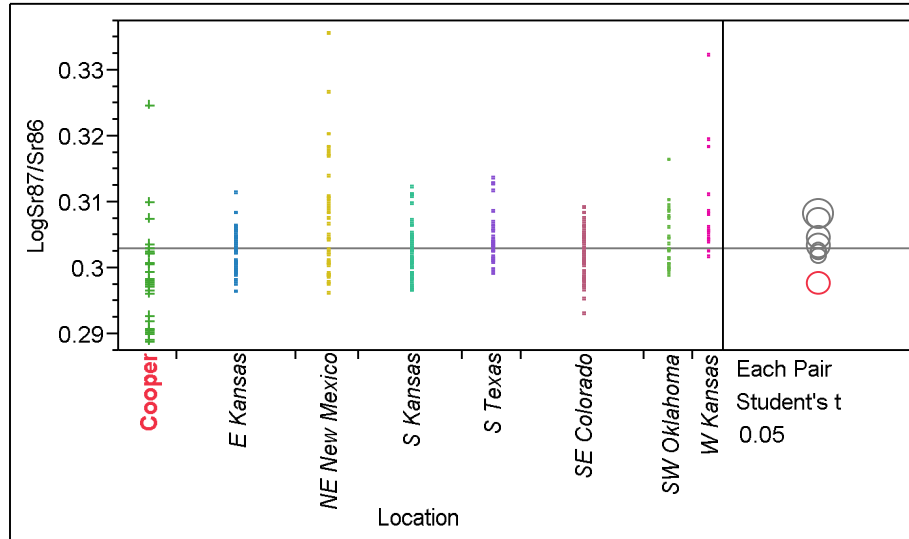


Figure 4.11 Oneway analysis of LogSr87/Sr86 by location (modern and Middle Kill Cooper samples) and t-test diagram.

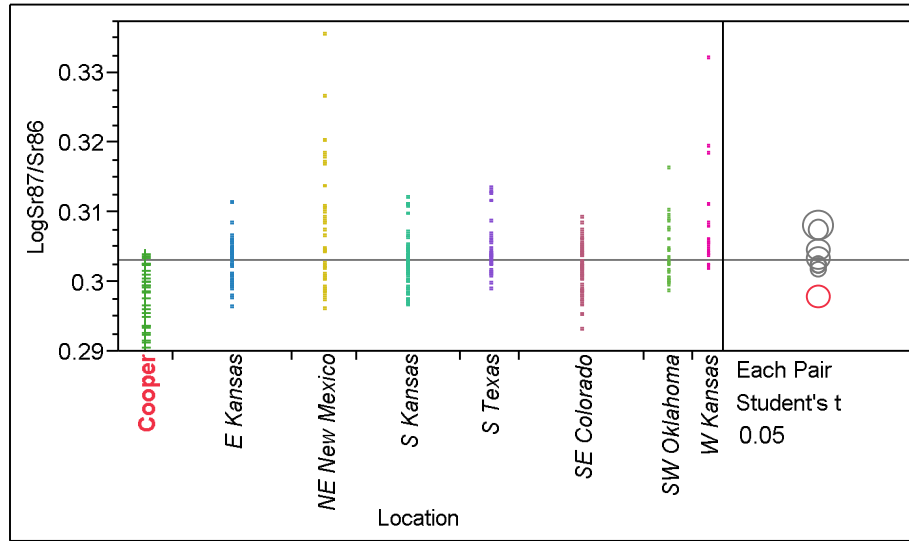


Figure 4.12 Oneway analysis of LogSr87/Sr86 by location (modern and Lower Kill Cooper samples) and t-test diagram.

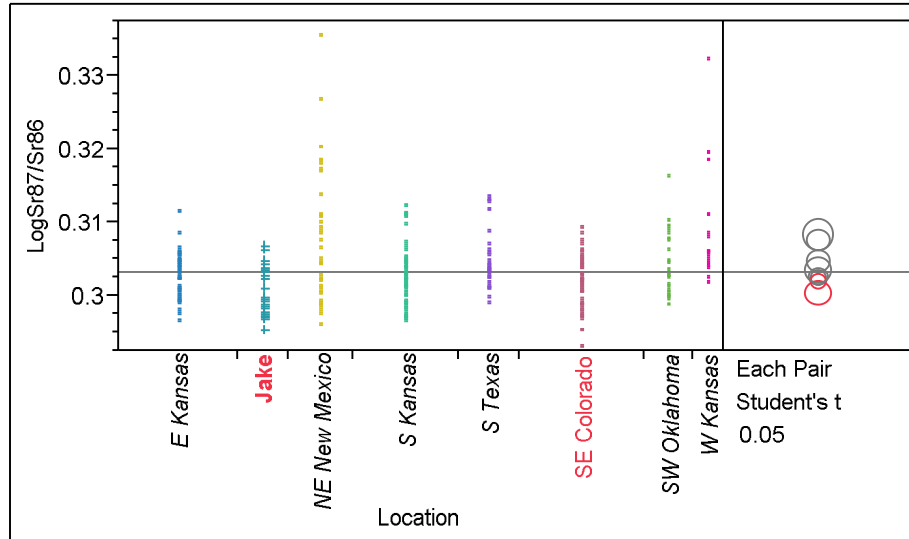


Figure 4.13 Oneway analysis of LogSr87/Sr86 by location (modern and Jake Bluff samples) and t-test diagram.

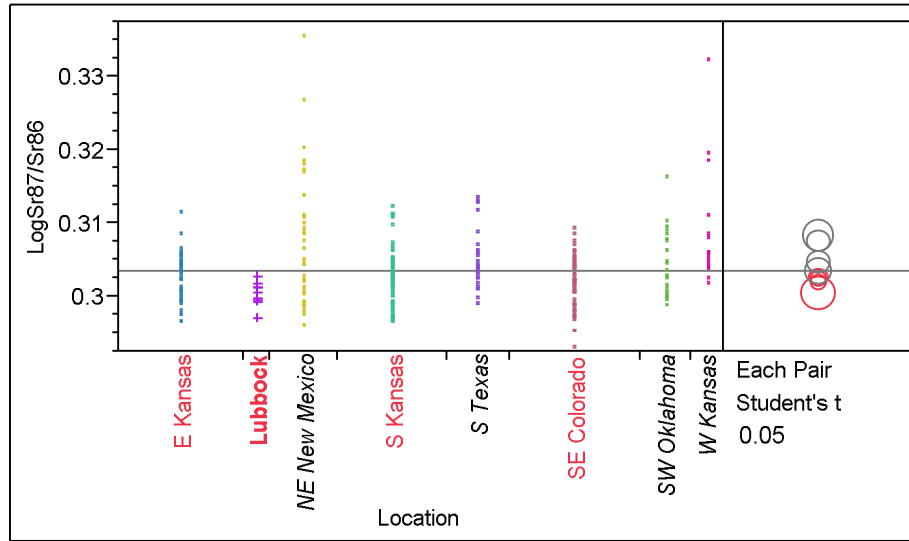


Figure 4.14 Oneway analysis of LogSr87/Sr86 by location (modern and Lubbock Lake samples) and t-test diagram.

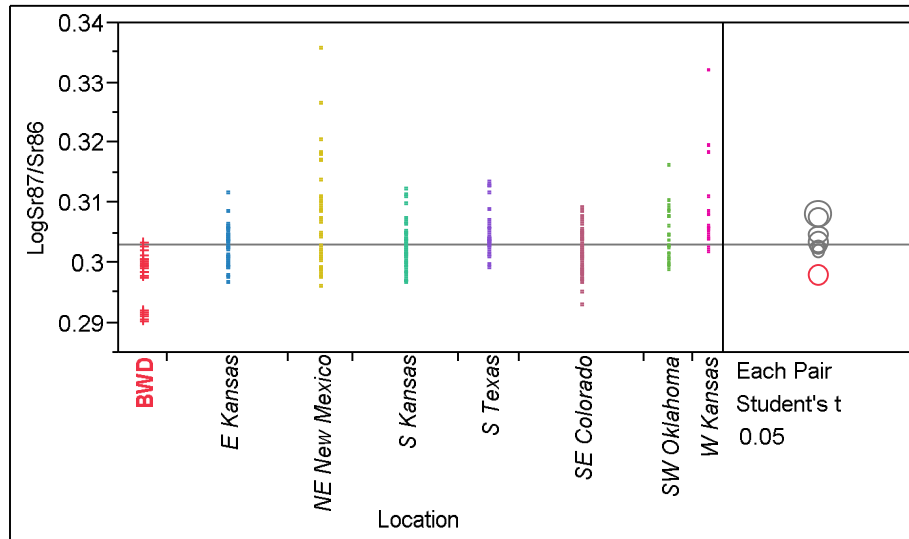


Figure 4.15 Oneway analysis of LogSr87/Sr86 by location (modern and Blackwater Draw samples) and t-test diagram.

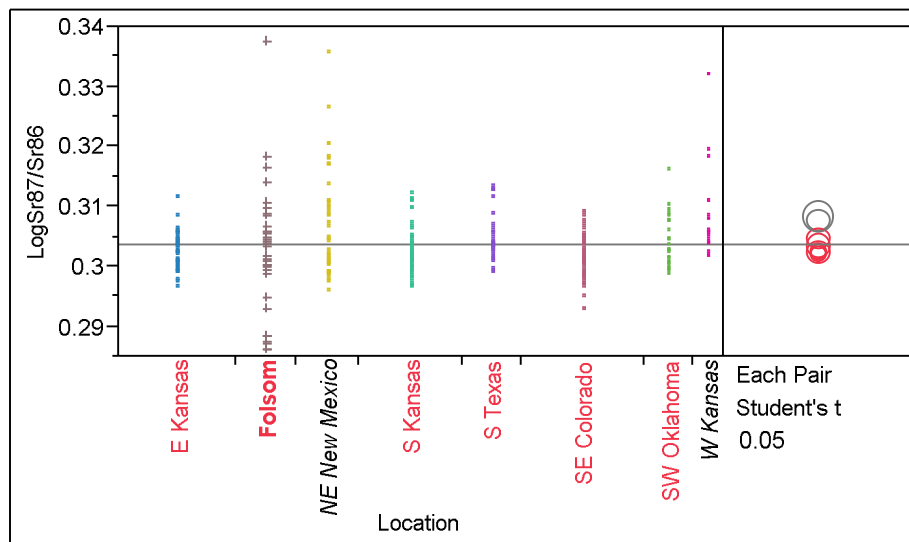


Figure 4.16 Oneway analysis of LogSr87/Sr86 by location (modern and Folsom samples) and t-test diagram.

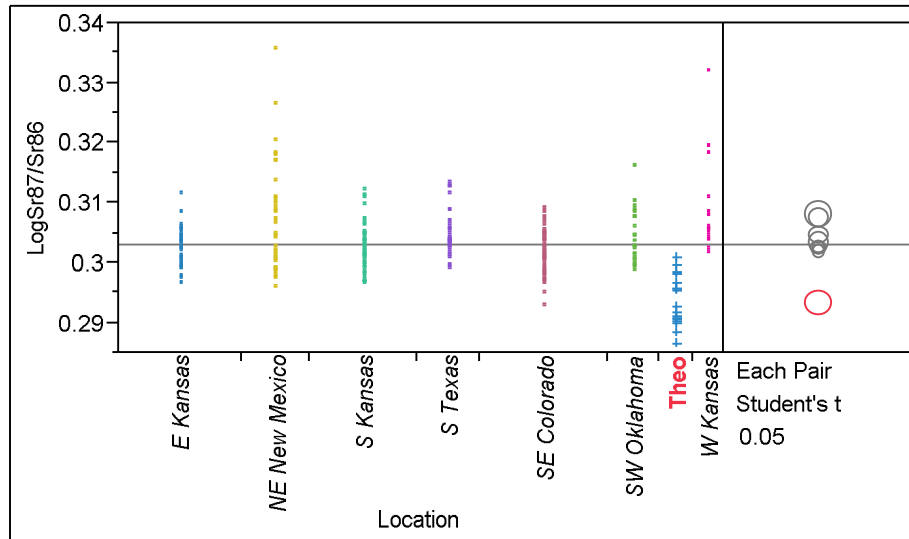


Figure 4.17 Oneway analysis of LogSr87/Sr86 by location (modern and Lake Theo samples) and t-test diagram.

Figure 4.10 shows that the Upper Kill Cooper sample has isotopic ratios that are statistically lower than northeastern New Mexico and south Texas. The implication is that Upper Kill bison did not traverse at least those two areas. Figure 4.11 shows that the Middle Kill Cooper sample has ratios that are statistically lower than all of the modern samples. The implication is that Middle Kill bison did not traverse any of the modern sample areas. Figure 4.12 shows that the Lower Kill Cooper sample has isotopic ratios that are statistically lower than all of the modern samples. The implication is that the Lower Kill bison did not traverse any of the modern sample areas. Figure 4.13 shows that the Jake Bluff sample has ratios that are statistically lower than all of the modern samples except for southeastern Colorado. The implication is that Jake Bluff bison grazed in an environment with similar Sr87/Sr86 ratios as modern bison in southeastern Colorado. Figure 4.14 shows that the Lubbock

Lake sample has isotopic ratios that are statistically lower than northeastern New Mexico, south Texas, southwestern Oklahoma, and west Kansas. The implication is that Lubbock bison did not traverse at least those four areas. Figure 4.15 shows that the Blackwater Draw sample has ratios that are statistically lower than all of the modern samples. The implication is that the Blackwater Draw bison did not traverse any of the modern sample areas. Figure 4.16 indicates that the Folsom sample has isotopic ratios that are statistically lower than northeastern New Mexico and west Kansas. The implication is that the Folsom bison did not traverse at least those two areas. Figure 4.17 shows that the Lake Theo sample has ratios that are statistically lower than all of the modern samples. The implication is that the Lake Theo bison did not traverse any of the modern sample areas.

T-tests of the prehistoric samples may correlate to the modern distributions of particular elements. An evaluation of this sort can provide information regarding the absence of a prehistoric bison in a particular region sampled by the modern teeth. The prehistoric samples that are markedly different from modern samples can presumably be inferred to have never traversed those areas. For example, B concentrations in the Cooper Middle and Cooper Lower samples indicate that there are no relationships in concentrations among those samples and the modern datasets with the exception of the southwestern Oklahoma B concentrations (Appendix B). One might infer, then, that the two Cooper bison did not traverse those areas sampled; with the potential that the individuals grazed in southwestern Oklahoma sometime during their enamel formation. However, it must be taken into consideration that some of the elements analyzed have similar concentrations in several of the modern sample areas (see

Figures 4.3 through 4.9 and a summary in **Table 4.1**). Some elemental concentrations of the selected minerals are unique to a specific area while others are more heterogeneous across several regions. Using the B example from above, modern samples indicate that a uniquely high concentration exists in southwestern Oklahoma that does not exist for the other samples. Because the Cooper Middle and Lower Kill sample's t-test circles are not significantly different from the southwestern Oklahoma samples it may be inferred that some real relationship exists between these samples.

Table 4.1 Table of selected elements and concentration levels (based on significant differences observed in the t-tests) for modern bison tooth samples.

Element	Concentration	Location
B	High	SW OK
	Middle	S KS
	Low	E KS=NE NM=S TX=SE CO=W KS
Na	High	W KS=SW OK=S TX
	Middle	NE NM=E KS
	Low	S KS, SE CO
Cl	High	W KS=S TX
	Middle	SW OK, SE CO, NE NM, E KS
	Low	S KS
K	High	SW OK
	Middle	NE NM=S KS=S TX=SE CO
	Low	W KS=EKS
Zn	High	S TX=SW OK=W KS
	Low	E KS=NE NM=S KS=SE CO
Sr	High	NE NM=W KS
	Low	E KS=S KS=S TX=SE CO=SW OK
Pb	High	SW OK
	Middle	S TX=SE CO
	Low	E KS=NE NM=S KS=W KS

Notes: = refers to locations that do not have significant elemental differences
, refers to locations that do have significant elemental differences but fall within a range of the data

For the current study, t-tests can provide a glimpse of some of the interrelationships observed in the data matrix, but examining down-tooth records in prehistoric bison requires further investigative techniques that utilize data points throughout the entire tooth (as opposed to averages) to be compared individually to the modern data sets.

PATTERN RECOGNITION AND GROUP EVALUATION

Identifying potential source-related subgroups in the compositional data matrix is the most crucial step in reconstructing bison movement patterns. One approach is to employ noncompositional information (location, time period) as a basis for hypothesizing which teeth can be grouped together. An alternative to this practice is to use numerical pattern-recognition techniques to identify analyzed specimens that are compositionally similar to one another (Neff 2002:18). Ordination or partitioning is an approach for pattern recognition (Bishop and Neff 1989). Ordination includes simple bivariate plots and numerous methods based on eigenvector extraction, the most common of which is principal components analysis (PCA). Partitioning approaches apply various forms of cluster analysis. The current study employs the ordination approach using PCA as it is the most effective method thought to represent the information within a data matrix in spaces of reduced dimensionality, and it is the most commonly used technique in archaeology (Bishop and Neff 1989). Like all ordination techniques, PCA is a tool to condense data. The essence of PCA involves treating data as a geometrical object, and then finding the most informative angle

from which to view the shape. The mathematics underlying PCA were first derived from Peerson (1901) and rediscovered by Hotelling (1933). It became widely adopted by plant ecologists in the 1950s, and remains the ordination technique of first choice for environmental scientists (Shaw 2003:93). PCA provides three useful datasets: projections onto new coordinate axes, the rotations needed to generate each new axis, and the actual information content of each new axis (Shaw 2003:100).

“PCA is based on the extraction of eigenvalues and eigenvectors (also called characteristic roots and characteristic vectors) from a minor product matrix $X'X$ (in R-mode analysis), or major product matrix, XX' (in Q-mode analysis), of a data matrix, X . R-mode analysis is thought of as focusing on variables, whereas Q-mode analysis is thought of as focusing on objects” (Neff 2002:19).

The principal components axes obtained by eigenvector extraction are arranged in order of decreasing amount of variance subsumed (Neff 2002:21). An assumption is that greater interpoint distances may be expected for members of different groups, and different distinct related subgroups will appear as separate point clouds on the object plots of the first several principal components. The view of the data derived from PCA depends on the subset of observations chosen as the basis for the analysis. The observations chosen in the current investigation are the elements, B, Na, Cl, K, Zn, Sr, and Pb.

In a variable space such as that defined by elemental concentrations or log concentrations, groups will be identifiable as regions of relatively high point density

that are separated from other groups by regions of lower point density (Everitt 1993). Evaluation of whether a potential group identified through ordination and pattern recognition may represent a localized source requires that the criteria for judging group coherence be stated formally and explicitly (Neff 2002). Two characteristics define the coherence of groups in multivariate elemental concentration space: location (centroid) and shape (variance-covariance structure). For example, several of the modern bison tooth sample groups plotted in **Figure 4.18** have distinct centroids, but they also differ in how compact they are and how they are oriented when examining the PCA correlation matrix. Plotting the first order principal component against the third order principal component was also done during this study, but no obvious patterns were recognized and they will not be discussed here.

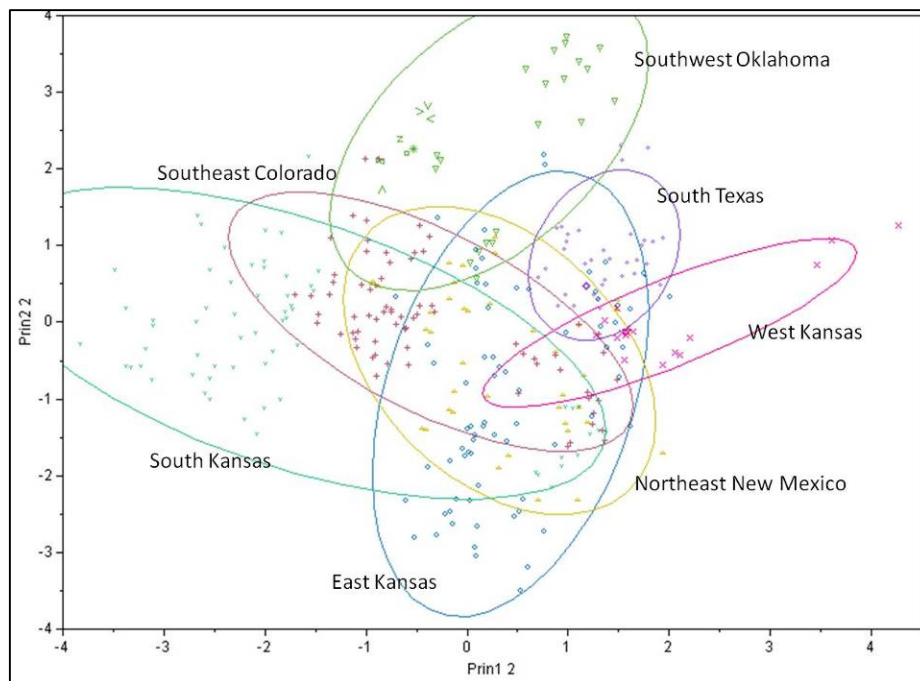


Figure 4.18 PCA plot of modern bison tooth samples and density ellipse ($P=0.90$).

What may be inferred from the PCA plot of modern bison teeth is that a high degree of overlap is observed using the selected elements in this analysis for the various locations. A closer look at the groups revealed by the PCA plot indicates that in several instances two or more groups are present within the density ellipses. These down-tooth points group by individual bison meaning the PCA plot is illustrating a wide range of variation not only geographically, but for tooth specimens from individual bison within the same herd. The south Texas samples, however, group together in a tighter cluster indicating less variation, but these two samples represent P4 premolars from either side of a mandible from a single bison. PCA plots of prehistoric bison samples and modern samples show similar trends (**Figures 4.19 through 4.26**).

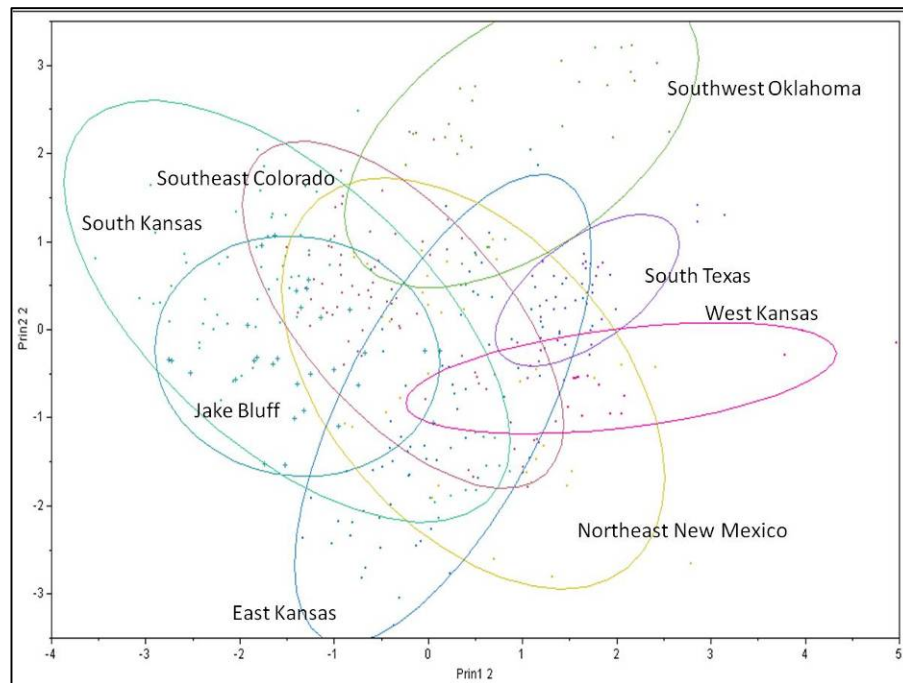


Figure 4.19 PCA plot of Jake Bluff and modern bison tooth samples showing density ellipses ($P=0.90$).

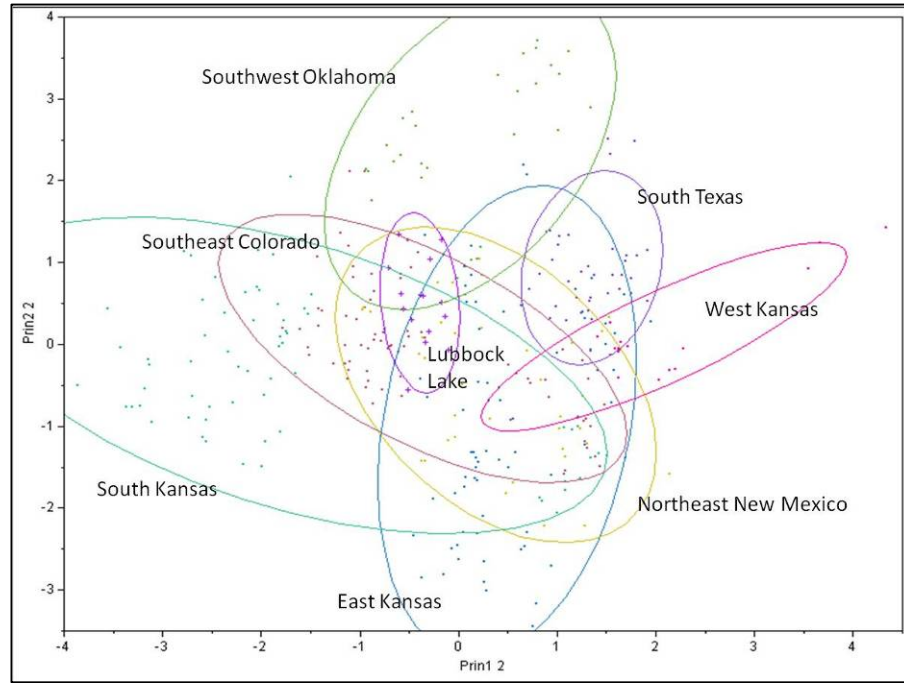


Figure 4.20 PCA plot of Lubbock Lake and modern bison tooth samples showing density ellipses ($P=0.90$).

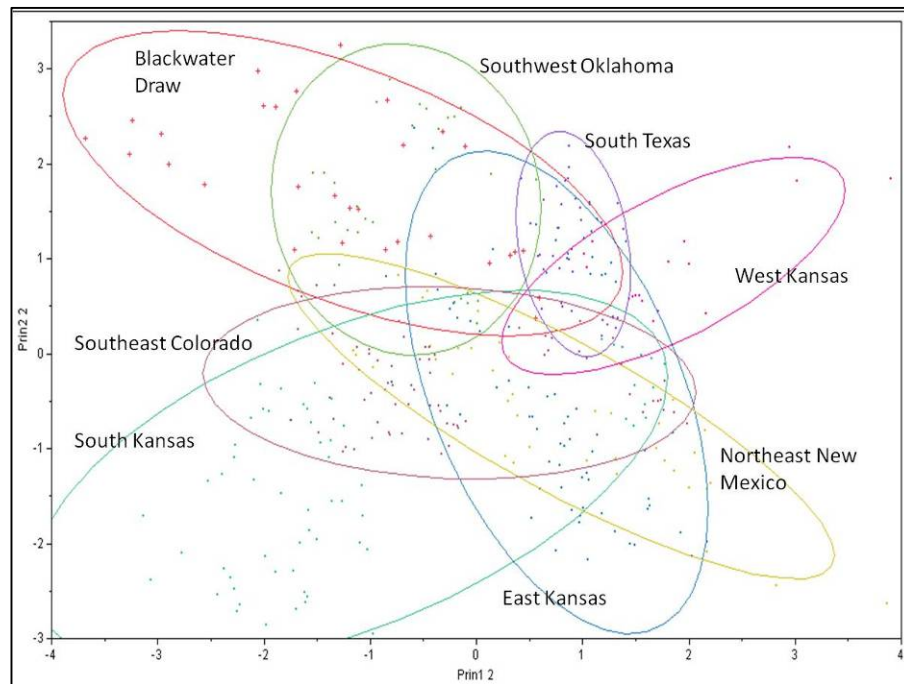


Figure 4.21. PCA plot of Blackwater Draw and modern bison tooth samples showing density ellipses ($P=0.90$).

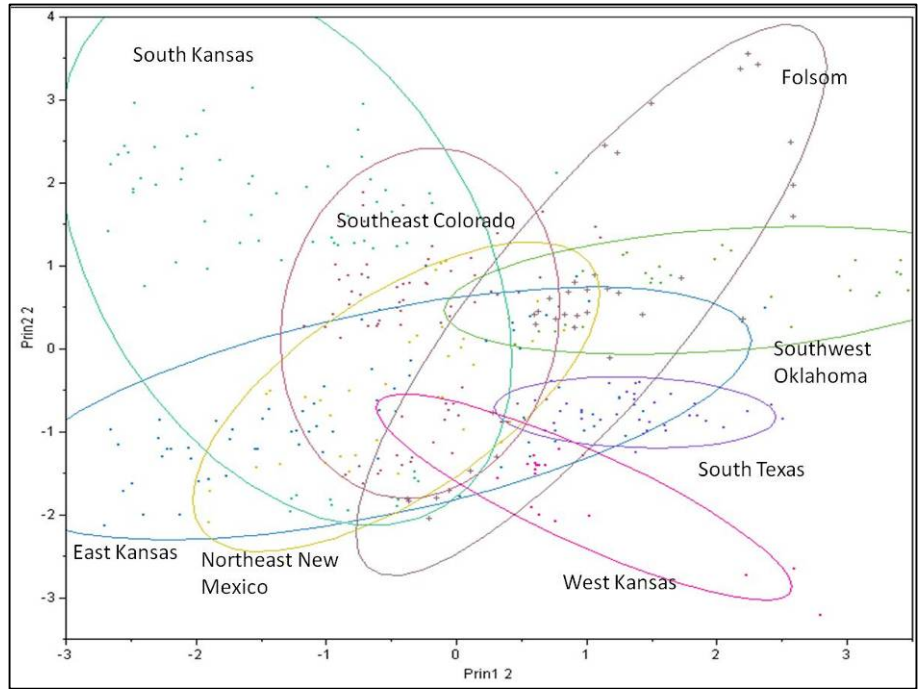


Figure 4.22. PCA plot of Folsom and modern bison tooth samples showing density ellipses (P=0.90).

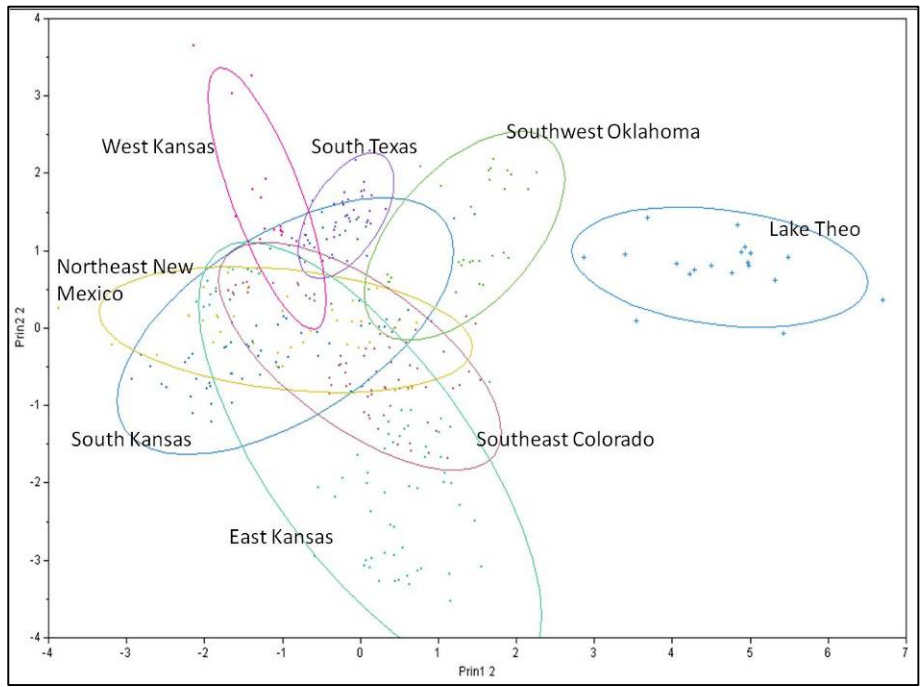


Figure 4.23. PCA plot of Lake Theo and modern bison tooth samples showing density ellipses (P=0.90).

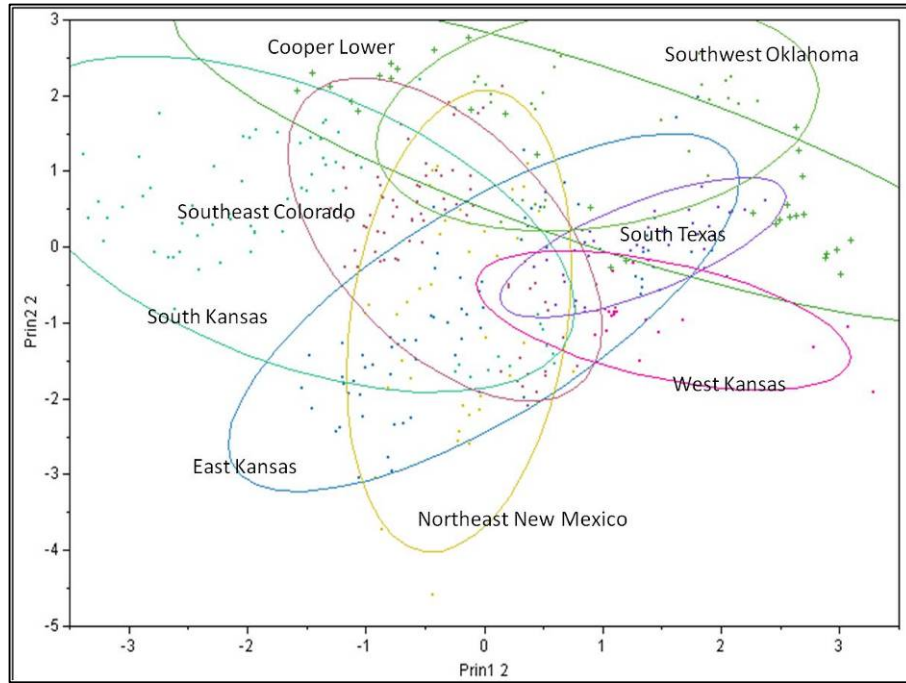


Figure 4.24 PCA plot of Cooper Lower and modern bison tooth samples showing density ellipses ($P=0.90$).

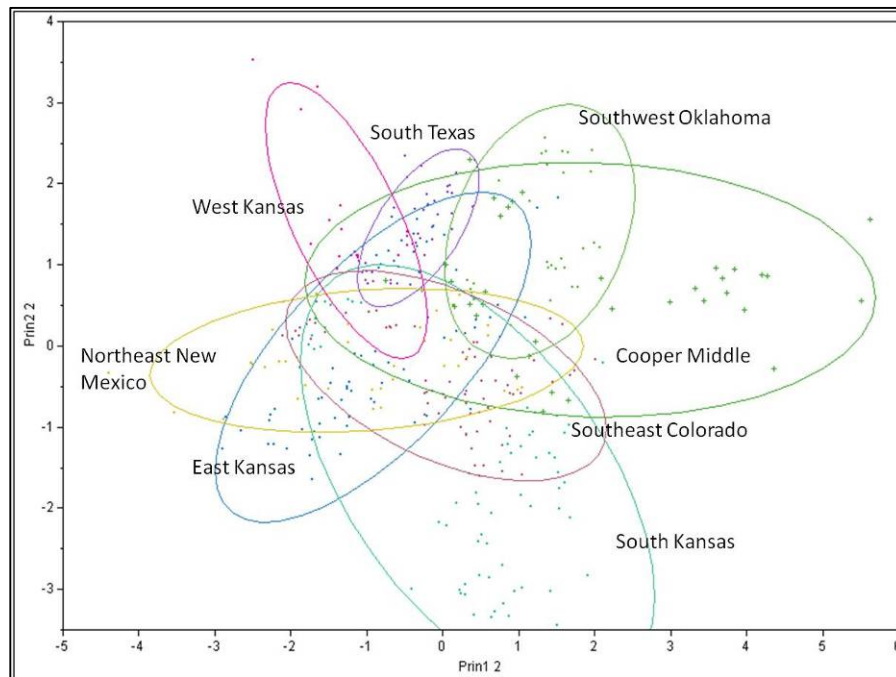


Figure 4.25 PCA plot of Cooper Middle and modern bison tooth samples showing density ellipses ($P=0.90$).

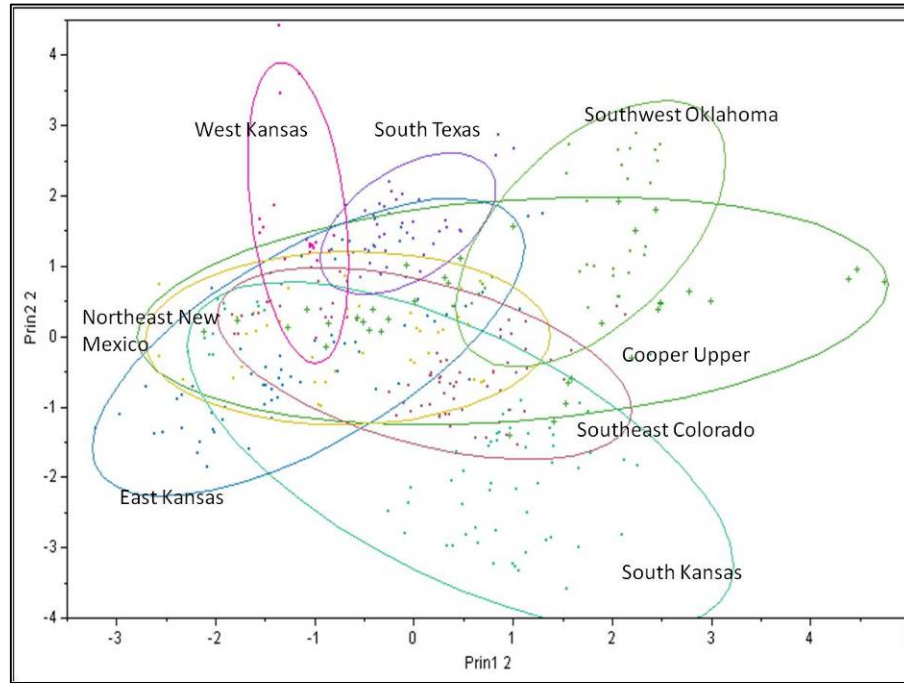


Figure 4.26 PCA plot of Cooper Upper and modern bison tooth samples showing density ellipses ($P=0.90$).

A PCA plot (biplot of the first order principal component to the second order principal component) of the Jake Bluff bison tooth samples group in the middle of plots of the modern samples, and the shape and size of the density ellipse is rounder and smaller than most of the modern samples (**Figure 4.19**). Lake Theo samples are unique in that they group well outside the range of the modern samples, and the density ellipse is similar to those of the modern samples (**Figure 4.23**). Blackwater Draw, Folsom, and each of the Cooper samples are scattered across the entire plot and generally are larger, elongated density ellipses than the modern samples (**Figures 4.21, 4.22, 4.24, 4.25, and 4.26**). Note, however, that within the ellipse of the Cooper Lower samples there are two distinct groups that cluster together by sample (i.e., representative of the two individuals sampled). Jake Bluff most resembles the south

Kansas samples. Lubbock Lake most resembles the northeastern New Mexico, southwestern Oklahoma, and southeast Colorado samples. Blackwater Draw samples most resemble the southwestern Oklahoma samples. The largest cluster in the Folsom plot most resembles the southwestern Oklahoma samples. Lake Theo is unlike any of the modern plots. Cooper Lower and Cooper Middle samples most resemble southwestern Oklahoma samples. The largest cluster of Cooper Upper samples most resembles northeastern New Mexico samples.

These biplots help identify potential patterns as discussed above but they do not reveal information about the down-tooth records of prehistoric teeth. Rather, we are only supplied with a comparison of modern and prehistoric sample averages. In order to discuss prehistoric bison movement – keeping in mind those lessons learned above regarding potential variation within a single tooth and variation within a herd – we need to examine modern tooth averages and point-to-point trends observed in the prehistoric samples. To understand how elemental compositions changed down the prehistoric tooth, and how these changes may be related to specific nodes on the landscape observed in averages of our modern sample data, we can plot each point down the tooth against the first order principal component (which is a representation of the selected elements for several samples for several locations). **Figures 4.27 through 4.34** illustrate the kinds of trends in the prehistoric sample data as they relate to specific geographic locations.

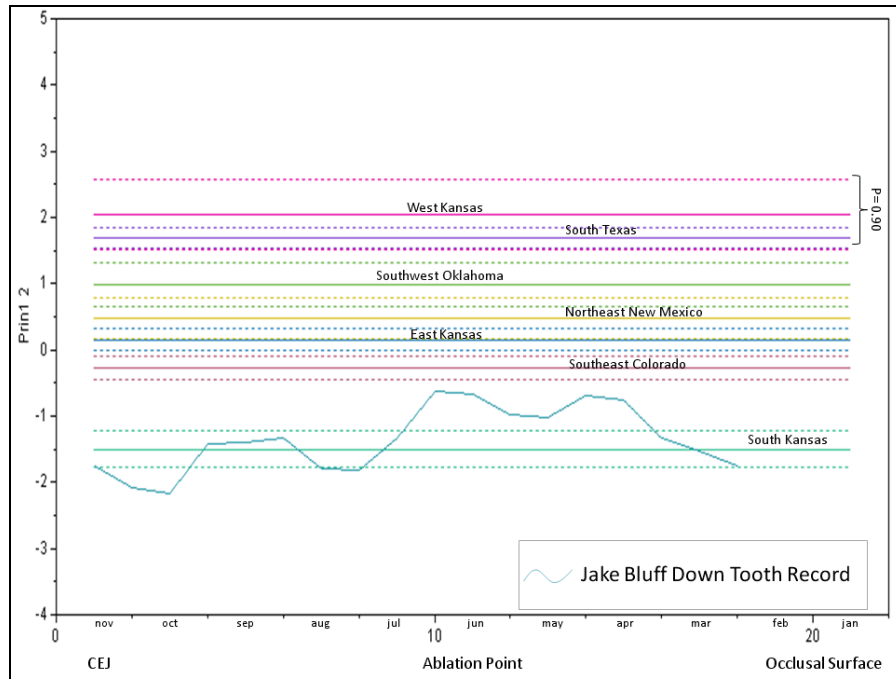


Figure 4.27 Plot of Jake Bluff down-tooth record and modern bison tooth samples (mean P=0.90) to the first order principal component.

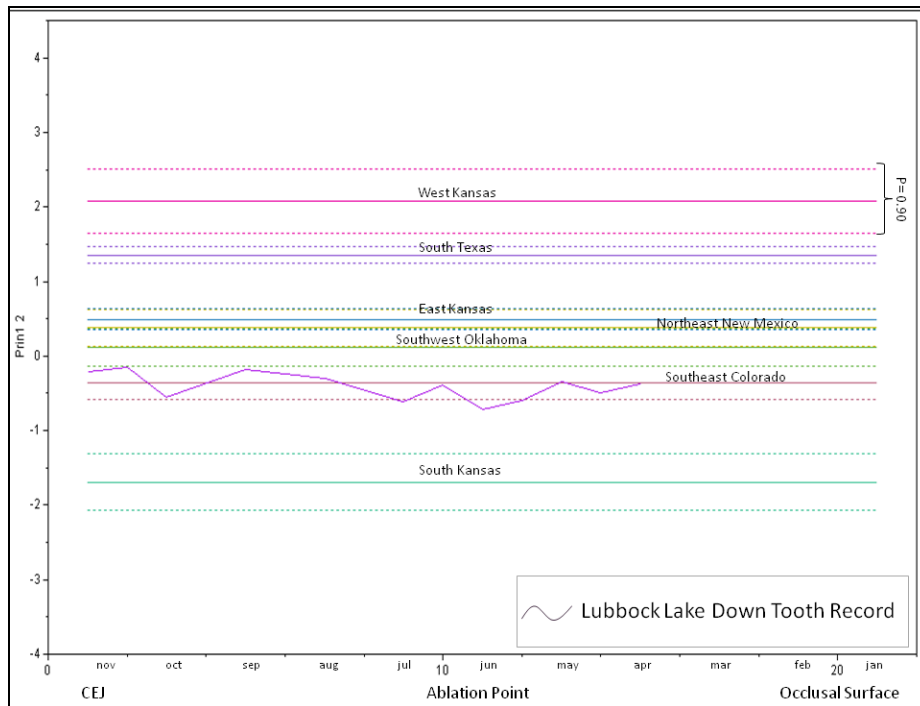


Figure 4.28 Plot of Lubbock Lake down-tooth record and modern bison tooth samples (mean P=0.90) to the first order principal component.

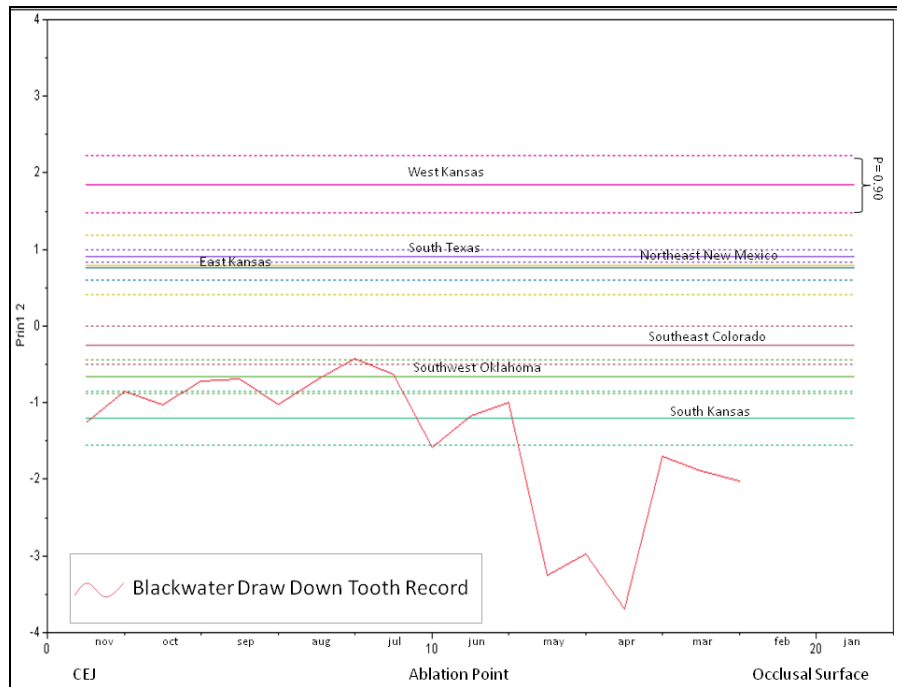


Figure 4.29 Plot of Blackwater Draw down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

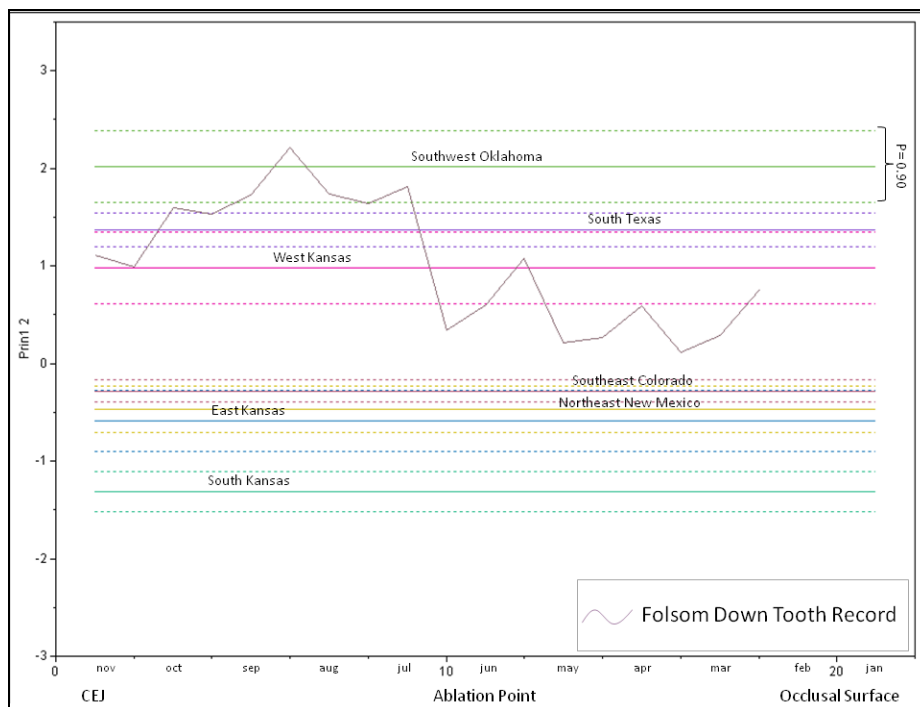


Figure 4.30 Plot of Folsom down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

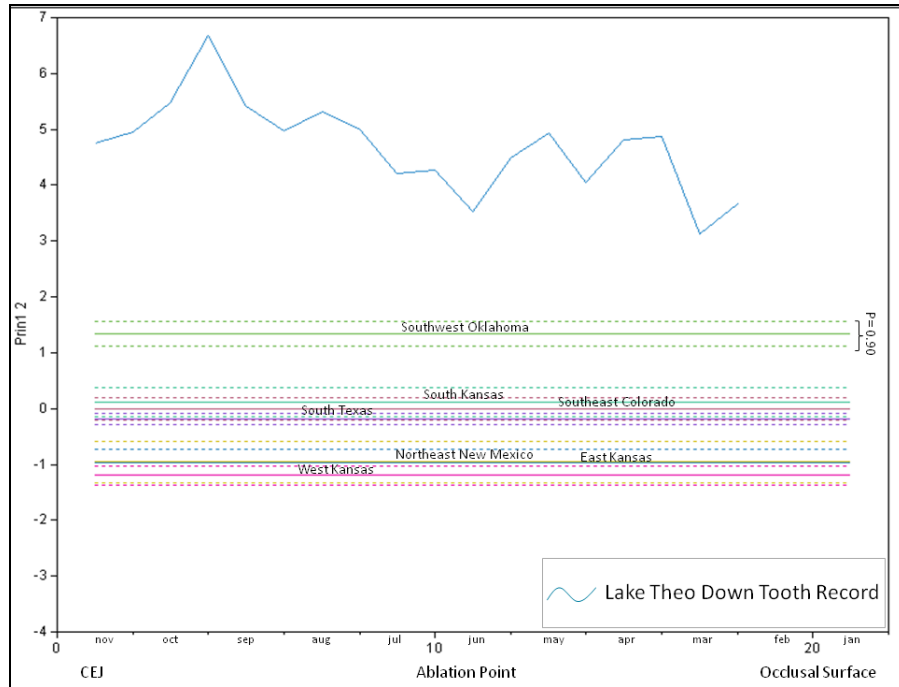


Figure 4.31 Plot of Lake Theo down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

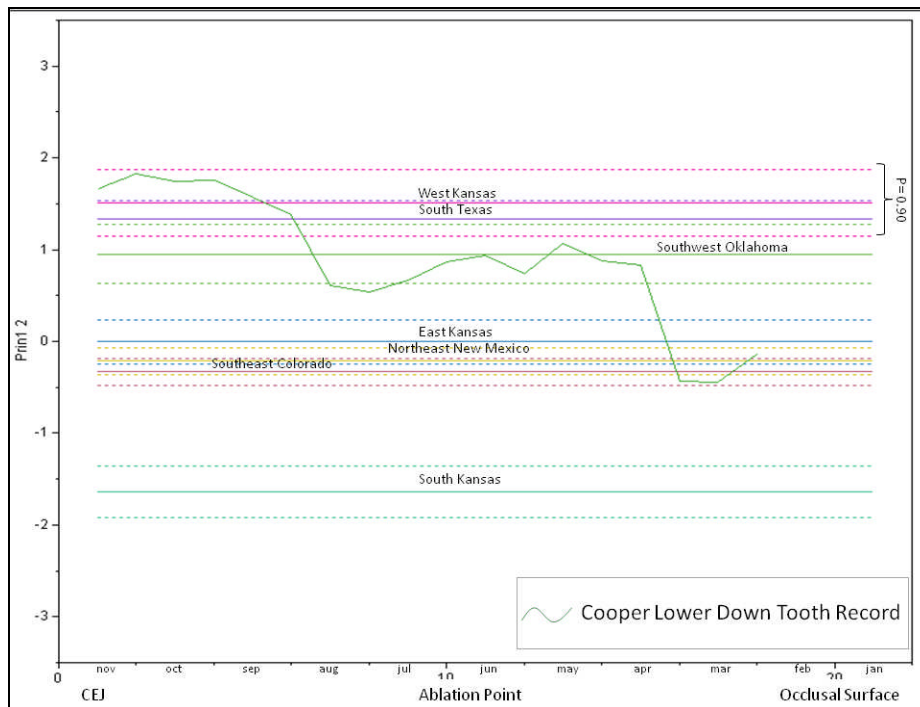


Figure 4.32 Plot of Cooper Lower down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

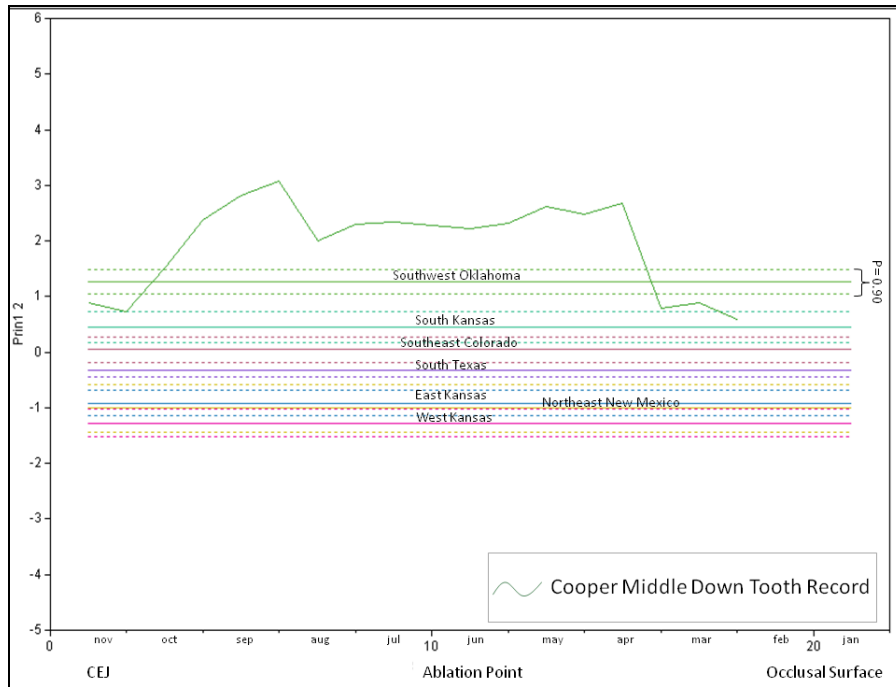


Figure 4.33 Plot of Cooper Middle down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

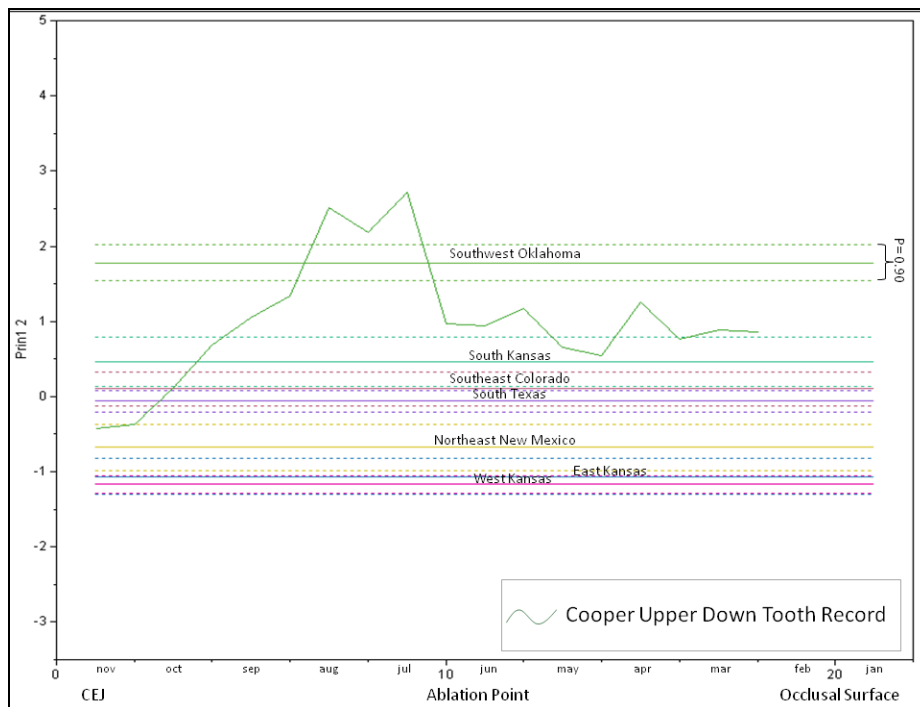


Figure 4.34 Plot of Cooper Upper down-tooth record and modern bison tooth samples (mean $P=0.90$) to the first order principal component.

Trends observed in the plots above are numerous. Many of the down-tooth points in the Jake Bluff samples resemble those of the modern south Kansas samples (**Figure 4.27**). At the onset of enamel mineralization, the individuals in the Jake Bluff bison assemblage grazed in a location approximating the elemental composition to that of south Kansas. By the spring and during the summer months, the bison were grazing in an area that does not parallel any of the areas sampled by this study. During the fall, bison were back consuming grasses in an area with a similar mineral composition to that of south Kansas. While we cannot conclusively say that bison at the Jake Bluff site traveled to south Kansas because we do not know the elemental composition of the Jake Bluff site proper, we can observe a few items of interest. First, we know the Jake Bluff bison did not travel during the early spring and through the mid- to late fall to any of the modern locations sampled by this study except for perhaps south Kansas. Since we know Folsom-age hunters may have been attempting to predict the movement of bison at the Jake Bluff site (as hunters will naturally do) in an effort to procure large herds during the late summer/early fall, the data may indicate that the Jake Bluff locality itself is similar in elemental content to a location we did not sample during this study. If that is indeed the case, the Cooper bison sampled in this study should also not have data points within known sample areas for the late summer/early fall months. Finally, it appears from the data that Jake Bluff bison did not move far, or at least for an extended period, from the area where they met their demise.

The Lubbock Lake samples indicate very little down-tooth variation, and have an elemental composition very much like the modern bison samples from southeastern Colorado (**Figure 4.28**). It does not appear much mobility is evident in the bison sampled from Lubbock Lake, and it is quite likely that the Lubbock Lake locality has an elemental composition similar to that found in southeastern Colorado.

The Blackwater Draw samples indicate a high degree of variability and for the first several months of enamel mineralization, uptake of the elements sampled did not occur in any of our modern sample areas (**Figure 4.29**). By the summer, the bison at Blackwater Draw appear to be visiting locations with elemental composition similar to that of south Kansas and then on to areas similar to southwestern Oklahoma during the months humans would have been attempting to find large herds on the Southern Plains.

The Folsom site samples indicate a high degree of variability and for the first several months of enamel mineralization, uptake of the elements sampled for occurred near the 90 percent confidence interval for west Kansas (**Figure 4.30**). However, it appears there are not enough data to understand the grazing location for these early months of amelogenesis. During the fall, the bison were grazing an area similar to that of southwestern Oklahoma, and moving on to an area with similar elemental content to that of west Kansas by the winter months.

Elemental composition trends observed in the Lake Theo sample are difficult to interpret as they are highly erratic, and none of the down-tooth points fall within the known modern tooth sample areas (**Figure 4.31**). Future studies should focus on

obtaining information about the elemental composition of areas near the Lake Theo site.

At first glance, the Cooper Lower samples appear to show movement across the board from northeastern New Mexico to southeastern Colorado to southwestern Oklahoma to south Texas to west Kansas (**Figure 4.32**). Looking closer at the actual data points, many do not fall within known modern source locality points. Specifically, and as alluded to above with the Jake Bluff bison discussion, evidence for fall movement are not within the range of our known modern sample areas supporting the hypothesis that the Jake Bluff/Cooper Lower site area has a relatively different elemental structure than what was sampled for from modern bison used in this study.

The Cooper Middle samples show similarities to south Kansas very early in enamel mineralization, but the remaining points have no relationships to the modern samples. The Cooper Lower samples reflect this sort of trend as well with a couple of points early and late during amelogenesis having elemental composition similar to that of south Kansas, and the rest indicating no relationships with the remaining data matrix.

General observations for the down-tooth plots include a trend toward less variability in the data for earlier dated sites like Jake Bluff and Lubbock Lake, whereas the middle and later Folsom-age sites (Cooper, Folsom, Blackwater Draw, and Lake Theo) all have highly varied down-tooth patterns. One may infer from the limited data that bison became more mobile over time through the Folsom Period. Also observed are relatively large spring and fall month spikes in the down-tooth record for bison tooth samples with greater variability (Cooper, Folsom, Blackwater Draw,

and Lake Theo). This type of exaggerated elemental signal suggests that these bison were more mobile during the spring and fall, which is consistent with known modern bison herd movement (McHugh 1972).

CONCLUSIONS

This chapter described some of the quantitative tools that proved useful in chemistry-based provenance research. Once data are collected, the general course of investigation proceeds from data transformation to pattern recognition to group evaluation. In practice, there is feedback between the stages. Further, each part of the analysis needs to be tailored to the specific conditions of the environmental and diagenetic properties of the samples analyzed. Quantitative techniques do not relieve us of having to define potential problems with our raw data, our research design, and sampling techniques. The techniques and groups evaluated and discussed in this chapter indicate that some bison herds in the Southern Plains moved significantly more than others. The discussion presented in the following chapter shows how the patterns described above can be combined in various ways to address specific questions about Folsom-age bison movement. From those inferences, we can begin to discuss how people would have negotiated potential patterning of bison movement.

CHAPTER 5: MODELING MOVEMENTS OF THE GIANT BISON AND FOLSOM-AGED HUNTER-GATHERERS

Coupling the information presented in Chapter 4 with the archaeological assemblages at the sites examined for this study reveals insights into the mobility strategies of Folsom-age people. Further, I can comment on the potential communal efforts involved with locating and procuring bison on the Southern Plains. This chapter is primarily concerned with first identifying if Folsom-age bison were moving and where they went, and from that information addressing how humans were moving and organized at several kill loci.

The impetus for the discussion in this chapter stems from Bement (1999, 2003). He presents a suite of data supporting a dichotomy between the size and seasonality of bison kills sites as a result of population aggregation in the late summer and early fall for large-scale kills, and a dispersed pattern with small bison kills during all other seasons. Although a direct link can be established between specific sites on the Southern Plains, suggesting a round of movement of a single human group, if a dichotomy exists, then there should be redundancy in the archaeological record.

When the Folsom-age sites used in this study are compared, links between large kills and a late summer/early fall seasonality, and an association of small kills to winter/spring seasonality are apparent. Location, butchery, landform, seasonal context, and lithic assemblage information from the sites examined during this study reveals a number of patterns regarding bison and human movement (**Table 5.1**).

Bison kills at Lubbock Lake and Blackwater Draw are dominated by Edwards Plateau chert. Kills farther north and east, and those that are larger kills, have Edwards chert projectile points, but some Alibates tools as well. Animal processing techniques vary according to setting, seasonality, bison mobility, and size of kill. The larger late summer/early fall kills have more articulation of the carcasses (Bement 1997), whereas smaller winter/spring kills were more heavily processed (Johnson 1987). Also, a correlation exists between bison herds with less mobility, and sites with heavier processing.

Table 4.1 Table of site attributes for locales examined by the study.

Site	MNI	Season	Stone Types	Butchery	Landform	Stage of Points Use	Bison Mobility
Jake Bluff	22	Fall	Alibates, Quartzite	Mixed	Gully	75% Reworked	Residential
Cooper Lower	20	Late Summer/Early Fall	Edwards, Alibates	Light	Gully	20% Reworked	Mobile
Lubbock Lake	3	Spring	Edwards, Alibates	Heavy	Pond	68% Reworked	Residential
Cooper Middle	29	Late Summer/Early Fall	Edwards, Alibates, Unknown	Light	Gully	63% Reworked	Mobile
Cooper Upper	29	Late Summer/Early Fall	Edwards, Alibates, Niobrara	Light	Gully	50% Reworked	Mobile
Folsom	32	Fall	Edwards, Alibates, Tecovas, Unknown	Mixed	Gully	20% Reworked	Mobile
Blackwater Draw	2 - 5		Edwards, Alibates, Niobrara	Heavy	Pond	74% Reworked	Mobile
Lake Theo	12	Fall	Edwards, Alibates, Tecovas, Unknown				Mobile

Sources: Bement and Carter in press; Johnson and Bement 2009; Bement 1999; Hofman 1992; Harrison and Smith 1975; Harrison and Killen 1978; Meltzer 2006

Bement (1999:160; 2003) asks why this dichotomy exists among bison herds with less mobility and sites with heavier processing, and suggests the variation is tied to bison aggregation and movement cycles. Large hunts of numerous species in various regions of the world correspond to cyclical animal aggregation and migration schedules, so why wouldn't the same be true of Folsom-age predators and their prey? Developing an understanding of the annual cycle of prey species to interpret the decisions of hunters has been a dominant theme in Plains archaeology (Frison 1970, 1987, 1991; Wheat 1972), and is the central focus of the current study.

Generally, the annual cycle of past bison herds is inferred from ethnographic data or movements of modern “free-ranging” herds. Mobility patterns are one of the most intensively investigated aspects of bison behavior (Krasinska et al. 2000; Roe 1951; Seton 1910). All grazing animals deplete the available forage in the area in which they live and therefore must move when forage becomes scarce in their local area. The key questions that most interest researchers concerning bison mobility are: How often do they move? How far do they move? What factors influence this mobility?

BISON MOVEMENT

Early historic accounts (e.g., Allen 1876; Arthur 1975; Roe 1951; Seton 1910) argued that bison seasonally migrated hundreds or thousands of miles. Allen (1876:59–61) reported,

“I have...been assured by former agents of the American Fur Company that before the great overland emigrations to California...divided the buffalo into two bands, the buffaloes that were found in summer on the plains of Saskatchewan and the Red River of the North spent winter in Texas.”

Later historians, though discounting these very long migrations, nonetheless steadfastly argued that bison seasonally moved hundreds of miles. Seton (1910:266) stated, “I conclude with Hornaday that the buffalo did migrate 300 to 400 miles northward in the spring, and as far southward again in the autumn.” These kinds of statements dominate most ethnohistoric records (see Bamforth 1987; Hornaday 1889; Roe 1951; Soper 1941).

Researchers have questioned these early ethnohistoric accounts. Roe (1951:78) concluded that the idea of long bison migrations is based on analogies to the cattle drives of the late nineteenth century in which domestic cattle were annually moved vast distances. As Roe (1951:77) stated, “a careful study...reveals how flimsy is much of the evidence upon which various forms of the migration argument are based.” Several researchers have outlined problems with these early models of long-distance bison mobility (Bamforth 1987; Hanson 1984; Roe 1951). First, no definitive evidence exists that an individual bison can walk 1,400 miles from Texas to southern Canada in a single year. Second, none of these models explain the impetus for such a long-distance migration. As discussed in Chapter 1, there are various reasons animals move, and these reasons are not clear in the ethnographic accounts. More recently, the focus of research has switched from the distance bison may move to the ecological factors that cause bison mobility.

Based on the definitions outlined by Baker (1978), bison are neither nomadic (i.e., having no apparent fixed pattern of direction) nor long-distance movers (Lott 1991). There are several reasons why bison move, including the search for food and water, search for other bison, and escape from danger or uncomfortable conditions (e.g., cold temperatures, snowfall, insects, and predators) (Hanson 1984; Krasinska et al. 2000; Lott 1991; Morgan 1980; Roe 1951; Senft et al. 1987). Random events, such as inclement weather or attacks by predators (including humans) also cause bison to take flight. But these moves usually occur over short distances, usually less than 10 km (Bamforth 1988).

Modern bison also appear to have predictable movements to the same geographic location. A multi-year tracking study of European bison, for example, saw a high proportion of bison returning to the same summer and winter ranges over multiple consecutive years (Krasinka et al. 2000). Similarly, a number of accounts suggest that Plains and wood bison repeatedly move back and forth between the same summer and winter forager areas (Lott 1991; Meagher 1973; Soper 1941). Baker (1978) identified this type of movement as “seasonal latitudinal return migrations” (see Lott 1991). At Yellowstone National Park, McHugh (1958:13) observed that the Lamar Herd bison move approximately 25 miles from the meadows at 8,000–9,000 feet to the lower Lamar Valley at 6,000 feet during the winter. In May or June the bison return to the higher elevations. Soper (1941:380) observed that for the herds at Wood Bison National Park, Canada, bison move from the plains of the Western Slave River in the spring to the uplands of the Alberta Plateau. In the fall, bison return to the plains. The bison at Henry Mountain, Utah, also move into their winter range in September and return to their summer range (approximately 15 km away) in May and June (Nelson 1965:24–29). Recent isotopic analyses (e.g., strontium, stable carbon) of archaeological bison remains suggest that prehistoric bison, like their modern counterparts, probably did not range over vast territories, but instead were restricted to relatively small seasonal and annual patches (Widga 2006a, 2006b).

Epp and Dyck’s (2002) research regarding behavioral ecology and its implications for bison mobility and numbers has led to the identification of two distinct, but not mutually exclusive, bison herd populations: resident and migrant herds. Their research shows that behavioral ecological views regarding bison numbers and

population dynamics should be reassessed on three bases: (1) there were often two discrete populations of bison species within any area at any given time; (2) the migratory population moved between two distinct home ranges; and (3) migrant herds tended to have larger home ranges vastly outnumbering resident herds, often by 4:1 or more (Epp and Dyck 2002:324,325).

So were Folsom-aged bison populations comprised of both resident and migrant bison? This study furthers the understanding of past bison movement through examination of the down-tooth distribution of B, Na, Cl, K, Zn, Sr87/Sr86, and Pb. While I identified intra-tooth variation of bison within the same herd, elemental signatures for modern herds approximate the variability of prehistoric samples in some cases, and diagenetic effects were observed in this study, patterns in the data emerged that indicate a presence of both resident and migratory herds during the Folsom Period. Figures 4.27 through 4.34 indicate a range of variability among the prehistoric bison tooth samples with a trend toward the earlier dated sites and spring kills being comprised of less mobile bison (**Figure 5.1**). The Jake Bluff bison that were examined in this study appear to have either not moved a great distance, not moved away from the Jake Bluff locale for very long, and/or remained in a homogenous geologic environment throughout the year the P4 premolar enamel mineralized. The Lubbock Lake individuals reflect this trend as well. Remaining prehistoric samples showed a high degree of down-tooth variation with spikes in the data during the spring and fall, which is consistent with the behavior of known herds in Yellowstone that have greater flexibility in their movement patterns.

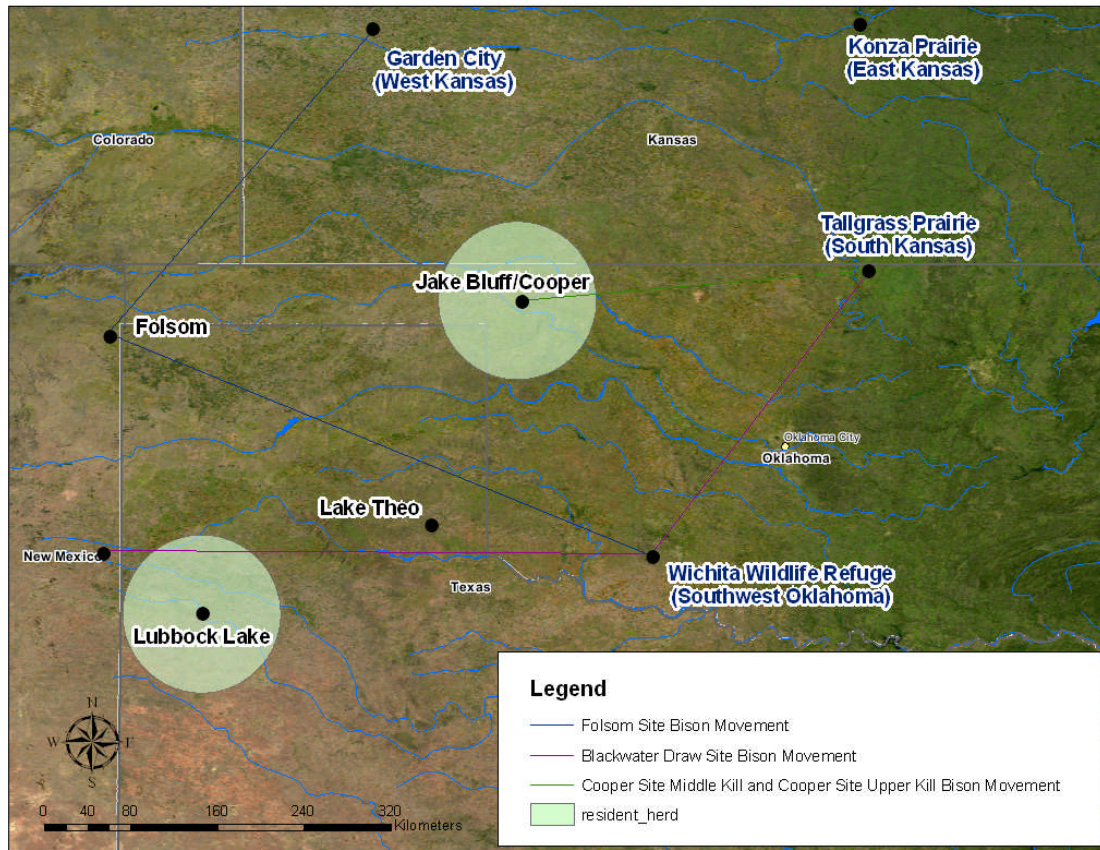


Figure 5.1 Locations of residential herds at older and spring season Folsom-age sites, and linear movement of bison from elemental analysis for younger Folsom-age sites.

With the limited data we have on change through time during the Folsom Period on the Southern Plains, one may argue that more residential herds were present earlier in the period (11,000 – 10,500 BP), while migratory herds dominated the later period sites (10,500 – 10,400 BP). Until further evidence are retrieved, however, we cannot yet know the distribution of residential and migratory herds through time and space during the Folsom Period.

Determining directional movement of bison is possible even with the limited number of locations sampled by this study, and seasonal movement patterns emerge from the data that provide insights into potential latitudinal bison movement. Patterns of similar movement are observed in the findings (Figures 4.33 and 4.34) for the Cooper Middle and Cooper Upper samples. Movement from an area similar in elemental composition to that of south Kansas in the spring to an unknown area in the late summer and early fall, and then a return in the winter to the same mineral environment grazed during the spring is apparent in both assemblages (**Figure 5.2**). It is not surprising, too, that these kills are only separated by less than one human generation in time. This kind of mobility is consistent with known bison behavior.

The Blackwater Draw and Folsom bison samples show similar cyclical patterns in their movement. The Blackwater Draw bison indicate movement from a south Kansas-type elemental environment during the late spring to southwestern Oklahoma during the fall and a return to south Kansas in the winter (**Figure 5.3**). Elemental values at the top of the tooth are markedly different from the rest of the down-tooth record and may be an artifact of tooth wear of the sample. Folsom bison moved from an area exhibiting an elemental composition similar to that of west Kansas to southwestern Oklahoma in the fall with a return to west Kansas in the winter (**Figure 5.4**). At the very least – and because elemental composition of the Llano Estacado is assumed to be different from that of the surrounding Central Plains to the north and Rolling Hills to the east – the movement evidenced from these four locales suggests an east to west movement, from the Rolling Hills to the Llano Estacado, during the spring through the fall and a return to the Rolling Hills to winter.

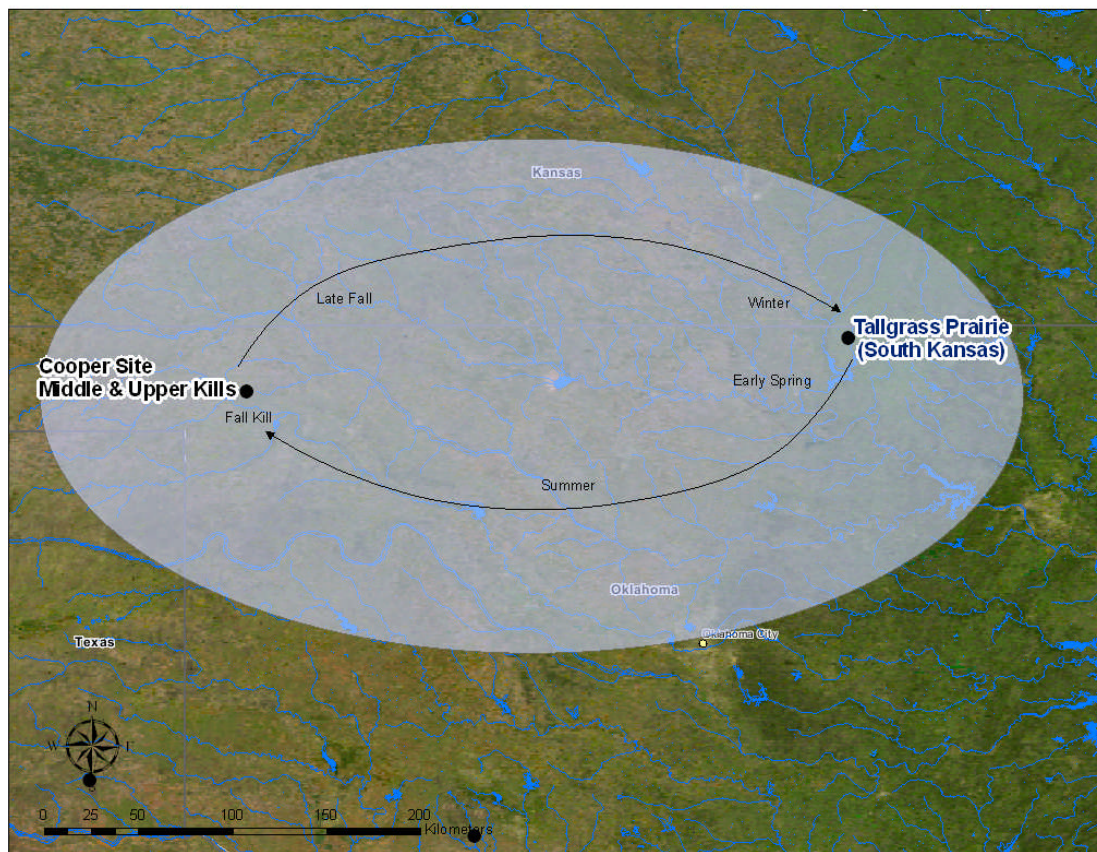


Figure 5.2 Cooper Site Middle and Upper Kill inferred bison movement from elemental analysis.

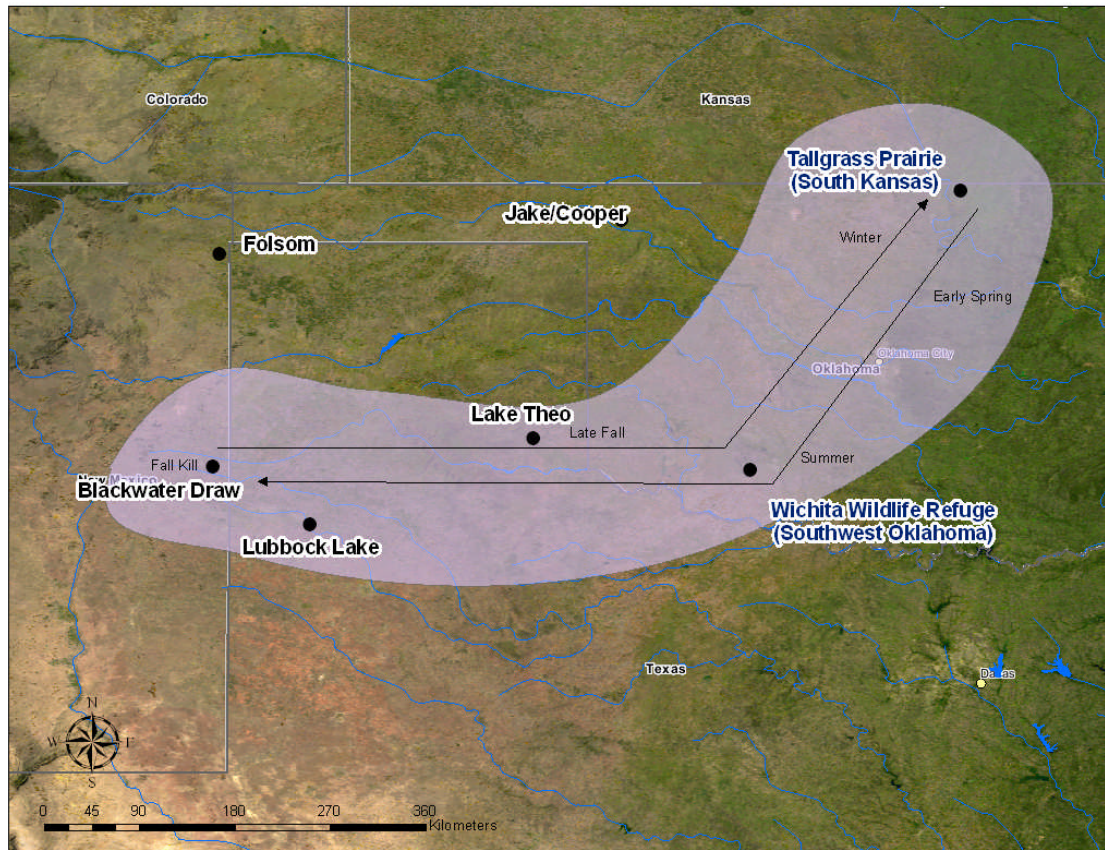


Figure 5.3 Blackwater Draw Site inferred bison movement from elemental analysis.

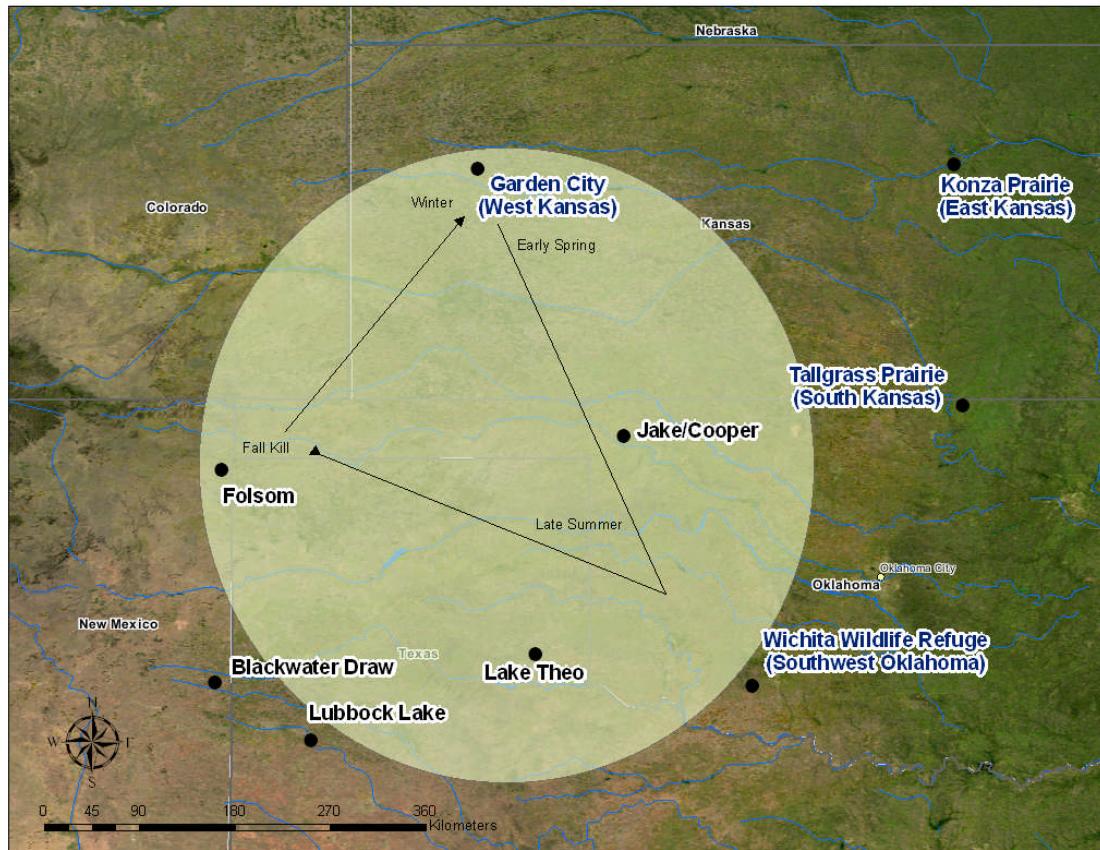


Figure 5.4 Folsom Site inferred bison movement from elemental analysis.

Figures 5.1 through 5.4 illustrate a pattern of movement on and off of the Llano Estacado in accordance with changing seasons. The elemental analysis provides a window into one year of movement and it appears that teeth representing migratory animals have similar elemental concentrations at the crown and CEJ. In other words, the bison grazed similar areas when amelogenesis began as they did when mineralization of enamel was complete indicating a circular movement pattern. Additionally, bison herds from various Folsom-age archaeological sites seemingly had overlapping ranges, or were potentially a single moving population.

HUMAN SUBSISTENCE AND MOBILITY STRATEGY

This study is not the only one to suggest the exploitation of migratory and residential bison herds by humans. Epp and Dyck (2002:332-334) offer an optimal foraging model that suggests people continuously exploited resident bison populations and seasonally exploited migrant bison populations in order to have an enormous supply of a high-quality protein resource and to ensure resident and migrant bison herd numbers. This subsistence strategy had several important implications for both humans and bison because the combined use of these herds would have ensured that the people had almost constant access to bison. As well, it ensured that neither the resident nor the migrant population was eliminated. Consequently, hunting both resident and migrant bison populations was an optimal subsistence strategy.

Anthropologists have long been interested in subsistence strategies; thus, applying evolutionary ecology theory to hunter-gatherer subsistence practices has obvious relevance (see Chapter 2). Models that can operationalize optimal diet breadth and group formation concepts have a great likelihood of increasing our understanding of foraging and human settlement patterns. When testing for optimal solutions, several active selective forces or behavioral attributes of a group of people can be measured. Decisions that are made about how, when, and where a group of people direct their procurement activities are variables that can be defined and measured by analyzing Folsom-age bison teeth.

Applying elemental analysis data to this model shows that these optimal decisions are identifiable in the archaeological record. People will adapt and respond to their

physical environment by exploiting a high-quality protein resource such as bison on a yearly basis by hunting both migrant and resident bison herds.

Numerous studies have alluded to the need to determine the behaviors of Folsom-age bison on the Southern Plains (Bement 1999, 2003; Hofman 1994) so that a correlation between such movement and the behaviors of humans (as evidenced through the locations of sites, the lithics identified on those sites, and the processing strategies observed at those sites) can be made. Questions about the directionality of human movement (Hofman 1991), the relationship between Folsom-age sites to determine regional variation (Amick 1996), the scale of human movement, and the potential for aggregations/communal efforts to hunt bison have all used various lines of evidence to support various answers to these questions.

Elemental data presented above illustrates an apparent east-to-west movement of migratory bison herds and the presence of residential herds during the Folsom Period. Folsom groups on the Southern Plains exhibit a close relationship to those areas where they obtained lithic raw materials. Humans at this time quite obviously obtained raw materials for the tools they needed in Texas and successfully hunted bison on the Llano Estacado adjacent to these toolstone sources. What then was the impetus drawing these same individuals to the periphery of the Llano Estacado hundreds of kilometers away from a reliable lithic acquisition area? The answer is that bison were nearly as reliable a resource as the knappable stone they used to dispatch and process the animals. Hunters operating in an environment where residential bison herds were present in various ecological patches, and where

migratory bison regularly wintered on the Rolling Hills, moved west to the Llano Estacado through the summer and fall, and returned to the Rolling Hills again for the following winter would have little trouble predicting where and when they could organize their own movement to best take advantage of seasonally available resources.

I submit that Folsom hunters-gatherers whose toolkits were composed primarily of Alibates spent much of the year on the Llano Estacado taking advantage of the numerous available resources, and moved to the landform's peripheries during the fall bison rut (**Figure 5.5**). Small bison herds or individual bison on the Llano Estacado that were dispatched in the spring would be difficult to hunt if they were undertaking their spring migration. A more likely scenario is one where residential herds or individual bison are dispatched, because their whereabouts would be predictable during the spring. Anticipating large, but temporarily occupied bison herds during the late summer rut near or on the dissected peripheries of the Llano Estacado would be feasible and the best time and place to successfully hunt, trap, and dispatch large groups of bison. Additionally, these locations would be the best places to meet groups of people moving north from the Edwards Plateau source area.

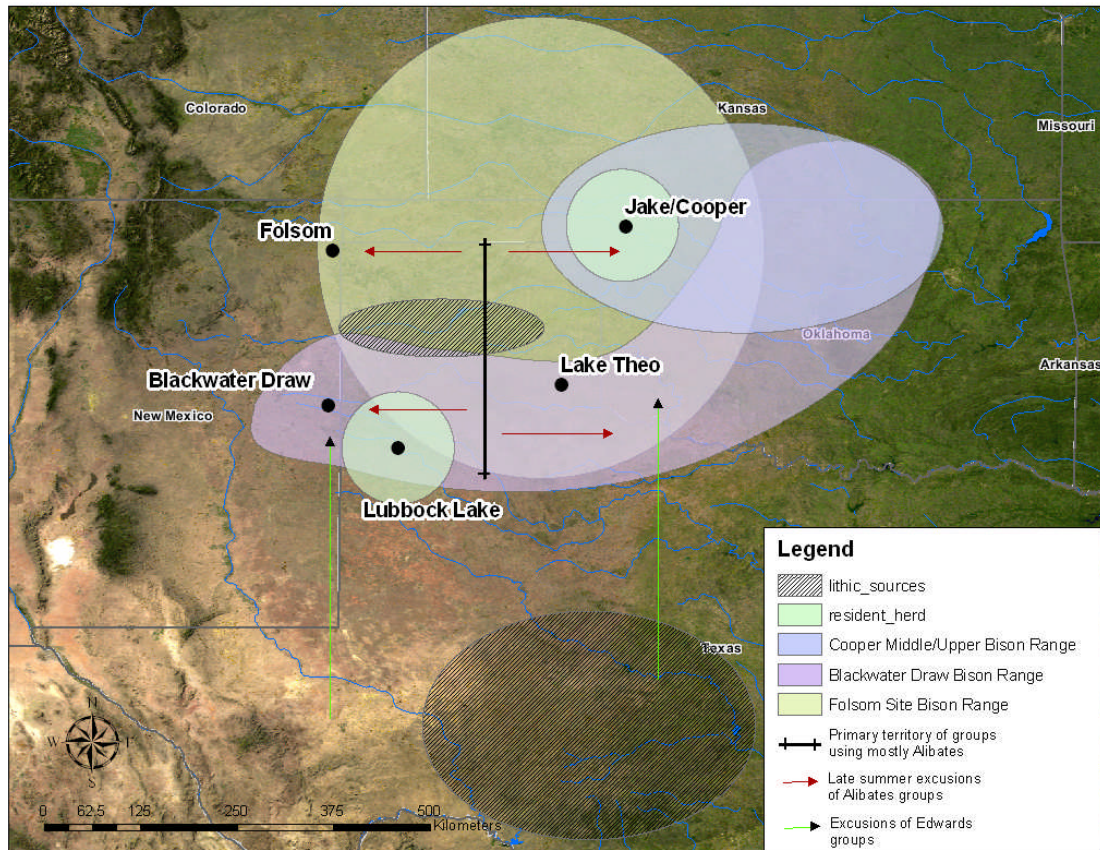


Figure 5.5 Folsom-aged hunter-gatherer movement in relation to *Bison antiquus* movement.

Why though, if residential herds were present during the Folsom Period on the Southern Plains, would it be necessary to move so far away from their seemingly preferred lithic acquisition locales? Two reasons come to mind: one is general conservation of the residential herds, and the other is to meet with other groups for the purposes of conducting social activities. As with other human colonization sequences, the first arrivals take the best locations and hang on to them. As the best locations become occupied and the resources become patchy during Folsom times,

strategies for obtaining resources must change. Human groups using Alibates developed seasonal rounds in the middle of a bison-rich ecosystem, and Edwards Plateau groups developed movement to interact with Alibates groups and procure a highly valuable resource in an efficient manner. The Edwards group or groups may have been small bands who needed to gather with other bands seasonally to make large bison kills, trade, and exchange marriage partners. The former reason for communal gatherings is the focus of the discussion below.

Communal hunting is part of a larger pattern of predation in which the strategy is to acquire an adequate amount of animal resources for a group larger than those participating in the hunt in as efficient a manner as possible. In this study, Driver's (1990) definition of communal hunting is used. He characterized communal hunting by the following traits (Driver 1990:12):

1. Participation by more than two hunters (usually many more than this).
2. Active cooperation between hunters such that they work together, as opposed to passive cooperation in which hunters agree not to interfere with each other's activities.
3. A system of hunting that requires all hunters to participate in a previously conceived plan.

For large game animals, such as bison, habitat, migration route, population density, meat, fat, and hide quality vary seasonally (Driver 1990:13). Consequently, incorporating information about certain environmental features and the adaptive

strategies people use to optimize their foraging practices can help reveal variation in social behavior as evidence by the current study.

The characteristics of the animal often will determine the hunting strategy adopted. Mobile, clumped prey, such as migratory bison, require an aggregated group strategy, whereas stable, evenly distributed prey, such as deer, require that the hunters be dispersed (Winterhalder 1981a:31). Driver (1990:23) maintains that “The widespread use of communal hunting in association with concentrated groups of animals suggests that the relative ease of killing may have been an important factor.” When considering how bison herd composition can vary according to the patchiness of a particular region, the optimal goal of search and handling time efficiency may lead to behavior that may not make the best use of labor efficiency. In fact, labor productivity may not be important when considering time efficiency if the goal is to take advantage of a seasonally available resource that may require a group of people to expend large amounts of labor for a short period of time (Jochim 1981:52). Due to the mobile nature of some bison, pursuit distances probably fluctuated on a seasonal basis, causing hunting groups to travel farther in order to obtain this highly sought resource. On the other hand, periods of prey aggregation may be highly predictable for migratory herd animals. In which case, search times would be reduced, particularly if hunters employed communal hunting techniques (Driver 1990:27). The evidence presented in the current study suggests a predictable pattern of bison behavior, and it can be inferred that the species was an excellent candidate for employing communal hunting techniques.

Hunter-gatherers are selective about which animal body parts are transported from the kill site back to the residential camp or village and the transport distance is an important variable in determining how many bones are transported (Metcalf and Barlow 1992:341). As a result, transport and processing decisions vary according to the animal species being exploited. Increasing the use of an aggregate resource such as bison would increase protein yields for any group of people. But, considering the large size of bison, people would also have to increase their return rate costs due to increased transport costs. Transport costs include prey size and distance from the kill site to the camp and the proportion of elements transported. Undoubtedly, in regards to hunting bison, search and handling time costs would increase given that the farther people go to hunt bison the greater the amount of field processing required in order to average out the costs of return travel due to the increased load size. In order to decrease transport costs, hunters butchered bison at kill sites and then made decisions regarding which parts of the animal would be transported back to the camp. For Folsom hunter-gatherers who were highly mobile during the fall months on the Southern High Plains, presumably they were not planning to haul their meat long distances as it would be impractical to carry such an enormous load.

It is generally accepted that Paleoindian population density was very low and the residential mobility was high, at least seasonally. Living in a very large, relatively unbound landscape, Folsom people's need for information exchange, economic cooperation, mates, group rituals or ceremonies, and access to trade goods was likely at a premium. Archaeologists have long assumed that Paleoindians satisfied these needs through periodic and temporary aggregations (i.e., fusion) of different groups

(e.g., Bamforth 1988, 1991; Greiser 1985; Wilmsen and Roberts 1978), and Bamforth (1991) suggested Paleoindian social aggregations were tied to communal bison hunts.

Hofman (1994) is critical of any perspective that argues for aggregations as a single type of site or event. He suggests that Paleoindian demography, subsistence, and land-use patterns may not fit any existing model as to why hunter-gatherer groups aggregate. Instead, he proposes that hunter-gatherer aggregations were a mechanism by which different groups could solve problems that were beyond the capacities of any single group, such as finding spouses, conducting necessary spiritual rituals, and gaining information about very large geographic regions (Hofman 1994:342). As a result, he sees aggregations arising for a wide variety of reasons and under diverse conditions. Therefore, multiple archaeological expressions of aggregation localities may exist depending on when, where, and why the fusion of different groups occurred. Hill (2007) believes it unlikely that social aggregations would have involved large communal hunts because (1) they would have occurred in landscapes with no major landscape features (Plains), (2) very few additional resources would have been available (high risk), (3) there may be no correlation between the number of bison killed and the number of people it would take to dispatch and process them (see also Hofman 1994), and (4) there is little evidence (lack of lithic and camp debris) for large number of people coming together.

One may infer from the findings presented in the current study that aggregations for the purposes of social activity provide an excellent opportunity to hunt large herds of bison in a landscape that provides numerous traps and landmarks for such an

endeavor. The predictable nature of bison, residential herds coupled with migratory herds, with regular and scientifically testable movement of bison, has been known by Plains bison hunters for at least 11,000 years. Further, the evidence for a large number of people coming together may be found at the large kill sites themselves. For example, the middle level of the Cooper site contained at least 29 *Bison antiquus*. The approximate meat weight yield from a modern cow bison using a Cooper-type butchering strategy yields approximately 61.7 kg or about half of the total meat weight of the animal (Johnson and Bement 2009:1445). Even a conservative measure (using modern cow bison size as opposed to *Bison antiquus*) of the total meat yield during the Cooper middle kill would be 1,790 kg (about 4,000 lbs.). Presumably, human groups present at or near the Cooper locale, even while operating in a highly mobile manner, would not likely have packed up that much meat and immediately hauled it back to the Llano Estacado. It would have taken several groups of people several trips from kill to a campsite far enough away to avoid the pleasure of 29 rotting bison carcasses and the scavengers that accompany decomposition. Furthermore, a few good hunters would have little reason to process over 4,000 lbs. of meat.

CHAPTER 6: WHAT HAVE WE LEARNED?

This research has supported a number of methodological and theoretical questions. The first is the method of laser ablation of bison teeth to examine spatial and temporal dietary changes. Extracting down-tooth elemental compositions from bison teeth as a method of determining diet and mobility has proven successful using laser ablation techniques and principal component analysis. More closely examining each element observed in the tooth enamel to better understand the biochemical and metabolic processes (how elements move through geologic, soil, vegetation, and animal systems) will only refine the technique. More modern samples will provide a better elemental map of the Great Plains, and more prehistoric samples will further our efforts to understand past human movement. More Jake Bluff and Lubbock Lake samples would provide better data to confirm the presence of resident herds. Examining modern bison teeth from Yellowstone (greater flexibility in their movement) may reveal similar spikes in the down-tooth record reflecting greater movement in the spring and fall.

Second, the results of elemental analysis using laser ablation indicate that Folsom-age bison were indeed moving, albeit not all of them. The evidence presented in this study suggests a latitudinal movement of bison on and off the southern High Plains according to seasonal changes during the Folsom Period. I posit that the manner in which humans located bison on the Southern Plains and organized their movement strategies (aggregation and dispersal) to hunt bison took advantage of the locations of bison across the landscape during different times of the year. Further, Folsom hunters

structured their settlement in a way whereby residential mobility was low throughout much of the year, but high during the fall when moving to the periphery of their territory on the Southern Plains was advantageous for meeting other groups and procuring large numbers of bison. Herd composition and mobility always affects the amounts and kinds of mobility for humans, which is why the relationship between Plains hunter-gatherers and the bison they hunted remained unchanged for 11,000 years.

The Folsom Period may be the first time in North America that those institutions of territoriality are expressed, and may warrant a look at Folsom groups as *foci* (perhaps the Folsom Alibates Focus for the current study). Folsom groups have been assumed long-distance travelers due to the occurrence of Folsom projectile points across a large area. Frison (1991) illustrates a number of Late Prehistoric side- and corner-notched projectile points on the northwest Plains while I myself have found near identical arrowheads in Oklahoma, yet we do not assume long-distance travel for Late Prehistoric Plains groups. Rather, we categorize these Late Prehistoric groups into *phases* and *foci* based on a number of spatial, environmental, architectural, artifacts, and resource-use factors. We use the small differences between these categories to draw specific conclusions about even more specific groups of people. Similar categories of Folsom-age people can be formed when comparing landscape and resource use as a starting point to understand who these groups of people were and how they interacted with each other; a very uncommon concept in the study of Folsom and other Paleoindian-age people, but very common study among almost any other human group in North America.

REFERENCES CITED

Agenbroad, L. D.

1984 New World Mammoth Distribution. In: *Quaternary Extinctions: A Prehistoric Revolution*, edited by P.S. Martin and R.G. Klein, pp. 90-112. University of Arizona Press, Tucson.

Ahrens, L.H.

1965 *Distribution of the Elements in our Planet*. McGraw Hill, New York.

Alcock, J.

1977 *Animal Behavior: An Evolutionary Approach* (8th edition). Harvard University Press, Cambridge.

Aldenderfer, M.S. and R.K. Blashfield

1984 Cluster Analysis. Sage University Paper series on Quantitative Applications in the Social Science, series number 07-044. Sage Publications, Newberry Park, CA.

Allen, J. A.

1876 The American bison, living, and extinct. *Memoir of the Geological Survey of Kentucky* 1(pt. 2). University Press, Cambridge.

Amick, D.S.

1994 Folsom Diet Breadth and Land Use in the American Southwest. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.

1996 Regional Patterns of Folsom Mobility and Land Use in the American Southwest. *World Archaeology* 27(3): 411-426.

2000 Regional Approaches with Unbounded Systems: The Folsom Record of Land Use in New Mexico and West Texas. In: *The Archaeology of Regional Interaction: Religion, Warfare, and Exchange in the American Southwest and Beyond*, edited by M. Hegmon, pp. 119-147. University Press of Colorado, Boulder.

Amick, D.S. (editor)

1999 *Folsom Lithic Technology: Explorations in Structure and Variation*. International Monographs in Prehistory, Archaeological Series 12, Ann Arbor.

Anderson, A.B. and C.V. Haynes

1979 How old is the Capulin Mountain? Correlation between Capulin Mountain volcanic flows and the Folsom type site northeastern New Mexico. In: *Proceedings of the First Conference on Scientific Research in the National Parks, Volume II*, edited by R. Linn, pp. 893-898. U.S. Department of the

Interior, NPS Transactions and Proceedings, vol. 5. Government Printing Office, Washington, DC.

Anderson, D.E.

1997 Younger Dryas Research and its Implications for Understanding Abrupt Climatic Change. *Progress in Physical Geography* 21:230-249.

Arthur, G.W.

1975 An Introduction to the Ecology of early Historic Communal Bison Hunting Among the Northern Plains Indians. *Archaeological Survey of Canada*, Paper 37, Ottawa.

Axelrod, D.I.

1985 Rise of the Grassland Biome, Central North America. *Botanical Review* 51:163-201.

Baker, R. R.

1978 *The evolutionary ecology of animal migration*. Hodder and Stoughton, London.

Balakrishnana, M., Yappa, C.J., Meltzer, D.J., and J.L. Theler

2005 Paleoenvironment of the Folsom archaeological site, New Mexico, USA, approximately 10,500 14C yr B.P. as inferred from the stable isotope composition of fossil land snail shells. *Quaternary Research* 63: 31–44.

Balasse, M.

2002 Reconstructing dietary and environmental history from enamel isotopic analysis: time resolution of intra-tooth sequential sampling. *International Journal of Osteoarchaeology* 12:155-165.

Bamforth, D.B.

1985 The technological organization of Paleo-Indian small-group bison hunting on the Llano Estacado. *Plains Anthropologist* 30:243-258.

1986 Technological Efficiency and Tool Curation. *American Antiquity* 51:38-50.

1987 Historical documents and bison ecology on the Great Plains. *Plains Anthropologist* 32: 1-16.

1988 *Ecology and Human Organization on the Great Plains: Interdisciplinary Contributions to Archaeology*. Plenum Press, New York.

1991 Flintknapping Skill, Communal Hunting, and Paleoindian Projectile Point Typology. *Plains Anthropologist* 36:309-322.

Baxter, M. J.

1994 *Exploratory multivariate analysis in archaeology*. Edinburgh University Press, Edinburgh.

Beard, B.L. and C.M. Johnson

- 2000 Strontium isotope compositions of skeletal material can determine the birth place and geographic mobility of animals and humans. *Journal of Forensic Science* Sep. 2000, 1049-1061.

Beiber, A. M., Brooks, D. W., Harbottle, G., and Sayre, E. V.

- 1976 Application of multivariate techniques to analytical data on Aegean ceramics. *Archaeometry* 18: 59-74.

Bement, L.C.

- 1986 *Excavation of the Late Pleistocene deposits at Bonfire Shelter, 41VV218, Val Verde County Texas, 1983-1984*. Texas Archeological Survey, Austin. University of Texas, Archeology Series 1.
- 1994 The Cooper Site: A Stratified Paleoindian Bison Kill in Northwest Oklahoma. *Current Research in the Pleistocene* 11: 7-9.
- 1997 The Cooper Site: A Stratified Folsom Bison Kill in Oklahoma. *Plains Anthropologist Memoir* 29: 85-100.
- 1999 *Bison Hunting at Cooper Site*. University of Oklahoma Press, Norman.
- 2003 Constructing the Cooper Model of Folsom Bison Kills on the Southern Plains. *Great Plains Research* 13: 27-41.

Bement, L.C., and B.J. Carter

- 2003 The Jake Bluff Site: Clovis Bison Hunting Adaptations at the Brink of Mammoth Extinction on the Southern Plains of North America. Report for Committee for Research and Exploration National Geographic Society, Grant # 7283-02.
- 2005 Late-Pleistocene/Early-Holocene Pollen Record at Bull Creek, Oklahoma Panhandle. *Current Research in the Pleistocene* 22: 67-70.
- 2010 Jake Bluff: Clovis Bison Hunting on the Southern Plains of North America. *American Antiquity*, forthcoming.

Bement, Leland C. and Scott D. Brosowske

- 1999 Paleoindian Bison Hunting along the Beaver River, Harper County, Oklahoma. Oklahoma Archeological Survey, Archeological Resource Report No. 40. Norman.

Bement, L.C., and K.J. Buehler

- 1994 Preliminary Results from the Certain Site: A Late Archaic Bison Kill in Western Oklahoma. *Plains Anthropologist* 39(148): 173-183.
- 1997 Southern Plains Bison Procurement and Utilization from Paleoindian to Historic. *Plains Anthropologist Memoir* 29.

- Bement, L.C., K. Schuster, and B.J. Carter
 2007 Archeological Survey for Paleo-Indian Sites along the Beaver River, Beaver County, Oklahoma. Archeological Resource Survey Report No. 54. Oklahoma Archeological Survey, University of Oklahoma, Norman.
- Benson L., J. Burdett, S. Lund, M. Kashgarian, and S. Mensing
 1997 Nearly Synchronous Climate Change in the Northern Hemisphere During the Last Glacial Termination. *Nature* 388:263-265.
- Berry, M.S.
 1982 *Time, Space, and Transition in Anasazi Prehistory*. University of Utah Press, Salt Lake City.
- Bettinger, Richard L.
 1991 *Hunter-Gatherers: Archaeological and Evolutionary Theory*. Plenum Press, New York.
- Binford, L.R.
 1978 *Nunamiut Ethnoarchaeology*. Academic Press, New York.
 1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45: 4-20.
 1983 *In Pursuit of the Past*. Thames and Hudson, London.
- Bishop, R.L. and H. Neff
 1989 Compositional Data Analysis in Archaeology, In *Archaeological Chemistry IV. Advances in Chemistry* 220:57-86.
- Boas, F.
 1955 *Primitive Art*. Dover Publications, New York.
- Bobek, B.
 1977 Summer food as the factor limiting roe deer population size. *Nature* 268: 47-49.
- Boldurian Anthony T. and John L. Cotter
 1999 *Clovis Revisited: New Perspectives on Paleoindian Adaptations from Blackwater Draw, New Mexico*. The University Museum, University of Pennsylvania, Philadelphia
- Bonnichsen, R., D. Stanford, and J. L. Fastook
 1987 Environmental change and developmental history of human adaptive patterns: The Paleo-Indian case. In: *North America and Adjacent Oceans during the Last Deglaciation*, edited by W. F. Ruddiman and H. E. Wright, Jr., pp.371-402. Geological Society of America, Boulder, Colorado.

- Boone, J.L., and E.A. Smith
 1998 Is it Evolution Yet? *Current Anthropology* 39: 141-173.
- Borchert, J.R.
 1950 The Climate of the Central North American Grassland. *Annals of the Association of American Geographers* 40:1-39.
- Broecker, W.S., M. Andree, W. Wolfli, H. Oescher, G. Bonani, J. Kennett, and D. Peteet
 1988 The Chronology of the Last Deglaciation: Implication to the Cause of the Younger Dryas Event. *Paleoceanography* 3:1-19.
- Buchanan, Briggs
 2002 Folsom Lithic Procurement, Tool Use, and Replacement at the Lake Theo Site, Texas. *American Antiquity* 47-181:121-146.
- Bunnell, F. L., and A. S. Harestad
 1983 Dispersal and dispersion of black-tailed deer: models and observations. *Journal of Mammalogy* 64(2):201-209.
- Butzer, K.
 1971 *Environment and Archaeology: An Ecological Approach To Prehistory* (2nd edition). Aldine Publishing Company, Chicago
- Carlisle, W.J., and R.W. Marris
 1982 Eolian Features of the Southern High Plains and Their Relationship to Windflow Patterns. In: *Interpretation of Windflow Characteristics from Eolian Landforms*, edited by R.W. Marris and K.E. Kolm, pp. 89-106. Geological Society of America Special Paper 192.
- Carter, B.J., and L.C. Bement
 2003 Geoarchaeology of the Cooper Site, Northwest Oklahoma: Evidence for Multiple Folsom Bison Kills. *Geoarchaeology* 18: 115-127.
 2004 Late Quaternary Soil-Sediment Stratigraphy, Cultural Materials and Bison from Bull Creek, Oklahoma Panhandle. *Current Research in the Pleistocene* 21:119-121.
- Cassells, E.S.
 1983 *The Archaeology of Colorado*. Johnson Publishing, Boulder.
- Chambers, K.E.
 1998 Genetic Diversity in Pre and Post Bottleneck Populations of North American Bison bison: Ancient DNA Analysis of Archaeological Bison Skeletal Remains. Unpublished PhD. dissertation, Pennsylvania State University.

- Chisolm, B., J. Driver, S. Dube, and H. Schwarcz
 1986 Assessment of Prehistoric Bison Foraging and Movement Patterns via Stable-Carbon Isotopic Analysis. *Plains Anthropologist* 31: 193-205.
- Clutton-Brock, T. H., and S. D. Albon
 1985 Competition and population regulation in social mammals. In: *Behavioural ecology – ecological consequences of adaptive behavior*, edited by R. M. Silby, and R. H. Smith, pp. 557-575. Blackwell Scientific Publications, Oxford.
- Collins, M.B.
 1999 Clovis and Folsom Lithic Technology on and Near the Southern Plains: Similar Ends, Different Means. In: *Folsom Lithic Technology: Explorations in Structure and Technology*, edited by D.S. Amick, pp.12-38. International Monographs in Prehistory, Archaeological Series 12, Ann Arbor.
- Daniel, G.
 1950 *A Hundred Years of Archaeology*. Duckworth, London.
- Davis, L.B. and M. Wilson
 1978 Bison procurement and utilization: a symposium. *Plains Anthropologist Memoir* 14.
- Dean, J.S., R.C. Euler, G.J. Gumerman, F. Plog, R.H. Hevly, and T.N.V. Karlstrom
 1985 Human Behavior, Demography, and Paleoenvironment on the Colorado Plateaus. *American Antiquity* 47(2):291-315.
- Dibble, D.S. and D. Lorrain
 1968 *Bonfire Shelter: A stratified bison kill site, Val Verde County Texas*. Texas Memorial Museum, Austin. Miscellaneous Papers no. 1.
- Dobson, F. S.
 1982 Competition for mates and predominant juvenile male dispersal in mammals. *Animal Behavior* 30:1183-1192.
- Dobson, F. S., and W. T. Jones
 1985 Multiple causes of dispersal. *American Naturalist* 126:855-858.
- Driver, J.C.
 1990 Meat in Due Season: The Timing of Communal Hunts. In: *Hunters of the Recent Past*, edited by Leslie B. Davis and Brian O. K. Reeves, pp. 11-33. Unwin Hyman, London.

- Dunlap, R.E.
1980 Paradigmatic Change in Social Science. *American Behavioral Scientist* 24: 5-14.
- Eder J. F.
1984 The impact of subsistence change on mobility and settlement pattern in a tropical forest foraging economy: Some implications for archaeology. *American Anthropologist* 86: 837–853.
- Ellis, C.J., and J.C. Lothrop, eds.
1989 *Eastern Paleoindian Lithic Resource Use*. Westview Press, Boulder.
- Emery, P.A.
1971 Water resources of the San Luis Valley, Colorado. In: *Guidebook of the San Luis Basin, Colorado*, edited by J.L. James, pp. 129-132. New Mexico Geological Society, Socorro, New Mexico.
- Epp, H.T.
1988 Way of the Migrant Herds: Dual Dispersion Strategy among Bison. *Plains Anthropologist* 33: 309-320.
- Epp, H. and I. Dyck
2002 Early Human-Bison Population Interdependence in the Plains Ecosystem. *Great Plains Research* 12:323-337.
- Epstein, H.E., W.K. Lauenroth, I.C. Burke, and D.P. Coffin
1997 Productivity Patterns of C3 and C4 Functional Types in the U.S. Great Plains. *Ecology* 78:722-731.
- Euler, R.C., G. Gumerman, T.N.V. Karlstrom, J.S. Dean, and R. Hevly
1979 The Colorado Plateaus: Cultural Dynamics and Paleoenvironment. *Science* 205:1089-1101.
- Everitt, B.S.
1993 *Cluster analysis* (3rd edition). Halsted Press, London.
- FAUNMAP Working Group
1996 Spatial Response of Mammals to Late Quaternary Environmental Fluctuations. *Science* 272: 1601-1606.
- Fawcett, W.B.
1987 Communal hunts, human aggregations, social variation, and climatic change: Bison utilization by prehistoric inhabitants of the Great Plains. Ph.D. dissertation, University of Massachusetts, Amherst.

- Fincham, A.G., J. Moradian-Oldak, and J.P. Simmer
 1999 The structural biology of the developing dental enamel matrix. *Journal of Structural Biology* 126: 270-299.
- Fricke, H.C. and O’Niel, J.R.
 1996 Inter- and intra-tooth variation in the oxygen isotope composition of mammalian tooth enamel: some implications for paleoclimatological and paleobiological research. *Paleogeography, Paleoclimatology, Paleoecology* 126:91-100.
- Frison, G.C.
 1970 The Glenrock Buffalo Jump, 48CO304: Late Prehistoric Period Buffalo Procurement and Butchering. *Plains Anthropologist Memoir* 7.
 1974 *The Casper Site: A Hell Gap Bison Kill on the High Plains*. Academic Press, New York.
 1982 Bison dentition studies. In: *The Agate Basin Site: A Record of the Paleoindian Occupation of the Northwestern High Plains*, edited by G.C. Frison and D.J. Stanford, pp. 240-260. Academic Press, New York.
 1984 The Carter/Kerr-McGee Paleoindian Site: Cultural resource management and archaeological research. *American Antiquity* 49:288-314.
 1987 Prehistoric, Plains-Mountain, Large Mammal, Communal Hunting Strategies. In *The Evolution of Human Hunting*, edited by H.H. Nitecki and D.V. Nitecki, pp.225-226. Plenum Press, New York.
 1991 *Prehistoric Hunters of the High Plains*, 2nd ed. Academic Press, New York.
 1996 *The Mill Iron Site*. University of New Mexico Press, Albuquerque.
 2004 *Survival by hunting: prehistoric human predators and animal prey*. University of California Press, Berkeley.
- Frison, G.C. and C.A. Reher
 1970 Age Determination of Buffalo by Teeth Eruption and Wear. In: *The Glenrock Buffalo Jump, 48CO304, Late Prehistoric Buffalo Procurement and Butchering*, edited by George C. Frison, pp. 46-50. *Plains Anthropologist, Memoir No. 7*.
- Frison, G.C. and L.C. Todd
 1987 *The Horner Site: The Type Site of the Cody Complex*. Academic Press, Orlando.
- Fryxell, J. M., J. Greever, and A. R. E. Sinclair
 1988 Why are migratory ungulates so abundant? *American Naturalist* 131:781-798.
 1988a Causes and consequences of migration by large herbivores. *Trends in Ecology and Evolution* 3:237-241.
 1988b Seasonal migration by white-eared kob in relation to resources. *African Journal of Ecology* 26:17-31.

- Gadbury, C., Todd, L.C., Jahren, A.H., and Amundson, R.
 2000 Spatial and temporal variations in the isotopic composition of bison tooth enamel from the Early Holocene Hudson-Meng bone bed, Nebraska. *Paleogeography, Paleoclimatology, Paleoecology* 157:79-93.
- Graham, R.W.
 1987 Late Quaternary Mammalian Faunas and Paleoenvironments of the Southwestern Plains of the United States. In: *Late Quaternary Mammalian Biogeography and Environments of the Great Plains and Prairies*, edited by R.W. Graham, H.A. Semken, and M.A. Graham, pp. 24-87. Illinois State Museum Scientific Papers, vol. XXII, Springfield.
- Graham, R.W., and E.L. Lundelius, Jr.
 1984 Coevolutionary Disequilibrium and Pleistocene Extinctions. In: *Quaternary Extinctions: A Prehistoric Revolution*, edited by P.S. Martin and R.G. Klein, pp. 223-249. University of Arizona Press, Tucson.
- Graves, A.C., L.C. Bement, and G. Morgan
 Unpublished data. Preliminary results of strontium analysis of bison teeth. Oklahoma Archeological Survey, University of Oklahoma, Norman.
- Goodyear, A.C.
 1989 A Hypothesis for the Use of Cryptocrystalline Raw Materials Among Paleoindian Groups of North America. In: *Eastern Paleoindian Lithic Resource Use*, edited by C. Ellis and J. Lothrop, pp.1-10. Westview Press, Boulder.
- Grayson, D.K.
 1988 Perspectives on the Archaeology of the First Americans. In: *Americas Before Columbus: Ice-Age Origins*, edited by R.C. Carlisle, pp.107-123. Ethnology Monograph 12, Department of Anthropology, University of Pittsburgh, Pittsburgh.
- Greiser, S.T.
 1985 Predictive models of hunter-gatherer subsistence and settlement strategies on the Central High Plains, Plains Anthropologist Memoir 20. *Plains Anthropologist* 30(110):1-134.
- Guthrie, R.D.
 1984 Mosaics, Allelochemicals, and Nutrients: An Ecological Theory of Late Pleistocene Megafaunal Extinctions. In: *Late Quaternary Extinctions: A Prehistoric Revolution*, edited by P.S. Martin and R.G. Klein, pp.259-298. University of Arizona Press, Tucson.

- Hanson, J. R.
 1984 Bison ecology in the Northern Plains and a reconstruction of bison patterns for the North Dakota regions. *Plains Anthropologist* 29: 93-114.
- Harbottle, G.
 1976 Activation analysis in archaeology. In: *Radiochemistry* 3, edited by G. W. A. Newton, pp. 33-72. Chemical Society, London.
- Harper, H.J. and Reed, L.W.
 1964 Effect of chemical composition of soil on micronutrient and other elements in Oklahoma forage plants. Processed Services P-486, Oklahoma State University Agricultural Experiment Station, Stillwater.
- Hartnett, D.C., A.A. Steuter, and K.R. Hickman
 1997 Comparative Ecology of Native and Introduced Ungulates. In: *Ecology and Conservation of Great Plains Vertebrates*, edited by F. Knopf and F. Sampson, pp. 72-101. Springer-Verlag, New York.
- Haynes, C.V.
 1984 Stratigraphy and Late Pleistocene Extinction in the United States. In: *Quaternary Extinctions: A Prehistoric Revolution*, edited by P.S. Martin and R.G. Klein, pp. 345-353. University of Arizona Press, Tucson.
 1993 Clovis-Folsom Geochronology and Climatic Change. In: *From Kostenki to Clovis: Upper Paleolithic – Paleo-Indian Adaptations*, edited by O. Soffer and N.D. Praslov, pp. 219-236. Plenum Press, New York.
- Haynes, G.
 2002 *The Early Settlement of North America*. Cambridge University Press, Cambridge.
- Hester, J.J. and J. Grady
 1977 Paleoindian Social Patterns on the Llano Estacado. In: *Paleoindian Lifeways*, edited by E. Johnson, pp. 78-96. The Museum Journal 18. West Texas Museum Association: Lubbock.
- Hill, M.E.
 2007 Causes of Regional and Temporal Variation in Paleoindian Diet in western North America. PhD. Dissertation, Department of Anthropology, University of Arizona, Tucson.
- Hill, M.E. and J.L. Hofman
 1997 The Waugh Site: A Folsom-age Bison Bonebed in Northwestern Oklahoma. In: *Southern Plains Bison Procurement and Utilization from Paleoindian to Historic*, edited by L.C. Bement and K.J. Buehler, pp.63-83. *Plains Anthropologist Memoir* 29.

- Hirst, S. M.
1969 Populations in a transvaal low-veld nature reserve. *Zoologica Africana* 4:199-230.
- Histol, T., and O. Hjeljord
1993 Winter feeding strategies of migrating and nonmigrating moose. *Canadian Journal of Zoology* 71(7):1421-1428.
- Hofman, J.L.
1991 Folsom Land Use: Projectile Point Variability as a Key to Mobility. In: *Raw Material Economies among Prehistoric Hunter-Gatherers*, edited by A. Montet-White and S. Holen, pp. 335-356. University of Kansas Publications in Anthropology 19, Lawrence.
1992 Recognition and Interpretation of Folsom Technological Variability on the Southern Plains. In: *Ice Age Hunters of the Rockies*, edited by D.J. Stanford and J.S. Day, pp. 193-224. Denver Museum of Natural History.
1994 Paleoindian aggregations on the Great Plains. *Journal of Anthropological Archaeology* 13(4):341-370.
1999 Folsom Land Use in West Texas: Evidence from the Robertson Site. *Current Research in the Pleistocene* 16:35-37.
- Hofman, J.L., and E. Ingbar
1988 A Folsom Hunting Overlook in Eastern Wyoming. *Plains Anthropologist* 33(121):337-350.
- Hofman, J.L., and L.C. Todd
2001 Tyranny in the Archaeological Record of Specialized Hunter. In: *People and Wildlife in Northern North America: Essays in Honor of R. Dale Guthrie*, edited by S.C. Gerlach and M.S. Murray, pp.200-215. BAR International Series 944, Oxford.
- Hofman, J.L., L.C. Todd, B. Schultz, and W. Hendy
1991 The Lipscomb bison quarry: continuing investigation at a Folsom site on the southern plains. *Bulletin of the Texas Archeological Society* 60:149-189.
- Holen, S.R.
2001 Clovis Mobility and Lithic Procurement on the Central Great Plains of North America. Unpublished PhD dissertation, University of Kansas, Lawrence.
- Holliday, V.T.
1985 Holocene Soil-geomorphological Relations in a Semi-arid Environment: The Southern High Plains of Texas. In: *Soils and Quaternary Landscape Evolution*, edited by J. Boardman, pp. 325-357. John Wiley and Sons, New York.

- 1995 Stratigraphy and Paleoenvironments of Late Quaternary Valley Fills on the Southern High Plains. *Geological Society of America Memoir 186*, Boulder.
- 1997 *Paleoindian Geoarchaeology of the Southern High Plains*. University of Texas Press, Austin.
- 2000 Folsom Drought and Episodic Drying on the Southern High Plains from 10,900 – 10,200 ¹⁴C yr B.P. *Quaternary Research* 53:1-12.
- Holliday, V.T. and E. Johnson
 1984 The Lubbock Lake 183 Season. *Current Research* (Center for the Study of Early Man) 1:11-13.
- Hornaday, W. T.
 1889 The extermination of the American bison, with sketch of its discovery and life history. *Report of the U.S. National Museum*, Part 2. U.S. Government Printing Office 367-548, Washington D.C.
- Hotelling, H.
 1933 Analysis of a Complex of Statistical Variables into Principal Components. *Journal of Educational Psychology* 24:417-441, 498-520.
- Hughes, D.T.
 1977 Analysis of Certain Prehistoric Bison Kills in the Texas Panhandle and Adjacent Areas. M.A. thesis, Department of Anthropology, University of Arkansas, Fayetteville.
- Hulett, G.K, J.R. Tomelleri, and C.O. Hampton
 1988 Vegetation and Flora of a Sandsage Prairie Site in Finney County, Southwestern Kansas. *Transactions of the Kansas Academy of Science*, 91(3/4):83-95.
- Humphrey, J.D., and C.R. Ferring
 1994 Stable Isotope Evidence for Latest Pleistocene and Holocene Climatic Change in North-Central Texas. *Quaternary Research* 41:200-213.
- Hundertmark, K. J.
 1998 Home range, dispersal and migration. In *Ecology and management of the North American moose*, edited by A. W. Franzmann, and C. C. Schwartz, pp. 303-366. The Wildlife Management Institute. Smithsonian Institution Press.
- Jochim, M.A.
 1981 *Strategies for Survival: Cultural Behavior in an Ecological Context*. Academic Press, New York.

Jodry, M.A.B.

- 1999 Folsom Technological and Socioeconomic Strategies: Views from Stewart's Cattle Guard and the Upper Rio Grande Basin, Colorado. Unpublished PhD dissertation, American University, Washington, D.C.

Johnson, E.

- 1987 *Lubbock Lake: Late Quaternary Studies on the Southern High Plains*. Texas A&M University Press, College Station.
- 1991 Late Pleistocene Cultural Occupation on the Southern Plains. In: *Clovis Origins and Adaptations*, edited by R. Bonnichsen and K.L. Turnmire, pp.215-236. Center for the Study of the First Americans, Corvallis, Oregon.
- 1997 Late Quaternary bison utilization at Lubbock Lake on the southern High Plains. In: *Southern Plains Bison Procurement and Utilization from Paleoindian to Historic*, edited by L.C. Bement and K.J. Buehler. *Plains Anthropologist Memoir* 29:45-61.

Johnson, E. and L.C. Bement

- 2009 Bison Butchery at Cooper, a Folsom Site on the Southern Plains. *Journal of Archaeological Science* 36:1430-1446.

Johnson, R.B.

- 1971 The Great Sand Dunes of southern Colorado. In: *Guidebook of the San Luis Basin, Colorado*, edited by J.L. James, pp. 123-128. New Mexico Geological Society, Socorro, New Mexico.

Kelly, R.L.

- 1983 Hunter-gatherer mobility strategies. *Journal of Anthropological Research* 39:277-306
- 1988 The Three Sides of a Biface. *American Antiquity* 53(4):717-734.
- 1992 Mobility/sedentism: Concepts, archaeological measures, and effects. *Annual Review of Anthropology* 21: 43-66.
- 1995 *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Smithsonian Institution Press, Washington.
- 1996 Ethnographic Analogy and Migration to the Western Hemisphere. In: *Prehistoric Mongoloid Dispersals*, edited by T. Akazawa and E.J.E. Szathmary, pp. 228-240. Oxford University Press, Oxford.

Kelly, R.L., and L.C. Todd

- 1988 Coming into the Country: Early Paleoindian Hunting and Mobility. *American Antiquity* 53: 231-244.

Knapp, A.K, J. Blair, J. Briggs, S. Collins, D. Hartnett, L. Johnson, and E. Towne

- 1999 The Keystone Role of Bison in North American Tallgrass Prairie. *Bioscience* 49:39-50.

- Knepper, D.H., Jr. and R.W. Marrs
 1971 Geological development of the Bonanza-San Luis Valley-Sangre de Cristo Range area, south-central Colorado. In: *Guidebook of the San Luis Basin, Colorado*, edited by J.L. James, pp. 123-128. New Mexico Geological Society, Socorro, New Mexico.
- Konza Prairie Biological Station
 2010 <http://kpbs.konza.ksu.edu/index.html> (accessed January 2010).
- Kornfeld, M.
 1996 The Big-Game Focus. *Current Anthropology* 37(4):629-657.
- Krasinska, Malgorzata, Zbigniew A. Kasinski, and Aleksei N. Bunevich
 2000 Factors Affecting the Variability in Home Range Size and Distribution in European Bison in the Polish and Belarussian Parts of Bialowieza Forest. *Acta Theriologica* 45:321-334
- Kroeber, A.
 1939 *Cultural and Natural Areas of Native North America*. University of California Publications in American Archaeology and Ethnology 38, Berkeley.
- Kutzback, J.E., and T. Webb
 1993 Conceptual Basis for Understanding Late Quaternary Climates. In: *Global Climates Since the Last Glacial Maximum*, edited by H.E. Wright, J.E. Kutzback, T. Webb, W.F. Ruddiman, F.A. Street-Perrott, and P.J. Bartlein, pp. 5-11. University of Minnesota Press, Minneapolis.
- Leonhardy, F.C.
 1966 *Domebo: A Paleo-Indian Mammoth Kill in the Prarie-Plains*. Museum of the Great Plains Contribution No. 1, Lawton, Oklahoma.
- LeResche, R. E.
 1974 Moose migrations in North America. *Nature Canada* 101:393-415.
- LeTourneau, P.D.
 2000 Folsom Toolstone Procurement in the Southwest and Southern Plains. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.
- Leuthold, W.
 1977 African ungulates: a comparative review of their ethology and behavioural ecology. In *Zoophysiology and ecology*, edited by D. S. Farner, W. S. Hoar, B. Hoelldobler, H. Langer, and M. Lindauer, pp. 307. Springer-Verlag, New York.

- Lidicker, W. Z.
1975 The role of dispersal in the demography of small mammals. In *Small mammals, their productivity and population dynamics*, edited by F. B. Goll, K. Petruszewicz, and L. Ryszkowski, pp. 103-128. Cambridge University Press, London.
- Lott, D.F.
1991 American bison socioecology. *Applied Animal Behaviour Science* 29: 135-145.
- MacArthur, R. H.
1972 *Geographical ecology*. Harper and Row, New York.
- MacDonald, D.H.
1999 Modeling Folsom mobility, mating strategies, and technological organization in the Northern Plains. *Plains Anthropologist* 44(68):141-161.
- Macfarlane, P.A.
1996 Regional Water-Quality Patterns. Kansas Geological Survey, Dakota Aquifer Program, July 5, 1996.
- Martin, P.S., and R.G. Klein (eds.)
1984 *Late Quaternary Extinctions: A Prehistoric Revolution*. University of Arizona Press, Tucson.
- McDonald, J.N.
1981 *North American Bison: Their Classification and Evolution*. University of California Press, Berkeley.
- McHugh, T.
1958 Social behavior of the American buffalo (*Bison bison bison*). *Zoologica* 43:1-40.
1972 *The Time of the Buffalo*. Alfred A. Knopf, New York.
- McNaughton, S. J.
1985 Ecology of a grazing ecosystem: the Serengeti. *Ecological Monographs* 55(3):259-294.
- Meagher, Margaret M.
1973 The Bison of Yellowstone National Park. National Park Service *Science Monograph* 1:1-161.

- Meltzer, D.J.
 1983 The Antiquity of Man and the Development of American Archaeology. In: *Advances in Archaeological Method and Theory*, edited by M.B. Schiffer, pp. 1-51. Academic Press, New York.
- 1993 *In Search of the First Americans*. Smithsonian Library, St. Remy Press, Montreal.
- 2006 *Folsom: New Archaeological Investigations of a Classic Paleoindian Bison Kill*. University of California Press, Berkeley.
- Meltzer, D.J., Todd, L.C., and V.T. Holliday
 2002 The Folsom (Paleoindian) type site: past investigations, current studies. *American Antiquity* 67:5-36.
- Messier, F., J. Huot, D. Le Henaff, and S. Luttich
 1988 Demography of the George River caribou herd: evidence of population regulation by forage exploitation and range expansion. *Arctic* 41:279-287.
- Metcalf, Duncan and K. Renee Barlow
 1993 Model for Exploring the Optimal Trade-Off between Field Processing and Transport. *American Anthropologist* 94:340-356.
- Molleson, T.
 1988 Trace elements in human teeth. In: *Trace Elements in Environmental History*, edited by Grupe and Herrmann, pp. 67-82. Springer-Verlag Press, New York.
- Montet-White, A., and S. Holen, eds.
 1991 *Raw Material Economies among Prehistoric Hunter-Gatherers*. University of Kansas Publications in Anthropology 19, Lawrence.
- Morgan, R. G.
 1980 Bison movement patterns on the Canadian plains: an ecological analysis. *Plains Anthropology* 25:142-160.
- Murdock, G.
 1967 The Ethnographic Atlas: A Summary. *Ethnology* 6 (2).
- Murray, B. G.
 1967 Dispersal in vertebrates. *Ecology* 48:975-978.
 1982 Home range, dispersal and the clan system of impala. *African Journal of Ecology* 20:253-269.
- Nature Conservancy
 2010 Oklahoma Tallgrass Prairie Preserve,
<http://www.nature.org/wherewework/northamerica/states/oklahoma/preserves/tallgrasses.html> (accessed January 2010).

- Nelson, K. L.
 1965 Status and habit of the American buffalo (Bison bison) in the Henry Mountain areas of Utah. Publication No 65-2 Utah State Department of Fish and Game, Salt Lake City.
- Nelson, M. E., and L. D. Mech
 1984 Home-range formation and dispersal of deer in northeastern Minnesota. *Journal of Mammalogy* 65:567-575.
 1992 Dispersal in female white-tailed deer. *Journal of Mammalogy* 73:891-894.
 1999 Twenty-year home-range dynamics of a white-tailed deer matriline. *Canadian Journal of Zoology* 77:1128-1135.
- Neff, H.
 2002 Quantitative techniques for analyzing ceramic compositional data Ceramic Production and Circulation in the Greater Southwest. In: Source Determination by INAA and Complementary Mineralogical Investigations, edited by D.M. Glowacki and H. Neff. Costen Institute of Archaeology, University of California, Monograph 44.
- Nicholson, M. C., R. T. Bowyer, and J. G. Kie
 1997 Habitat selection and survival of mule deer: tradeoffs associated with migration. *Journal of Mammalogy* 78(2):483-504.
- Nixon, C. M., L. P. Hansen, P. A. Brewer, and J. E. Chelsvig
 1991 Ecology of white-tailed deer in an intensively farmed region of Illinois. *Wildlife Monographs* 118:1-77.
- Ochoa, R.E.
 2010 Handbook of Texas Online,
<http://www.tshaonline.org/handbook/online/articles/MM/hcm6.html> (accessed March 26, 2010).
- Odum, E. P.
 1971 *Fundamentals of ecology* 3rd edition. W. B. Saunders Co., Philadelphia.
- Parry, W., and R.L. Kelly
 1988 Expedient Core Technology and Sedentism. In: *The Organization of Core Technology*, edited by J. Johnson and C. Morrow, pp.285-305. Westview Press, Boulder.
- Paruelo, J.M., and W.K. Lauenroth
 1996 Relative Abundance of Plant Functional Types in Grasslands and Shrublands of North America. *Ecological Applications* 6:1212-1224.

- Pease, C. M., and R. Lande
 1989 A model of population growth, dispersal and evolution in a changing environment. *Ecology* 70(6):1657-1664.
- Peden, D.G., G.M. VanDyne, R.W. Rice, and R.M. Hansen
 1974 The Trophic Ecology of *Bison bison* L. on Shortgrass Plains. *Journal of Applied Ecology* 11:489-498.
- Peerson, K.
 1901 On Lines and Planes of Closest Fit to Systems of Points in Space. *Philosophical Magazine, Sixth Series* 2:559-572.
- Perlman, I. and F. Asaro
 1969 Pottery analysis by neutron activation. *Archaeometry* 11:21-52.
- Pianka, E.R.
 1983 *Evolutionary Ecology*. Harper and Row, New York.
- Pillmore, C. L., and R.M. Flores
 1987 Stratigraphy and depositional environments of the Cretaceous-Tertiary boundary interval and associated rocks, Raton Basin, New Mexico and Colorado. In: *Cretaceous-Tertiary boundary of the San Juan and Raton Basins, northern New Mexico and southern Colorado*, edited by J. E. Fassett and K. B. Rigby Jr., pp. 111-130. Special Paper 209, Geological Society of America, Boulder, Colorado.
- Pouchou, J.L. and Pichoir, F
 1985 "PAP" correction procedure for improved microanalysis. In: *Microbeam Analysis*, edited by J.T. Armstrong, pp. 104-106. San Francisco Press: California.
- Prins, H. H. T.
 1989 Condition changes and choice of social environment in African buffalo bulls. *Behaviour* 108:297-305.
- Pullainen, E.
 1974 Seasonal movements of moose in Europe. *Nature Canada* 101:379-392.
- Reeves, B.O.K.
 1978 Head-Smashed-In: 5,500 years of Bison Jumping in the Alberta Plains. In: *Bison Procurement and Utilization: A Symposium*, edited by L.B. Davis and M. Wilson. *Plains Anthropologist Memoir* 14:151-174.

- Reher, C.A. and G.C. Frison
1980 The Vore Site: 48CK302, a stratified buffalo jump site in the Wyoming Black Hills. *Plains Anthropologist Memoir* 16.
- Reynolds, H.W., R.D. Glaholt, A.W.L. Hawley
1982 Bison. In: *Wild Mammals of North America – Biology, Management, and Economics*, edited by J.A. Chapman and G.A. Feldhamer, pp. 972-1007. Johns Hopkins University Press, Baltimore.
- Risser, P.G.
1985 Grasslands. In *Physiological Ecology of North American Plant Communities*, edited by B.F. Chabot and H.A. Mooney, pp. 232-256. Chapman and Hall, New York.
- Roberts, F.H.H.
1936 Additional Information on the Folsom Complex. *Smithsonian Miscellaneous Collections* 95:1-38.
- Roe, F.G.
1951 *The North American Buffalo*. University of Toronto Press, Toronto.
- Root, M.
2000 *The Archaeology of the Bobtail Wolf Site*. Washington State University Press, Pullman, WA.
- Rooth, C.
1982 Hydrology and Ocean Circulation. *Progress in Oceanography* 11:131-149.
- Roy, E.C., Jr
1984 Stratigraphy and Sedimentology of the Kincaid Formation, Midway Group (Paleocene), Upper Rio Grande Embayment, Texas. *Transactions of the Gulf Coast Association of Geological Societies*, Volume XXXIV, Marlow, New Hampshire.
- Schneider, K.N.
1986 Dental caries, enamel composition, and subsistence among prehistoric Amerindians of Ohio. *American Journal of Physical Anthropology* 71:95-102
- Schneider, K.N. and Blakeslee, D.
1990 Evaluating residence patterns among prehistoric populations: clues from dental enamel composition. *Human Biology* 62:71-83.

- Scott, G. and C. Pillmore
 1993 Geologic and structure-contour map of the Raton Quadrangle, Colfax and Union Counties, New Mexico and Las Animas County, Colorado. *U.S. Geological Survey, Miscellaneous Investigations Series*. Map I-2266.
- Sellards, E.H.
 1952 *Early Man in America: A Study of Prehistory*. University of Texas Press, Austin.
- Senft, R. L., M. B. Coughenour, D. W. Bailey, L. R. Rittenhouse, O. E. Sala, and D. M. Swift
 1987 Large Herbivore Foraging and Ecological Hierarchies. *BioScience* 37: 789-799.
- Seton, E. T.
 1910 *Life-Histories of Northern Animals* 2nd vol. Scribner's, New York.
- Sharp, Z.D. and Cerling, T.E.
 1998 Fossil records of seasonal climate and ecology: straight from the horse's mouth. *Geology* 26:219-222.
- Shaw, P.J.A.
 1993 *Multivariate Statistics for the Environmental Sciences*. Oxford University Press, New York.
- Sinclair, A. R. E.
 1974 The resource limitation of trophic levels in tropical grassland ecosystems. *Journal of Animal Ecology* 44:497-520.
 1977 *The African Buffalo: a study of resource limitation*. University of Chicago Press, Chicago, Illinois.
 1992 Do large mammals disperse like small mammals? In: *Animal dispersal – small mammals as a model*, edited by N. C. Stenseth, and W. Z. Lidicker, Jr., pp. 229-242. Chapman and Hall, London.
- Smith, E.A., and B. Winterhalder
 1981 New Perspectives on Hunter-Gatherer Socioecology. In: *Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses*, edited by B. Winterhalder and E.A. Smith, pp. 1-12. University of Chicago Press.
- Smith, E.A., and B. Winterhalder (eds.)
 1992 *Evolutionary Ecology and Human Behavior*. Aldine de Gruyter, Hawthorne, NY.

- Smith, T. E.
1989 The role of bulls in pioneering new habitats in an expanding muskox population on the Seward Peninsula, Alaska. *Canadian Journal of Zoology* 67(5):1096-1101.
- Sneath, P.H.A. and Sokal, R.R.
1973 *Numerical Taxonomy*. W. H. Freeman and Company, San Francisco.
- Soper, J.D.
1941 History, range, and home life of the northern bison. *Ecological Monographs* 11:347-412.
- Speth, J.D., and K.A. Spielmann
1983 Energy Source, Protein Metabolism, and Hunter-Gatherer Subsistence Strategies. *Journal of Anthropological Archaeology* 2:1-3.
- Spinage, C. A.
1982 *A territorial antelope: the Uganda waterbuck*. Academic Press, New York.
- Stanford, D.J.
1978 The Jones-Miller Site: An Example of Hell Gap Bison Procurement Strategy. In: *Bison Procurement and Utilization: A Symposium*, edited by L.B. Davis and M. Wilson, pp.90-97. *Plains Anthropologist Memoir* 14.
1984 The Jones-Miller Site: A Study of Hell Gap Bison Procurement and Processing. *National Geographic Society Research Reports* 16:615-635.
- Steele, D.G. and B.W. Baker
1993 Multiple Predation: A Definitive Human Hunting Strategy. In: *From Bones to Behavior*, Ethnoarchaeological and Experimental Contributions to the Interpretations of Faunal Remains, edited by Jean Hudson, pp. 9-37. Occasional Paper No. 21, Center for Archaeological Investigations, Southern Illinois University at Carbondale.
- Stenseth, N. C., and W. Z. Lidicker, Jr.
1992 The study of dispersal: a conceptual and methodological guide. In: *Animal dispersal – small mammals as a model*, edited by N. C. Stenseth, and W. Z. Lidicker, Jr. Chapman and Hall, London.
- Steward, J.H.
1955 *Theory of Culture Change*. University of Illinois Press, Urbana.

- Stormer, J.C. Jr., Pierson, M.L., and Tacker, R.C
1993 Variation of F and Cl X-ray intensity due to anisotropic diffusion in apatite during electron microprobe analysis. *American Mineralogist* 78:641-648.
- Talbot L., and M. Talbot.
1963 The wildebeest in Western Masailand, East Africa. *Wildlife Monographs* 12:1-88.
- Tankersley, K.B.
1989 A Close Look at the Big Picture: Early Paleoindian Lithic Procurement in the Midwestern United States. In *Eastern Paleoindian Lithic Resource Use*, edited by C. Ellis and J. Lothrop, pp.259-292. Westview Press, Boulder.
- Taylor, L. R., and R. A. Taylor
1977 Aggregation, migration and population mechanics. *Nature* 265:415-421.
- Tieszen, L.L., B.C. Reed, N.B. Bliss, B.K. Wylie, and D.D. DeJong
1997 NDVI, C3 and C4 Production, and Distributions in Great Plains Grassland Cover Classes. *Ecological Applications* 7:59-78.
- Todd, L.C.
1987 Analysis of kill-butcher sites and the interpretation of Paleoindian hunting. In: *The Evolution of Human Hunting*, edited by M. Nitecki and D. Nitecki, pp.225-266. Plenum Press, New York.
1991 Seasonality Studies and Paleoindian Subsistence Strategies. In: *Human Predators and Prey Mortality*, edited by M.C. Stiner, pp.217-238. Westview Press, Boulder.
- Trimble, S.
2001 Great Sand Dunes: The shape of the wind. *Southwest Parks and Monuments Association*, 32. Tuscon, Arizona.
- Trigger, B.
1989 *A History of Archaeological Thought*. Cambridge University Press, New York.
- U.S. Fish and Wildlife Service
2009 Geology: Excerpts from C.A. Merrit, School of Geology, University of Oklahoma, and the Programs in Geosciences at the University of Texas at Dallas,
<http://www.fws.gov/southwest/refuges/oklahoma/wichitamountains/geology.html> June 11, 2009.

- Varien, M. D.
1999 *Sedentism and Mobility in a Social Landscape: Mesa Verde and Beyond*. University of Arizona Press, Tucson.
- Vrbicky-Todd, E.
1984 *Communal Buffalo Hunting Among the Plains Indians*. Edmond, AB: Archaeological Survey of Alberta, Occasional Paper no. 24.
- Waguespack, N.M., and T.A. Surovell
2003 Clovis Hunting Strategies, or How to Make Out on Plentiful Resources. *American Antiquity* 68: 333-352.
- Waguespack, N. M., T. A. Surovell, M. Kornfeld and G. C. Frison
2002 The 2001 Field Season at Barger Gulch, Locality B, Middle Park, Colorado. Technical Report No. 20, George C. Frison Institute of Archaeology and Anthropology, University of Wyoming, Laramie.
- Waser, P. M.
1985 Does competition drive dispersal? *Ecology* 66(4):1170-1175.
- Wheat, J.B.
1967 A Paleo-Indian Bison Kill. *Scientific American* 216:44-52.
1972 The Olsen-Chubbuck Site: A Paleo-Indian Bison Kill. *Society for American Anthropology Memoir* 26.
1978 Olsen-Chubbuck and Jurgens Sites: Four Aspects of Paleo-Indian Economy. In: *Bison Procurement and Utilization: A Symposium*, edited by L.B. Davis and M. Wilson, pp.84-89. *Plains Anthropologist Memoir* 14.
- Widga, C.C.
2006a. Niche Variability in Late Holocene Bison: A Perspective from Big Bone Lick, KY. *Journal of Archaeological Science* 33:1237-1255.
2006b Bison, Bogs, and Big Bluestem: The Subsistence Ecology of Middle Holocene Hunter-Gatherers in the Eastern Great Plains. Unpublished Ph.D. dissertation, Department of Anthropology, University of Kansas, Lawrence.
- Wiedemann, F.B., Bocherens, H., von den Driesch, A., Grupe, G., and Mariotti, A.
1999 Methodological and archaeological implications of intra-tooth isotopic variations (13C, 18O) in herbivores from Ain Ghazal (Jordan, Neolithic). *Journal of Archaeological Science* 26:697-704.
- Wilmsen, E.N. and F.H.H. Roberts Jr.
1978 *Lindenmeier, 1934-1974: Concluding Report on Investigations*. Smithsonian Institution, Contributions to Anthropology 24: Washington, DC

Winterhalder, B.

1981a Optimal Foraging Strategies and Hunter-Gatherer Research in Anthropology: Theory and Models. In: *Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses*, edited by Bruce Winterhalder and Eric A. Smith, pp. 13-35. University of Chicago Press, Chicago.

1981b Foraging Strategies in the Boreal Forest: An Analysis of Cree Hunting and Gathering. In: *Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses*, edited by Bruce Winterhalder and Eric A. Smith, pp. 66-98. University of Chicago Press, Chicago.

Winterhalder, B., and E.A. Smith

1992 Evolutionary Ecology and the Social Sciences. In: *Evolutionary Ecology and Human Behavior*, edited by E. Smith and B. Winterhalder, pp. 3-24. Aldine de Gruyter, Hawthorne, NY.

Wissler, C.

1926 *The Relation of Nature to Man in Aboriginal America*. Oxford University Press, New York.

Woodward, L. A.

1987 Tectonic framework of northeastern New Mexico and adjacent parts of Colorado, Oklahoma, and Texas. *Guidebook to 38th Field Conference*, pp. 67-71. New Mexico Geological Society, Socorro, New Mexico.

Worsaae, J.J.A.

1849 *The primeval antiquities of Denmark*. (trans. Thoms, William J.). John Henry Parker, Oxford.

Wyckoff, D.G.

1999 Southern Plains Folsom Lithic Technology: A View from the Edge. In: *Folsom Lithic Technology: Explorations in Structure and Variation*, edited by D. S. Amick, pp. 39-64. International Monographs in Prehistory, Archaeological Series 12, Ann Arbor.

APPENDIX A. RAW TRACE ELEMENT DATASHEETS FROM
LASER ABLATION.

Appendix A. Raw trace element datasheets from laser ablation.

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-3	59256.33	81.92	1310.85	854.32	2597.05	654.88	1163.41
SRM614-3	54212.02	152.28	15818.93	27703.36	25736.03	4605.59	6337.48
SRM612-3	64922.00	3746.90	21469.28	22771.45	63468.56	10710.98	13195.56
SRM610-3	130879.89	24278.10	38226.26	10727.86	165451.05	23159.09	27654.04
AP1-3	50707.97	131.76	4645.15	1173.45	96465.58	12487.23	17790.66
AP2-3	49144.48	374.72	11836.19	1030.57	1820539.90	196098.06	239908.11
AP3-3	50066.40	1285.49	13937.28	835.52	3160027.30	345537.59	421742.84
AP4-3	50475.93	1727.49	11636.63	809.72	2784381.00	305136.88	371981.09
EVA2.5-1	49277.92	106.52	2022.65	3561.94	5878617.00	722451.50	877857.38
EVA2.5-2	51525.09	99.40	1726.37	3392.62	4407799.00	540277.25	656937.69
EVA2.5-3	52586.38	113.88	1716.33	3076.58	4416488.50	527657.94	642623.06
EVA2.5-4	51195.57	98.48	1784.93	2599.53	6341829.50	746884.06	912324.00
EVA2.5-5	51129.45	79.48	2114.29	2685.86	7331584.50	872406.25	1066353.00
EVA2.5-6	50361.84	69.08	2351.05	2732.14	7466186.00	885351.94	1082071.10
EVA2.5-7	52989.22	71.44	1571.29	1358.05	1119761.00	135598.86	148549.36
EVA2.5-8	54852.39	91.20	1687.77	1430.09	1297352.00	141661.67	171273.80
EVA2.5-9	54659.75	83.96	1825.05	1435.37	1324726.00	143096.52	173507.61
EVA2.5-10	57095.96	76.56	1366.57	1188.93	1091769.50	122560.13	147855.75
EVA2.5-11	58394.85	74.68	1771.89	1269.93	1466595.60	160300.19	193755.25
EVA2.5-12	58519.33	57.36	1356.85	1399.81	1776335.50	193653.66	234148.28
EVA2.5-13	59824.90	96.68	1538.45	1389.33	1934275.00	211160.31	256478.89
EVA2.5-14	59445.29	59.08	1637.21	1559.81	2128826.30	230380.98	280627.56
EVA2.5-15	59332.77	51.96	1532.01	1622.89	2189574.50	239509.34	291391.91
SRM614-4	66400.70	114.44	4273.54	18701.23	29210.81	4445.94	5350.55
SRM612-4	73942.94	2677.02	8224.37	16978.82	36918.05	5490.43	6492.40
SRM610-4	123448.45	18981.43	25681.23	8656.85	114362.09	15446.93	18085.98
AP1-4	60727.26	143.20	2429.09	1023.85	51507.81	6312.20	8721.49
AP2-4	53126.46	264.40	6553.48	703.12	857886.00	91436.44	112163.15
AP3-4	53324.46	948.93	8820.33	649.08	2066502.30	216788.34	264639.63
AP4-4	53584.50	1150.61	5550.39	600.08	1212237.60	128789.72	155549.23
blank-4	66061.45	62.00	403.36	412.08	23320.61	3382.26	3444.10
blank average	62658.89	71.96	857.10	633.20	12958.83	2018.57	2303.75
blank subtraction							
SRM614-3	-8446.87	80.32	14961.82	27070.15	12777.19	2587.01	4033.72
SRM612-3	2263.11	3674.94	20612.18	22138.24	50509.72	8692.41	10891.80
SRM610-3	68221.00	24206.14	37369.15	10094.66	152492.22	21140.52	25350.28
AP1-3	-11950.93	59.80	3788.04	540.24	83506.75	10468.66	15486.91
AP2-3	-13514.42	302.76	10979.08	397.36	1807581.07	194079.49	237604.36
AP3-3	-12592.49	1213.53	13080.17	202.32	3147068.47	343519.02	419439.09
AP4-3	-12182.97	1655.53	10779.52	176.52	2771422.17	303118.31	369677.34
EVA2.5-1	-13380.97	34.56	1165.55	2928.74	5865658.17	720432.93	875553.63
EVA2.5-2	-11133.80	27.44	869.26	2759.42	4394840.17	538258.68	654633.94
EVA2.5-3	-10072.52	41.92	859.22	2443.37	4403529.67	525639.37	640319.31
EVA2.5-4	-11463.33	26.52	927.83	1966.33	6328870.67	744865.49	910020.25
EVA2.5-5	-11529.44	7.52	1257.19	2052.65	7318625.67	870387.68	1064049.25
EVA2.5-6	-12297.05	-2.88	1493.95	2098.93	7453227.17	883333.37	1079767.35
EVA2.5-7	-9669.67	-0.52	714.18	724.84	1106802.17	121580.29	146245.61
EVA2.5-8	-7806.50	19.24	830.66	796.88	1284393.17	139643.10	168970.05
EVA2.5-9	-7999.15	12.00	967.95	802.16	1311767.17	141077.95	171203.86
EVA2.5-10	-5562.93	4.60	509.46	555.72	1078810.67	120541.56	145552.00
EVA2.5-11	-4264.04	2.72	914.79	636.72	1453636.77	158281.62	191451.50
EVA2.5-12	-4139.56	-14.60	499.74	766.60	1763376.67	191635.09	231844.53
EVA2.5-13	-2833.99	24.72	681.34	756.12	1921316.17	209141.74	254175.14
EVA2.5-14	-3213.60	-12.88	780.10	926.61	2115867.47	228362.41	278323.81
EVA2.5-15	-3326.12	-20.00	674.90	989.69	2176615.67	237490.77	289088.16
SRM614-4	3741.80	42.48	3416.44	18068.02	16251.97	2427.37	3046.80
SRM612-4	11284.05	2605.05	7367.26	16345.61	23959.21	3471.86	4188.64
SRM610-4	60789.56	18909.47	24824.12	8023.65	101403.26	13428.36	15782.23
AP1-4	-1931.63	71.24	1571.99	390.64	38548.98	4293.62	6417.74
AP2-4	-9532.44	192.44	5696.37	69.92	844927.17	89417.87	109859.40
AP3-4	-9334.43	876.96	7963.23	15.88	2053543.47	214769.77	262335.88
AP4-4	-9074.39	1078.65	4693.29	-33.12	1199278.77	126771.15	153245.48
zero correction							
SRM614-3	0.00	80.32	14961.82	27070.15	12777.19	2587.01	4033.72
SRM612-3	2263.11	3674.94	20612.18	22138.24	50509.72	8692.41	10891.80

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	68221.00	24206.14	37369.15	10094.66	152492.22	21140.52	25350.28
AP1-3	0.00	59.80	3788.04	540.24	83506.75	10468.66	15486.91
AP2-3	0.00	302.76	10979.08	397.36	1807581.07	194079.49	237604.36
AP3-3	0.00	1213.53	13080.17	202.32	3147068.47	343519.02	419439.09
AP4-3	0.00	1655.53	10779.52	176.52	2771422.17	303118.31	369677.34
EVA2.5-1	0.00	34.56	1165.55	2928.74	5865658.17	720432.93	875553.63
EVA2.5-2	0.00	27.44	869.26	2759.42	4394840.17	538258.68	654633.94
EVA2.5-3	0.00	41.92	859.22	2443.37	4403529.67	525639.37	640319.31
EVA2.5-4	0.00	26.52	927.83	1966.33	6328870.67	744865.49	910020.25
EVA2.5-5	0.00	7.52	1257.19	2052.65	7318625.67	870387.68	1064049.25
EVA2.5-6	0.00	0.00	1493.95	2098.93	7453227.17	883333.37	1079767.35
EVA2.5-7	0.00	0.00	714.18	724.84	1106802.17	121580.29	146245.61
EVA2.5-8	0.00	19.24	830.66	796.88	1284393.17	139643.10	168970.05
EVA2.5-9	0.00	12.00	967.95	802.16	1311767.17	141077.95	171203.86
EVA2.5-10	0.00	4.60	509.46	555.72	1078810.67	120541.56	145552.00
EVA2.5-11	0.00	2.72	914.79	636.72	1453636.77	158281.62	191451.50
EVA2.5-12	0.00	0.00	499.74	766.60	1763376.67	191635.09	231844.53
EVA2.5-13	0.00	24.72	681.34	756.12	1921316.17	209141.74	254175.14
EVA2.5-14	0.00	0.00	780.10	926.61	2115867.47	228362.41	278323.81
EVA2.5-15	0.00	0.00	674.90	989.69	2176615.67	237490.77	289088.16
SRM614-4	3741.80	42.48	3416.44	18068.02	16251.97	2427.37	3046.80
SRM612-4	11284.05	2605.05	7367.26	16345.61	23959.21	3471.86	4188.64
SRM610-4	60789.56	18909.47	24824.12	8023.65	101403.26	13428.36	15782.23
AP1-4	0.00	71.24	1571.99	390.64	38548.98	4293.62	6417.74
AP2-4	0.00	192.44	5696.37	69.92	844927.17	89417.87	109859.40
AP3-4	0.00	876.96	7963.23	15.88	2053543.47	214769.77	262335.88
AP4-4	0.00	1078.65	4693.29	0.00	1199278.77	126771.15	153245.48

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-3	0.000000	0.000020	0.003673	0.006645	0.003136	0.000635	0.000990
SRM612-3	0.000635	0.001031	0.005784	0.006212	0.014174	0.002439	0.003056
SRM610-3	0.052948	0.018787	0.029003	0.007835	0.118353	0.016408	0.019675
AP1-3	0.000000	0.000003	0.000189	0.000027	0.004167	0.000522	0.000773
AP2-3	0.000000	0.000014	0.000523	0.000019	0.086178	0.009253	0.011328
AP3-3	0.000000	0.000052	0.000559	0.000009	0.134518	0.014683	0.017928
AP4-3	0.000000	0.000082	0.000534	0.000009	0.137380	0.015026	0.018325
EVA2.5-1	0.000000	0.000003	0.000101	0.000254	0.508122	0.062409	0.075846
EVA2.5-2	0.000000	0.000003	0.000110	0.000348	0.554943	0.067967	0.082662
EVA2.5-3	0.000000	0.000005	0.000098	0.000280	0.504780	0.060254	0.073400
EVA2.5-4	0.000000	0.000002	0.000064	0.000135	0.434158	0.051097	0.062427
EVA2.5-5	0.000000	0.000000	0.000071	0.000116	0.413093	0.049128	0.060059
EVA2.5-6	0.000000	0.000000	0.000080	0.000112	0.398971	0.047285	0.057800
EVA2.5-7	0.000000	0.000000	0.000060	0.000061	0.093703	0.010293	0.012381
EVA2.5-8	0.000000	0.000001	0.000065	0.000062	0.100089	0.010882	0.013167
EVA2.5-9	0.000000	0.000001	0.000071	0.000059	0.096741	0.010404	0.012626
EVA2.5-10	0.000000	0.000000	0.000054	0.000059	0.114023	0.012740	0.015384
EVA2.5-11	0.000000	0.000000	0.000082	0.000057	0.130722	0.014234	0.017217
EVA2.5-12	0.000000	0.000000	0.000042	0.000064	0.148283	0.016115	0.019496
EVA2.5-13	0.000000	0.000002	0.000059	0.000065	0.165168	0.017979	0.021850
EVA2.5-14	0.000000	0.000000	0.000060	0.000072	0.163425	0.017638	0.021497

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000000	0.000000	0.000053	0.000078	0.171350	0.018696	0.022758
SRM614-4	0.001549	0.000018	0.001414	0.007478	0.006726	0.001005	0.001261
SRM612-4	0.004984	0.001151	0.003254	0.007219	0.010582	0.001533	0.001850
SRM610-4	0.064511	0.020067	0.026344	0.008515	0.107611	0.014250	0.016748
AP1-4	0.000000	0.000005	0.000109	0.000027	0.002681	0.000299	0.000446
AP2-4	0.000000	0.000013	0.000389	0.000005	0.057635	0.006099	0.007494
AP3-4	0.000000	0.000053	0.000479	0.000001	0.123492	0.012915	0.015776
AP4-4	0.000000	0.000081	0.000353	0.000000	0.090162	0.009531	0.011521

standardize signal averages AP

AP1	0.000000	0.000004	0.000149	0.000027	0.003424	0.000411	0.000610
AP2	0.000000	0.000014	0.000456	0.000012	0.071907	0.007676	0.009411
AP3	0.000000	0.000052	0.000519	0.000005	0.129005	0.013799	0.016852
AP4	0.000000	0.000082	0.000444	0.000004	0.113771	0.012278	0.014923

linest from std sig ave

0.000000	0.181055	0.056481	4.672246	0.012657	0.118009	0.096736
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standardize signal averages SRM

srm614-2	0.000774	0.000019	0.002543	0.007061	0.004931	0.000820	0.001126
srm612-2	0.002809	0.001091	0.004519	0.006716	0.012378	0.001986	0.002453
srm610-2	0.058729	0.019427	0.027673	0.008175	0.112982	0.015329	0.018212

linest from std sig ave

0.096373	0.279841	0.147382	147.870759	0.048367	0.355872	0.299280
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concentration data

i.s. correction

SRM614-3	85763.00	0.00	0.31	17.79	2662.72	3.40	6.43	8.21
SRM612-3	85763.00	0.00	16.01	28.02	2489.35	15.39	24.69	25.36
SRM610-3	85763.00	0.00	291.72	140.49	3139.41	128.47	166.06	163.23
AP1-3	398936	0.00	0.22	4.26	50.25	21.04	24.60	29.83
AP2-3	398936	0.00	1.04	11.79	35.31	435.14	435.61	437.17
AP3-3	398936	0.00	3.75	12.60	16.12	679.22	691.26	691.88
AP4-3	398936	0.00	5.93	12.04	16.31	693.67	707.38	707.19
EVA2.5-1	398936	0.00	0.22	2.28	472.89	2565.65	2938.06	2927.02
EVA2.5-2	398936	0.00	0.25	2.47	649.46	2802.06	3199.73	3190.03
EVA2.5-3	398936	0.00	0.35	2.22	522.06	2548.78	2836.65	2832.63
EVA2.5-4	398936	0.00	0.13	1.43	251.42	2192.18	2405.56	2409.15
EVA2.5-5	398936	0.00	0.03	1.60	215.95	2085.83	2312.85	2317.78
EVA2.5-6	398936	0.00	0.00	1.80	209.42	2014.52	2226.07	2230.58
EVA2.5-7	398936	0.00	0.00	1.36	114.38	473.13	484.58	477.81
EVA2.5-8	398936	0.00	0.11	1.46	115.75	505.38	512.30	508.15
EVA2.5-9	398936	0.00	0.06	1.61	110.27	488.47	489.81	487.26
EVA2.5-10	398936	0.00	0.04	1.21	109.48	575.73	599.79	593.69
EVA2.5-11	398936	0.00	0.02	1.85	106.73	660.05	670.10	664.42
EVA2.5-12	398936	0.00	0.00	0.95	120.16	748.72	758.65	752.38
EVA2.5-13	398936	0.00	0.15	1.32	121.16	833.98	846.42	843.24
EVA2.5-14	398936	0.00	0.00	1.36	133.40	825.18	830.37	829.61
EVA2.5-15	398936	0.00	0.00	1.20	145.22	865.20	880.17	878.27
SRM614-4	85763.00	0.00	0.27	6.85	2996.43	7.30	10.17	10.46
SRM612-4	85763.00	0.00	17.87	15.76	2892.76	11.49	15.52	15.35
SRM610-4	85763.00	0.00	311.60	127.61	3411.95	116.81	144.23	138.95
AP1-4	398936	0.00	0.36	2.46	50.64	13.54	14.06	17.23
AP2-4	398936	0.00	0.95	8.76	8.89	291.02	287.15	289.20
AP3-4	398936	0.00	3.81	10.79	1.78	623.55	608.03	608.81
AP4-4	398936	0.00	5.86	7.95	0.00	455.25	448.68	444.61

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

Li Be B Na Mg24 Mg25 Mg26

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	56547.20	77.60	1160.85	863.72	1699.33	472.36	666.12
SRM614-5	54149.34	167.16	11654.83	17937.46	16940.94	3066.94	4012.62
SRM612-5	62442.59	3160.98	17413.02	19510.87	43927.05	6671.44	8235.49
SRM610-5	125130.63	22525.73	35873.92	9980.54	138683.91	18710.82	22114.13
AP1-5	49947.44	153.28	3811.98	1109.65	74890.30	9578.97	13708.56
AP2-5	45796.30	298.80	9511.93	1026.41	1210161.40	130869.30	159157.45
AP3-5	45814.54	937.05	11211.94	862.08	1995173.60	214304.77	261887.34
AP4-5	45377.50	1377.29	9005.09	654.92	1640459.00	175169.66	214765.97
EVA3-1	43419.24	63.28	3002.74	3557.34	11617366.00	1454052.90	1773679.00
EVA3-2	43186.28	69.00	2614.77	2920.14	10455342.00	1302027.50	1585089.40
EVA3-3	43341.81	97.68	2315.29	2455.93	8972290.00	1098420.10	1341109.30
SRM614-6	50328.68	115.56	4947.47	11553.83	42288.44	6123.63	6533.24
SRM612-6	61924.75	2768.42	10401.46	15984.93	53308.38	7778.08	8697.37
SRM610-6	118020.70	20881.52	29934.89	9085.17	138651.91	18134.82	21296.92
AP1-6	52246.06	99.44	2961.30	937.41	58502.09	7321.20	9945.54
AP2-6	49602.76	277.80	7644.24	668.00	933178.00	101592.73	123686.41
AP3-6	50149.80	928.09	10312.78	678.40	2170835.50	233558.31	283253.28
AP4-6	51158.45	1496.73	8241.53	567.88	1822556.30	196930.70	238377.63
blank-6	49446.68	114.48	556.80	527.40	45655.46	6256.92	6335.88
blank average	52996.94	96.04	858.82	695.56	23677.39	3364.64	3501.00
blank subtraction							
SRM614-5	1152.40	71.12	10796.00	17241.90	-6736.46	-297.70	511.62
SRM612-5	9445.65	3064.94	16554.20	18815.31	20249.65	3306.80	4734.49
SRM610-5	72133.69	22429.69	35015.10	9284.97	115006.52	15346.19	18613.13
AP1-5	-3049.50	57.24	2953.16	414.08	51212.90	6214.33	10207.56
AP2-5	-7200.64	202.76	8653.11	330.84	1186484.01	127504.66	155656.45
AP3-5	-7182.40	841.00	10353.12	166.52	1971496.21	210940.13	258386.34
AP4-5	-7619.44	1281.25	8146.27	-40.64	1616781.61	171805.02	211264.97
EVA3-1	-9577.70	-32.76	2143.91	2861.78	11593688.61	1450688.26	1770178.00
EVA3-2	-9810.66	-27.04	1755.95	2224.57	10431664.61	1298662.86	1581588.40
EVA3-3	-9655.13	1.64	1456.47	1760.37	8948612.61	1095055.46	1337608.30
SRM614-6	-2668.26	19.52	4088.64	10858.26	18611.04	2759.00	3032.24
SRM612-6	8927.81	2672.37	9542.63	15289.37	29630.99	4413.45	5196.37
SRM610-6	65023.76	20785.48	29076.06	8389.61	114974.52	14770.18	17795.92
AP1-6	-750.88	3.40	2102.47	241.84	34824.70	3956.56	6444.54
AP2-6	-3394.18	181.76	6785.42	-27.56	909500.61	98228.09	120185.41
AP3-6	-2847.14	832.04	9453.95	-17.16	2147158.11	230193.67	279752.28
AP4-6	-1838.49	1400.69	7382.70	-127.68	1798878.91	193566.06	234876.63
zero correction							
SRM614-5	1152.40	71.12	10796.00	17241.90	0.00	0.00	511.62
SRM612-5	9445.65	3064.94	16554.20	18815.31	20249.65	3306.80	4734.49
SRM610-5	72133.69	22429.69	35015.10	9284.97	115006.52	15346.19	18613.13
AP1-5	0.00	57.24	2953.16	414.08	51212.90	6214.33	10207.56
AP2-5	0.00	202.76	8653.11	330.84	1186484.01	127504.66	155656.45
AP3-5	0.00	841.00	10353.12	166.52	1971496.21	210940.13	258386.34
AP4-5	0.00	1281.25	8146.27	0.00	1616781.61	171805.02	211264.97
EVA3-1	0.00	0.00	2143.91	2861.78	11593688.61	1450688.26	1770178.00
EVA3-2	0.00	0.00	1755.95	2224.57	10431664.61	1298662.86	1581588.40
EVA3-3	0.00	1.64	1456.47	1760.37	8948612.61	1095055.46	1337608.30
SRM614-6	0.00	19.52	4088.64	10858.26	18611.04	2759.00	3032.24
SRM612-6	8927.81	2672.37	9542.63	15289.37	29630.99	4413.45	5196.37
SRM610-6	65023.76	20785.48	29076.06	8389.61	114974.52	14770.18	17795.92
AP1-6	0.00	3.40	2102.47	241.84	34824.70	3956.56	6444.54
AP2-6	0.00	181.76	6785.42	0.00	909500.61	98228.09	120185.41
AP3-6	0.00	832.04	9453.95	0.00	2147158.11	230193.67	279752.28
AP4-6	0.00	1400.69	7382.70	0.00	1798878.91	193566.06	234876.63
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000416	0.000026	0.003898	0.006225	0.000000	0.000000	0.000185
SRM612-5	0.003223	0.001046	0.005649	0.006421	0.006910	0.001128	0.001616
SRM610-5	0.060123	0.018695	0.029185	0.007739	0.095857	0.012791	0.015514
AP1-5	0.000000	0.000003	0.000174	0.000024	0.003024	0.000367	0.000603
AP2-5	0.000000	0.000012	0.000517	0.000020	0.070882	0.007617	0.009299
AP3-5	0.000000	0.000041	0.000508	0.000008	0.096736	0.010350	0.012678
AP4-5	0.000000	0.000071	0.000454	0.000000	0.090151	0.009580	0.011780
EVA3-1	0.000000	0.000000	0.000116	0.000155	0.627854	0.078562	0.095864
EVA3-2	0.000000	0.000000	0.000104	0.000131	0.616326	0.076728	0.093444
EVA3-3	0.000000	0.000000	0.000097	0.000117	0.592940	0.072559	0.088631
SRM614-6	0.000000	0.000012	0.002531	0.006720	0.011519	0.001708	0.001877
SRM612-6	0.003980	0.001191	0.004254	0.006816	0.013209	0.001967	0.002317
SRM610-6	0.061072	0.019522	0.027309	0.007880	0.107988	0.013873	0.016715
AP1-6	0.000000	0.000000	0.000148	0.000017	0.002447	0.000278	0.000453
AP2-6	0.000000	0.000012	0.000456	0.000000	0.061161	0.006606	0.008082
AP3-6	0.000000	0.000046	0.000524	0.000000	0.119020	0.012760	0.015507
AP4-6	0.000000	0.000091	0.000479	0.000000	0.116607	0.012547	0.015225

standardize signal averages AP

AP1	0.000000	0.000002	0.000161	0.000021	0.002736	0.000322	0.000528
AP2	0.000000	0.000012	0.000487	0.000010	0.066022	0.007111	0.008691
AP3	0.000000	0.000044	0.000516	0.000004	0.107878	0.011555	0.014093
AP4	0.000000	0.000081	0.000466	0.000000	0.103379	0.011064	0.013503

linest from std sig ave

	0.000000	0.191186	0.054589	5.605769	0.014541	0.135696	0.111198
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standardize signal averages SRM

srm614-2	0.000208	0.000019	0.003214	0.006473	0.005759	0.000854	0.001031
srm612-2	0.003602	0.001119	0.004952	0.006618	0.010060	0.001548	0.001966
srm610-2	0.060598	0.019109	0.028247	0.007809	0.101923	0.013332	0.016114

linest from std sig ave

	0.093390	0.284480	0.143369	155.286610	0.053618	0.409411	0.338577
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concentration data

i.s. correction

SRM614-5	85763.00	0.00	0.42	18.25	2992.84	0.00	0.00	1.76
SRM612-5	85763.00	0.00	17.15	26.45	3087.01	8.62	13.13	15.41
SRM610-5	85763.00	0.00	306.54	136.64	3720.65	119.54	148.86	147.95
AP1-5	398936	0.00	0.26	3.80	54.68	17.54	19.86	26.74
AP2-5	398936	0.00	0.92	11.26	44.20	411.19	412.36	412.52
AP3-5	398936	0.00	3.15	11.06	18.27	561.17	560.31	562.42
AP4-5	398936	0.00	5.45	9.89	0.00	522.96	518.59	522.57
EVA3-1	398936	0.00	0.00	2.53	346.59	3642.17	4252.88	4252.61
EVA3-2	398936	0.00	0.00	2.26	293.93	3575.30	4153.60	4145.25
EVA3-3	398936	0.00	0.01	2.10	260.85	3439.63	3927.92	3931.74
SRM614-6	85763.00	0.00	0.20	11.85	3230.96	14.36	19.87	17.90
SRM612-6	85763.00	0.00	19.53	19.92	3276.88	16.47	22.90	22.09
SRM610-6	85763.00	0.00	320.10	127.85	3788.35	134.67	161.45	159.40
AP1-6	398936	0.00	0.02	3.22	38.01	14.20	15.05	20.09
AP2-6	398936	0.00	0.93	9.94	0.00	354.80	357.59	358.53
AP3-6	398936	0.00	3.52	11.41	0.00	690.43	690.75	687.91
AP4-6	398936	0.00	6.93	10.42	0.00	676.43	679.24	675.40

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-3	107257.92	91.60	94.64	3417401.50	1764.09	498.52	361.00
SRM614-3	94275.61	149.72	5506.47	37760336.00	25901.03	4520.39	3437.34
SRM612-3	109585.34	125.52	3334.90	36978168.00	19631.23	3416.42	2355.57
SRM610-3	187858.73	14555.28	17554.26	32591982.00	73307.25	9980.54	10827.18
AP1-3	123483.26	148.12	4256.74	18392812.00	79058.16	9507.37	12585.63
AP2-3	104960.03	326.36	11259.10	14641081.00	2069515.40	227459.31	270495.59
AP3-3	100209.80	1349.73	10486.58	11954107.00	3101302.80	344611.69	412738.09
AP4-3	99732.40	2396.21	12039.91	9762126.00	3822513.50	425732.97	510752.25
MZ5-1	94510.57	101.12	9403.29	25443188.00	7657334.00	898975.25	1077151.10
MZ5-2	93759.85	102.24	7382.72	22594456.00	5521650.00	641128.25	766146.06
MZ5-3	95159.90	101.04	8454.21	25038622.00	7240181.00	850943.63	1019109.00
MZ5-4	98562.31	60.40	3249.70	16118517.00	2255091.00	245982.22	293987.94
MZ5-5	101787.73	91.04	3034.74	15737114.00	2305592.30	252606.91	301426.81

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	102236.26	97.32	3926.10	18351316.00	2782288.50	305455.75	363820.78
MZ5-7	99937.72	74.16	4507.07	24376086.00	4721146.00	549158.75	656251.50
MZ5-8	96535.87	69.72	4247.54	23635942.00	4034827.00	445791.88	535291.13
MZ5-9	93979.61	84.92	4282.30	24636632.00	4212757.50	467557.03	557489.69
MZ5-10	93691.88	84.00	3593.82	23774140.00	3722604.00	407382.09	490330.66
MZ5-11	92219.12	103.24	3934.46	25482898.00	4269916.00	468927.97	563058.63
MZ5-12	92560.60	85.64	3512.74	23747102.00	3773266.50	412923.56	495407.44
MZ5-13	94612.93	83.56	3005.82	22797366.00	3924319.50	431015.69	514441.94
MZ5-14	95473.34	68.96	3287.50	23706374.00	4154684.80	457731.84	549228.94
MZ5-15	96026.74	78.72	3378.62	25109446.00	4670876.00	519273.16	622114.00
MZ5-16	97150.31	74.60	2919.26	21128786.00	4164954.80	458786.75	553536.75
MZ5-17	96388.98	82.52	2716.58	22102744.00	4353277.00	479997.25	576737.50
MZ5-18	97989.03	74.20	2865.66	21608182.00	4438224.00	489663.97	586710.38
SRM614-4	121655.33	107.72	1316.17	32192370.00	41971.96	5878.95	5263.35
SRM612-4	131915.55	1255.25	3622.94	34497552.00	48359.59	6913.80	6205.04
SRM610-4	172346.33	11301.94	16717.33	30921210.00	88667.06	11670.03	12102.35
AP1-4	124019.86	124.16	2213.73	10858643.00	53033.42	6523.80	8100.33
AP2-4	118981.31	218.12	5705.71	8625182.00	949140.13	105272.07	124548.54
AP3-4	118110.59	755.28	6314.44	7454504.50	1593771.10	173569.30	208451.73
AP4-4	117102.50	1281.45	6239.19	6476937.00	1865442.10	203334.06	242780.16
blank-4	112810.99	90.00	460.92	5575427.50	33642.47	4326.62	4188.22
blank average	110034.46	90.80	277.78	4496414.50	17703.28	2412.57	2274.61

blank subtraction							
SRM614-3	-15758.85	58.92	5228.69	33263921.50	8197.75	2107.81	1162.73
SRM612-3	-449.12	34.72	3057.12	32481753.50	1927.95	1003.85	80.96
SRM610-3	77824.28	14464.48	17276.48	28095567.50	55603.97	7567.96	8552.57
AP1-3	13448.81	57.32	3978.96	13896397.50	61354.88	7094.80	10311.02
AP2-3	-5074.43	235.56	10981.32	10144666.50	2051812.12	225046.74	268220.98
AP3-3	-9824.66	1258.93	10208.80	7457692.50	3083599.52	342199.12	410463.48
AP4-3	-10302.06	2305.41	11762.13	5265711.50	3804810.22	423320.40	508477.64
MZ5-1	-15523.89	10.32	9125.51	20946773.50	7639630.72	896562.68	1074876.49
MZ5-2	-16274.60	11.44	7104.94	18098041.50	5503946.72	638715.68	763871.45
MZ5-3	-14874.56	10.24	8176.43	20542207.50	7222477.72	848531.06	1016834.39
MZ5-4	-11472.14	-30.40	2971.92	11622102.50	2237387.72	243569.65	291713.33
MZ5-5	-8246.73	0.24	2756.96	11240699.50	2287889.02	250194.34	299152.20
MZ5-6	-7798.20	6.52	3648.32	13854901.50	2764585.22	303043.18	361546.17
MZ5-7	-10096.74	-16.64	4229.28	19879671.50	4703442.72	546746.18	653976.89
MZ5-8	-13498.59	-21.08	3969.76	19139527.50	4017123.72	443379.31	533016.52
MZ5-9	-16054.85	-5.88	4004.52	20140217.50	4195054.22	465144.46	552515.08
MZ5-10	-16342.57	-6.80	3316.04	19277725.50	3704900.72	404969.52	488056.05
MZ5-11	-17815.34	12.44	3656.68	20986483.50	4252212.72	466515.40	560784.02
MZ5-12	-17473.85	-5.16	3234.96	19250687.50	3755563.22	410510.99	493132.83
MZ5-13	-15421.53	-7.24	2728.04	18300951.50	3906616.22	428603.12	512167.33
MZ5-14	-14561.12	-21.84	3009.72	19209959.50	4136981.52	455319.27	546954.33
MZ5-15	-14007.71	-12.08	3100.84	20613031.50	4653172.72	516860.59	619839.39
MZ5-16	-12884.15	-16.20	2641.47	16632371.50	4147251.52	456374.18	551262.14
MZ5-17	-13645.47	-8.28	2438.79	17606329.50	4335573.72	477584.68	574462.89
MZ5-18	-12045.42	-16.60	2587.87	17111767.50	4420520.72	487251.40	584435.77
SRM614-4	11620.88	16.92	1038.39	27695955.50	24268.68	3466.38	2988.74
SRM612-4	21881.10	1164.45	3345.16	30001137.50	30656.31	4501.23	3930.42
SRM610-4	62311.88	11211.14	16439.55	26424795.50	70963.78	9257.45	9827.74
AP1-4	13985.41	33.36	1935.95	6362228.50	35330.14	4111.22	5825.71
AP2-4	8946.86	127.32	5427.93	4128767.50	931436.85	102859.50	122273.93
AP3-4	8076.13	664.48	6036.65	2958090.00	1576067.82	171156.73	206177.12
AP4-4	7068.05	1190.65	5961.41	1980522.50	1847738.82	200921.49	240505.55

zero correction							
SRM614-3	0.00	58.92	5228.69	33263921.50	8197.75	2107.81	1162.73
SRM612-3	0.00	34.72	3057.12	32481753.50	1927.95	1003.85	80.96
SRM610-3	77824.28	14464.48	17276.48	28095567.50	55603.97	7567.96	8552.57
AP1-3	13448.81	57.32	3978.96	13896397.50	61354.88	7094.80	10311.02
AP2-3	0.00	235.56	10981.32	10144666.50	2051812.12	225046.74	268220.98
AP3-3	0.00	1258.93	10208.80	7457692.50	3083599.52	342199.12	410463.48
AP4-3	0.00	2305.41	11762.13	5265711.50	3804810.22	423320.40	508477.64
MZ5-1	0.00	10.32	9125.51	20946773.50	7639630.72	896562.68	1074876.49
MZ5-2	0.00	11.44	7104.94	18098041.50	5503946.72	638715.68	763871.45
MZ5-3	0.00	10.24	8176.43	20542207.50	7222477.72	848531.06	1016834.39
MZ5-4	0.00	0.00	2971.92	11622102.50	2237387.72	243569.65	291713.33
MZ5-5	0.00	0.24	2756.96	11240699.50	2287889.02	250194.34	299152.20
MZ5-6	0.00	6.52	3648.32	13854901.50	2764585.22	303043.18	361546.17
MZ5-7	0.00	0.00	4229.28	19879671.50	4703442.72	546746.18	653976.89
MZ5-8	0.00	0.00	3969.76	19139527.50	4017123.72	443379.31	533016.52
MZ5-9	0.00	0.00	4004.52	20140217.50	4195054.22	465144.46	552515.08
MZ5-10	0.00	0.00	3316.04	19277725.50	3704900.72	404969.52	488056.05
MZ5-11	0.00	12.44	3656.68	20986483.50	4252212.72	466515.40	560784.02
MZ5-12	0.00	0.00	3234.96	19250687.50	3755563.22	410510.99	493132.83
MZ5-13	0.00	0.00	2728.04	18300951.50	3906616.22	428603.12	512167.33

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	0.00	0.00	3009.72	19209959.50	4136981.52	455319.27	546954.33
MZ5-15	0.00	0.00	3100.84	20613031.50	4653172.72	516860.59	619839.39
MZ5-16	0.00	0.00	2641.47	16632371.50	4147251.52	456374.18	551262.14
MZ5-17	0.00	0.00	2438.79	17606329.50	4335573.72	477584.68	574462.89
MZ5-18	0.00	0.00	2587.87	17111767.50	4420520.72	487251.40	584435.77
SRM614-4	11620.88	16.92	1038.39	27695955.50	24268.68	3466.38	2988.74
SRM612-4	21881.10	1164.45	3345.16	30001137.50	30656.31	4501.23	3930.42
SRM610-4	62311.88	11211.14	16439.55	26424795.50	70963.78	9257.45	9827.74
AP1-4	13985.41	33.36	1935.95	6362228.50	35330.14	4111.22	5825.71
AP2-4	8946.86	127.32	5427.93	4128767.50	931436.85	102859.50	122273.93
AP3-4	8076.13	664.48	6036.65	2958090.00	1576067.82	171156.73	206177.12
AP4-4	7068.05	1190.65	5961.41	1980522.50	1847738.82	200921.49	240505.55
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-3	0.000000	0.000050	0.004453	28.328440	0.006981	0.001795	0.000990
SRM612-3	0.000000	0.000040	0.003558	37.802055	0.002244	0.001168	0.000094
SRM610-3	0.156168	0.029025	0.034668	56.378516	0.111579	0.015186	0.017162
AP1-3	0.001025	0.000004	0.000303	1.059419	0.004678	0.000541	0.000786
AP2-3	0.000000	0.000016	0.000756	0.698595	0.141295	0.015497	0.018471
AP3-3	0.000000	0.000085	0.000688	0.502294	0.207688	0.023048	0.027646
AP4-3	0.000000	0.000141	0.000721	0.322725	0.233189	0.025944	0.031164
MZ5-1	0.000000	0.000001	0.000719	1.650148	0.601836	0.070630	0.084677
MZ5-2	0.000000	0.000001	0.000518	1.320627	0.401627	0.046608	0.055740
MZ5-3	0.000000	0.000001	0.000698	1.753925	0.616666	0.072449	0.086819
MZ5-4	0.000000	0.000000	0.000352	1.375018	0.264707	0.028817	0.034513
MZ5-5	0.000000	0.000000	0.000296	1.206612	0.245589	0.026857	0.032112
MZ5-6	0.000000	0.000001	0.000366	1.389847	0.277328	0.030400	0.036268
MZ5-7	0.000000	0.000000	0.000289	1.358754	0.321475	0.037370	0.044699
MZ5-8	0.000000	0.000000	0.000250	1.203779	0.252657	0.027886	0.033524
MZ5-9	0.000000	0.000000	0.000267	1.340848	0.279288	0.030967	0.036964
MZ5-10	0.000000	0.000000	0.000201	1.166813	0.224245	0.024511	0.029540
MZ5-11	0.000000	0.000001	0.000198	1.136016	0.230176	0.025253	0.030356
MZ5-12	0.000000	0.000000	0.000192	1.144079	0.223195	0.024397	0.029307
MZ5-13	0.000000	0.000000	0.000214	1.432952	0.305885	0.033559	0.040102
MZ5-14	0.000000	0.000000	0.000222	1.419895	0.305783	0.033655	0.040428
MZ5-15	0.000000	0.000000	0.000218	1.446403	0.326510	0.036268	0.043494
MZ5-16	0.000000	0.000000	0.000182	1.143247	0.285067	0.031369	0.037892
MZ5-17	0.000000	0.000000	0.000160	1.154210	0.284225	0.031309	0.037660
MZ5-18	0.000000	0.000000	0.000164	1.086640	0.280714	0.030942	0.037113
SRM614-4	0.017517	0.000026	0.001565	41.747222	0.036581	0.005225	0.004505
SRM612-4	0.030831	0.001641	0.004713	42.272203	0.043195	0.006342	0.005538
SRM610-4	0.138363	0.024894	0.036504	58.675854	0.157574	0.020556	0.021822
AP1-4	0.001492	0.000004	0.000206	0.678631	0.003769	0.000439	0.000621
AP2-4	0.000888	0.000013	0.000539	0.409652	0.092416	0.010206	0.012132
AP3-4	0.000744	0.000061	0.000556	0.272461	0.145167	0.015765	0.018990
AP4-4	0.000631	0.000106	0.000532	0.176888	0.165029	0.017945	0.021480
standardize signal averages AP							
AP1	0.001259	0.000004	0.000255	0.869025	0.004223	0.000490	0.000704
AP2	0.000444	0.000014	0.000647	0.554124	0.116855	0.012852	0.015301
AP3	0.000372	0.000073	0.000622	0.387377	0.176428	0.019406	0.023318
AP4	0.000316	0.000124	0.000627	0.249807	0.199109	0.021945	0.026322
linest from std sig ave							
	0.003271	0.122736	0.041653	0.000100	0.008217	0.074631	0.062237
standardize signal averages SRM							
srM614-2	0.008758	0.000038	0.003009	35.037831	0.021781	0.003510	0.002748
srM612-2	0.015415	0.000841	0.004136	40.037129	0.022720	0.003755	0.002816
srM610-2	0.147265	0.026960	0.035586	57.527185	0.134576	0.017871	0.019492

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
		0.038168	0.201683	0.115710	0.023537	0.039723	0.293980	0.276464
concentration data		i.s. correction						
SRM614-3	85763.00	0.00	0.53	15.91	242.90	4.92	11.49	5.29
SRM612-3	85763.00	0.00	0.43	12.71	324.12	1.58	7.48	0.50
SRM610-3	85763.00	43.81	305.53	123.84	483.40	78.63	97.20	91.61
AP1-3	398936	1.34	0.21	5.04	42.25	15.33	16.10	19.52
AP2-3	398936	0.00	0.79	12.57	27.86	463.15	461.41	458.60
AP3-3	398936	0.00	4.15	11.43	20.03	680.78	686.21	686.40
AP4-3	398936	0.00	6.92	11.98	12.87	764.37	772.44	773.75
MZ5-1	398936	0.00	0.04	11.95	65.81	1972.76	2102.85	2102.40
MZ5-2	398936	0.00	0.04	8.62	52.67	1316.49	1387.64	1383.95
MZ5-3	398936	0.00	0.04	11.60	69.95	2021.37	2157.02	2155.59
MZ5-4	398936	0.00	0.00	5.84	54.84	867.68	857.96	856.90
MZ5-5	398936	0.00	0.00	4.92	48.12	805.02	799.60	797.29
MZ5-6	398936	0.00	0.03	6.08	55.43	909.05	905.09	900.49
MZ5-7	398936	0.00	0.00	4.80	54.19	1053.76	1112.60	1109.80
MZ5-8	398936	0.00	0.00	4.15	48.01	828.18	830.26	832.35
MZ5-9	398936	0.00	0.00	4.43	53.48	915.48	921.99	917.76
MZ5-10	398936	0.00	0.00	3.34	46.54	735.05	729.78	733.44
MZ5-11	398936	0.00	0.03	3.29	45.31	754.49	751.85	753.69
MZ5-12	398936	0.00	0.00	3.19	45.63	731.61	726.37	727.66
MZ5-13	398936	0.00	0.00	3.55	57.15	1002.66	999.16	995.68
MZ5-14	398936	0.00	0.00	3.70	56.63	1002.32	1002.00	1003.77
MZ5-15	398936	0.00	0.00	3.62	57.69	1070.27	1079.80	1079.89
MZ5-16	398936	0.00	0.00	3.02	45.60	934.42	933.96	940.80
MZ5-17	398936	0.00	0.00	2.66	46.03	931.66	932.16	935.04
MZ5-18	398936	0.00	0.00	2.73	43.34	920.15	921.23	921.47
SRM614-4	85763.00	4.91	0.27	5.59	357.95	25.78	33.44	24.05
SRM612-4	85763.00	8.65	17.27	16.84	362.45	30.44	40.59	29.56
SRM610-4	85763.00	38.81	262.04	130.40	503.10	111.04	131.57	116.48
AP1-4	398936	1.95	0.17	3.43	27.07	12.35	13.06	15.43
AP2-4	398936	1.16	0.62	8.95	16.34	302.93	303.85	301.22
AP3-4	398936	0.97	3.00	9.24	10.87	475.84	469.36	471.50
AP4-4	398936	0.82	5.21	8.85	7.06	540.95	534.28	533.33
certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16
raw data								
		Li	Be	B	Na	Mg24	Mg25	Mg26
blank-1		366625.50	78.28	941.77	17268302.00	13488.64	1998.13	1854.57
SRM614-1		177283.16	130.04	4746.15	34894480.00	22393.41	3736.78	2932.06
SRM612-1		174729.19	2306.13	11545.91	43144888.00	47170.98	7269.24	5880.95
SRM610-1		209514.66	12302.03	18284.22	33034034.00	81462.42	10947.38	11778.03
AP1-1		163411.20	137.16	4341.18	18660176.00	43510.93	5465.19	7004.52
AP2-1		158782.58	221.12	8140.61	16414698.00	943835.63	105850.35	125412.55
AP3-1		158456.94	459.96	3587.78	14751897.00	497754.16	57748.40	68751.71
AP4-1		155430.23	775.96	4631.07	12953935.00	818098.38	93070.28	110049.06
MZ4-1		153726.75	132.72	1868.73	16381285.00	1445844.50	160529.19	190009.95
MZ4-2		150511.45	84.88	2134.65	16554092.00	3002386.00	343611.16	409262.69
MZ4-3		149560.36	95.16	2847.98	16503050.00	4389126.00	530331.56	633179.50
MZ4-4		149170.59	99.84	1935.13	13447436.00	1717674.30	188801.94	223569.14
MZ4-5		149223.13	75.84	1718.25	12688375.00	1531856.40	169341.91	200026.20
MZ4-6		149356.20	74.84	1703.29	12117041.00	1385045.90	152710.66	182307.06
MZ4-7		152421.89	87.12	1538.09	11215369.00	1148954.60	128716.52	152500.45
MZ4-8		154946.95	72.28	1425.65	10722186.00	1025302.10	116188.57	136398.97
MZ4-9		156648.36	76.56	1445.21	10604986.00	1082881.10	122107.21	144960.78
MZ4-10		202949.47	70.84	1695.45	13334193.00	1248901.00	140191.31	165916.09
MZ4-11		191626.28	73.00	1807.65	14011301.00	1514634.10	167939.14	198934.20
MZ4-12		180248.38	97.92	1922.33	14401873.00	1886374.30	207910.05	247392.19
SRM614-2		206419.80	114.20	2253.29	38681728.00	35658.92	5656.95	4314.90
SRM612-2		200066.72	1626.53	5618.63	40160628.00	41995.32	6497.52	5232.63
SRM610-2		229124.61	10811.94	15871.57	32746544.00	80356.98	10838.74	11143.42
AP1-2		180681.66	127.16	2590.45	17520774.00	30399.77	3968.46	4727.23
AP2-2		172900.86	176.92	5719.99	15030359.00	723078.94	81983.27	96737.43
AP3-2		167970.03	387.24	3337.06	13284998.00	562737.69	64794.68	77255.67
AP4-2		162138.47	780.88	3535.10	11254367.00	703441.19	79881.89	95421.02
blank-2		206392.89	98.88	547.64	8946983.00	19099.59	2718.70	2582.89
blank average		286509.20	88.58	744.70	13107642.50	16294.11	2358.41	2218.73

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction							
SRM614-1	-109226.04	41.46	4001.44	21786837.50	6099.29	1378.37	713.32
SRM612-1	-111780.01	2217.55	10801.20	30037245.50	30876.87	4910.83	3662.22
SRM610-1	-76994.54	12213.45	17539.52	19926391.50	65168.31	8588.97	9559.29
AP1-1	-123098.00	48.58	3596.48	5552533.50	27216.81	3106.78	4785.79
AP2-1	-127726.62	132.54	7395.90	3307055.50	927541.52	103491.94	123193.82
AP3-1	-128052.26	371.38	2843.08	1644254.50	481460.05	55389.99	66532.98
AP4-1	-131078.97	687.38	3886.36	-153707.50	801804.27	90711.87	107830.33
MZ4-1	-132782.45	44.14	1124.03	3273642.50	1429550.39	158170.78	187791.22
MZ4-2	-135997.75	-3.70	1389.95	3446449.50	2986091.89	341252.75	407043.96
MZ4-3	-136948.84	6.58	2103.27	3395407.50	4372831.89	527973.15	630960.77
MZ4-4	-137338.61	11.26	1190.43	339793.50	1701380.19	186443.53	221350.41
MZ4-5	-137286.07	-12.74	973.55	-419267.50	1515562.29	166983.50	197807.47
MZ4-6	-137153.00	-13.74	958.59	-990601.50	1368751.79	150352.25	180088.33
MZ4-7	-134087.31	-1.46	793.38	-1892273.50	1132660.49	126358.11	150281.72
MZ4-8	-131562.25	-16.30	680.94	-2385456.50	1009007.99	113830.16	134180.24
MZ4-9	-129860.84	-12.02	700.50	-2502656.50	1066586.99	119748.80	142742.05
MZ4-10	-83559.73	-17.74	950.75	226550.50	1232606.89	137832.90	163697.36
MZ4-11	-94882.92	-15.58	1062.95	903658.50	1498339.99	165580.73	196715.47
MZ4-12	-106260.82	9.34	1177.63	1294230.50	1870080.19	205551.64	245173.46
SRM614-2	-80089.40	25.62	1508.59	25574085.50	19364.81	3298.54	2096.17
SRM612-2	-86442.48	1537.95	4873.93	27052985.50	25701.20	4139.10	3013.90
SRM610-2	-57384.59	10723.36	15126.86	19638901.50	64062.87	8480.33	8924.69
AP1-2	-105827.54	38.58	1845.75	4413131.50	14105.66	1610.05	2508.49
AP2-2	-113608.34	88.34	4975.29	1922716.50	706784.83	79624.85	94518.70
AP3-2	-118539.17	298.66	2592.35	177355.50	546443.58	62436.27	75036.94
AP4-2	-124370.73	692.30	2790.40	-1853275.50	687147.08	77523.48	93202.28
zero correction							
SRM614-1	0.00	41.46	4001.44	21786837.50	6099.29	1378.37	713.32
SRM612-1	0.00	2217.55	10801.20	30037245.50	30876.87	4910.83	3662.22
SRM610-1	0.00	12213.45	17539.52	19926391.50	65168.31	8588.97	9559.29
AP1-1	0.00	48.58	3596.48	5552533.50	27216.81	3106.78	4785.79
AP2-1	0.00	132.54	7395.90	3307055.50	927541.52	103491.94	123193.82
AP3-1	0.00	371.38	2843.08	1644254.50	481460.05	55389.99	66532.98
AP4-1	0.00	687.38	3886.36	0.00	801804.27	90711.87	107830.33
MZ4-1	0.00	44.14	1124.03	3273642.50	1429550.39	158170.78	187791.22
MZ4-2	0.00	0.00	1389.95	3446449.50	2986091.89	341252.75	407043.96
MZ4-3	0.00	6.58	2103.27	3395407.50	4372831.89	527973.15	630960.77
MZ4-4	0.00	11.26	1190.43	339793.50	1701380.19	186443.53	221350.41
MZ4-5	0.00	0.00	973.55	0.00	1515562.29	166983.50	197807.47
MZ4-6	0.00	0.00	958.59	0.00	1368751.79	150352.25	180088.33
MZ4-7	0.00	0.00	793.38	0.00	1132660.49	126358.11	150281.72
MZ4-8	0.00	0.00	680.94	0.00	1009007.99	113830.16	134180.24
MZ4-9	0.00	0.00	700.50	0.00	1066586.99	119748.80	142742.05
MZ4-10	0.00	0.00	950.75	226550.50	1232606.89	137832.90	163697.36
MZ4-11	0.00	0.00	1062.95	903658.50	1498339.99	165580.73	196715.47
MZ4-12	0.00	9.34	1177.63	1294230.50	1870080.19	205551.64	245173.46
SRM614-2	0.00	25.62	1508.59	25574085.50	19364.81	3298.54	2096.17
SRM612-2	0.00	1537.95	4873.93	27052985.50	25701.20	4139.10	3013.90
SRM610-2	0.00	10723.36	15126.86	19638901.50	64062.87	8480.33	8924.69
AP1-2	0.00	38.58	1845.75	4413131.50	14105.66	1610.05	2508.49
AP2-2	0.00	88.34	4975.29	1922716.50	706784.83	79624.85	94518.70
AP3-2	0.00	298.66	2592.35	177355.50	546443.58	62436.27	75036.94
AP4-2	0.00	692.30	2790.40	0.00	687147.08	77523.48	93202.28
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-1	0.000000	0.000052	0.005015	27.308098	0.007645	0.001728	0.000894
SRM612-1	0.000000	0.001596	0.007773	21.616267	0.022221	0.003534	0.002636

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.000000	0.027949	0.040137	45.599213	0.149130	0.019655	0.021875	
AP1-1	0.000000	0.000006	0.000439	0.677687	0.003322	0.000379	0.000584	
AP2-1	0.000000	0.000020	0.001093	0.488908	0.137126	0.015300	0.018213	
AP3-1	0.000000	0.000057	0.000440	0.254444	0.074505	0.008571	0.010296	
AP4-1	0.000000	0.000081	0.000458	0.000000	0.094420	0.010682	0.012698	
MZ4-1	0.000000	0.000007	0.000178	0.518481	0.226413	0.025051	0.029742	
MZ4-2	0.000000	0.000000	0.000212	0.525131	0.454987	0.051996	0.062021	
MZ4-3	0.000000	0.000001	0.000323	0.522194	0.672517	0.081199	0.097038	
MZ4-4	0.000000	0.000002	0.000189	0.053906	0.269912	0.029578	0.035116	
MZ4-5	0.000000	0.000000	0.000158	0.000000	0.246210	0.027127	0.032135	
MZ4-6	0.000000	0.000000	0.000156	0.000000	0.222762	0.024470	0.029309	
MZ4-7	0.000000	0.000000	0.000158	0.000000	0.225643	0.025172	0.029938	
MZ4-8	0.000000	0.000000	0.000142	0.000000	0.209723	0.023660	0.027889	
MZ4-9	0.000000	0.000000	0.000141	0.000000	0.215117	0.024152	0.028789	
MZ4-10	0.000000	0.000000	0.000196	0.046661	0.253871	0.028388	0.033716	
MZ4-11	0.000000	0.000000	0.000178	0.151708	0.251545	0.027798	0.033025	
MZ4-12	0.000000	0.000001	0.000174	0.191393	0.276550	0.030397	0.036257	
SRM614-2	0.000000	0.000024	0.001442	24.438156	0.018505	0.003152	0.002003	
SRM612-2	0.000000	0.001478	0.004685	26.001765	0.024703	0.003978	0.002897	
SRM610-2	0.000000	0.024025	0.033890	43.999281	0.143527	0.018999	0.019995	
AP1-2	0.000000	0.000007	0.000323	0.771657	0.002466	0.000282	0.000439	
AP2-2	0.000000	0.000015	0.000835	0.322546	0.118567	0.013358	0.015856	
AP3-2	0.000000	0.000047	0.000404	0.027635	0.085144	0.009729	0.011692	
AP4-2	0.000000	0.000087	0.000352	0.000000	0.086574	0.009767	0.011743	
standardize signal averages AP								
AP1	0.000000	0.000006	0.000381	0.724672	0.002894	0.000330	0.000511	
AP2	0.000000	0.000017	0.000964	0.405727	0.127846	0.014329	0.017034	
AP3	0.000000	0.000052	0.000422	0.141039	0.079824	0.009150	0.010994	
AP4	0.000000	0.000084	0.000405	0.000000	0.090497	0.010225	0.012220	
linest from std sig ave								
	0.000000	0.176393	0.035587	0.000137	0.012933	0.114857	0.096369	
standardize signal averages SRM								
srm614-2	0.000000	0.000038	0.003229	25.873127	0.013075	0.002440	0.001449	
srm612-2	0.000000	0.001537	0.006229	23.809016	0.023462	0.003756	0.002766	
srm610-2	0.000000	0.025987	0.037014	44.799247	0.146329	0.019327	0.020935	
linest from std sig ave								
	0.000000	0.209179	0.110156	0.031749	0.037046	0.277337	0.260295	
concentration data i.s. correction								
SRM614-1	85763.00	0.00	0.79	15.31	319.79	8.48	17.02	7.39
SRM612-1	85763.00	0.00	24.14	23.72	253.13	24.65	34.81	21.78
SRM610-1	85763.00	0.00	422.81	122.50	533.98	165.41	193.61	180.80
AP1-1	398936	0.00	0.42	6.23	36.91	17.14	17.37	22.46
AP2-1	398936	0.00	1.38	15.52	26.63	707.51	701.06	700.19
AP3-1	398936	0.00	4.04	6.25	13.86	384.41	392.75	395.82
AP4-1	398936	0.00	5.70	6.50	0.00	487.17	489.47	488.18
MZ4-1	398936	0.00	0.49	2.53	28.24	1168.19	1147.86	1143.45
MZ4-2	398936	0.00	0.00	3.01	28.60	2347.52	2382.50	2384.39
MZ4-3	398936	0.00	0.07	4.59	28.44	3469.88	3720.61	3730.63
MZ4-4	398936	0.00	0.13	2.68	2.94	1392.62	1355.28	1350.02
MZ4-5	398936	0.00	0.00	2.25	0.00	1270.33	1242.99	1235.42
MZ4-6	398936	0.00	0.00	2.21	0.00	1149.35	1121.21	1126.79
MZ4-7	398936	0.00	0.00	2.24	0.00	1164.21	1153.42	1150.98
MZ4-8	398936	0.00	0.00	2.01	0.00	1082.07	1084.10	1072.21
MZ4-9	398936	0.00	0.00	2.01	0.00	1109.90	1106.65	1106.80
MZ4-10	398936	0.00	0.00	2.78	2.54	1309.86	1300.78	1296.19
MZ4-11	398936	0.00	0.00	2.53	8.26	1297.85	1273.73	1269.65
MZ4-12	398936	0.00	0.10	2.47	10.43	1426.87	1392.82	1393.88
SRM614-2	85763.00	0.00	0.37	4.40	286.18	20.53	31.05	16.56
SRM612-2	85763.00	0.00	22.36	14.30	304.49	27.40	39.19	23.94
SRM610-2	85763.00	0.00	363.45	103.43	515.25	159.20	187.15	165.26
AP1-2	398936	0.00	0.47	4.58	42.03	12.73	12.90	16.86
AP2-2	398936	0.00	1.04	11.85	17.57	611.75	612.05	609.59
AP3-2	398936	0.00	3.27	5.73	1.51	439.31	445.77	449.50
AP4-2	398936	0.00	6.14	4.99	0.00	446.68	447.54	451.44
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	

Appendix A. Raw trace element datasheets from laser ablation.

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-3	42552.24	73.60	69.12	140008.39	2291.05	465.20	1033.29
SRM614-3	42698.60	129.96	130.52	1919676.90	33698.23	5210.67	6642.88
SRM612-3	59117.13	3544.02	229.88	1325720.00	172350.30	22762.41	27618.12
SRM610-3	144961.30	24178.66	427.28	574909.00	270526.38	34700.91	41133.83
AP1-3	58094.97	148.88	107.84	175208.22	280803.91	34964.72	42923.28
AP2-3	55001.15	330.24	181.16	133170.03	1968554.10	219544.44	262842.88
AP3-3	55151.91	1268.25	222.44	111705.39	2767723.50	312641.97	372996.66
AP4-3	58253.57	2092.57	217.28	89602.95	3382825.80	382939.03	459055.91
TGP3-1	51147.93	108.08	170.68	281099.69	16585428.00	2232408.50	2649689.50
TGP3-2	50627.33	57.08	163.16	209692.77	14878781.00	1948113.50	2317088.50
TGP3-3	50901.13	80.76	218.88	162584.23	13573093.00	1746502.90	2077373.50
TGP3-4	50635.57	102.08	199.80	238182.81	15504999.00	2027245.50	2410709.80
TGP3-5	51973.29	79.28	155.84	181948.50	14589341.00	1896583.80	2259772.50
TGP3-6	53262.06	60.88	183.24	161853.80	13782478.00	1780506.40	2116375.30
TGP3-7	55026.19	100.60	122.56	127324.20	13175428.00	1693789.30	2016329.00
TGP3-8	55071.87	76.16	97.88	124253.22	12780312.00	1633445.60	1941877.60
TGP3-9	55387.35	76.64	127.76	153191.98	12972628.00	1670813.60	1986227.30
TGP3-10	59721.86	84.44	121.44	94696.21	11759799.00	1481375.30	1766990.90
TGP3-11	60225.62	80.28	117.08	105257.39	12859526.00	1635986.80	1948628.10
TGP3-12	60815.54	80.36	102.28	107200.80	12733809.00	1614787.10	1925936.60
TGP3-13	66096.85	118.36	91.32	57606.81	1303205.90	144941.97	171563.17
TGP3-14	68054.23	120.24	77.04	58405.85	1184814.90	130113.09	153344.66
TGP3-15	69474.47	109.52	77.36	68119.02	1579008.50	171426.69	203148.50
SRM614-4	76671.47	111.92	147.32	736784.75	48826.07	6630.40	7492.64
SRM612-4	88564.86	3024.42	200.60	738720.25	66662.34	9080.13	9969.94
SRM610-4	150492.41	20490.20	542.72	384180.03	139271.50	18160.50	20620.60
AP1-4	80310.13	99.24	116.24	98273.95	63249.56	7520.12	9632.77
AP2-4	75227.78	232.68	197.60	76632.47	1123669.80	123066.77	145540.22
AP3-4	74713.82	776.64	185.88	65987.77	1496791.30	164264.28	194720.86
AP4-4	76327.19	1637.53	201.24	56563.36	2389329.50	262751.59	312958.72
blank-4	78556.96	40.12	55.68	32963.34	42747.72	5633.23	5754.43
blank average	60554.60	56.86	62.40	86485.87	22519.39	3049.22	3393.86
blank subtraction							
SRM614-3	-17856.00	73.10	68.12	1833191.03	11178.84	2161.45	3249.02
SRM612-3	-1437.47	3487.16	167.48	1239234.13	149830.91	19713.19	24224.26
SRM610-3	84406.70	24121.80	364.88	488423.13	248006.99	31651.70	37739.97
AP1-3	-2459.63	92.02	45.44	88722.35	258284.52	31915.50	39529.42
AP2-3	-5553.45	273.38	118.76	46684.16	1946034.71	216495.22	259449.02
AP3-3	-5402.69	1211.39	160.04	25219.52	2745204.11	309592.75	369602.80
AP4-3	-2301.03	2035.71	154.88	3117.08	3360306.41	379889.81	455662.05
TGP3-1	-9406.67	51.22	108.28	194613.82	16562908.61	2229359.28	2646295.64
TGP3-2	-9927.27	0.22	100.76	123206.90	14856261.61	1945064.28	2313694.64
TGP3-3	-9653.47	23.90	156.48	76098.36	13550573.61	1743453.68	2073979.64
TGP3-4	-9919.03	45.22	137.40	151696.94	15482479.61	2024196.28	2407315.28
TGP3-5	-8581.31	22.42	93.44	95462.63	14566821.61	1893534.58	2256378.64
TGP3-6	-7292.54	4.02	120.84	75367.93	13759958.61	1777457.18	2112981.44
TGP3-7	-5528.41	43.74	60.16	40838.33	13152908.61	1690740.08	2012935.14
TGP3-8	-5482.73	19.30	35.48	37767.35	12757792.61	1630396.38	1938483.74
TGP3-9	-5167.25	19.78	65.36	66706.11	12950108.61	1667764.38	1982833.44
TGP3-10	-832.74	27.58	59.04	8210.34	11737279.61	1478326.08	1763597.04
TGP3-11	-328.98	23.42	54.68	18771.52	12837006.61	1632937.58	1935234.24
TGP3-12	260.94	23.50	39.88	20714.93	12711289.61	1611737.88	1922542.74
TGP3-13	5542.25	61.50	28.92	-28879.06	1280686.51	141892.75	168169.31
TGP3-14	7499.63	63.38	14.64	-28080.02	1162295.51	127063.87	149950.80
TGP3-15	8919.87	52.66	14.96	-18366.84	1556489.11	168377.47	199754.64
SRM614-4	16116.87	55.06	84.92	650298.88	26306.69	3581.18	4098.78
SRM612-4	28010.26	2967.56	138.20	652234.38	44142.95	6030.91	6576.08
SRM610-4	89937.81	20433.33	480.32	297694.16	116752.11	15111.28	17226.74
AP1-4	19755.53	42.38	53.84	11788.09	40730.17	4470.91	6238.92
AP2-4	14673.18	175.82	135.20	-9853.40	1101150.41	120017.55	142146.36
AP3-4	14159.22	719.78	123.48	-20498.09	1474271.91	161215.06	191327.00
AP4-4	15772.59	1580.67	138.84	-29922.51	2366810.11	259702.37	309564.86
zero correction							
SRM614-3	0.00	73.10	68.12	1833191.03	11178.84	2161.45	3249.02
SRM612-3	0.00	3487.16	167.48	1239234.13	149830.91	19713.19	24224.26
SRM610-3	84406.70	24121.80	364.88	488423.13	248006.99	31651.70	37739.97
AP1-3	0.00	92.02	45.44	88722.35	258284.52	31915.50	39529.42
AP2-3	0.00	273.38	118.76	46684.16	1946034.71	216495.22	259449.02
AP3-3	0.00	1211.39	160.04	25219.52	2745204.11	309592.75	369602.80
AP4-3	0.00	2035.71	154.88	3117.08	3360306.41	379889.81	455662.05
TGP3-1	0.00	51.22	108.28	194613.82	16562908.61	2229359.28	2646295.64
TGP3-2	0.00	0.22	100.76	123206.90	14856261.61	1945064.28	2313694.64
TGP3-3	0.00	23.90	156.48	76098.36	13550573.61	1743453.68	2073979.64

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	0.00	45.22	137.40	151696.94	15482479.61	2024196.28	2407315.94
TGP3-5	0.00	22.42	93.44	95462.63	14566821.61	1893534.58	2256378.64
TGP3-6	0.00	4.02	120.84	75367.93	13759958.61	1777457.18	2112981.44
TGP3-7	0.00	43.74	60.16	40838.33	13152908.61	1690740.08	2012935.14
TGP3-8	0.00	19.30	35.48	37767.35	12757792.61	1630396.38	1938483.74
TGP3-9	0.00	19.78	65.36	66706.11	12950108.61	1667764.38	1982833.44
TGP3-10	0.00	27.58	59.04	8210.34	11737279.61	1478326.08	1763597.04
TGP3-11	0.00	23.42	54.68	18771.52	12837006.61	1632937.58	1945234.24
TGP3-12	260.94	23.50	39.88	20714.93	12711289.61	1611737.88	1922542.74
TGP3-13	5542.25	61.50	28.92	0.00	1280686.51	141892.75	168169.31
TGP3-14	7499.63	63.38	14.64	0.00	1162295.51	127063.87	149950.80
TGP3-15	8919.87	52.66	14.96	0.00	1556489.11	168377.47	199754.64
SRM614-4	16116.87	55.06	84.92	650298.88	26306.69	3581.18	4098.78
SRM612-4	28010.26	2967.56	138.20	652234.38	44142.95	6030.91	6576.08
SRM610-4	89937.81	20433.33	480.32	297694.16	116752.11	15111.28	17226.74
AP1-4	19755.53	42.38	53.84	11788.09	40730.17	4470.91	6238.92
AP2-4	14673.18	175.82	135.20	0.00	1101150.41	120017.55	142146.36
AP3-4	14159.22	719.78	123.48	0.00	1474271.91	161215.06	191327.00
AP4-4	15772.59	1580.67	138.84	0.00	2366810.11	259702.37	309564.86

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-3	0.000000	0.000023	0.000021	0.566955	0.003457	0.000668	0.001005
SRM612-3	0.000000	0.001138	0.000055	0.404497	0.048906	0.006435	0.007907
SRM610-3	0.062035	0.017728	0.000268	0.358969	0.182274	0.023263	0.027737
AP1-3	0.000000	0.000005	0.000003	0.004931	0.014354	0.001774	0.002197
AP2-3	0.000000	0.000016	0.000007	0.002700	0.112560	0.012522	0.015007
AP3-3	0.000000	0.000054	0.000007	0.001133	0.123341	0.013910	0.016606
AP4-3	0.000000	0.000104	0.000008	0.000159	0.171237	0.019359	0.023220
TGP3-1	0.000000	0.000002	0.000004	0.007609	0.647576	0.087163	0.103465
TGP3-2	0.000000	0.000000	0.000004	0.005305	0.639622	0.083743	0.099614
TGP3-3	0.000000	0.000001	0.000007	0.003639	0.647987	0.083372	0.099178
TGP3-4	0.000000	0.000002	0.000005	0.005913	0.603521	0.078905	0.093839
TGP3-5	0.000000	0.000001	0.000004	0.003943	0.601615	0.078204	0.093189
TGP3-6	0.000000	0.000000	0.000005	0.003291	0.600812	0.077610	0.092261
TGP3-7	0.000000	0.000002	0.000003	0.001906	0.613792	0.078900	0.093935
TGP3-8	0.000000	0.000001	0.000002	0.001791	0.604957	0.077311	0.091920
TGP3-9	0.000000	0.000001	0.000003	0.002782	0.540038	0.069548	0.082687
TGP3-10	0.000000	0.000001	0.000003	0.000411	0.587264	0.073967	0.088240
TGP3-11	0.000000	0.000001	0.000003	0.000898	0.613798	0.078078	0.093011
TGP3-12	0.000012	0.000001	0.000002	0.000960	0.589140	0.074700	0.089106
TGP3-13	0.000493	0.000005	0.000003	0.000000	0.113881	0.012617	0.014954
TGP3-14	0.000654	0.000006	0.000001	0.000000	0.101305	0.011075	0.013070
TGP3-15	0.000604	0.000004	0.000001	0.000000	0.105409	0.011403	0.013528
SRM614-4	0.008194	0.000028	0.000043	0.330601	0.013374	0.001821	0.002084
SRM612-4	0.012939	0.001371	0.000064	0.301286	0.020391	0.002786	0.003038
SRM610-4	0.095172	0.021622	0.000508	0.315019	0.123547	0.015991	0.018229
AP1-4	0.001551	0.000003	0.000004	0.000925	0.003197	0.000351	0.000490
AP2-4	0.001105	0.000013	0.000010	0.000000	0.082929	0.009039	0.010705
AP3-4	0.000863	0.000044	0.000008	0.000000	0.089899	0.009831	0.011667
AP4-4	0.001024	0.000103	0.000009	0.000000	0.153660	0.016861	0.020098

standardize signal averages AP							
AP1	0.000775	0.000004	0.000003	0.002928	0.008775	0.001062	0.001343
AP2	0.000553	0.000015	0.000009	0.001350	0.097744	0.010780	0.012856
AP3	0.000432	0.000049	0.000007	0.000567	0.106620	0.011870	0.014137
AP4	0.000512	0.000103	0.000008	0.000079	0.162449	0.018110	0.021659

linest from std sig ave							
	0.006727	0.153746	3.223189	0.041033	0.010960	0.098523	0.082483

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.004097	0.000025	0.000032	0.448778	0.008416	0.001245	0.001544
srM612-2	0.006469	0.001255	0.000059	0.352892	0.034649	0.004610	0.005472
srM610-2	0.078603	0.019675	0.000388	0.336994	0.152910	0.019627	0.022983

linest from std sig ave							
	0.071725	0.276226	10.545597	2.823613	0.035048	0.272323	0.232287

concentration data	i.s. correction							
SRM614-3	85763.00	0.00	0.30	5.82	1995.16	3.25	5.65	7.11
SRM612-3	85763.00	0.00	15.01	15.11	1423.46	45.97	54.37	55.93
SRM610-3	85763.00	35.79	233.76	74.13	1263.24	171.33	196.56	196.21
AP1-3	398936	0.00	0.31	3.25	80.71	62.76	69.71	72.28
AP2-3	398936	0.00	0.97	8.83	44.20	492.16	492.18	493.80
AP3-3	398936	0.00	3.34	9.25	18.55	539.30	546.72	546.43
AP4-3	398936	0.00	6.36	10.15	2.60	748.72	760.88	764.06
TGP3-1	398936	0.00	0.12	5.44	124.56	2831.48	3425.91	3404.54
TGP3-2	398936	0.00	0.00	5.58	86.83	2796.71	3291.47	3277.83
TGP3-3	398936	0.00	0.07	9.62	59.57	2833.28	3276.89	3263.47
TGP3-4	398936	0.00	0.11	6.89	96.80	2638.86	3101.32	3087.81
TGP3-5	398936	0.00	0.06	4.96	64.54	2630.52	3073.76	3066.42
TGP3-6	398936	0.00	0.01	6.78	53.87	2627.01	3050.44	3035.87
TGP3-7	398936	0.00	0.13	3.61	31.20	2683.77	3101.12	3090.97
TGP3-8	398936	0.00	0.06	2.16	29.32	2645.14	3038.68	3024.66
TGP3-9	398936	0.00	0.05	3.50	45.54	2361.28	2733.55	2720.84
TGP3-10	398936	0.00	0.08	3.80	6.72	2567.77	2907.22	2903.56
TGP3-11	398936	0.00	0.07	3.36	14.69	2683.79	3068.84	3060.55
TGP3-12	398936	0.03	0.07	2.38	15.72	2575.98	2936.06	2932.05
TGP3-13	398936	1.32	0.34	3.31	0.00	497.94	495.92	492.06
TGP3-14	398936	1.75	0.34	1.64	0.00	442.95	435.29	430.06
TGP3-15	398936	1.62	0.22	1.30	0.00	460.90	448.19	445.14
SRM614-4	85763.00	4.73	0.37	11.93	1163.41	12.57	15.38	14.74
SRM612-4	85763.00	7.47	18.08	17.65	1060.25	19.17	23.54	21.49
SRM610-4	85763.00	54.91	285.11	140.50	1108.58	116.13	135.12	128.95
AP1-4	398936	4.16	0.20	5.43	15.15	13.98	13.79	16.12
AP2-4	398936	2.97	0.81	13.09	0.00	362.60	355.26	352.26
AP3-4	398936	2.32	2.69	9.68	0.00	393.08	386.39	383.90
AP4-4	398936	2.75	6.29	11.59	0.00	671.87	662.70	661.33

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-1	32945.34	70.48	64.04	141178.91	1709.57	416.48	1100.85
SRM614-1	32834.54	143.80	126.40	2716729.30	25610.38	4241.54	5881.15
SRM612-1	50112.52	3810.42	171.28	1668875.50	88685.66	12488.03	15373.05
SRM610-1	127349.20	22860.93	351.08	508558.69	136537.13	18535.94	22178.77
AP1-1	45368.14	128.84	125.36	164531.84	174357.02	22295.37	28659.28
AP2-1	48025.63	345.48	187.12	135546.08	2540144.80	284728.00	341091.09
AP3-1	51829.93	1585.57	201.52	116136.77	4508110.00	529418.50	632396.44
AP4-1	53966.43	2187.89	197.48	96302.74	3720480.00	422913.38	504492.94
TGP2-1	48482.23	90.72	218.72	215467.97	16386995.00	2176183.30	2587020.80
TGP2-2	48557.99	92.12	222.60	198124.16	15917026.00	2105087.80	2500649.80
TGP2-3	50005.68	89.40	216.24	218329.22	14119613.00	1824930.10	2172956.80
TGP2-4	54539.11	88.92	138.12	88925.02	2179483.00	243854.97	287539.09
TGP2-5	58375.53	97.44	119.28	98622.35	2066513.00	224282.91	265948.38
TGP2-6	62305.31	78.40	107.16	75589.31	1822629.50	199352.20	236312.45
TGP2-7	65790.89	72.28	104.84	71612.84	1606178.60	179500.13	212465.56
TGP2-8	68126.34	92.76	98.56	70649.80	1396848.50	154059.06	181998.66
TGP2-9	70270.16	81.12	95.08	66848.38	1284226.60	140780.31	167616.86
TGP2-10	70746.84	81.12	96.88	68043.50	1396757.90	152153.09	180768.17
TGP2-11	73253.97	77.96	109.20	75496.82	2477434.00	278275.72	331115.22
TGP2-12	74453.06	64.44	126.64	64826.00	1488992.30	162998.67	192604.00
TGP2-13	76629.56	82.52	103.60	62581.19	3454475.50	404687.78	482387.00
TGP2-14	77010.59	58.36	126.00	73478.81	4385379.50	520721.94	620236.81
TGP2-15	77917.68	97.92	129.44	83496.15	6105836.50	740881.63	885452.56
TGP2-16	76100.02	80.16	100.40	132172.63	13759493.00	1761842.00	2099988.50
TGP2-17	75062.78	60.80	203.96	112780.59	13321564.00	1699307.10	2027530.60
TGP2-18	73880.34	85.80	120.12	107473.56	13258215.00	1690327.30	2014473.10
SRM614-2	86806.81	143.20	182.20	637127.69	56714.16	7536.56	8110.25
SRM612-2	98964.32	2845.58	214.84	624868.19	68616.51	9356.29	10432.82

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	157781.05	19811.95	539.16	331463.16	136320.73	18014.02	19851.83
AP1-2	80760.98	62.32	114.64	73508.85	60434.26	7468.32	9805.58
AP2-2	83522.19	247.96	140.60	63556.68	1287014.40	140169.06	167246.55
AP3-2	85063.00	1268.65	280.16	59162.77	3326608.50	371885.03	443344.09
AP4-2	83763.75	1445.17	193.88	49547.56	1937524.10	212637.59	252694.73
blank-2	84416.84	76.12	56.04	34322.88	62257.07	7927.28	8099.41
blank average	58681.09	73.30	60.04	87750.89	31983.32	4171.88	4600.13
blank subtraction							
SRM614-1	-25846.55	70.50	66.36	2628978.41	-6372.94	69.66	1281.03
SRM612-1	-8568.57	3737.12	111.24	1581124.61	56702.34	8316.15	10772.92
SRM610-1	68668.11	22787.63	291.04	420807.80	104553.81	14364.06	17578.64
AP1-1	-13312.95	55.54	65.32	76780.95	142373.70	18123.48	24059.16
AP2-1	-10655.46	272.18	127.08	47795.19	2508161.48	280556.12	336490.96
AP3-1	-6851.16	1512.27	141.48	28385.88	4476126.68	525246.62	627796.31
AP4-1	-4714.66	2114.59	137.44	8551.85	3688496.68	418741.50	499892.81
TGP2-1	-10198.86	17.42	158.68	127717.08	16355011.68	2172011.42	2582420.67
TGP2-2	-10123.10	18.82	162.56	110373.27	15885042.68	2100915.92	2496049.67
TGP2-3	-8675.41	16.10	156.20	130578.33	14087629.68	1820758.22	2168356.67
TGP2-4	-4141.98	15.62	78.08	1174.12	2147499.68	239683.09	282938.96
TGP2-5	-305.56	24.14	59.24	10871.46	2034529.68	220111.03	261348.25
TGP2-6	3624.22	5.10	47.12	-12161.59	1790646.18	195180.32	231712.32
TGP2-7	7109.80	-1.02	44.80	-16138.05	1574195.28	175328.25	207865.43
TGP2-8	9445.25	19.46	38.52	-17101.10	1364865.18	149887.18	177398.53
TGP2-9	11589.07	7.82	35.04	-20902.52	1252243.28	136608.43	163016.73
TGP2-10	12065.75	7.82	36.84	-19707.39	1364774.58	147981.21	176168.04
TGP2-11	14572.88	4.66	49.16	-12254.07	2445450.68	274103.84	326515.09
TGP2-12	15771.97	-8.86	66.60	-22924.89	1457008.98	158826.79	188003.87
TGP2-13	17948.47	9.22	43.56	-25169.70	3422492.18	400515.90	477786.87
TGP2-14	18329.50	-14.94	65.96	-14272.08	4353396.18	516550.06	615636.68
TGP2-15	19236.59	24.62	69.40	-4254.74	6073853.18	736709.75	880852.43
TGP2-16	17418.93	6.86	40.36	44421.74	13727509.68	1757670.12	2095388.37
TGP2-17	16381.69	-12.50	143.92	25029.70	13289580.68	1695135.22	2022930.47
TGP2-18	15199.25	12.50	60.08	19722.67	13226231.68	1686155.42	2009872.97
SRM614-2	28125.72	69.90	122.16	549376.80	24730.84	3364.68	3510.12
SRM612-2	40283.23	2772.28	154.80	537117.30	36633.19	5184.41	5832.69
SRM610-2	99099.96	19738.65	479.12	243712.27	104337.41	13842.14	15251.71
AP1-2	22079.89	-10.98	54.60	-14242.04	28450.94	3296.44	5205.45
AP2-2	24841.10	174.66	80.56	-24194.22	1255031.08	135997.18	162646.42
AP3-2	26381.91	1195.35	220.12	-28588.12	3294625.18	367713.15	438743.96
AP4-2	25082.66	1371.87	133.84	-38203.33	1905540.78	208465.71	248094.60
zero correction							
SRM614-1	0.00	70.50	66.36	2628978.41	0.00	69.66	1281.03
SRM612-1	0.00	3737.12	111.24	1581124.61	56702.34	8316.15	10772.92
SRM610-1	68668.11	22787.63	291.04	420807.80	104553.81	14364.06	17578.64
AP1-1	0.00	55.54	65.32	76780.95	142373.70	18123.48	24059.16
AP2-1	0.00	272.18	127.08	47795.19	2508161.48	280556.12	336490.96
AP3-1	0.00	1512.27	141.48	28385.88	4476126.68	525246.62	627796.31
AP4-1	0.00	2114.59	137.44	8551.85	3688496.68	418741.50	499892.81
TGP2-1	0.00	17.42	158.68	127717.08	16355011.68	2172011.42	2582420.67
TGP2-2	0.00	18.82	162.56	110373.27	15885042.68	2100915.92	2496049.67
TGP2-3	0.00	16.10	156.20	130578.33	14087629.68	1820758.22	2168356.67
TGP2-4	0.00	15.62	78.08	1174.12	2147499.68	239683.09	282938.96
TGP2-5	0.00	24.14	59.24	10871.46	2034529.68	220111.03	261348.25
TGP2-6	3624.22	5.10	47.12	0.00	1790646.18	195180.32	231712.32
TGP2-7	7109.80	0.00	44.80	0.00	1574195.28	175328.25	207865.43
TGP2-8	9445.25	19.46	38.52	0.00	1364865.18	149887.18	177398.53
TGP2-9	11589.07	7.82	35.04	0.00	1252243.28	136608.43	163016.73
TGP2-10	12065.75	7.82	36.84	0.00	1364774.58	147981.21	176168.04
TGP2-11	14572.88	4.66	49.16	0.00	2445450.68	274103.84	326515.09
TGP2-12	15771.97	0.00	66.60	0.00	1457008.98	158826.79	188003.87
TGP2-13	17948.47	9.22	43.56	0.00	3422492.18	400515.90	477786.87
TGP2-14	18329.50	0.00	65.96	0.00	4353396.18	516550.06	615636.68
TGP2-15	19236.59	24.62	69.40	0.00	6073853.18	736709.75	880852.43
TGP2-16	17418.93	6.86	40.36	44421.74	13727509.68	1757670.12	2095388.37
TGP2-17	16381.69	0.00	143.92	25029.70	13289580.68	1695135.22	2022930.47
TGP2-18	15199.25	12.50	60.08	19722.67	13226231.68	1686155.42	2009872.97
SRM614-2	28125.72	69.90	122.16	549376.80	24730.84	3364.68	3510.12
SRM612-2	40283.23	2772.28	154.80	537117.30	36633.19	5184.41	5832.69
SRM610-2	99099.96	19738.65	479.12	243712.27	104337.41	13842.14	15251.71
AP1-2	22079.89	0.00	54.60	0.00	28450.94	3296.44	5205.45
AP2-2	24841.10	174.66	80.56	0.00	1255031.08	135997.18	162646.42
AP3-2	26381.91	1195.35	220.12	0.00	3294625.18	367713.15	438743.96
AP4-2	25082.66	1371.87	133.84	0.00	1905540.78	208465.71	248094.60
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-1	0.000000	0.000018	0.000017	0.672571	0.000000	0.000018	0.000328
SRM612-1	0.000000	0.001105	0.000033	0.467632	0.016770	0.002460	0.003186
SRM610-1	0.061906	0.020544	0.000262	0.379368	0.094258	0.012950	0.015848
AP1-1	0.000000	0.000003	0.000003	0.003577	0.006634	0.000844	0.001121
AP2-1	0.000000	0.000017	0.000008	0.002914	0.152904	0.017103	0.020513
AP3-1	0.000000	0.000072	0.000007	0.001350	0.212887	0.024981	0.029858
AP4-1	0.000000	0.000107	0.000007	0.000432	0.186454	0.021167	0.025270
TGP2-1	0.000000	0.000001	0.000006	0.004985	0.638326	0.084772	0.100790
TGP2-2	0.000000	0.000001	0.000007	0.004605	0.662744	0.087653	0.104138
TGP2-3	0.000000	0.000001	0.000007	0.005446	0.587540	0.075937	0.090434
TGP2-4	0.000000	0.000001	0.000007	0.000107	0.195431	0.021812	0.025749
TGP2-5	0.000000	0.000002	0.000005	0.000933	0.174640	0.018894	0.022434
TGP2-6	0.000368	0.000001	0.000005	0.000000	0.181619	0.019796	0.023502
TGP2-7	0.000778	0.000000	0.000005	0.000000	0.172254	0.019185	0.022745
TGP2-8	0.000965	0.000002	0.000004	0.000000	0.139433	0.015312	0.018123
TGP2-9	0.001167	0.000001	0.000004	0.000000	0.126092	0.013755	0.016415
TGP2-10	0.000943	0.000001	0.000003	0.000000	0.106692	0.011569	0.013772
TGP2-11	0.001033	0.000000	0.000003	0.000000	0.173314	0.019426	0.023141
TGP2-12	0.001243	0.000000	0.000005	0.000000	0.114830	0.012517	0.014817
TGP2-13	0.001515	0.000001	0.000004	0.000000	0.288877	0.033806	0.040328
TGP2-14	0.001366	0.000000	0.000005	0.000000	0.324524	0.038506	0.045893
TGP2-15	0.001228	0.000002	0.000004	0.000000	0.387776	0.047034	0.056237
TGP2-16	0.000804	0.000000	0.000002	0.002051	0.633922	0.081167	0.096763
TGP2-17	0.000755	0.000000	0.000007	0.001154	0.612689	0.078151	0.093263
TGP2-18	0.000696	0.000001	0.000003	0.000904	0.605929	0.077247	0.092078
SRM614-2	0.012678	0.000032	0.000055	0.247637	0.011148	0.001517	0.001582
SRM612-2	0.018976	0.001306	0.000073	0.253020	0.017257	0.002442	0.002748
SRM610-2	0.115887	0.023082	0.000560	0.284996	0.122012	0.016187	0.017835
AP1-2	0.001484	0.000000	0.000004	0.000000	0.001912	0.000222	0.000350
AP2-2	0.002088	0.000015	0.000007	0.000000	0.105480	0.011430	0.013670
AP3-2	0.001445	0.000065	0.000012	0.000000	0.180482	0.020144	0.024035
AP4-2	0.001678	0.000092	0.000009	0.000000	0.127455	0.013944	0.016594

standardize signal averages AP							
AP1	0.000742	0.000001	0.000003	0.001789	0.004273	0.000533	0.000735
AP2	0.001044	0.000016	0.000007	0.001457	0.129192	0.014267	0.017092
AP3	0.000723	0.000069	0.000009	0.000675	0.196685	0.022562	0.026947
AP4	0.000839	0.000099	0.000008	0.000216	0.156955	0.017555	0.020932

linest from std sig ave							
	0.005317	0.145297	3.160730	0.038026	0.008324	0.073506	0.061534

standardize signal averages SRM							
srm614-2	0.006339	0.000025	0.000036	0.460104	0.005574	0.000767	0.000955
srm612-2	0.009488	0.001206	0.000053	0.360326	0.017014	0.002451	0.002967
srm610-2	0.088896	0.021813	0.000411	0.332182	0.108135	0.014568	0.016841

linest from std sig ave							
	0.063120	0.249239	9.987662	2.779919	0.050286	0.372611	0.321826

concentration data		i.s. correction						
SRM614-1	85763.00	0.00	0.22	4.60	2193.43	0.00	0.11	1.73
SRM612-1	85763.00	0.00	13.77	8.92	1525.07	11.97	15.51	16.81
SRM610-1	85763.00	28.23	256.00	71.12	1237.22	67.29	81.63	83.63
AP1-1	398936	0.00	0.15	3.84	54.27	22.03	24.76	27.52
AP2-1	398936	0.00	0.96	9.77	44.20	507.73	501.54	503.57
AP3-1	398936	0.00	4.17	8.48	20.48	706.91	732.55	732.97
AP4-1	398936	0.00	6.20	8.76	6.56	619.13	620.72	620.32
TGP2-1	398936	0.00	0.04	7.81	75.62	2119.61	2485.87	2474.22
TGP2-2	398936	0.00	0.05	8.55	69.86	2200.69	2570.34	2556.41
TGP2-3	398936	0.00	0.04	8.21	82.61	1950.97	2226.78	2219.98

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	398936	0.00	0.08	8.96	1.62	648.94	639.62	632.08
TGP2-5	398936	0.00	0.12	6.41	14.16	579.91	554.05	550.71
TGP2-6	398936	0.78	0.03	6.03	0.00	603.08	580.51	576.93
TGP2-7	398936	1.65	0.00	6.18	0.00	571.98	562.58	558.36
TGP2-8	398936	2.05	0.12	4.96	0.00	463.00	449.02	444.88
TGP2-9	398936	2.48	0.05	4.45	0.00	418.70	403.37	402.95
TGP2-10	398936	2.00	0.04	3.63	0.00	354.28	339.24	338.08
TGP2-11	398936	2.19	0.02	4.39	0.00	575.50	569.66	568.06
TGP2-12	398936	2.64	0.00	6.62	0.00	381.30	367.06	363.73
TGP2-13	398936	3.21	0.05	4.64	0.00	959.24	991.32	989.98
TGP2-14	398936	2.90	0.00	6.20	0.00	1077.61	1129.16	1126.58
TGP2-15	398936	2.60	0.09	5.59	0.00	1287.64	1379.24	1380.51
TGP2-16	398936	1.71	0.02	2.35	31.12	2104.99	2380.16	2375.35
TGP2-17	398936	1.60	0.00	8.37	17.51	2034.48	2291.70	2289.44
TGP2-18	398936	1.48	0.03	3.47	13.71	2012.03	2265.21	2260.34
SRM614-2	85763.00	5.78	0.39	14.93	807.61	7.96	9.56	8.35
SRM612-2	85763.00	8.65	16.27	19.77	825.16	12.32	15.40	14.50
SRM610-2	85763.00	52.84	287.63	151.88	929.44	87.10	102.04	94.12
AP1-2	398936	3.15	0.00	4.63	0.00	6.35	6.50	8.59
AP2-2	398936	4.43	0.85	8.54	0.00	350.26	335.18	335.57
AP3-2	398936	3.07	3.80	15.20	0.00	599.31	590.69	590.01
AP4-2	398936	3.56	5.32	11.29	0.00	423.23	408.88	407.36

certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-11	46090.82	88.32	2453.25	14645319.00	4202.70	847.08	1446.93
SRM614-11	48229.59	163.48	23172.89	57577596.00	70655.32	11152.82	8733.53
SRM612-11	62737.35	3570.86	33276.39	52599044.00	181490.11	23879.54	24642.82
SRM610-11	147331.91	25286.86	55753.35	41485120.00	304264.97	36773.85	41019.43
AP1-11	53273.34	136.44	7907.64	18544994.00	319506.78	38151.93	47098.91
AP2-11	52766.70	329.04	15145.25	15313698.00	3209435.30	337069.78	406298.28
AP3-11	53241.18	1332.69	14444.28	11968608.00	3810526.00	406862.81	491403.69
AP4-11	59715.54	3127.58	19140.47	9810503.00	6780923.50	762139.69	918016.25
GCK4-1	50295.00	116.60	2779.10	25741864.00	12705769.00	1535840.50	1844894.00
GCK4-2	50098.68	86.76	2689.34	25009818.00	12586797.00	1514017.80	1816037.60
GCK4-3	51207.21	89.24	2708.10	26181412.00	13769811.00	1679412.00	2011300.40
GCK4-4	49534.52	108.68	4232.14	31469566.00	17657328.00	2249880.30	2684423.80
GCK4-5	49107.04	93.32	4640.95	31280820.00	17361072.00	2206705.50	2639855.30
GCK4-6	48437.39	87.76	4384.18	31525542.00	18331096.00	2347143.30	2802511.50
GCK4-7	56744.56	52.72	2488.41	12845334.00	2505044.80	271068.91	323439.94
GCK4-8	60785.22	71.52	2164.09	10593192.00	1474587.90	155705.64	186374.41
GCK4-9	63725.40	82.80	2339.53	15116613.00	4057462.30	451758.69	541347.00
GCK4-10	64546.76	83.32	2469.01	11798884.00	1294564.90	136031.61	161764.55
GCK4-11	70243.95	82.92	1608.29	8069178.00	628435.75	69499.07	81686.82
GCK4-12	72696.73	70.04	1632.33	8278394.00	701055.31	76264.91	89911.38
GCK4-13	72087.45	101.72	2215.33	12902171.00	1961050.40	201992.33	242404.08
GCK4-14	70341.91	78.60	2165.57	13028020.00	1921736.60	197734.95	236894.73
GCK4-15	70916.16	84.84	2235.89	13009161.00	1971292.90	203118.98	242528.00
GCK4-16	67427.18	100.04	2178.49	16650830.00	3314675.00	345046.03	414683.34
GCK4-17	66736.94	76.28	2098.13	16007414.00	3443598.50	358354.09	431198.06
GCK4-18	66835.54	78.56	2567.45	15736520.00	3397978.00	353507.78	425605.34
SRM614-11	35367.56	107.40	194.52	170532.33	9026.01	1490.45	1720.21
SRM612-11	44993.73	2003.21	283.40	234351.64	19949.95	2976.78	3442.86
SRM610-11	96347.54	16195.97	707.20	188404.55	82022.58	10748.54	12755.55
AP1-11	48047.19	132.96	124.76	96647.06	44172.57	5318.87	7148.92
AP2-11	45975.98	259.96	228.16	72708.73	1267532.60	136851.94	162943.84
AP3-11	49943.68	808.92	249.76	47487.91	1688886.90	183670.03	218548.52
AP4-11	55542.35	1621.77	243.84	41185.51	2611997.50	285850.31	339019.56
blank-11	30856.85	82.04	91.08	35332.36	2517.37	439.56	541.84
blank average	38473.84	85.18	1272.17	7340325.68	3360.04	643.32	994.39

blank subtraction								
SRM614-11		9755.75	78.30	21900.72	50237270.32	67295.28	10509.50	7739.14
SRM612-11		24263.52	3485.68	32004.22	45258718.32	178130.07	23236.21	23648.43
SRM610-11		108858.07	25201.68	54481.18	34144794.32	300904.93	36130.52	40025.04
AP1-11		14799.50	51.26	6635.48	11204668.32	316146.74	37508.61	46104.52
AP2-11		14292.86	243.86	13873.08	7973372.32	3206075.26	336426.46	405303.89
AP3-11		14767.34	1247.51	13172.11	4628282.32	3807165.96	406219.49	490409.30
AP4-11		21241.70	3042.40	17868.30	2470177.32	6777563.46	761496.37	917021.86

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	11821.17	31.42	1506.93	18401538.32	12702408.96	1535197.18	1843899.61
GCK4-2	11624.85	1.58	1417.17	17669492.32	12583436.96	1513374.48	1815043.21
GCK4-3	12733.37	4.06	1435.93	18841086.32	13766450.96	1678768.68	2010306.01
GCK4-4	11060.68	23.50	2959.98	24129240.32	17653967.96	2249236.98	2683429.41
GCK4-5	10633.20	8.14	3368.78	23940494.32	17357711.96	2206062.18	2638860.91
GCK4-6	9963.55	2.58	3112.02	24185216.32	18327735.96	2346499.98	2801517.11
GCK4-7	18270.72	-32.46	1216.25	5505008.32	2501684.76	270425.59	322445.55
GCK4-8	22311.39	-13.66	891.93	3252866.32	1471227.86	155062.32	185380.02
GCK4-9	25251.56	-2.38	1067.37	7776287.32	4054102.26	451115.37	540352.61
GCK4-10	26072.93	-1.86	1196.85	4458558.32	1291204.86	135388.29	160770.16
GCK4-11	31770.12	-2.26	336.12	728852.32	625075.71	68855.75	80692.43
GCK4-12	34222.90	-15.14	360.16	938068.32	697695.27	75621.59	88917.00
GCK4-13	33613.61	16.54	943.17	5561845.32	1957690.36	201349.01	241409.69
GCK4-14	31868.08	-6.58	893.41	5687694.32	1918376.56	197091.63	235900.34
GCK4-15	32442.32	-0.34	963.73	5668835.32	1967932.86	202475.66	241533.61
GCK4-16	28953.34	14.86	906.32	9310504.32	3311314.96	344402.71	413688.95
GCK4-17	28263.10	-8.90	825.96	8667088.32	3440238.46	357710.77	430203.67
GCK4-18	28361.70	-6.62	1295.29	8396194.32	3394617.96	352864.46	424610.95
SRM614-11	-3106.28	22.22	-1077.65	-7169793.35	5665.97	847.12	725.82
SRM612-11	6519.90	1918.03	-988.77	-7105974.04	16589.91	2333.45	2448.47
SRM610-11	57873.70	16110.79	-564.96	-7151921.13	78662.54	10105.22	11761.17
AP1-11	9573.35	47.78	-1147.41	-7243678.62	40812.53	4675.55	6154.53
AP2-11	7502.14	174.78	-1044.01	-7267616.95	1264172.56	136208.62	161949.45
AP3-11	11469.84	723.74	-1022.41	-7292837.77	1685526.86	183026.71	217554.13
AP4-11	17068.52	1536.59	-1028.33	-7299140.17	2608637.46	285206.99	338025.17

zero correction

SRM614-11	9755.75	78.30	21900.72	50237270.32	67295.28	10509.50	7739.14
SRM612-11	24263.52	3485.68	32004.22	45258718.32	178130.07	23236.21	23648.43
SRM610-11	108858.07	25201.68	54481.18	34144794.32	300904.93	36130.52	40025.04
AP1-11	14799.50	51.26	6635.48	11204668.32	316146.74	37508.61	46104.52
AP2-11	14292.86	243.86	13873.08	7973372.32	3206075.26	336426.46	405303.89
AP3-11	14767.34	1247.51	13172.11	4628282.32	3807165.96	406219.49	490409.30
AP4-11	21241.70	3042.40	17868.30	2470177.32	6777563.46	761496.37	917021.86
GCK4-1	11821.17	31.42	1506.93	18401538.32	12702408.96	1535197.18	1843899.61
GCK4-2	11624.85	1.58	1417.17	17669492.32	12583436.96	1513374.48	1815043.21
GCK4-3	12733.37	4.06	1435.93	18841086.32	13766450.96	1678768.68	2010306.01
GCK4-4	11060.68	23.50	2959.98	24129240.32	17653967.96	2249236.98	2683429.41
GCK4-5	10633.20	8.14	3368.78	23940494.32	17357711.96	2206062.18	2638860.91
GCK4-6	9963.55	2.58	3112.02	24185216.32	18327735.96	2346499.98	2801517.11
GCK4-7	18270.72	0.00	1216.25	5505008.32	2501684.76	270425.59	322445.55
GCK4-8	22311.39	0.00	891.93	3252866.32	1471227.86	155062.32	185380.02
GCK4-9	25251.56	0.00	1067.37	7776287.32	4054102.26	451115.37	540352.61
GCK4-10	26072.93	0.00	1196.85	4458558.32	1291204.86	135388.29	160770.16
GCK4-11	31770.12	0.00	336.12	728852.32	625075.71	68855.75	80692.43
GCK4-12	34222.90	0.00	360.16	938068.32	697695.27	75621.59	88917.00
GCK4-13	33613.61	16.54	943.17	5561845.32	1957690.36	201349.01	241409.69
GCK4-14	31868.08	0.00	893.41	5687694.32	1918376.56	197091.63	235900.34
GCK4-15	32442.32	0.00	963.73	5668835.32	1967932.86	202475.66	241533.61
GCK4-16	28953.34	14.86	906.32	9310504.32	3311314.96	344402.71	413688.95
GCK4-17	28263.10	0.00	825.96	8667088.32	3440238.46	357710.77	430203.67
GCK4-18	28361.70	0.00	1295.29	8396194.32	3394617.96	352864.46	424610.95
SRM614-11	0.00	22.22	0.00	0.00	5665.97	847.12	725.82
SRM612-11	6519.90	1918.03	0.00	0.00	16589.91	2333.45	2448.47
SRM610-11	57873.70	16110.79	0.00	0.00	78662.54	10105.22	11761.17
AP1-11	9573.35	47.78	0.00	0.00	40812.53	4675.55	6154.53
AP2-11	7502.14	174.78	0.00	0.00	1264172.56	136208.62	161949.45
AP3-11	11469.84	723.74	0.00	0.00	1685526.86	183026.71	217554.13
AP4-11	17068.52	1536.59	0.00	0.00	2608637.46	285206.99	338025.17

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	0.002692	0.000022	0.006043	13.861555	0.018568	0.002900	0.002135	
SRM612-11	0.007677	0.001103	0.010126	14.320094	0.056361	0.007352	0.007482	
SRM610-11	0.066899	0.015488	0.033481	20.983620	0.184921	0.022204	0.024597	
AP1-11	0.000735	0.000003	0.000329	0.556121	0.015691	0.001862	0.002288	
AP2-11	0.000773	0.000013	0.000750	0.431268	0.173412	0.018197	0.021922	
AP3-11	0.000687	0.000058	0.000612	0.215187	0.177010	0.018887	0.022801	
AP4-11	0.000955	0.000137	0.000803	0.111039	0.304665	0.034231	0.041222	
GCK4-1	0.000658	0.000002	0.000084	1.023838	0.706746	0.085416	0.102592	
GCK4-2	0.000641	0.000000	0.000078	0.974034	0.693664	0.083425	0.100055	
GCK4-3	0.000646	0.000000	0.000073	0.956320	0.698746	0.085210	0.102037	
GCK4-4	0.000407	0.000001	0.000109	0.887060	0.649010	0.082688	0.098651	
GCK4-5	0.000393	0.000000	0.000124	0.884340	0.641178	0.081490	0.097477	
GCK4-6	0.000367	0.000000	0.000115	0.890266	0.674650	0.086375	0.103125	
GCK4-7	0.001914	0.000000	0.000127	0.576804	0.262122	0.028335	0.033785	
GCK4-8	0.002868	0.000000	0.000115	0.418101	0.189102	0.019931	0.023827	
GCK4-9	0.002216	0.000000	0.000094	0.682569	0.355852	0.039597	0.047430	
GCK4-10	0.002429	0.000000	0.000111	0.415363	0.120290	0.012613	0.014977	
GCK4-11	0.005832	0.000000	0.000062	0.133799	0.114748	0.012640	0.014813	
GCK4-12	0.005673	0.000000	0.000060	0.155489	0.115646	0.012535	0.014738	
GCK4-13	0.002617	0.000001	0.000073	0.432946	0.152391	0.015673	0.018792	
GCK4-14	0.002490	0.000000	0.000070	0.444355	0.149874	0.015398	0.018430	
GCK4-15	0.002557	0.000000	0.000076	0.446881	0.155134	0.015961	0.019040	
GCK4-16	0.001769	0.000001	0.000055	0.568729	0.202270	0.021038	0.025270	
GCK4-17	0.001743	0.000000	0.000051	0.534629	0.212211	0.022065	0.026537	
GCK4-18	0.001804	0.000000	0.000082	0.534005	0.215901	0.022442	0.027006	
SRM614-11	0.000000	0.000023	0.000000	0.000000	0.005913	0.000884	0.000758	
SRM612-11	0.005193	0.001528	0.000000	0.000000	0.013213	0.001858	0.001950	
SRM610-11	0.093415	0.026005	0.000000	0.000000	0.126971	0.016311	0.018984	
AP1-11	0.000788	0.000004	0.000000	0.000000	0.003359	0.000385	0.000507	
AP2-11	0.000641	0.000015	0.000000	0.000000	0.107992	0.011636	0.013835	
AP3-11	0.000863	0.000054	0.000000	0.000000	0.126855	0.013775	0.016373	
AP4-11	0.001307	0.000118	0.000000	0.000000	0.199781	0.021842	0.025887	
standardize signal averages AP								
AP1	0.000761	0.000003	0.000165	0.278061	0.009525	0.001123	0.001397	
AP2	0.000707	0.000014	0.000375	0.215634	0.140702	0.014916	0.017878	
AP3	0.000775	0.000056	0.000306	0.107594	0.151933	0.016331	0.019587	
AP4	0.001131	0.000127	0.000402	0.055520	0.252223	0.028037	0.033555	
linest from std sig ave								
	0.006028	0.126344	0.071086	0.000257	0.007274	0.066292	0.055357	
standardize signal averages SRM								
srm614-2	0.001346	0.000022	0.003021	6.930777	0.012241	0.001892	0.001446	
srm612-2	0.006435	0.001315	0.005063	7.160047	0.034787	0.004605	0.004716	
srm610-2	0.080157	0.020746	0.016741	10.491810	0.155946	0.019258	0.021791	
linest from std sig ave								
	0.070507	0.261974	0.227350	0.127956	0.034349	0.276373	0.246453	
concentration data i.s. correction								
SRM614-11	85763.00	1.39	0.23	36.84	305.42	11.58	16.49	10.14
SRM612-11	85763.00	3.97	11.95	61.74	315.52	35.16	41.80	35.52
SRM610-11	85763.00	34.58	167.82	204.12	462.34	115.36	126.24	116.78
AP1-11	398936	1.77	0.13	9.34	57.00	45.53	49.23	50.53
AP2-11	398936	1.86	0.66	21.28	44.20	503.22	481.24	484.13
AP3-11	398936	1.65	2.92	17.37	22.05	513.66	499.48	503.54
AP4-11	398936	2.30	6.89	22.78	11.38	884.11	905.28	910.34
GCK4-1	398936	1.58	0.09	2.38	104.93	2050.90	2258.94	2265.63
GCK4-2	398936	1.54	0.00	2.22	99.83	2012.94	2206.28	2209.59
GCK4-3	398936	1.55	0.01	2.07	98.01	2027.68	2253.47	2253.38
GCK4-4	398936	0.98	0.04	3.09	90.92	1883.36	2186.80	2178.58
GCK4-5	398936	0.94	0.02	3.53	90.64	1860.63	2155.10	2152.67
GCK4-6	398936	0.88	0.00	3.25	91.24	1957.76	2284.31	2277.39
GCK4-7	398936	4.60	0.00	3.61	59.12	760.65	749.35	746.11
GCK4-8	398936	6.90	0.00	3.25	42.85	548.75	527.09	526.20
GCK4-9	398936	5.33	0.00	2.66	69.96	1032.64	1047.19	1047.43
GCK4-10	398936	5.84	0.00	3.16	42.57	349.07	333.56	330.76
GCK4-11	398936	14.02	0.00	1.75	13.71	332.99	334.28	327.13
GCK4-12	398936	13.64	0.00	1.69	15.94	335.59	331.49	325.48
GCK4-13	398936	6.29	0.06	2.08	44.37	442.22	414.50	415.00
GCK4-14	398936	5.99	0.00	1.98	45.54	434.92	407.22	407.00
GCK4-15	398936	6.15	0.00	2.15	45.80	450.18	422.12	420.48
GCK4-16	398936	4.25	0.05	1.57	58.29	586.97	556.37	558.06
GCK4-17	398936	4.19	0.00	1.44	54.79	615.81	583.55	586.04
GCK4-18	398936	4.34	0.00	2.34	54.73	626.52	593.52	596.39
SRM614-11	85763.00	0.00	0.25	0.00	0.00	3.69	5.03	3.60

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	85763.00	2.68	16.55	0.00	0.00	8.24	10.57	9.26
SRM610-11	85763.00	48.29	281.78	0.00	0.00	79.21	92.73	90.13
AP1-11	398936	1.89	0.20	0.00	0.00	9.75	10.18	11.19
AP2-11	398936	1.54	0.75	0.00	0.00	313.38	307.72	305.52
AP3-11	398936	2.08	2.75	0.00	0.00	368.12	364.29	361.59
AP4-11	398936	3.14	5.93	0.00	0.00	579.74	577.65	571.69

certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	

	Li	Be	B	Na	Mg24	Mg25	Mg26	
raw data								
blank-9	29182.48	79.56	5917.91	11317195.00	4534.79	972.69	2157.61	
SRM614-9	35488.28	144.40	45172.90	54359132.00	55750.63	9034.09	7588.76	
SRM612-9	54787.91	3816.34	51373.57	55660388.00	106056.48	15517.49	14499.04	
SRM610-9	166578.14	29334.56	66919.02	44985628.00	277525.13	34099.79	37713.37	
AP1-9	46150.82	138.48	13567.08	15541923.00	121402.52	14610.88	20667.08	
AP2-9	46884.22	343.00	18141.70	12668087.00	2411713.80	253337.98	305305.31	
AP3-9	47384.43	1461.29	25009.50	9858098.00	3744396.30	403531.03	487062.97	
AP4-9	49846.64	2163.89	20745.88	8138332.50	3553913.00	383174.56	461179.13	
GCK3-1	46947.02	95.12	10022.62	19352176.00	5120804.00	563851.88	677982.19	
GCK3-2	47911.71	102.52	9611.21	25812742.00	11070059.00	1324492.00	1588436.30	
GCK3-3	49330.80	104.72	8081.53	24455636.00	10462762.00	1238480.80	1487719.50	
GCK3-4	53957.90	89.20	3825.10	9233962.00	969096.38	107041.56	127963.12	
GCK3-5	57176.28	99.72	4117.42	9108482.00	919940.94	100736.37	118247.70	
GCK3-6	58716.33	99.16	3749.82	8770505.00	821521.94	90753.63	106511.44	
GCK3-7	59509.65	112.08	5456.07	13992241.00	1647497.90	176116.52	209675.86	
GCK3-8	61378.79	89.84	5495.91	13530061.00	1470337.30	154747.80	185049.92	
GCK3-9	62628.88	97.16	5774.43	12940838.00	1468156.80	153648.02	184411.95	
GCK3-10	65634.61	104.32	5165.31	10770232.00	1834808.90	192954.00	228593.13	
GCK3-11	66478.41	81.76	4803.67	11078943.00	1925673.30	201647.66	239673.55	
GCK3-12	68337.87	82.36	4844.43	10612648.00	1835158.60	191594.28	228763.45	
GCK3-13	70112.59	86.12	5095.91	12283868.00	2925139.50	308156.78	369132.31	
GCK3-14	72183.41	78.80	4580.79	12620042.00	2939477.00	307788.78	369959.38	
GCK3-15	73250.45	97.40	4685.43	13299063.00	3089287.50	323627.47	387376.13	
GCK3-16	74707.30	68.68	4733.07	16466567.00	5335687.00	580877.06	698662.88	
GCK3-17	76060.75	101.08	4728.95	17295468.00	5389978.50	587767.81	707365.31	
GCK3-18	76678.11	103.48	6060.27	16557786.00	5730052.50	626465.19	752749.94	
SRM614-10	88769.06	131.88	10109.10	42378032.00	55283.59	8244.61	6524.76	
SRM612-10	102685.90	3077.74	14972.08	44985644.00	70103.31	10173.06	8836.25	
SRM610-10	175337.70	23798.85	37449.85	37738024.00	166618.58	21179.60	22340.21	
AP1-10	85136.60	109.68	5889.95	8903634.00	69454.15	8282.49	11542.03	
AP2-10	84144.39	276.20	9059.69	6776992.50	1094121.10	114943.01	137429.33	
AP3-10	83416.35	1148.81	14374.60	5812497.50	2546494.00	264941.13	320268.00	
AP4-10	85499.77	1724.77	12063.75	5036747.00	2535613.50	266671.19	320571.78	
blank-10	84894.56	95.60	1176.73	3118841.80	33371.55	4412.22	4326.18	
blank average	57038.52	87.58	3547.32	7218018.40	18953.17	2692.46	3241.90	

blank subtraction								
SRM614-9	-21550.24	56.82	41625.58	47141113.60	36797.47	6341.64	4346.86	
SRM612-9	-2250.61	3728.76	47826.25	48442369.60	87103.31	12825.03	11257.14	
SRM610-9	109539.62	29246.98	63371.70	37767609.60	258571.96	31407.34	34471.47	
AP1-9	-10887.70	50.90	10019.76	8323904.60	102449.35	11918.43	17425.18	
AP2-9	-10154.30	255.42	14594.38	5450068.60	2392760.63	250645.52	302063.41	
AP3-9	-9654.09	1373.71	21462.18	2640079.60	3725443.13	400838.57	483821.07	
AP4-9	-7191.88	2076.31	17198.56	920314.10	3534959.83	380482.10	457937.23	
GCK3-1	-10091.50	7.54	6475.30	12134157.60	5101850.83	561159.42	674740.29	
GCK3-2	-9126.81	14.94	6063.89	18594723.60	11051105.83	1321799.54	1585194.40	
GCK3-3	-7707.72	17.14	4534.21	17237617.60	10443808.83	1235788.34	1484477.60	
GCK3-4	-3080.62	1.62	277.78	2015943.60	950143.21	104349.10	124721.22	
GCK3-5	137.76	12.14	570.10	1890463.60	900987.77	98043.91	115005.80	
GCK3-6	1677.81	11.58	202.50	1552486.60	802568.77	88061.18	103269.54	
GCK3-7	2471.13	24.50	1908.75	6774222.60	1628544.73	173424.06	206433.96	
GCK3-8	4340.27	2.26	1948.59	6312042.60	1451384.13	152055.34	181808.02	
GCK3-9	5590.36	9.58	2227.11	5722819.60	1449203.63	150955.56	181170.05	
GCK3-10	8596.09	16.74	1617.99	3552213.60	1815855.73	190261.54	225351.23	
GCK3-11	9439.89	-5.82	1256.35	3860924.60	1906720.13	198955.20	236431.65	
GCK3-12	11299.35	-5.22	1297.11	3394629.60	1816205.43	188901.82	225521.55	
GCK3-13	13074.07	-1.46	1548.59	5065849.60	2906186.33	305464.32	365890.41	
GCK3-14	15144.89	-8.78	1033.47	5402023.60	2920523.83	305096.32	367177.48	
GCK3-15	16211.93	9.82	1138.11	6081044.60	3070334.33	320935.01	384134.23	
GCK3-16	17668.78	-18.90	1185.75	9248548.60	5316733.83	578184.60	695420.98	

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	19022.23	13.50	1181.63	10077449.60	5371025.33	585075.35	704123.41
GCK3-18	19639.59	15.90	2512.95	9339767.60	5711099.33	623772.73	749508.04
SRM614-10	31730.54	44.30	6561.78	35160013.60	36330.42	5552.15	3282.86
SRM612-10	45647.38	2990.16	11424.76	37767625.60	51150.15	7480.60	5594.35
SRM610-10	118299.18	23711.27	33902.53	30520005.60	147665.41	18487.14	19098.31
AP1-10	28098.08	22.10	2342.63	1685615.60	50500.98	5590.03	8300.13
AP2-10	27105.87	188.62	5512.37	-441025.90	1075167.93	112250.55	134187.43
AP3-10	26377.83	1061.23	10827.28	-1405520.90	2527540.83	262248.67	317026.10
AP4-10	28461.25	1637.19	8516.43	-2181271.40	2516660.33	263978.73	317329.88

zero correction

SRM614-9	0.00	56.82	41625.58	47141113.60	36797.47	6341.64	4346.86
SRM612-9	0.00	3728.76	47826.25	48442369.60	87103.31	12825.03	11257.14
SRM610-9	109539.62	29246.98	63371.70	37767609.60	258571.96	31407.34	34471.47
AP1-9	0.00	50.90	10019.76	8323904.60	102449.35	11918.43	17425.18
AP2-9	0.00	255.42	14594.38	5450068.60	2392760.63	250645.52	302063.41
AP3-9	0.00	1373.71	21462.18	2640079.60	3725443.13	400838.57	483821.07
AP4-9	0.00	2076.31	17198.56	920314.10	3534959.83	380482.10	457937.23
GCK3-1	0.00	7.54	6475.30	12134157.60	5101850.83	561159.42	674740.29
GCK3-2	0.00	14.94	6063.89	18594723.60	11051105.83	1321799.54	1585194.40
GCK3-3	0.00	17.14	4534.21	17237617.60	10443808.83	1235788.34	1484477.60
GCK3-4	0.00	1.62	277.78	2015943.60	950143.21	104349.10	124721.22
GCK3-5	137.76	12.14	570.10	1890463.60	900987.77	98043.91	115005.80
GCK3-6	1677.81	11.58	202.50	1552486.60	802568.77	88061.18	103269.54
GCK3-7	2471.13	24.50	1908.75	6774222.60	1628544.73	173424.06	206433.96
GCK3-8	4340.27	2.26	1948.59	6312042.60	1451384.13	152055.34	181808.02
GCK3-9	5590.36	9.58	2227.11	5722819.60	1449203.63	150955.56	181170.05
GCK3-10	8596.09	16.74	1617.99	3552213.60	1815855.73	190261.54	225351.23
GCK3-11	9439.89	0.00	1256.35	3860924.60	1906720.13	198955.20	236431.65
GCK3-12	11299.35	0.00	1297.11	3394629.60	1816205.43	188901.82	225521.55
GCK3-13	13074.07	0.00	1548.59	5065849.60	2906186.33	305464.32	365890.41
GCK3-14	15144.89	0.00	1033.47	5402023.60	2920523.83	305096.32	366717.48
GCK3-15	16211.93	9.82	1138.11	6081044.60	3070334.33	320935.01	384134.23
GCK3-16	17668.78	0.00	1185.75	9248548.60	5316733.83	578184.60	695420.98
GCK3-17	19022.23	13.50	1181.63	10077449.60	5371025.33	585075.35	704123.41
GCK3-18	19639.59	15.90	2512.95	9339767.60	5711099.33	623772.73	749508.04
SRM614-10	31730.54	44.30	6561.78	35160013.60	36330.42	5552.15	3282.86
SRM612-10	45647.38	2990.16	11424.76	37767625.60	51150.15	7480.60	5594.35
SRM610-10	118299.18	23711.27	33902.53	30520005.60	147665.41	18487.14	19098.31
AP1-10	28098.08	22.10	2342.63	1685615.60	50500.98	5590.03	8300.13
AP2-10	27105.87	188.62	5512.37	0.00	1075167.93	112250.55	134187.43
AP3-10	26377.83	1061.23	10827.28	0.00	2527540.83	262248.67	317026.10
AP4-10	28461.25	1637.19	8516.43	0.00	2516660.33	263978.73	317329.88

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-9	0.000000	0.000017	0.012158	13.769248	0.010748	0.001852	0.001270
SRM612-9	0.000000	0.001003	0.012866	13.031462	0.023432	0.003450	0.003028
SRM610-9	0.060859	0.016249	0.035209	20.983433	0.143661	0.017450	0.019152
AP1-9	0.000000	0.000002	0.000424	0.352336	0.004337	0.000504	0.000738
AP2-9	0.000000	0.000013	0.000739	0.275917	0.121137	0.012689	0.015292
AP3-9	0.000000	0.000051	0.000803	0.098827	0.139456	0.015005	0.018111
AP4-9	0.000000	0.000093	0.000771	0.041264	0.158498	0.017060	0.020533
GCK3-1	0.000000	0.000000	0.000289	0.541417	0.227641	0.025039	0.030106
GCK3-2	0.000000	0.000001	0.000240	0.737017	0.438020	0.052391	0.062830
GCK3-3	0.000000	0.000001	0.000198	0.750862	0.454927	0.053830	0.064663
GCK3-4	0.000000	0.000000	0.000031	0.226606	0.106803	0.011730	0.014020
GCK3-5	0.000015	0.000001	0.000060	0.200298	0.095461	0.010388	0.012185
GCK3-6	0.000181	0.000001	0.000022	0.167700	0.086694	0.009512	0.011155
GCK3-7	0.000155	0.000002	0.000119	0.423747	0.101870	0.010848	0.012913
GCK3-8	0.000275	0.000000	0.000124	0.400193	0.092020	0.009641	0.011527

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000356	0.000001	0.000142	0.364555	0.092317	0.009616	0.011541	
GCK3-10	0.000660	0.000001	0.000124	0.272927	0.139518	0.014618	0.017314	
GCK3-11	0.000690	0.000000	0.000092	0.282404	0.139465	0.014552	0.017294	
GCK3-12	0.000868	0.000000	0.000100	0.260875	0.139574	0.014517	0.017331	
GCK3-13	0.000893	0.000000	0.000106	0.345992	0.198490	0.020863	0.024990	
GCK3-14	0.001014	0.000000	0.000069	0.361697	0.195546	0.020428	0.024554	
GCK3-15	0.001055	0.000001	0.000074	0.395779	0.199830	0.020888	0.025001	
GCK3-16	0.000962	0.000000	0.000065	0.503343	0.289358	0.031467	0.037848	
GCK3-17	0.001037	0.000001	0.000064	0.549138	0.292677	0.031882	0.038369	
GCK3-18	0.000965	0.000001	0.000124	0.459015	0.280679	0.030656	0.036836	
SRM614-10	0.016706	0.000023	0.003455	18.511764	0.019128	0.002923	0.001728	
SRM612-10	0.021503	0.001409	0.005382	17.791158	0.024095	0.003524	0.002635	
SRM610-10	0.109530	0.021954	0.031389	28.257653	0.136719	0.017117	0.017683	
AP1-10	0.001648	0.000001	0.000137	0.098855	0.002962	0.000328	0.000487	
AP2-10	0.002219	0.000015	0.000451	0.000000	0.088022	0.009190	0.010986	
AP3-10	0.001322	0.000053	0.000543	0.000000	0.126649	0.013141	0.015885	
AP4-10	0.001670	0.000096	0.000500	0.000000	0.147706	0.015493	0.018625	
standardize signal averages AP								
AP1	0.000824	0.000002	0.000281	0.225595	0.003649	0.000416	0.000612	
AP2	0.001110	0.000014	0.000595	0.137959	0.104579	0.010940	0.013139	
AP3	0.000661	0.000052	0.000673	0.049414	0.133053	0.014073	0.016998	
AP4	0.000835	0.000095	0.000635	0.020632	0.153102	0.016277	0.019579	
linest from std sig ave								
	0.004915	0.163024	0.040890	0.000402	0.010496	0.099231	0.082396	
standardize signal averages SRM								
srm614-2	0.008353	0.000020	0.007807	16.140506	0.014938	0.002388	0.001499	
srm612-2	0.010752	0.001206	0.009124	15.411310	0.023763	0.003487	0.002832	
srm610-2	0.085195	0.019102	0.033299	24.620543	0.140190	0.017283	0.018417	
linest from std sig ave								
	0.065394	0.284534	0.113385	0.055443	0.038531	0.308962	0.294845	
concentration data i.s. correction								
SRM614-9	85763.00	0.00	0.23	42.64	474.20	9.68	15.76	8.97
SRM612-9	85763.00	0.00	14.02	45.12	448.79	21.09	29.36	21.40
SRM610-9	85763.00	25.65	227.19	123.47	722.65	129.32	148.50	135.34
AP1-9	398936	0.00	0.14	6.92	56.44	18.16	19.97	24.24
AP2-9	398936	0.00	0.84	12.05	44.20	507.24	502.33	502.67
AP3-9	398936	0.00	3.34	13.11	15.83	583.96	593.99	595.33
AP4-9	398936	0.00	6.05	12.58	6.61	663.69	675.34	674.93
GCK3-1	398936	0.00	0.02	4.71	86.73	953.22	991.20	989.62
GCK3-2	398936	0.00	0.04	3.92	118.07	1834.15	2073.98	2065.29
GCK3-3	398936	0.00	0.05	3.22	120.29	1904.95	2130.97	2125.53
GCK3-4	398936	0.00	0.01	0.51	36.30	447.22	464.34	460.83
GCK3-5	398936	0.03	0.08	0.99	32.09	399.73	411.22	400.53
GCK3-6	398936	0.36	0.08	0.36	26.87	363.02	376.56	366.68
GCK3-7	398936	0.30	0.10	1.95	67.88	426.57	429.45	424.46
GCK3-8	398936	0.54	0.01	2.02	64.11	385.32	381.64	378.90
GCK3-9	398936	0.70	0.04	2.31	58.40	386.57	380.67	379.36
GCK3-10	398936	1.30	0.08	2.03	43.72	584.21	578.69	569.14
GCK3-11	398936	1.35	0.00	1.50	45.24	583.99	576.08	568.45
GCK3-12	398936	1.70	0.00	1.63	41.79	584.45	574.68	569.69
GCK3-13	398936	1.75	0.00	1.73	55.43	831.15	825.90	821.44
GCK3-14	398936	1.99	0.00	1.13	57.94	818.82	808.68	807.10
GCK3-15	398936	2.07	0.04	1.21	63.40	836.76	826.88	821.80
GCK3-16	398936	1.89	0.00	1.05	80.63	1211.65	1245.68	1244.08
GCK3-17	398936	2.03	0.05	1.05	87.97	1225.55	1262.10	1261.22
GCK3-18	398936	1.89	0.05	2.01	73.53	1175.31	1213.58	1210.81
SRM614-10	85763.00	7.04	0.33	12.12	637.53	17.22	24.88	12.21
SRM612-10	85763.00	9.06	19.69	18.87	612.71	21.69	29.99	18.62
SRM610-10	85763.00	46.17	306.94	110.08	973.17	123.07	145.67	124.95
AP1-10	398936	3.23	0.08	2.24	15.84	12.40	12.98	16.00
AP2-10	398936	4.35	1.00	7.36	0.00	368.58	363.79	361.11
AP3-10	398936	2.59	3.46	8.85	0.00	530.33	520.20	522.17
AP4-10	398936	3.28	6.25	8.15	0.00	618.50	613.33	612.20
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	

Appendix A. Raw trace element datasheets from laser ablation.

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-7	49648.52	86.96	905.97	14027259.00	5484.11	1003.21	979.33
SRM614-7	49541.72	172.52	6885.68	50404536.00	52374.86	8767.29	6654.08
SRM612-7	61208.55	2767.94	12451.51	47762884.00	100225.13	14300.36	13577.32
SRM610-7	118992.43	17964.98	27674.72	38114116.00	183098.80	23564.53	25327.10
AP1-7	51967.69	111.80	4816.63	19273586.00	140844.67	17001.54	22156.40
AP2-7	50841.69	286.12	10583.78	15272076.00	2263000.50	239169.63	287121.41
AP3-7	49654.28	1088.33	10947.14	11410001.00	2750990.00	291580.53	353429.88
AP4-7	51346.17	1522.21	8358.73	8966221.00	2513529.30	268551.06	322168.50
GCK2-1	52624.02	102.12	1019.69	12665676.00	825132.44	93278.60	109440.70
GCK2-2	55202.39	81.92	896.09	11650868.00	666298.75	74685.42	88130.77
GCK2-3	56976.76	72.48	774.08	11376046.00	724113.69	80286.65	95396.09
GCK2-4	57899.97	75.44	938.45	10358194.00	875542.69	98992.04	116797.54
GCK2-5	59967.66	72.88	951.93	9968185.00	818880.94	89653.18	107130.48
GCK2-6	60115.30	72.88	1067.29	10192510.00	945917.13	103335.34	122035.25
GCK2-7	61820.63	67.72	1361.81	9268298.00	872596.06	97843.23	115906.57
GCK2-8	61897.35	78.56	1181.33	9207867.00	858338.50	94025.77	111799.99
GCK2-9	62634.91	63.04	962.77	8929582.00	824451.31	90635.59	106909.45
GCK2-10	59024.73	90.44	1333.85	19313518.00	8823109.00	1037165.30	1250377.50
GCK2-11	57498.81	74.52	1225.01	19234814.00	8433795.00	984322.44	1185807.00
GCK2-12	55945.84	84.36	1206.81	18921046.00	8013557.50	929789.94	1120066.80
GCK2-13	55516.03	82.76	2503.53	18069834.00	7962979.00	924081.19	1114640.90
GCK2-14	53205.38	64.64	1134.77	16701512.00	6678692.50	768284.19	924152.06
GCK2-15	52533.77	83.96	1231.85	18416308.00	7971127.00	926433.13	1116568.80
GCK2-16	53181.34	65.68	1123.37	14297432.00	5638380.00	637289.06	766427.00
GCK2-17	52541.73	56.88	987.97	13670325.00	4860840.50	538847.88	650798.88
GCK2-18	53419.66	74.52	831.24	10840367.00	2728011.80	293378.28	352190.56
SRM614-8	60901.58	138.28	1796.41	39592344.00	60876.62	8884.45	7303.52
SRM612-8	67074.14	1970.81	5048.43	40611552.00	66809.90	9833.02	8302.21
SRM610-8	110154.90	13595.60	20277.99	35124720.00	121314.68	15770.61	16471.45
AP1-8	53808.70	75.92	2199.69	14386994.00	60377.74	7389.76	9432.05
AP2-8	49035.48	238.44	5894.75	11014391.00	1207235.30	127162.76	152127.30
AP3-8	46609.54	884.20	7656.64	8624736.00	2021752.30	213336.36	255174.03
AP4-8	46138.14	996.41	4676.03	7058414.00	1280500.30	135332.20	162453.59
blank-8	59104.81	92.92	244.80	4668800.50	51069.73	6480.88	6629.52
blank average	54376.67	89.94	575.38	9348029.75	28276.92	3742.04	3804.42
blank subtraction							
SRM614-7	-4834.95	82.58	6310.30	41056506.25	24097.94	5025.25	2849.66
SRM612-7	6831.88	2677.99	11876.13	38414854.25	71948.21	10558.32	9772.89
SRM610-7	64615.76	17875.04	27099.33	28766086.25	154821.88	19822.49	21522.68
AP1-7	-2408.98	21.86	4241.24	9925556.25	112567.75	13259.49	18351.98
AP2-7	-3534.98	196.18	10008.40	5924046.25	2234723.58	235427.59	283316.99
AP3-7	-4722.39	998.39	10371.76	2061971.25	2722713.08	287838.49	349625.46
AP4-7	-3030.50	1432.27	7783.34	-381808.75	2485252.38	264809.02	318364.08
GCK2-1	-1752.65	12.18	444.30	3317646.25	796855.52	89536.56	105636.28
GCK2-2	825.72	-8.02	320.70	2302838.25	638021.83	70943.38	84326.35
GCK2-3	2600.10	-17.46	198.70	2028016.25	695836.77	76544.61	91591.67
GCK2-4	3523.30	-14.50	363.06	1010164.25	847265.77	95250.00	112993.12
GCK2-5	5590.99	-17.06	376.54	620155.25	790604.02	85911.14	103326.06
GCK2-6	5738.63	-17.06	491.90	844480.25	917640.21	99593.30	118230.83
GCK2-7	7443.96	-22.22	786.42	-79731.75	844319.14	94101.19	112102.15
GCK2-8	7520.68	-11.38	605.94	-140162.75	830061.58	90283.72	107995.57
GCK2-9	8258.25	-26.90	387.38	-418447.75	796174.39	86893.55	103105.03
GCK2-10	4648.06	0.50	758.46	9965488.25	8794832.08	1033423.26	1246573.08
GCK2-11	3122.14	-15.42	649.62	9886784.25	8405518.08	980580.40	1182002.58
GCK2-12	1569.17	-5.58	631.42	9573016.25	7985280.58	926047.90	1116262.38
GCK2-13	1139.36	-7.18	1928.15	8721804.25	7934702.08	920339.15	1110836.48
GCK2-14	-1171.29	-25.30	559.38	7353482.25	6650415.58	764542.15	920347.64
GCK2-15	-1842.89	-5.98	656.46	9068278.25	7942850.08	922691.09	1112764.38
GCK2-16	-1195.33	-24.26	547.98	4949402.25	5610103.08	633547.02	762622.58
GCK2-17	-1834.93	-33.06	412.58	4322295.25	4832563.58	535105.84	646994.46
GCK2-18	-957.01	-15.42	255.86	1492337.25	2699734.88	289636.24	348386.14
SRM614-8	6524.92	48.34	1221.03	30244314.25	32599.70	5142.41	3499.10
SRM612-8	12697.47	1880.87	4473.04	31263522.25	38532.98	6090.97	4497.79
SRM610-8	55778.23	13505.66	19702.61	25776690.25	93037.76	12028.57	12667.02
AP1-8	-567.96	-14.02	1624.31	5038964.25	32100.82	3647.72	5627.63
AP2-8	-5341.19	148.50	5319.37	1666361.25	1178958.38	123420.72	148322.88
AP3-8	-7767.12	794.26	7081.26	-723293.75	1993475.38	209594.32	251369.61
AP4-8	-8238.53	906.47	4100.64	-2289615.75	1252223.38	131590.16	158649.17
zero correction							
SRM614-7	0.00	82.58	6310.30	41056506.25	24097.94	5025.25	2849.66
SRM612-7	6831.88	2677.99	11876.13	38414854.25	71948.21	10558.32	9772.89
SRM610-7	64615.76	17875.04	27099.33	28766086.25	154821.88	19822.49	21522.68
AP1-7	0.00	21.86	4241.24	9925556.25	112567.75	13259.49	18351.98
AP2-7	0.00	196.18	10008.40	5924046.25	2234723.58	235427.59	283316.99

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	0.00	998.39	10371.76	2061971.25	2722713.08	287838.49	349625.46
AP4-7	0.00	1432.27	7783.34	0.00	2485252.38	264809.02	318364.08
GCK2-1	0.00	12.18	444.30	3317646.25	796855.52	89536.56	105636.28
GCK2-2	825.72	0.00	320.70	2302838.25	638021.83	70943.38	84326.35
GCK2-3	2600.10	0.00	198.70	2028016.25	695836.77	76544.61	91591.67
GCK2-4	3523.30	0.00	363.06	1010164.25	847265.77	95250.00	112993.12
GCK2-5	5590.99	0.00	376.54	620155.25	790604.02	85911.14	103326.06
GCK2-6	5738.63	0.00	491.90	844480.25	917640.21	99593.30	118230.83
GCK2-7	7443.96	0.00	786.42	0.00	844319.14	94101.19	112102.15
GCK2-8	7520.68	0.00	605.94	0.00	830061.58	90283.72	107995.57
GCK2-9	8258.25	0.00	387.38	0.00	796174.39	86893.55	103105.03
GCK2-10	4648.06	0.50	758.46	9965488.25	8794832.08	1033423.26	1246573.08
GCK2-11	3122.14	0.00	649.62	9886784.25	8405518.08	980580.40	1182002.58
GCK2-12	1569.17	0.00	631.42	9573016.25	7985280.58	926047.90	1116262.38
GCK2-13	1139.36	0.00	1928.15	8721804.25	7934702.08	920339.15	1110836.48
GCK2-14	0.00	0.00	559.38	7353482.25	6650415.58	764542.15	920347.64
GCK2-15	0.00	0.00	656.46	9068278.25	7942850.08	922691.09	1112764.38
GCK2-16	0.00	0.00	547.98	4949402.25	5610103.08	633547.02	762622.58
GCK2-17	0.00	0.00	412.58	4322295.25	4832563.58	535105.84	646994.46
GCK2-18	0.00	0.00	255.86	1492337.25	2699734.88	289636.24	348386.14
SRM614-8	6524.92	48.34	1221.03	30244314.25	32599.70	5142.41	3499.10
SRM612-8	12697.47	1880.87	4473.04	31263522.25	38532.98	6090.97	4497.79
SRM610-8	55778.23	13505.66	19702.61	25776690.25	93037.76	12028.57	12667.03
AP1-8	0.00	0.00	1624.31	5038964.25	32100.82	3647.72	5627.63
AP2-8	0.00	148.50	5319.37	1666361.25	1178958.38	123420.72	148322.88
AP3-8	0.00	794.26	7081.26	0.00	1993475.38	209594.32	251369.61
AP4-8	0.00	906.47	4100.64	0.00	1252223.38	131590.16	158649.17

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-7	0.000000	0.000033	0.002530	16.463379	0.009663	0.002015	0.001143
SRM612-7	0.002874	0.001127	0.004996	16.160642	0.030268	0.004442	0.004111
SRM610-7	0.066951	0.018521	0.028079	29.805733	0.160417	0.020539	0.022301
AP1-7	0.000000	0.000001	0.000230	0.539339	0.006117	0.000721	0.000997
AP2-7	0.000000	0.000013	0.000668	0.395654	0.149252	0.015724	0.018922
AP3-7	0.000000	0.000049	0.000509	0.101268	0.133718	0.014136	0.017171
AP4-7	0.000000	0.000083	0.000454	0.000000	0.144882	0.015437	0.018560
GCK2-1	0.000000	0.000002	0.000079	0.586898	0.140965	0.015839	0.018687
GCK2-2	0.000160	0.000000	0.000062	0.447158	0.123889	0.013776	0.016374
GCK2-3	0.000512	0.000000	0.000039	0.399132	0.136947	0.015065	0.018026
GCK2-4	0.000607	0.000000	0.000063	0.174106	0.146030	0.016417	0.019475
GCK2-5	0.000919	0.000000	0.000062	0.101991	0.130024	0.014129	0.016993
GCK2-6	0.000832	0.000000	0.000071	0.122398	0.133001	0.014435	0.017136
GCK2-7	0.001210	0.000000	0.000128	0.000000	0.137233	0.015295	0.018221
GCK2-8	0.001091	0.000000	0.000088	0.000000	0.120428	0.013099	0.015668
GCK2-9	0.001277	0.000000	0.000060	0.000000	0.123121	0.013437	0.015944
GCK2-10	0.000342	0.000000	0.000056	0.732333	0.646305	0.075943	0.091607
GCK2-11	0.000237	0.000000	0.000049	0.749682	0.637363	0.074354	0.089627
GCK2-12	0.000121	0.000000	0.000049	0.736544	0.614384	0.071250	0.085885
GCK2-13	0.000084	0.000000	0.000143	0.646457	0.588117	0.068215	0.082335
GCK2-14	0.000000	0.000000	0.000044	0.582840	0.527115	0.060598	0.072947
GCK2-15	0.000000	0.000000	0.000048	0.663931	0.581533	0.067555	0.081471
GCK2-16	0.000000	0.000000	0.000049	0.440738	0.499573	0.056417	0.067911
GCK2-17	0.000000	0.000000	0.000038	0.398489	0.445533	0.049333	0.059649
GCK2-18	0.000000	0.000000	0.000030	0.175099	0.316766	0.033984	0.040877
SRM614-8	0.004814	0.000036	0.000901	22.315290	0.024053	0.003794	0.002582
SRM612-8	0.008453	0.001252	0.002978	20.812661	0.025652	0.004055	0.002994
SRM610-8	0.078647	0.019043	0.027781	36.345212	0.131184	0.016960	0.017861
AP1-8	0.000000	0.000000	0.000124	0.383934	0.002446	0.000278	0.000429
AP2-8	0.000000	0.000013	0.000483	0.151173	0.106956	0.011197	0.013456
AP3-8	0.000000	0.000048	0.000430	0.000000	0.120989	0.012721	0.015256

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.000000	0.000073	0.000331	0.000000	0.101220	0.010637	0.012824	
standardize signal averages AP								
AP1	0.000000	0.000001	0.000177	0.461637	0.004281	0.000499	0.000713	
AP2	0.000000	0.000013	0.000576	0.273414	0.128104	0.013460	0.016189	
AP3	0.000000	0.000049	0.000470	0.050634	0.127354	0.013429	0.016214	
AP4	0.000000	0.000078	0.000393	0.000000	0.123051	0.013037	0.015692	
linest from std sig ave								
	0.000000	0.190630	0.054367	0.000203	0.010816	0.102600	0.085170	
standardize signal averages SRM								
srm614-2	0.002407	0.000034	0.001716	19.389335	0.016858	0.002905	0.001862	
srm612-2	0.005664	0.001189	0.003987	18.486651	0.027960	0.004248	0.003553	
srm610-2	0.072799	0.018782	0.027930	33.075473	0.145800	0.018750	0.020081	
linest from std sig ave								
	0.077589	0.289371	0.147301	0.042682	0.036847	0.282103	0.269123	
concentration data i.s. correction								
SRM614-7	85763.00	0.00	0.54	11.80	286.09	8.96	17.73	8.35
SRM612-7	85763.00	0.00	18.42	23.30	280.83	28.08	39.08	30.03
SRM610-7	85763.00	0.00	302.80	130.92	517.94	148.81	180.73	162.89
AP1-7	398936	0.00	0.09	5.00	43.60	26.39	29.49	33.88
AP2-7	398936	0.00	1.00	14.50	31.98	644.01	643.58	642.93
AP3-7	398936	0.00	3.73	11.05	8.19	576.98	578.61	583.42
AP4-7	398936	0.00	6.35	9.84	0.00	625.15	631.87	630.61
GCK2-1	398936	0.00	0.16	1.70	47.44	608.25	648.31	634.95
GCK2-2	398936	0.00	0.00	1.35	36.14	534.57	563.85	556.36
GCK2-3	398936	0.00	0.00	0.85	32.26	590.91	616.61	612.48
GCK2-4	398936	0.00	0.00	1.36	14.07	630.11	671.95	661.71
GCK2-5	398936	0.00	0.00	1.34	8.24	561.04	578.31	577.38
GCK2-6	398936	0.00	0.00	1.55	9.89	573.89	590.83	582.25
GCK2-7	398936	0.00	0.00	2.77	0.00	592.15	626.03	619.09
GCK2-8	398936	0.00	0.00	1.91	0.00	519.64	536.14	532.37
GCK2-9	398936	0.00	0.00	1.30	0.00	531.25	550.00	541.75
GCK2-10	398936	0.00	0.00	1.21	59.20	2788.75	3108.41	3112.58
GCK2-11	398936	0.00	0.00	1.07	60.60	2750.16	3043.38	3045.32
GCK2-12	398936	0.00	0.00	1.05	59.54	2651.01	2916.31	2918.15
GCK2-13	398936	0.00	0.00	3.10	52.25	2537.67	2792.10	2797.54
GCK2-14	398936	0.00	0.00	0.96	47.11	2274.45	2480.32	2478.57
GCK2-15	398936	0.00	0.00	1.04	53.67	2509.26	2765.06	2768.17
GCK2-16	398936	0.00	0.00	1.06	35.63	2155.61	2309.18	2307.44
GCK2-17	398936	0.00	0.00	0.82	32.21	1922.43	2019.26	2026.73
GCK2-18	398936	0.00	0.00	0.65	14.15	1366.82	1390.98	1388.90
SRM614-8	85763.00	0.00	0.58	4.20	387.78	22.31	33.39	18.86
SRM612-8	85763.00	0.00	20.47	13.88	361.67	23.80	35.68	21.87
SRM610-8	85763.00	0.00	311.33	129.53	631.58	121.69	149.24	130.46
AP1-8	398936	0.00	0.00	2.68	31.03	10.55	11.38	14.57
AP2-8	398936	0.00	1.02	10.47	12.22	461.50	458.29	457.20
AP3-8	398936	0.00	3.67	9.32	0.00	522.06	520.67	518.37
AP4-8	398936	0.00	5.57	7.19	0.00	436.76	435.37	435.73
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	
raw data								
	Li	Be	B	Na	Mg24	Mg25	Mg26	
blank-5	42365.72	88.76	1198.25	1699456.80	6011.31	1164.49	1263.61	
SRM614-5	45404.42	158.60	5970.31	47524180.00	121580.88	16182.61	15979.21	
SRM612-5	57783.29	2822.94	15353.21	45749504.00	110681.98	15422.61	14908.20	
SRM610-5	117987.87	18906.35	31217.46	37737692.00	207554.48	26290.75	28458.68	
AP1-5	51499.89	105.32	4515.39	18193828.00	142007.11	16932.98	21715.52	
AP2-5	48648.91	265.08	9872.74	14128093.00	2205801.50	234957.88	281848.44	
AP3-5	50282.44	1541.45	14177.24	10842856.00	4501290.00	494981.00	597160.06	
AP4-5	52023.97	2259.17	11769.55	8328597.00	4615450.50	509627.03	615506.88	
GCK1-1	45615.82	82.00	1839.69	18478830.00	5671946.50	645774.94	776059.38	
GCK1-2	44384.85	69.48	1946.05	19510736.00	6961973.00	806557.63	971064.25	
GCK1-3	46161.98	83.44	1195.57	15251074.00	5021204.00	556389.38	669819.88	
GCK1-4	46862.58	81.76	1678.37	18923854.00	10540359.00	1262269.00	1521875.60	
GCK1-5	46460.18	79.72	1615.05	19465710.00	10766375.00	1293566.40	1560252.50	
GCK1-6	46820.02	89.12	1372.53	14928962.00	5706819.00	656286.06	788796.81	

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	50112.28	64.36	1145.21	9127170.00	1409128.40	153459.50	181917.81
GCK1-8	51018.81	95.36	974.97	8387204.00	1116659.40	120487.64	142702.52
GCK1-9	52970.74	76.76	1003.77	8288637.50	1183687.10	127527.24	151670.86
GCK1-10	48314.99	75.44	1324.45	18439900.00	11426046.00	1383194.90	1666418.00
GCK1-11	47518.75	69.52	1094.25	16258534.00	9415867.00	1117540.50	1342478.30
GCK1-12	46034.42	72.56	1090.13	16661260.00	9752789.00	1155719.00	1392936.60
GCK1-13	47860.71	96.16	1222.25	9633750.00	1566172.90	166679.73	198424.23
GCK1-14	49270.64	79.40	1196.81	9626784.00	1554887.60	164688.41	196943.34
GCK1-15	49237.28	63.52	1118.73	8969770.00	1332919.50	142741.72	169648.67
GCK1-16	51241.13	97.32	1178.33	8348738.50	877912.75	97550.03	114947.93
GCK1-17	50249.76	82.64	807.08	8656154.00	952628.88	103170.22	122703.77
GCK1-18	50020.00	85.00	729.84	8122312.50	806077.19	88721.98	105076.95
SRM614-6	55402.43	104.76	1634.13	39696920.00	46362.22	7294.80	5707.67
SRM612-6	62203.55	1812.77	4855.99	39380428.00	52801.26	7765.08	6578.52
SRM610-6	106132.88	13898.36	19353.31	34698128.00	113345.00	14959.89	15499.73
AP1-6	50547.05	106.80	2021.77	13490886.00	50555.57	6509.08	8308.37
AP2-6	46548.74	203.52	4900.55	10148518.00	1064015.60	113599.84	135553.97
AP3-6	45914.66	872.48	8402.89	7979444.00	2351968.30	249449.25	300655.56
AP4-6	44801.33	1073.01	5544.51	6095985.50	1707283.30	181501.14	217996.19
blank-6	53893.15	58.52	286.52	3649303.50	28077.84	3866.54	3730.02
blank average	48129.43	73.64	742.38	2674380.15	17044.58	2515.51	2496.81
blank subtraction							
SRM614-5	-2725.01	84.96	5227.93	44849799.85	104536.30	13667.10	13482.40
SRM612-5	9653.85	2749.30	14610.82	43075123.85	93637.40	12907.09	12411.39
SRM610-5	69858.44	18832.71	30475.07	35063311.85	190509.90	23775.23	25961.87
AP1-5	3370.46	31.68	3773.00	15519447.85	124962.53	14417.46	19218.71
AP2-5	519.48	191.44	9130.35	11453712.85	2188756.92	232442.37	279351.63
AP3-5	2153.01	1467.81	13434.86	8168475.85	4484245.42	492465.49	594663.25
AP4-5	3894.54	2185.53	11027.16	5654216.85	4598405.92	507111.52	613010.07
GCK1-1	-2513.62	8.36	1097.31	15804449.85	5654901.92	643259.43	773562.57
GCK1-2	-3744.58	-4.16	1203.67	16836355.85	6944928.42	804042.12	968567.44
GCK1-3	-1967.45	9.80	453.18	12576693.85	5004159.42	553873.87	667323.07
GCK1-4	-1266.85	8.12	935.99	16249473.85	10523314.42	1259753.49	1519378.79
GCK1-5	-1669.25	6.08	872.66	16791329.85	10749330.42	1291050.89	1557755.69
GCK1-6	-1309.41	15.48	630.14	12254581.85	5689774.42	653770.55	786300.00
GCK1-7	1982.85	-9.28	402.82	6452789.85	1392083.82	150943.99	179421.00
GCK1-8	2889.38	21.72	232.58	5712823.85	1099614.82	117972.13	140205.71
GCK1-9	4841.31	3.12	261.38	5614257.35	1166642.52	125011.73	149174.05
GCK1-10	185.56	1.80	582.06	15765519.85	11409001.42	1380679.39	1663921.19
GCK1-11	-610.69	-4.12	351.86	13584153.85	9398822.42	1115024.99	1339981.49
GCK1-12	-2095.01	-1.08	347.74	13986879.85	9735744.42	1153203.49	1390439.79
GCK1-13	-268.72	22.52	479.86	6959369.85	1549128.32	164164.22	195927.42
GCK1-14	1141.21	5.76	454.42	6952403.85	1537843.02	162172.90	194446.53
GCK1-15	1107.85	-10.12	376.34	6295389.85	1315874.92	140226.21	167151.86
GCK1-16	3111.70	23.68	435.94	5674358.35	860868.17	95034.52	112451.12
GCK1-17	2120.33	9.00	64.70	5981773.85	935584.30	100654.71	120206.96
GCK1-18	1890.57	11.36	-12.54	5447932.35	789032.61	86206.46	102508.14
SRM614-6	7273.00	31.12	891.75	37022539.85	29317.65	4779.29	3210.86
SRM612-6	14074.12	1739.13	4113.60	36706047.85	35756.68	5249.57	4081.70
SRM610-6	58003.45	13824.72	18610.92	32023747.85	96300.42	12444.37	13002.91
AP1-6	2417.62	33.16	1279.39	10816505.85	33510.99	3993.56	5811.55
AP2-6	-1580.69	129.88	4158.16	7474137.85	1046971.02	111084.33	133057.16
AP3-6	-2214.77	798.84	7660.50	5305063.85	2334923.72	246933.74	298158.75
AP4-6	-3328.10	999.37	4802.13	3421605.35	1690238.72	178985.63	215499.38
zero correction							
SRM614-5	0.00	84.96	5227.93	44849799.85	104536.30	13667.10	13482.40
SRM612-5	9653.85	2749.30	14610.82	43075123.85	93637.40	12907.09	12411.39
SRM610-5	69858.44	18832.71	30475.07	35063311.85	190509.90	23775.23	25961.87
AP1-5	3370.46	31.68	3773.00	15519447.85	124962.53	14417.46	19218.71
AP2-5	519.48	191.44	9130.35	11453712.85	2188756.92	232442.37	279351.63
AP3-5	2153.01	1467.81	13434.86	8168475.85	4484245.42	492465.49	594663.25
AP4-5	3894.54	2185.53	11027.16	5654216.85	4598405.92	507111.52	613010.07
GCK1-1	0.00	8.36	1097.31	15804449.85	5654901.92	643259.43	773562.57
GCK1-2	0.00	0.00	1203.67	16836355.85	6944928.42	804042.12	968567.44
GCK1-3	0.00	9.80	453.18	12576693.85	5004159.42	553873.87	667323.07
GCK1-4	0.00	8.12	935.99	16249473.85	10523314.42	1259753.49	1519378.79
GCK1-5	0.00	6.08	872.66	16791329.85	10749330.42	1291050.89	1557755.69
GCK1-6	0.00	15.48	630.14	12254581.85	5689774.42	653770.55	786300.00
GCK1-7	1982.85	0.00	402.82	6452789.85	1392083.82	150943.99	179421.00
GCK1-8	2889.38	21.72	232.58	5712823.85	1099614.82	117972.13	140205.71
GCK1-9	4841.31	3.12	261.38	5614257.35	1166642.52	125011.73	149174.05
GCK1-10	185.56	1.80	582.06	15765519.85	11409001.42	1380679.39	1663921.19
GCK1-11	0.00	0.00	351.86	13584153.85	9398822.42	1115024.99	1339981.49
GCK1-12	0.00	0.00	347.74	13986879.85	9735744.42	1153203.49	1390439.79
GCK1-13	0.00	22.52	479.86	6959369.85	1549128.32	164164.22	195927.42
GCK1-14	1141.21	5.76	454.42	6952403.85	1537843.02	162172.90	194446.53

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	1107.85	0.00	376.34	6295389.85	1315874.92	140226.21	167151.86
GCK1-16	3111.70	23.68	435.94	5674358.35	860868.17	95034.52	112451.12
GCK1-17	2120.33	9.00	64.70	5981773.85	935584.30	100654.71	120206.96
GCK1-18	1890.57	11.36	0.00	5447932.35	789032.61	86206.46	102580.14
SRM614-6	7273.00	31.12	891.75	37022539.85	29317.65	4779.29	3210.86
SRM612-6	14074.12	1739.13	4113.60	36706047.85	35756.68	5249.57	4081.70
SRM610-6	58003.45	13824.72	18610.92	32023747.85	96300.42	12444.37	13002.91
AP1-6	2417.62	33.16	1279.39	10816505.85	33510.99	3993.56	5811.55
AP2-6	0.00	129.88	4158.16	7474137.85	1046971.02	111084.33	133057.16
AP3-6	0.00	798.84	7660.50	5305063.85	2334923.72	246933.74	298158.75
AP4-6	0.00	999.37	4802.13	3421605.35	1690238.72	178985.63	215499.38

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-5	0.000000	0.000034	0.002121	18.193965	0.042407	0.005544	0.005469
SRM612-5	0.004329	0.012333	0.006552	19.316250	0.041990	0.005788	0.005566
SRM610-5	0.064956	0.017511	0.028336	32.602522	0.177140	0.022107	0.024140
AP1-5	0.000195	0.000002	0.000219	0.899334	0.007241	0.000835	0.001114
AP2-5	0.000037	0.000014	0.000644	0.808290	0.154461	0.016403	0.019714
AP3-5	0.000106	0.000072	0.000662	0.402587	0.221008	0.024271	0.029308
AP4-5	0.000212	0.000119	0.000602	0.308474	0.250873	0.027666	0.033444
GCK1-1	0.000000	0.000000	0.000061	0.883261	0.316035	0.035950	0.043232
GCK1-2	0.000000	0.000000	0.000061	0.847066	0.349411	0.040453	0.048730
GCK1-3	0.000000	0.000001	0.000030	0.835314	0.332364	0.036787	0.044322
GCK1-4	0.000000	0.000000	0.000050	0.870625	0.563825	0.067496	0.081406
GCK1-5	0.000000	0.000000	0.000046	0.882553	0.564985	0.067858	0.081876
GCK1-6	0.000000	0.000001	0.000040	0.780698	0.362476	0.041650	0.050093
GCK1-7	0.000239	0.000000	0.000049	0.777006	0.167626	0.018176	0.021605
GCK1-8	0.000360	0.000003	0.000029	0.712664	0.137175	0.014717	0.017490
GCK1-9	0.000582	0.000000	0.000031	0.674357	0.140131	0.015016	0.017918
GCK1-10	0.000010	0.000000	0.000030	0.808951	0.585412	0.070845	0.085378
GCK1-11	0.000000	0.000000	0.000022	0.840487	0.581530	0.068990	0.082908
GCK1-12	0.000000	0.000000	0.000021	0.836142	0.582007	0.068939	0.083121
GCK1-13	0.000000	0.000002	0.000043	0.623718	0.138837	0.014713	0.017560
GCK1-14	0.000100	0.000001	0.000040	0.612219	0.135420	0.014281	0.017123
GCK1-15	0.000104	0.000000	0.000035	0.592100	0.123762	0.013189	0.015721
GCK1-16	0.000382	0.000003	0.000054	0.697010	0.105745	0.011674	0.013813
GCK1-17	0.000224	0.000001	0.000007	0.633064	0.099015	0.010653	0.012722
GCK1-18	0.000239	0.000001	0.000000	0.689921	0.099922	0.010917	0.012991
SRM614-6	0.005393	0.000023	0.000661	27.453662	0.021740	0.003544	0.002381
SRM612-6	0.009917	0.001225	0.002899	25.863717	0.025195	0.003699	0.002876
SRM610-6	0.079034	0.018837	0.025359	43.634963	0.131217	0.016956	0.017718
AP1-6	0.000203	0.000003	0.000107	0.906807	0.002809	0.000335	0.000487
AP2-6	0.000000	0.000013	0.000406	0.730019	0.102260	0.010850	0.012996
AP3-6	0.000000	0.000052	0.000502	0.347567	0.152975	0.016178	0.019534
AP4-6	0.000000	0.000090	0.000434	0.309419	0.152850	0.016186	0.019488

standardize signal averages AP							
AP1	0.000199	0.000002	0.000163	0.903070	0.005025	0.000585	0.000800
AP2	0.000018	0.000013	0.000525	0.769155	0.128361	0.013627	0.016355
AP3	0.000053	0.000062	0.000582	0.375077	0.186991	0.020225	0.024421
AP4	0.000106	0.000105	0.000518	0.308947	0.201861	0.021926	0.026466

linest from std sig ave							
	0.027253	0.144674	0.049548	0.000072	0.007868	0.072821	0.060370

standardize signal averages SRM							
srm614-2	0.002697	0.000029	0.001391	22.823814	0.032073	0.004544	0.003925
srm612-2	0.007123	0.001229	0.004725	22.589983	0.033592	0.004743	0.004221
srm610-2	0.071995	0.018174	0.026848	38.118743	0.154178	0.019532	0.020929

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
		0.078284	0.298986	0.152314	0.036646	0.033893	0.263630	0.252153
concentration data		i.s. correction						
SRM614-5	85763.00	0.00	0.43	9.01	112.39	28.62	34.63	28.32
SRM612-5	85763.00	10.12	15.30	27.84	119.32	28.34	36.15	28.82
SRM610-5	85763.00	151.82	217.27	120.41	201.39	119.54	138.06	124.99
AP1-5	398936	2.12	0.11	4.32	25.84	22.73	24.27	26.82
AP2-5	398936	0.40	0.78	12.74	23.23	484.85	476.54	474.79
AP3-5	398936	1.15	4.18	13.09	11.57	693.74	705.11	705.86
AP4-5	398936	2.31	6.88	11.89	8.86	787.49	803.73	805.45
GCK1-1	398936	0.00	0.03	1.21	25.38	992.03	1044.37	1041.20
GCK1-2	398936	0.00	0.00	1.20	24.34	1096.79	1175.19	1173.62
GCK1-3	398936	0.00	0.04	0.59	24.00	1043.29	1068.70	1067.45
GCK1-4	398936	0.00	0.03	0.99	25.02	1769.84	1960.82	1960.58
GCK1-5	398936	0.00	0.02	0.91	25.36	1773.48	1971.33	1971.89
GCK1-6	398936	0.00	0.06	0.79	22.43	1137.81	1209.96	1206.42
GCK1-7	398936	2.60	0.00	0.96	22.33	526.18	528.02	520.33
GCK1-8	398936	3.92	0.16	0.57	20.48	430.59	427.54	421.24
GCK1-9	398936	6.32	0.02	0.62	19.38	439.87	436.22	431.54
GCK1-10	398936	0.10	0.01	0.59	23.24	1837.60	2058.10	2056.24
GCK1-11	398936	0.00	0.00	0.43	24.15	1825.41	2004.21	1996.75
GCK1-12	398936	0.00	0.00	0.41	24.03	1826.91	2002.74	2001.88
GCK1-13	398936	0.00	0.12	0.85	17.92	435.81	427.42	422.90
GCK1-14	398936	1.09	0.03	0.79	17.59	425.08	414.87	412.38
GCK1-15	398936	1.13	0.00	0.70	17.01	388.49	383.14	378.63
GCK1-16	398936	4.16	0.17	1.06	20.03	331.93	339.13	332.67
GCK1-17	398936	2.44	0.05	0.14	18.19	310.81	309.47	306.39
GCK1-18	398936	2.60	0.08	0.00	19.82	313.65	317.15	312.87
SRM614-6	85763.00	12.61	0.29	2.81	169.59	14.67	22.13	12.33
SRM612-6	85763.00	23.18	15.20	12.32	159.76	17.00	23.10	14.89
SRM610-6	85763.00	184.73	233.73	107.76	269.54	88.55	105.90	91.73
AP1-6	398936	2.20	0.16	2.12	26.06	8.82	9.73	11.73
AP2-6	398936	0.00	0.73	8.03	20.98	320.99	315.20	313.00
AP3-6	398936	0.00	3.02	9.92	9.99	480.19	469.99	470.46
AP4-6	398936	0.00	5.22	8.58	8.89	479.79	470.21	469.34
certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16
raw data		Li	Be	B	Na	Mg24	Mg25	Mg26
blank-1		203616.14	79.56	145.88	4111177.00	2487.37	637.96	425.28
SRM614-1		128339.88	202.56	13313.88	46843160.00	89034.22	13373.36	11935.67
SRM612-1		124741.78	3444.94	21894.88	44097336.00	88371.86	12493.79	11773.31
SRM610-1		184543.28	22872.41	35616.04	36602304.00	193173.41	25260.62	27725.36
AP1-1		100378.65	131.96	5362.75	18291350.00	107078.20	12903.63	11791.82
AP2-1		86878.25	362.28	14491.56	14223816.00	2606951.00	282402.31	340317.44
AP3-1		84938.88	1949.85	15279.13	11547139.00	4455727.00	499075.28	600151.88
AP4-1		80956.22	2431.45	10310.02	9111206.00	3488192.50	383885.34	461330.34
V2-1		83075.51	80.00	2085.85	13272061.00	1494202.60	163319.84	193947.84
V2-2		88568.34	76.96	2149.93	11757650.00	1265909.50	139193.75	165248.69
V2-3		94137.77	95.32	1815.53	10455129.00	1128571.60	124825.14	147309.31
V2-4		96981.10	95.28	2541.09	11553441.00	2255405.00	245031.42	292693.00
V2-5		98610.84	112.92	2571.61	12359155.00	3088675.00	343412.56	412339.59
V2-6		99912.56	89.84	2460.45	12022117.00	2946240.00	329803.78	394868.53
V2-7		103631.46	105.44	1914.89	9599399.00	1622702.30	179967.86	214487.81
V2-8		107242.60	78.96	1726.69	9490793.00	1519866.90	167663.38	199794.69
V2-9		111186.98	79.76	1564.21	8959287.00	1392052.40	153771.75	183253.59
V2-10		113243.64	93.72	1603.89	9369150.00	1138225.90	128428.16	151752.50
V2-11		116309.62	82.08	1702.57	8637548.00	892976.88	100487.93	119704.95
V2-12		119256.51	78.08	1460.25	8428560.00	850825.13	96541.06	113772.04
V2-13		105360.79	95.24	3181.42	18787222.00	10401915.00	1259682.00	1513406.60
V2-14		97926.27	82.80	3269.26	19076588.00	10333212.00	1244494.50	1496960.10
V2-15		92094.32	61.72	3676.66	20282968.00	11085608.00	1343602.40	1617539.50
SRM614-2		113900.68	127.48	3924.74	40676040.00	67755.70	9661.13	8305.49
SRM612-2		125383.59	2487.49	8869.61	41212692.00	73844.02	10652.66	9254.13
SRM610-2		183546.19	18723.15	26960.23	35688432.00	151263.94	19380.23	20464.08
AP1-2		108355.17	112.56	2914.70	12707973.00	60993.18	7591.84	9572.01
AP2-2		100889.69	255.08	7669.56	9727155.00	1379420.00	148825.08	177790.23
AP3-2		100579.97	808.00	7248.24	6540374.00	1595704.10	173148.89	207503.64
AP4-2		99736.28	1524.77	6482.56	5655388.50	1929920.10	208620.53	251459.94

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	104476.95	102.32	551.16	4694651.50	55779.88	6880.76	7074.48
blank average	154046.55	90.94	348.52	4402914.25	29133.62	3759.36	3749.88
blank subtraction							
SRM614-1	-25706.67	111.62	12965.35	42440245.75	59900.59	9613.99	8185.79
SRM612-1	-29304.77	3354.00	21546.36	39694421.75	59238.23	8734.43	8023.43
SRM610-1	30496.74	22781.47	35267.52	32199389.75	164039.79	21501.26	23975.47
AP1-1	-53667.90	41.02	5014.23	13888435.75	77944.58	9144.27	13441.93
AP2-1	-67168.30	271.34	14143.04	9820901.75	2577817.38	278642.95	336567.56
AP3-1	-69107.67	1858.91	14930.60	7144224.75	4426593.38	495315.92	596402.00
AP4-1	-73090.33	2340.51	9961.50	4708291.75	3459058.88	380125.98	457580.46
V2-1	-70971.04	-10.94	1737.33	8869146.75	1465068.98	159560.48	190197.96
V2-2	-65478.21	-13.98	1801.41	7354735.75	1236775.88	135434.39	161498.81
V2-3	-59908.77	4.38	1467.01	6052214.75	1099437.98	121065.78	143559.43
V2-4	-57065.44	4.34	2192.57	7150526.75	2226271.38	241272.06	288943.12
V2-5	-55435.71	21.98	2223.09	7956240.75	3059541.38	339653.20	408589.71
V2-6	-54133.98	-1.10	2111.93	7619202.75	2917106.38	326044.42	391118.65
V2-7	-50415.09	14.50	1566.37	5196484.75	1593568.68	176208.50	210737.93
V2-8	-46803.95	-11.98	1378.17	5087878.75	1490733.28	163904.02	196044.81
V2-9	-42859.57	-11.18	1215.69	4556372.75	1362918.78	150012.39	179503.71
V2-10	-40802.91	2.78	1255.37	4966235.75	1109092.28	124668.80	148002.62
V2-11	-37736.93	-8.86	1354.05	4234633.75	863843.26	96728.57	115955.07
V2-12	-34790.04	-12.86	1111.73	4025645.75	821691.51	92781.70	110022.16
V2-13	-48685.76	4.30	2832.90	14384307.75	10372781.38	1255922.64	1509656.72
V2-14	-56120.27	-8.14	2920.74	14673673.75	10304078.38	1240735.14	1493210.22
V2-15	-61952.23	-29.22	3328.14	15880053.75	11056474.38	1339843.04	1613789.62
SRM614-2	-40145.87	36.54	3576.22	36273125.75	38622.08	5901.77	4555.61
SRM612-2	-28662.96	2396.55	8521.09	36809777.75	44710.39	6893.30	5504.25
SRM610-2	29499.65	18632.20	26611.71	31285517.75	122130.32	15620.87	16714.19
AP1-2	-45691.38	21.62	2566.17	8305058.75	31859.56	3832.48	5822.13
AP2-2	-53156.86	164.14	7321.04	5324240.75	1350286.38	145065.72	174040.35
AP3-2	-53466.58	717.06	6899.72	2137459.75	1566570.48	169389.53	203753.76
AP4-2	-54310.26	1433.83	6134.03	1252474.25	1900786.48	204861.17	247710.06
zero correction							
SRM614-1	0.00	111.62	12965.35	42440245.75	59900.59	9613.99	8185.79
SRM612-1	0.00	3354.00	21546.36	39694421.75	59238.23	8734.43	8023.43
SRM610-1	30496.74	22781.47	35267.52	32199389.75	164039.79	21501.26	23975.47
AP1-1	0.00	41.02	5014.23	13888435.75	77944.58	9144.27	13441.93
AP2-1	0.00	271.34	14143.04	9820901.75	2577817.38	278642.95	336567.56
AP3-1	0.00	1858.91	14930.60	7144224.75	4426593.38	495315.92	596402.00
AP4-1	0.00	2340.51	9961.50	4708291.75	3459058.88	380125.98	457580.46
V2-1	0.00	0.00	1737.33	8869146.75	1465068.98	159560.48	190197.96
V2-2	0.00	0.00	1801.41	7354735.75	1236775.88	135434.39	161498.81
V2-3	0.00	4.38	1467.01	6052214.75	1099437.98	121065.78	143559.43
V2-4	0.00	4.34	2192.57	7150526.75	2226271.38	241272.06	288943.12
V2-5	0.00	21.98	2223.09	7956240.75	3059541.38	339653.20	408589.71
V2-6	0.00	0.00	2111.93	7619202.75	2917106.38	326044.42	391118.65
V2-7	0.00	14.50	1566.37	5196484.75	1593568.68	176208.50	210737.93
V2-8	0.00	0.00	1378.17	5087878.75	1490733.28	163904.02	196044.81
V2-9	0.00	0.00	1215.69	4556372.75	1362918.78	150012.39	179503.71
V2-10	0.00	2.78	1255.37	4966235.75	1109092.28	124668.80	148002.62
V2-11	0.00	0.00	1354.05	4234633.75	863843.26	96728.57	115955.07
V2-12	0.00	0.00	1111.73	4025645.75	821691.51	92781.70	110022.16
V2-13	0.00	4.30	2832.90	14384307.75	10372781.38	1255922.64	1509656.72
V2-14	0.00	0.00	2920.74	14673673.75	10304078.38	1240735.14	1493210.22
V2-15	0.00	0.00	3328.14	15880053.75	11056474.38	1339843.04	1613789.62
SRM614-2	0.00	36.54	3576.22	36273125.75	38622.08	5901.77	4555.61
SRM612-2	0.00	2396.55	8521.09	36809777.75	44710.39	6893.30	5504.25
SRM610-2	29499.65	18632.20	26611.71	31285517.75	122130.32	15620.87	16714.19
AP1-2	0.00	21.62	2566.17	8305058.75	31859.56	3832.48	5822.13
AP2-2	0.00	164.14	7321.04	5324240.75	1350286.38	145065.72	174040.35
AP3-2	0.00	717.06	6899.72	2137459.75	1566570.48	169389.53	203753.76
AP4-2	0.00	1433.83	6134.03	1252474.25	1900786.48	204861.17	247710.06
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-1	0.000000	0.000045	0.005171	16.925045	0.023888	0.003834	0.003264
SRM612-1	0.000000	0.001501	0.009641	17.760812	0.026505	0.003908	0.003590
SRM610-1	0.029191	0.021806	0.033757	30.820465	0.157015	0.020580	0.022949
AP1-1	0.000000	0.000002	0.000295	0.816281	0.004581	0.000537	0.000790
AP2-1	0.000000	0.000016	0.000820	0.569113	0.149382	0.016147	0.019504
AP3-1	0.000000	0.000088	0.000711	0.340056	0.210700	0.023576	0.028388
AP4-1	0.000000	0.000117	0.000496	0.234539	0.172310	0.018936	0.022794
V2-1	0.000000	0.000000	0.000192	0.982616	0.162316	0.017678	0.021072
V2-2	0.000000	0.000000	0.000226	0.923381	0.155276	0.017004	0.020276
V2-3	0.000000	0.000001	0.000222	0.916781	0.166541	0.018339	0.021746
V2-4	0.000000	0.000001	0.000262	0.854260	0.265969	0.028824	0.034520
V2-5	0.000000	0.000002	0.000247	0.882402	0.339324	0.037670	0.045315
V2-6	0.000000	0.000000	0.000235	0.848916	0.325018	0.036327	0.043578
V2-7	0.000000	0.000002	0.000254	0.842273	0.258294	0.028561	0.034157
V2-8	0.000000	0.000000	0.000231	0.851092	0.249367	0.027418	0.032794
V2-9	0.000000	0.000000	0.000230	0.860514	0.257400	0.028331	0.033901
V2-10	0.000000	0.000001	0.000246	0.972434	0.217170	0.024411	0.028980
V2-11	0.000000	0.000000	0.000291	0.911423	0.185926	0.020819	0.024957
V2-12	0.000000	0.000000	0.000249	0.900408	0.183786	0.020752	0.024608
V2-13	0.000000	0.000000	0.000159	0.805009	0.580507	0.070287	0.084487
V2-14	0.000000	0.000000	0.000159	0.798913	0.561009	0.067552	0.081298
V2-15	0.000000	0.000000	0.000167	0.796960	0.554883	0.067242	0.080990
SRM614-2	0.000000	0.000024	0.002365	23.985836	0.025539	0.003903	0.003012
SRM612-2	0.000000	0.001396	0.004965	21.446896	0.026050	0.004016	0.003207
SRM610-2	0.032969	0.020824	0.029742	34.965339	0.136495	0.017458	0.018680
AP1-2	0.000000	0.000002	0.000210	0.679039	0.002605	0.000313	0.000476
AP2-2	0.000000	0.000013	0.000587	0.426826	0.108248	0.011629	0.013952
AP3-2	0.000000	0.000056	0.000535	0.165689	0.121435	0.013131	0.015794
AP4-2	0.000000	0.000097	0.000413	0.084421	0.128120	0.013808	0.016697
standardize signal averages AP							
AP1	0.000000	0.000002	0.000252	0.747660	0.003593	0.000425	0.000633
AP2	0.000000	0.000014	0.000703	0.497969	0.128815	0.013888	0.016728
AP3	0.000000	0.000072	0.000623	0.252872	0.166068	0.018353	0.022091
AP4	0.000000	0.000107	0.000455	0.159480	0.150215	0.016372	0.019745
linest from std sig ave							
	0.000000	0.136657	0.043052	0.000111	0.009194	0.084039	0.069771
standardize signal averages SRM							
srM614-2	0.000000	0.000034	0.003768	20.455440	0.024714	0.003868	0.003138
srM612-2	0.000000	0.001449	0.007303	19.603854	0.026278	0.003962	0.003398
srM610-2	0.031080	0.021315	0.031749	32.892902	0.146755	0.019019	0.020814
linest from std sig ave							
	0.181803	0.254927	0.125420	0.042186	0.036305	0.275763	0.257713
concentration data							
	i.s. correction						
SRM614-1	85763.00	0.00	0.52	19.09	161.48	18.84	27.63
SRM612-1	85763.00	0.00	17.59	35.60	169.46	20.90	21.48
SRM610-1	85763.00	0.00	255.57	124.64	294.06	123.81	148.33
AP1-1	398936	0.00	0.13	5.06	36.23	16.80	18.02
AP2-1	398936	0.00	0.86	14.08	25.26	547.93	541.35
AP3-1	398936	0.00	4.82	12.21	15.09	772.85	790.43
AP4-1	398936	0.00	6.36	8.52	10.41	632.03	634.84
V2-1	398936	0.00	0.00	3.31	43.61	595.37	592.67
V2-2	398936	0.00	0.00	3.88	40.98	569.55	570.07
V2-3	398936	0.00	0.04	3.82	40.69	610.87	614.83
V2-4	398936	0.00	0.03	4.50	37.91	975.57	966.37
V2-5	398936	0.00	0.13	4.23	39.16	1244.64	1262.93
V2-6	398936	0.00	0.00	4.04	37.68	1192.16	1217.91
V2-7	398936	0.00	0.13	4.36	37.38	947.42	957.54
V2-8	398936	0.00	0.00	3.96	37.77	914.68	919.21
V2-9	398936	0.00	0.00	3.94	38.19	944.14	949.84
V2-10	398936	0.00	0.03	4.22	43.16	796.58	818.42
V2-11	398936	0.00	0.00	5.01	40.45	681.97	697.98
V2-12	398936	0.00	0.00	4.27	39.96	674.12	695.75
V2-13	398936	0.00	0.01	2.72	35.73	2129.29	2356.46
V2-14	398936	0.00	0.00	2.73	35.46	2057.77	2264.77
V2-15	398936	0.00	0.00	2.87	35.37	2035.30	2254.36
SRM614-2	85763.00	0.00	0.28	8.73	228.85	20.14	28.13
SRM612-2	85763.00	0.00	16.37	18.33	204.63	20.54	28.95

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	85763.00	0.00	244.06	109.81	333.61	107.63	125.83	111.78
AP1-2	398936	0.00	0.10	3.60	30.14	9.55	10.51	13.25
AP2-2	398936	0.00	0.72	10.08	18.94	397.05	389.89	388.35
AP3-2	398936	0.00	3.03	9.19	7.35	445.42	440.22	439.62
AP4-2	398936	0.00	5.27	7.10	3.75	469.94	462.94	464.73

certified concentration								
SRM614	1.70	0.74			93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73		93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40		93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00		13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59		22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84		19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77		19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26	
raw data								
blank-23	25903.11	73.44	2068.89		733.24	3502.02	617.84	4242.70
SRM614-23	26715.75	108.04	11727.51		14231.40	21582.40	3151.30	7021.88
SRM612-23	35669.52	2248.45	16068.93		12605.99	139510.47	19865.83	26458.51
SRM610-23	74919.46	13869.04	26901.19		6126.07	189964.19	24557.90	31522.18
AP1-23	31126.98	145.76	4487.71		954.45	127318.91	15475.61	21758.80
AP2-23	29633.09	329.24	14003.48		948.13	2536339.30	239872.39	295904.75
AP3-23	29354.48	761.68	11370.19		690.24	2069038.80	198431.67	243924.30
AP4-23	29832.85	1194.65	9369.17		622.32	1887581.30	22422.39	224422.22
34HP45-494-1	28507.08	124.44	14178.48		3197.74	3132984.30	320274.13	392729.84
34HP45-494-2	27530.23	134.84	12742.03		2207.85	1951581.40	196362.42	239035.98
34HP45-494-3	29031.92	115.48	14841.96		1834.17	3121024.30	334910.00	408035.25
34HP45-494-4	30221.85	136.24	11537.63		755.16	22317206.00	3115771.50	3764982.80
34HP45-494-5	29350.21	101.36	8949.29		830.48	18263416.00	2365995.30	2870815.50
34HP45-494-6	30307.41	92.80	8236.73		688.88	17090268.00	2212047.80	2682932.80
34HP45-494-7	30704.25	103.16	7111.72		878.64	15025313.00	1937514.50	2350494.00
34HP45-494-8	32492.10	94.04	8156.97		686.32	17365032.00	2268359.50	2753346.80
34HP45-494-9	32873.70	114.36	8631.77		685.96	15220783.00	1947127.10	2360685.00
34HP45-494-10	33088.91	271.08	39012.46		980.85	9720884.00	1180661.90	1435004.40
34HP45-494-11	31245.62	240.08	40896.99		1106.45	6652134.00	775556.00	943465.50
34HP45-494-12	31791.42	252.64	53361.82		1095.69	9632155.00	1201524.80	1459605.60
34HP45-494-13	32101.46	129.44	13146.59		788.16	9940268.00	1191187.90	1452623.50
34HP45-494-14	32679.86	126.48	15719.37		846.20	10967953.00	1322395.50	1609993.90
34HP45-494-15	31945.78	120.04	12320.03		802.68	10293935.00	1233616.00	1501498.10
34HP45-494-16	31630.38	91.12	6273.16		708.00	11296453.00	1385758.40	1690806.90
34HP45-494-17	32135.26	89.20	5991.35		592.00	15878595.00	2123752.80	2574882.50
34HP45-494-18	31414.86	80.08	5495.19		615.80	15542474.00	2046603.80	2482310.50
SRM614-24	32926.66	89.64	2726.02		11346.54	99966.92	12602.35	13864.56
SRM612-24	40230.27	1876.49	6362.76		10334.22	95182.06	12268.39	13653.84
SRM610-24	77209.80	13308.28	20875.08		5872.23	144598.69	18088.54	20233.91
AP1-24	36276.48	107.48	1852.49		701.28	83278.83	10459.34	12111.91
AP2-24	33201.15	254.96	7657.96		526.92	1384324.40	136622.61	165377.69
AP3-24	33116.31	685.60	8070.73		498.32	1680414.60	166269.02	203428.47
AP4-24	32670.02	972.21	6444.88		510.80	1425734.90	140535.83	172077.33
blank-24	34315.56	71.04	424.84		169.72	118226.47	14708.72	15211.21
blank average	30109.33	72.24	1246.87		451.48	60864.24	7663.28	9726.95

blank subtraction								
SRM614-23	-3393.58	35.80	10480.64		13779.92	-39281.84	-4511.99	-2705.08
SRM612-23	5560.19	2176.21	14822.06		12154.51	78646.23	12202.55	16731.55
SRM610-23	44810.13	13796.80	25654.32		5674.59	129099.95	16894.61	21795.22
AP1-23	1017.65	73.52	3240.84		502.96	66454.67	7812.32	12031.85
AP2-23	-476.24	257.00	12756.61		496.64	2475475.06	232209.11	286177.80
AP3-23	-754.85	689.44	10123.32		238.76	2008174.56	190768.39	234197.35
AP4-23	-276.48	1122.41	8122.31		170.84	1826717.06	174854.11	214695.27
34HP45-494-1	-1602.25	52.20	12931.61		2746.26	3072120.06	312610.85	383002.89
34HP45-494-2	-2579.10	62.60	11495.16		1756.37	1890717.16	188699.14	223909.03
34HP45-494-3	-1077.41	43.24	13595.10		1382.69	3060160.06	327246.72	398308.30
34HP45-494-4	112.52	64.00	10290.76		303.68	22256341.76	3108108.22	3755255.85
34HP45-494-5	-759.13	29.12	7702.42		379.00	18202551.76	2358332.02	2861088.55
34HP45-494-6	198.08	20.56	6989.86		237.40	17029403.76	2204384.52	2673205.85
34HP45-494-7	594.92	30.92	5864.85		427.16	14964448.76	1929851.22	2340767.05
34HP45-494-8	2382.77	21.80	6910.10		234.84	17304167.76	2260696.22	2743619.85
34HP45-494-9	2764.37	42.12	7384.90		234.48	15159918.76	1939463.82	2350958.05
34HP45-494-10	2979.58	198.84	37765.59		529.36	9660019.76	1172998.62	1425277.45
34HP45-494-11	1136.29	167.84	39650.12		654.96	6591269.76	767892.72	933738.55
34HP45-494-12	1682.09	180.40	52114.95		644.20	9571290.76	1193861.52	1449878.65
34HP45-494-13	1992.13	57.20	11899.73		336.68	9879403.76	1183524.62	1442896.55
34HP45-494-14	2570.53	54.24	14472.50		394.72	10907088.76	1314732.22	1600266.95
34HP45-494-15	1836.45	47.80	11073.16		351.20	10233070.76	1225952.72	1491771.15
34HP45-494-16	1521.05	18.88	5062.29		256.52	11235588.76	1378095.12	1681079.95
34HP45-494-17	2025.93	16.96	4744.49		140.52	15817730.76	2116089.52	2565155.55

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	1305.53	7.84	4248.32	164.32	15481609.76	2038940.52	2472583.55
SRM614-24	2817.33	17.40	1479.15	10895.06	39102.68	4939.07	4137.60
SRM612-24	10120.94	1804.25	5115.89	9882.74	34317.81	4605.11	3926.88
SRM610-24	47100.47	13236.03	19628.21	5420.75	83734.45	10425.26	10506.96
AP1-24	6167.15	35.24	605.62	249.80	22414.58	2796.06	2384.95
AP2-24	3091.82	182.72	6411.10	75.44	1323460.16	128959.33	155650.74
AP3-24	3006.98	613.36	6823.86	46.84	1619550.36	158605.74	193701.52
AP4-24	2560.69	899.97	5198.01	59.32	1364870.66	132872.55	162350.38

zero correction

SRM614-23	0.00	35.80	10480.64	13779.92	0.00	0.00	0.00
SRM612-23	5560.19	2176.21	14822.06	12154.51	78646.23	12202.55	16731.55
SRM610-23	44810.13	13796.80	25654.32	5674.59	129099.95	16894.61	21795.22
AP1-23	1017.65	73.52	3240.84	502.96	66454.67	7812.32	12031.85
AP2-23	0.00	257.00	12756.61	496.64	2475475.06	232209.11	286177.80
AP3-23	0.00	689.44	10123.32	238.76	2008174.56	190768.39	234197.35
AP4-23	0.00	1122.41	8122.31	170.84	1826717.06	174854.11	214695.27
34HP45-494-1	0.00	52.20	12931.61	2746.26	3072120.06	312610.85	383002.89
34HP45-494-2	0.00	62.60	11495.16	1756.37	1890717.16	188699.14	229309.03
34HP45-494-3	0.00	43.24	13595.10	1382.69	3060160.06	327246.72	398308.30
34HP45-494-4	112.52	64.00	10290.76	303.68	22256341.76	3108108.22	3755255.85
34HP45-494-5	0.00	29.12	7702.42	379.00	18202551.76	2358332.02	2861088.55
34HP45-494-6	198.08	20.56	6989.86	237.40	17029403.76	2204384.52	2673205.85
34HP45-494-7	594.92	30.92	5864.85	427.16	14964448.76	1929851.22	2340767.05
34HP45-494-8	2382.77	21.80	6910.10	234.84	17304167.76	2260696.22	2743619.85
34HP45-494-9	2764.37	42.12	7384.90	234.48	15159918.76	1939463.82	2350958.05
34HP45-494-10	2979.58	198.84	37765.59	529.36	9660019.76	1172998.62	1425277.45
34HP45-494-11	1136.29	167.84	39650.12	654.96	6591269.76	767892.72	933738.55
34HP45-494-12	1682.09	180.40	52114.95	644.20	9571290.76	1193861.52	1449878.65
34HP45-494-13	1992.13	57.20	11899.73	336.68	9879403.76	1183524.62	1442896.55
34HP45-494-14	2570.53	54.24	14472.50	394.72	10907088.76	1314732.22	1600266.95
34HP45-494-15	1836.45	47.80	11073.16	351.20	10233070.76	1225952.72	1491771.15
34HP45-494-16	1521.05	18.88	5026.29	256.52	11235588.76	1378095.12	1681079.95
34HP45-494-17	2025.93	16.96	4744.49	140.52	15817730.76	2116089.52	2565155.55
34HP45-494-18	1305.53	7.84	4248.32	164.32	15481609.76	2038940.52	2472583.55
SRM614-24	2817.33	17.40	1479.15	10895.06	39102.68	4939.07	4137.60
SRM612-24	10120.94	1804.25	5115.89	9882.74	34317.81	4605.11	3926.88
SRM610-24	47100.47	13236.03	19628.21	5420.75	83734.45	10425.26	10506.96
AP1-24	6167.15	35.24	605.62	249.80	22414.58	2796.06	2384.95
AP2-24	3091.82	182.72	6411.10	75.44	1323460.16	128959.33	155650.74
AP3-24	3006.98	613.36	6823.86	46.84	1619550.36	158605.74	193701.52
AP4-24	2560.69	899.97	5198.01	59.32	1364870.66	132872.55	162350.38

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-23	0.000000	0.000017	0.005043	0.006630	0.000000	0.000000	0.000000
SRM612-23	0.002856	0.001118	0.007613	0.006243	0.040397	0.006268	0.008594
SRM610-23	0.061834	0.019038	0.035401	0.007830	0.178146	0.023313	0.030075
AP1-23	0.000101	0.000007	0.000321	0.000050	0.006580	0.000774	0.001191
AP2-23	0.000000	0.000019	0.000940	0.000037	0.182484	0.017118	0.021096
AP3-23	0.000000	0.000046	0.000672	0.000016	0.133247	0.012658	0.015539
AP4-23	0.000000	0.000075	0.000543	0.000011	0.122170	0.011694	0.014359
34HP45-494-1	0.000000	0.000003	0.000852	0.000181	0.202302	0.020586	0.025221
34HP45-494-2	0.000000	0.000005	0.000866	0.000132	0.142363	0.014208	0.017266
34HP45-494-3	0.000000	0.000003	0.001084	0.000110	0.243912	0.026083	0.031747
34HP45-494-4	0.000008	0.000005	0.000732	0.000022	1.583382	0.221120	0.267160
34HP45-494-5	0.000000	0.000002	0.000548	0.000027	1.295816	0.167887	0.203677
34HP45-494-6	0.000016	0.000002	0.000559	0.000019	1.362290	0.176343	0.213847
34HP45-494-7	0.000053	0.000003	0.000518	0.000038	1.322782	0.170589	0.206912
34HP45-494-8	0.000234	0.000002	0.000678	0.000023	1.698419	0.221889	0.269289
34HP45-494-9	0.000282	0.000004	0.000753	0.000024	1.546731	0.197879	0.239863

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.000236	0.000016	0.002989	0.000042	0.764479	0.092829	0.112794
34HP45-494-11	0.000083	0.000012	0.002902	0.000048	0.482396	0.056200	0.068338
34HP45-494-12	0.000121	0.000013	0.003752	0.000046	0.689086	0.085952	0.104384
34HP45-494-13	0.000162	0.000005	0.000968	0.000027	0.803391	0.096244	0.117336
34HP45-494-14	0.000199	0.000004	0.001120	0.000031	0.843800	0.101711	0.123801
34HP45-494-15	0.000137	0.000004	0.000828	0.000026	0.765107	0.091662	0.111537
34HP45-494-16	0.000137	0.000002	0.000454	0.000023	1.014979	0.124492	0.151862
34HP45-494-17	0.000168	0.000001	0.000394	0.000012	1.312666	0.175608	0.212875
34HP45-494-18	0.000098	0.000001	0.000318	0.000012	1.158205	0.152537	0.184978
SRM614-24	0.002113	0.000013	0.001109	0.008171	0.029328	0.003704	0.003103
SRM612-24	0.007810	0.001392	0.003948	0.007626	0.026483	0.003554	0.003030
SRM610-24	0.089619	0.025184	0.037347	0.010314	0.159323	0.019836	0.019992
AP1-24	0.000709	0.000004	0.000070	0.000029	0.002579	0.000322	0.000274
AP2-24	0.000268	0.000016	0.000555	0.000007	0.114607	0.011167	0.013479
AP3-24	0.000232	0.000047	0.000526	0.000004	0.124791	0.012221	0.014925
AP4-24	0.000199	0.000070	0.000404	0.000005	0.106171	0.010336	0.012629

standardize signal averages AP

AP1	0.000405	0.000006	0.000195	0.000039	0.004579	0.000548	0.000733
AP2	0.000134	0.000017	0.000748	0.000022	0.148545	0.014143	0.017287
AP3	0.000116	0.000047	0.000599	0.000010	0.129019	0.012439	0.015232
AP4	0.000100	0.000073	0.000474	0.000008	0.114170	0.011015	0.013494

linest from std sig ave

0.010043	0.201091	0.043030	2.568117	0.010197	0.106450	0.087003
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standardize signal averages SRM

srM614-2	0.001057	0.000015	0.003076	0.007401	0.014664	0.001852	0.001552
srM612-2	0.005333	0.001255	0.005781	0.006935	0.033440	0.004911	0.005812
srM610-2	0.075726	0.022111	0.036374	0.009072	0.168734	0.021575	0.025034

linest from std sig ave

0.074686	0.245863	0.112376	137.771687	0.031912	0.247817	0.213684
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concentration data

i.s. correction

SRM614-23	85763.00	0.00	0.30	18.61	1460.28	0.00	0.00	0.00
SRM612-23	85763.00	2.46	19.28	28.10	1375.06	35.33	57.22	64.13
SRM610-23	85763.00	53.26	328.34	130.64	1724.65	155.79	212.84	224.41
AP1-23	398936	0.40	0.58	5.51	51.02	26.77	32.85	41.35
AP2-23	398936	0.00	1.52	16.14	37.51	742.32	726.93	732.22
AP3-23	398936	0.00	3.67	11.53	16.23	542.03	537.54	539.35
AP4-23	398936	0.00	6.02	9.32	11.71	496.97	496.61	498.37
34HP45-494-1	398936	0.00	0.28	14.62	185.28	822.94	874.21	875.39
34HP45-494-2	398936	0.00	0.38	14.86	135.49	579.12	603.38	599.28
34HP45-494-3	398936	0.00	0.28	18.60	112.91	992.20	1107.68	1101.91
34HP45-494-4	398936	0.03	0.37	12.57	22.13	6441.00	9390.26	9272.75
34HP45-494-5	398936	0.00	0.17	9.41	27.64	5271.22	7129.61	7069.35
34HP45-494-6	398936	0.06	0.13	9.60	19.46	5541.63	7488.71	7422.32
34HP45-494-7	398936	0.21	0.22	8.90	38.68	5380.91	7244.37	7181.62
34HP45-494-8	398936	0.94	0.17	11.64	23.61	6908.96	9422.93	9346.63
34HP45-494-9	398936	1.13	0.34	12.93	24.51	6291.91	8403.29	8325.30
34HP45-494-10	398936	0.94	1.26	51.30	42.92	3109.80	3942.16	3914.93
34HP45-494-11	398936	0.33	0.99	49.81	49.11	1962.33	2386.63	2371.90
34HP45-494-12	398936	0.49	1.04	64.41	47.52	2803.11	3650.11	3623.02
34HP45-494-13	398936	0.65	0.37	16.61	28.05	3268.09	4087.17	4072.57
34HP45-494-14	398936	0.80	0.34	19.22	31.29	3432.47	4319.34	4296.95
34HP45-494-15	398936	0.55	0.29	14.21	26.90	3112.36	3892.60	3871.29
34HP45-494-16	398936	0.55	0.14	7.79	23.74	4128.81	5286.76	5270.92
34HP45-494-17	398936	0.67	0.11	6.76	11.95	5339.76	7457.51	7388.58
34HP45-494-18	398936	0.39	0.05	5.46	12.59	4711.43	6477.74	6420.33
SRM614-24	85763.00	1.82	0.23	4.09	1799.76	25.65	33.82	23.16
SRM612-24	85763.00	6.73	24.01	14.57	1679.73	23.16	32.44	22.61
SRM610-24	85763.00	77.19	434.33	137.82	2271.68	139.33	181.09	149.17
AP1-24	398936	2.84	0.33	1.20	29.44	10.49	13.66	9.52
AP2-24	398936	1.07	1.27	9.53	6.69	466.21	474.24	467.83
AP3-24	398936	0.93	3.79	9.03	3.70	507.63	518.99	518.03
AP4-24	398936	0.80	5.62	6.94	4.73	431.89	438.93	438.33

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

Li Be B Na Mg24 Mg25 Mg26

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-21	27067.71	73.88	2625.29	590.08	4727.55	855.32	6185.75
SRM614-21	28715.80	117.96	13189.15	8967.13	15756.69	2214.53	7086.84
SRM612-21	36899.01	1890.29	29063.08	12501.07	120436.96	13610.88	20415.20
SRM610-21	85456.12	14999.36	39466.82	7329.44	182401.75	21072.20	28535.64
AP1-21	33188.83	151.32	6492.68	1039.01	164031.44	18293.78	25966.75
AP2-21	30182.49	250.60	14026.92	859.64	1966707.60	176341.67	218815.55
AP3-21	29381.33	202.88	11806.39	688.76	1418385.60	131504.22	162425.95
AP4-21	32045.18	1465.85	14436.64	625.00	3428922.80	321494.69	396309.22
34HP45-671-1	28654.00	102.08	6151.71	1414.33	3606329.50	363949.06	448851.72
34HP45-671-2	27946.64	90.76	4859.59	1451.17	2168197.00	216648.94	266262.22
34HP45-671-3	28129.32	139.32	5084.95	1317.21	1946086.50	198696.00	243292.64
34HP45-671-4	29517.13	103.36	7890.64	1722.53	4273934.00	458077.06	560135.25
34HP45-671-5	28440.44	97.04	5207.27	1466.81	1957428.10	195440.30	239219.83
34HP45-671-6	29549.93	116.12	5023.55	1127.61	2559585.00	267032.75	325860.13
34HP45-671-7	30028.93	138.60	6711.24	1411.13	2955966.80	327702.91	400290.00
34HP45-671-8	29242.68	141.12	5011.03	1422.73	1671214.80	166625.17	204309.31
34HP45-671-9	29896.29	127.40	5936.63	1490.81	1999366.60	210214.42	256429.69
34HP45-671-10	30708.29	132.16	6965.56	1306.33	2787873.00	325397.44	394462.56
34HP45-671-11	30449.41	149.52	5349.11	1118.05	1507520.10	157705.45	191922.00
34HP45-671-12	31072.09	125.88	5412.63	1079.77	1831145.50	194186.41	237469.30
34HP45-671-13	32967.63	118.12	2908.42	678.88	1550109.50	183953.36	221622.33
34HP45-671-14	34118.63	75.20	2121.69	511.20	869889.44	94726.41	114581.09
34HP45-671-15	34845.96	79.24	1876.01	555.28	1030455.30	109460.85	132754.58
34HP45-671-16	36206.16	71.56	1676.65	470.64	837012.50	94964.02	114026.24
34HP45-671-17	36021.76	83.12	1528.53	571.04	726659.19	77873.68	93856.13
34HP45-671-18	36552.65	63.52	1679.01	606.44	942403.38	100122.77	121540.41
SRM614-22	39595.46	108.72	3767.26	8447.33	31467.98	4397.30	5367.95
SRM612-22	45799.54	1971.77	8808.49	9736.54	39748.18	5394.27	6869.08
SRM610-22	94185.85	16538.01	28912.00	6817.40	106238.28	13461.56	15992.93
AP1-22	41031.55	118.36	3326.46	659.44	45103.77	5394.47	7679.28
AP2-22	39214.26	217.88	8315.01	518.28	986646.25	98937.91	121376.80
AP3-22	38857.10	789.44	9249.57	546.64	1821972.50	181242.38	221603.97
AP4-22	39479.22	1094.73	7816.48	430.88	1728000.90	172025.97	210334.55
blank-22	39408.90	98.76	609.36	234.72	23493.33	3030.90	3563.66
blank average	33238.31	86.32	1617.33	412.40	14110.44	1943.11	4874.71
blank subtraction							
SRM614-21	-4522.51	31.64	11571.82	8554.73	1646.25	271.42	2212.13
SRM612-21	3660.70	1803.97	27445.75	12088.67	106326.52	11667.77	15540.49
SRM610-21	52217.81	14913.04	37849.49	6917.04	168291.31	19129.09	23660.93
AP1-21	-49.48	65.00	4875.35	626.60	149921.00	16350.67	21092.04
AP2-21	-3055.82	164.28	12409.59	447.24	1952597.16	174398.56	213940.84
AP3-21	-3856.98	116.56	10189.06	276.36	1404275.16	129561.11	157551.21
AP4-21	-1193.13	1379.53	12819.31	212.60	3414812.36	319551.58	391434.54
34HP45-671-1	-4584.31	15.76	4534.39	1001.93	3592219.06	362005.95	443977.01
34HP45-671-2	-5291.67	4.44	3242.26	1038.77	2154086.56	214705.83	261387.51
34HP45-671-3	-5108.99	53.00	3467.62	904.81	1931976.06	196752.89	238417.93
34HP45-671-4	-3721.18	17.04	6273.32	1310.13	4259823.56	456133.95	555260.54
34HP45-671-5	-4797.87	10.72	3589.94	1054.41	1943317.66	193497.19	234345.12
34HP45-671-6	-3688.38	29.80	3406.22	715.20	2545474.56	265089.64	320985.42
34HP45-671-7	-3209.38	52.28	5093.91	998.73	2941856.36	325759.80	395415.29
34HP45-671-8	-3995.62	54.80	3393.70	1010.33	1657104.36	164682.06	199434.60
34HP45-671-9	-3342.02	41.08	4319.30	1078.41	1985256.16	208271.31	251554.98
34HP45-671-10	-2530.01	45.84	5348.23	893.93	2773762.56	323454.33	389587.85
34HP45-671-11	-2788.90	63.20	3731.78	705.64	1493409.66	155762.34	187047.29
34HP45-671-12	-2166.21	39.56	3795.30	667.36	1817035.06	192243.30	232594.59
34HP45-671-13	-270.68	31.80	1291.09	266.48	1535999.06	182010.25	216747.62
34HP45-671-14	880.33	-11.12	504.36	98.80	855779.00	92783.30	109706.38
34HP45-671-15	1607.65	-7.08	258.68	142.88	1016344.86	107517.74	127879.87
34HP45-671-16	2967.86	-14.76	59.32	58.24	822902.06	93020.91	109151.53
34HP45-671-17	2783.45	-3.20	-88.80	158.64	712548.75	75930.57	88981.43
34HP45-671-18	3314.34	-22.80	61.68	194.04	928292.94	98179.66	116665.70
SRM614-22	6357.15	22.40	2149.93	8034.93	17357.54	2454.19	493.24
SRM612-22	12561.23	1885.45	7191.16	9324.13	25637.74	3451.16	1994.37
SRM610-22	60947.54	16451.69	27294.67	6405.00	92127.84	11518.45	11118.22
AP1-22	7793.24	32.04	1709.13	247.04	30993.33	3451.36	2804.58
AP2-22	5975.95	131.56	6697.68	105.88	972535.81	96994.80	116502.09
AP3-22	5618.79	703.12	7632.24	134.24	1807862.06	179299.27	216729.26
AP4-22	6240.92	1008.41	6199.15	18.48	1713890.46	170082.86	205459.84
zero correction							
SRM614-21	0.00	31.64	11571.82	8554.73	1646.25	271.42	2212.13
SRM612-21	3660.70	1803.97	27445.75	12088.67	106326.52	11667.77	15540.49
SRM610-21	52217.81	14913.04	37849.49	6917.04	168291.31	19129.09	23660.93
AP1-21	0.00	65.00	4875.35	626.60	149921.00	16350.67	21092.04
AP2-21	0.00	164.28	12409.59	447.24	1952597.16	174398.56	213940.84
AP3-21	0.00	116.56	10189.06	276.36	1404275.16	129561.11	157551.24

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	0.00	1379.53	12819.31	212.60	3414812.36	319551.58	391434.51
34HP45-671-1	0.00	15.76	4534.39	1001.93	3592219.06	362005.95	443977.01
34HP45-671-2	0.00	4.44	3242.26	1038.77	2154086.56	214705.83	261387.51
34HP45-671-3	0.00	53.00	3467.62	904.81	1931976.06	196752.89	238417.93
34HP45-671-4	0.00	17.04	6273.32	1310.13	4259823.56	456133.95	555260.54
34HP45-671-5	0.00	10.72	3589.94	1054.41	1943317.66	193497.19	234345.12
34HP45-671-6	0.00	29.80	3406.22	715.20	2545474.56	265089.64	320985.42
34HP45-671-7	0.00	52.28	5093.91	998.73	2941856.36	325759.80	395415.29
34HP45-671-8	0.00	54.80	3393.70	1010.33	1657104.36	164682.06	199434.60
34HP45-671-9	0.00	41.08	4319.30	1078.41	1985256.16	208271.31	251554.98
34HP45-671-10	0.00	45.84	5348.23	893.93	2773762.56	323454.33	389587.85
34HP45-671-11	0.00	63.20	3731.78	705.64	1493409.66	155762.34	187047.29
34HP45-671-12	0.00	39.56	3795.30	667.36	1817035.06	192243.30	232594.59
34HP45-671-13	0.00	31.80	1291.09	266.48	1535999.06	182010.25	216747.62
34HP45-671-14	880.33	0.00	504.36	98.80	855779.00	92783.30	109706.38
34HP45-671-15	1607.65	0.00	258.68	142.88	1016344.86	107517.74	127879.87
34HP45-671-16	2967.86	0.00	59.32	58.24	822902.06	93020.91	109151.53
34HP45-671-17	2783.45	0.00	0.00	158.64	712548.75	75930.57	88981.43
34HP45-671-18	3314.34	0.00	61.68	194.04	928292.94	98179.66	116665.70
SRM614-22	6357.15	22.40	2149.93	8034.93	17357.54	2454.19	493.24
SRM612-22	12561.23	1885.45	7191.16	9324.13	25637.74	3451.16	1994.37
SRM610-22	60947.54	16451.69	27294.67	6405.00	92127.84	11518.45	11118.22
AP1-22	7793.24	32.04	1709.13	247.04	30993.33	3451.36	2804.58
AP2-22	5975.95	131.56	6697.68	105.88	972535.81	96994.80	116502.09
AP3-22	5618.79	703.12	7632.24	134.24	1807862.06	179299.27	212729.26
AP4-22	6240.92	1008.41	6199.15	18.48	1713890.46	170082.86	205459.84

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-21	0.000000	0.000024	0.008627	0.006378	0.001227	0.000202	0.001649
SRM612-21	0.001855	0.000914	0.013909	0.006126	0.053884	0.005913	0.007876
SRM610-21	0.050852	0.014523	0.036859	0.006736	0.163888	0.018629	0.023042
AP1-21	0.000000	0.000006	0.000469	0.000060	0.014425	0.001573	0.002029
AP2-21	0.000000	0.000012	0.000941	0.000034	0.147987	0.013218	0.016215
AP3-21	0.000000	0.000010	0.000834	0.000023	0.114933	0.010604	0.012895
AP4-21	0.000000	0.000081	0.000754	0.000013	0.200787	0.018789	0.023016
34HP45-671-1	0.000000	0.000001	0.000236	0.000052	0.186754	0.018820	0.023082
34HP45-671-2	0.000000	0.000000	0.000185	0.000059	0.123117	0.012272	0.014940
34HP45-671-3	0.000000	0.000003	0.000208	0.000054	0.116079	0.011822	0.014325
34HP45-671-4	0.000000	0.000001	0.000339	0.000071	0.230163	0.024645	0.030001
34HP45-671-5	0.000000	0.000001	0.000215	0.000063	0.116646	0.011615	0.014066
34HP45-671-6	0.000000	0.000002	0.000241	0.000051	0.180444	0.018792	0.022754
34HP45-671-7	0.000000	0.000003	0.000278	0.000054	0.160522	0.017775	0.021576
34HP45-671-8	0.000000	0.000003	0.000192	0.000057	0.093963	0.009338	0.011309
34HP45-671-9	0.000000	0.000002	0.000238	0.000060	0.109561	0.011494	0.013883
34HP45-671-10	0.000000	0.000003	0.000350	0.000058	0.181359	0.021149	0.025473
34HP45-671-11	0.000000	0.000004	0.000259	0.000049	0.103526	0.010798	0.012966
34HP45-671-12	0.000000	0.000003	0.000272	0.000048	0.130037	0.013758	0.016646
34HP45-671-13	0.000000	0.000005	0.000201	0.000042	0.239618	0.028394	0.033813
34HP45-671-14	0.000167	0.000000	0.000096	0.000019	0.162762	0.017647	0.020865
34HP45-671-15	0.000317	0.000000	0.000051	0.000028	0.200444	0.021205	0.025221
34HP45-671-16	0.000621	0.000000	0.000012	0.000012	0.172132	0.019458	0.022832
34HP45-671-17	0.000467	0.000000	0.000000	0.000027	0.119427	0.012726	0.014914
34HP45-671-18	0.000524	0.000000	0.000010	0.000031	0.146796	0.015526	0.018449
SRM614-22	0.006158	0.000022	0.002083	0.007783	0.016814	0.002377	0.000478
SRM612-22	0.010413	0.001563	0.005961	0.007729	0.021253	0.002861	0.001653
SRM610-22	0.090719	0.024488	0.040628	0.009534	0.137130	0.017145	0.016549
AP1-22	0.000789	0.000003	0.000173	0.000025	0.003136	0.000349	0.000284
AP2-22	0.000579	0.000013	0.000649	0.000010	0.094286	0.009404	0.011295
AP3-22	0.000428	0.000054	0.000581	0.000010	0.137717	0.013658	0.016510
AP4-22	0.000476	0.000077	0.000473	0.000001	0.130677	0.012968	0.015665

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP								
AP1	0.000394	0.000005	0.000321	0.000043	0.008781	0.000961	0.001157	
AP2	0.000290	0.000013	0.000795	0.000022	0.121137	0.011311	0.013755	
AP3	0.000214	0.000032	0.000708	0.000016	0.126325	0.012131	0.014702	
AP4	0.000238	0.000079	0.000613	0.000007	0.165732	0.015879	0.019341	
linest from std sig ave								
	0.012850	0.204498	0.036532	2.508937	0.009929	0.104243	0.085732	
standardize signal averages SRM								
srms614-2	0.003079	0.000023	0.005355	0.007080	0.009021	0.001290	0.001063	
srms612-2	0.006134	0.001239	0.009935	0.006928	0.037568	0.004387	0.004764	
srms610-2	0.070785	0.019505	0.038743	0.008135	0.150509	0.017887	0.019796	
linest from std sig ave								
	0.079681	0.278637	0.101341	146.878768	0.035363	0.297746	0.269664	
concentration data i.s. correction								
SRM614-21	85763.00	0.00	0.41	27.03	1372.32	1.05	1.81	12.13
SRM612-21	85763.00	2.04	16.03	43.58	1318.22	45.89	52.86	57.91
SRM610-21	85763.00	56.04	254.71	115.48	1449.43	139.56	166.54	169.42
AP1-21	398936	0.00	0.51	6.84	60.35	57.14	65.43	69.41
AP2-21	398936	0.00	1.02	13.71	33.93	586.20	549.67	554.56
AP3-21	398936	0.00	0.78	12.15	22.64	455.26	440.98	441.02
AP4-21	398936	0.00	6.62	10.99	12.51	795.35	781.38	787.18
34HP45-671-1	398936	0.00	0.07	3.44	52.14	739.76	782.66	789.43
34HP45-671-2	398936	0.00	0.02	2.70	59.42	487.69	510.33	510.96
34HP45-671-3	398936	0.00	0.26	3.04	54.41	459.81	491.61	489.94
34HP45-671-4	398936	0.00	0.08	4.94	70.85	911.71	1024.91	1026.09
34HP45-671-5	398936	0.00	0.05	3.14	63.35	462.05	483.01	481.09
34HP45-671-6	398936	0.00	0.17	3.52	50.75	714.76	781.48	778.23
34HP45-671-7	398936	0.00	0.23	4.05	54.54	635.85	739.20	737.93
34HP45-671-8	398936	0.00	0.25	2.80	57.34	372.20	388.33	386.77
34HP45-671-9	398936	0.00	0.18	3.47	59.57	433.99	477.99	474.81
34HP45-671-10	398936	0.00	0.24	5.10	58.50	718.39	879.49	871.21
34HP45-671-11	398936	0.00	0.36	3.77	48.96	410.08	449.04	443.47
34HP45-671-12	398936	0.00	0.23	3.96	47.80	515.09	572.14	569.31
34HP45-671-13	398936	0.00	0.40	2.94	41.61	949.16	1180.80	1156.46
34HP45-671-14	398936	0.86	0.00	1.40	18.81	644.72	733.86	713.62
34HP45-671-15	398936	1.63	0.00	0.74	28.20	793.99	881.82	862.58
34HP45-671-16	398936	3.18	0.00	0.18	12.19	681.84	809.18	780.89
34HP45-671-17	398936	2.39	0.00	0.00	26.61	473.07	529.24	510.07
34HP45-671-18	398936	2.69	0.00	0.14	30.71	581.48	645.65	630.98
SRM614-22	85763.00	6.79	0.38	6.52	1674.75	14.32	21.25	3.51
SRM612-22	85763.00	11.48	27.41	18.68	1663.15	18.10	25.58	12.16
SRM610-22	85763.00	99.98	429.48	127.29	2051.40	116.78	153.28	121.68
AP1-22	398936	4.04	0.26	2.52	25.02	12.42	14.52	9.71
AP2-22	398936	2.97	1.04	9.46	10.27	373.48	391.06	386.30
AP3-22	398936	2.19	4.37	8.47	10.24	545.52	568.00	564.66
AP4-22	398936	2.44	6.27	6.89	1.41	517.63	539.30	535.78
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	
raw data								
	Li	Be	B	Na	Mg24	Mg25	Mg26	
blank-19	44616.21	97.84	2364.05	878.68	2491.53	510.48	1730.01	
SRM614-19	43683.77	151.88	19346.07	16883.33	27585.80	3898.50	5752.59	
SRM612-19	49632.68	2322.85	66014.53	12361.07	147021.91	17110.18	21818.20	
SRM610-19	101108.65	17995.26	40520.43	7583.84	140400.63	16326.69	20425.35	
AP1-19	45187.93	142.76	6784.48	1040.01	57648.08	6541.00	9715.97	
AP2-19	41909.59	345.08	22459.09	1224.29	3841099.50	358543.94	438668.22	
AP3-19	41993.40	1562.73	20586.40	958.01	5900183.50	572342.38	704210.38	
AP4-19	42213.88	2303.45	19673.15	746.68	5292754.00	492106.06	606847.56	
34HP60-102-1	37962.49	124.28	8497.69	1246.81	1932569.40	192911.25	235416.56	
34HP60-102-2	38226.10	111.60	6279.04	1106.33	1189188.00	112756.23	137548.94	
34HP60-102-3	38756.22	102.52	5585.83	844.92	871817.19	85249.92	103388.59	
34HP60-102-4	40024.19	89.44	2555.85	631.40	873067.50	87603.17	105291.31	
34HP60-102-5	40964.43	95.76	3942.10	703.64	992804.44	99648.77	121214.41	
34HP60-102-6	41183.79	135.12	8823.93	1240.73	2297636.00	240547.72	293886.50	
34HP60-102-7	42141.32	103.64	3012.02	529.32	1056657.50	103574.11	124501.82	

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	42457.48	135.40	5708.87	785.96	1552929.30	153033.70	186279.64
34HP60-102-9	43209.32	155.84	6844.48	720.92	2029163.30	199890.41	244180.13
34HP60-102-10	43327.52	204.32	8820.29	1075.01	2960709.00	286868.66	351361.06
34HP60-102-11	43021.48	183.64	7592.04	921.89	2709088.80	258919.66	316921.47
34HP60-102-12	43694.16	222.92	8912.61	1028.41	3052172.00	295450.78	360283.72
34HP60-102-13	43390.00	195.12	6117.59	987.21	2272385.80	216995.11	263905.66
34HP60-102-14	43275.88	155.48	5474.83	927.33	2270312.00	216399.63	263955.81
34HP60-102-15	43431.52	130.48	5374.79	984.81	2120186.50	199513.28	244341.70
34HP60-102-16	44300.17	97.28	3392.78	635.04	1644826.00	166448.06	201812.17
34HP60-102-17	45618.66	108.76	3281.26	692.48	1564436.10	152478.34	183861.47
34HP60-102-18	45986.06	80.16	2775.46	655.44	1132125.40	112950.52	136531.05
SRM614-20	49438.44	99.00	7337.24	11430.78	29804.81	4082.78	5041.23
SRM612-20	57676.16	2195.85	16870.98	11341.66	41880.84	5450.55	6743.72
SRM610-20	109252.54	18069.54	35401.96	7255.20	119321.11	14379.80	17207.90
AP1-20	51085.77	114.12	3659.30	654.92	47327.91	5561.47	7962.52
AP2-20	48255.35	228.88	10377.62	615.76	1383495.30	131307.50	159791.53
AP3-20	48164.99	829.92	10920.30	535.96	1946370.00	184620.69	226008.70
AP4-20	48205.95	1524.33	11852.39	460.08	2810559.50	267004.81	327229.03
blank-20	49163.44	83.44	994.93	340.56	24610.54	3202.26	3628.90
blank average	46889.82	90.64	1679.49	609.62	13551.04	1856.37	2679.46
blank subtraction							
SRM614-19	-3206.06	61.24	17666.58	16273.71	14034.76	2042.13	3073.14
SRM612-19	2742.86	2232.21	64335.04	11751.45	133470.87	15253.81	19138.75
SRM610-19	54218.83	17904.62	38840.94	6974.22	126849.59	14470.32	17745.90
AP1-19	-1701.89	52.12	5104.99	430.38	44097.05	4684.63	7036.52
AP2-19	-4980.23	254.44	20779.60	614.66	3827548.46	356687.57	435988.76
AP3-19	-4896.43	1472.09	18906.91	348.38	5886632.46	570486.01	701530.92
AP4-19	-4675.95	2212.81	17993.66	137.06	5279202.96	490249.69	604168.10
34HP60-102-1	-8927.33	33.64	6818.20	637.18	1919018.36	191054.88	232737.10
34HP60-102-2	-8663.73	20.96	4599.55	496.70	1175636.96	110899.86	134869.48
34HP60-102-3	-8133.61	11.88	3906.34	235.30	858266.15	83393.55	100709.13
34HP60-102-4	-6865.64	-1.20	876.36	21.78	859516.46	85746.80	102611.85
34HP60-102-5	-5925.39	5.12	2262.61	94.02	979253.40	97792.40	118534.95
34HP60-102-6	-5706.03	44.48	7144.44	631.10	2284084.96	238691.35	291207.04
34HP60-102-7	-4748.51	13.00	1332.53	-80.30	1043106.46	101717.74	121822.36
34HP60-102-8	-4432.34	44.76	4029.38	176.34	1539378.26	151177.33	183600.18
34HP60-102-9	-3680.50	65.20	5164.99	111.30	2015612.26	198034.04	241500.67
34HP60-102-10	-3562.30	113.68	7140.80	465.38	2947157.96	285012.29	348681.60
34HP60-102-11	-3868.34	93.00	5912.55	312.26	2695537.76	257063.29	314242.01
34HP60-102-12	-3195.66	132.28	7233.12	418.78	3038620.96	293594.41	357604.26
34HP60-102-13	-3499.82	104.48	4438.10	377.58	2258834.76	215138.74	261226.20
34HP60-102-14	-3613.94	64.84	3795.34	317.70	2256760.96	214543.26	261276.35
34HP60-102-15	-3458.30	39.84	3695.30	375.18	2106635.46	197656.91	241662.24
34HP60-102-16	-2589.66	6.64	1713.29	25.42	1631274.96	164591.69	199132.71
34HP60-102-17	-1271.17	18.12	1601.77	82.86	1550885.06	150621.97	181182.01
34HP60-102-18	-903.77	-10.48	1095.97	45.82	1118574.36	111094.15	133851.59
SRM614-20	2548.61	8.36	5657.75	10821.16	16253.77	2226.41	2361.77
SRM612-20	10786.34	2105.21	15191.49	10732.04	28329.80	3594.18	4064.26
SRM610-20	62362.72	17978.90	33722.47	6645.58	105770.07	12523.43	14528.44
AP1-20	4195.94	23.48	1979.81	45.30	33776.87	3705.10	5283.07
AP2-20	1365.53	138.24	8698.13	6.14	1369944.26	129451.13	157112.07
AP3-20	1275.17	739.28	9240.81	-73.66	1932818.96	182764.32	223329.24
AP4-20	1316.13	1433.69	10172.90	-149.54	2797008.46	265148.44	324549.57
zero correction							
SRM614-19	0.00	61.24	17666.58	16273.71	14034.76	2042.13	3073.14
SRM612-19	2742.86	2232.21	64335.04	11751.45	133470.87	15253.81	19138.75
SRM610-19	54218.83	17904.62	38840.94	6974.22	126849.59	14470.32	17745.90
AP1-19	0.00	52.12	5104.99	430.38	44097.05	4684.63	7036.52
AP2-19	0.00	254.44	20779.60	614.66	3827548.46	356687.57	435988.76
AP3-19	0.00	1472.09	18906.91	348.38	5886632.46	570486.01	701530.92
AP4-19	0.00	2212.81	17993.66	137.06	5279202.96	490249.69	604168.10
34HP60-102-1	0.00	33.64	6818.20	637.18	1919018.36	191054.88	232737.10
34HP60-102-2	0.00	20.96	4599.55	496.70	1175636.96	110899.86	134869.48
34HP60-102-3	0.00	11.88	3906.34	235.30	858266.15	83393.55	100709.13
34HP60-102-4	0.00	0.00	876.36	21.78	859516.46	85746.80	102611.85
34HP60-102-5	0.00	5.12	2262.61	94.02	979253.40	97792.40	118534.95
34HP60-102-6	0.00	44.48	7144.44	631.10	2284084.96	238691.35	291207.04
34HP60-102-7	0.00	13.00	1332.53	0.00	1043106.46	101717.74	121822.36
34HP60-102-8	0.00	44.76	4029.38	176.34	1539378.26	151177.33	183600.18
34HP60-102-9	0.00	65.20	5164.99	111.30	2015612.26	198034.04	241500.67
34HP60-102-10	0.00	113.68	7140.80	465.38	2947157.96	285012.29	348681.60
34HP60-102-11	0.00	93.00	5912.55	312.26	2695537.76	257063.29	314242.01
34HP60-102-12	0.00	132.28	7233.12	418.78	3038620.96	293594.41	357604.26
34HP60-102-13	0.00	104.48	4438.10	377.58	2258834.76	215138.74	261226.20
34HP60-102-14	0.00	64.84	3795.34	317.70	2256760.96	214543.26	261276.35
34HP60-102-15	0.00	39.84	3695.30	375.18	2106635.46	197656.91	241662.24

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	0.00	6.64	1713.29	25.42	1631274.96	164591.69	199132.71
34HP60-102-17	0.00	18.12	1601.77	82.86	1550885.06	150621.97	181182.01
34HP60-102-18	0.00	0.00	1095.97	45.82	1118574.36	111094.15	133851.59
SRM614-20	2548.61	8.36	5657.75	10821.16	16253.77	2226.41	2361.77
SRM612-20	10786.34	2105.21	15191.49	10732.04	28329.80	3594.18	4064.26
SRM610-20	62362.72	17978.90	33722.47	6645.58	105770.07	12523.43	14528.44
AP1-20	4195.94	23.48	1979.81	45.30	33776.87	3705.10	5283.07
AP2-20	1365.53	138.24	8698.13	6.14	1369944.26	129451.13	157112.07
AP3-20	1275.17	739.28	9240.81	0.00	1932818.96	182764.32	223329.24
AP4-20	1316.13	1433.69	10172.90	0.00	2797008.46	265148.44	324549.57

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-19	0.000000	0.000026	0.007455	0.006867	0.005922	0.000862	0.001297
SRM612-19	0.001457	0.001186	0.034176	0.006243	0.070901	0.008103	0.010167
SRM610-19	0.056405	0.018627	0.040407	0.007255	0.131964	0.015054	0.018461
AP1-19	0.000000	0.000004	0.000441	0.000037	0.003807	0.000404	0.000607
AP2-19	0.000000	0.000016	0.001280	0.000038	0.235763	0.021971	0.026855
AP3-19	0.000000	0.000071	0.000913	0.000017	0.284356	0.027558	0.033888
AP4-19	0.000000	0.000108	0.000878	0.000007	0.257693	0.023930	0.029491
34HP60-102-1	0.000000	0.000003	0.000568	0.000053	0.159979	0.015927	0.019402
34HP60-102-2	0.000000	0.000003	0.000573	0.000062	0.146468	0.013817	0.016803
34HP60-102-3	0.000000	0.000002	0.000677	0.000041	0.148816	0.014460	0.017462
34HP60-102-4	0.000000	0.000000	0.000230	0.000006	0.225747	0.022521	0.026950
34HP60-102-5	0.000000	0.000001	0.000402	0.000017	0.174132	0.017390	0.021078
34HP60-102-6	0.000000	0.000004	0.000606	0.000054	0.193690	0.020241	0.024694
34HP60-102-7	0.000000	0.000003	0.000319	0.000000	0.249418	0.024322	0.029129
34HP60-102-8	0.000000	0.000008	0.000697	0.000030	0.266139	0.026137	0.031742
34HP60-102-9	0.000000	0.000010	0.000777	0.000017	0.303082	0.029778	0.036314
34HP60-102-10	0.000000	0.000010	0.000617	0.000040	0.254568	0.024619	0.030118
34HP60-102-11	0.000000	0.000009	0.000558	0.000029	0.254388	0.024260	0.029656
34HP60-102-12	0.000000	0.000012	0.000631	0.000037	0.265135	0.025618	0.031203
34HP60-102-13	0.000000	0.000008	0.000352	0.000030	0.179340	0.017081	0.020740
34HP60-102-14	0.000000	0.000005	0.000296	0.000025	0.176066	0.016738	0.020384
34HP60-102-15	0.000000	0.000003	0.000310	0.000031	0.176853	0.016593	0.020288
34HP60-102-16	0.000000	0.000001	0.000205	0.000003	0.195428	0.019718	0.023856
34HP60-102-17	0.000000	0.000002	0.000182	0.000009	0.176403	0.017132	0.020608
34HP60-102-18	0.000000	0.000000	0.000165	0.000007	0.168574	0.016742	0.020172
SRM614-20	0.001767	0.000006	0.003922	0.007502	0.011268	0.001543	0.001637
SRM612-20	0.007232	0.001412	0.010186	0.007196	0.018995	0.002410	0.002725
SRM610-20	0.079020	0.022781	0.042730	0.008421	0.134022	0.015869	0.018409
AP1-20	0.000411	0.000002	0.000194	0.000004	0.003308	0.000363	0.000517
AP2-20	0.000126	0.000013	0.000800	0.000001	0.125960	0.011902	0.014446
AP3-20	0.000091	0.000053	0.000659	0.000000	0.137902	0.013040	0.015934
AP4-20	0.000084	0.000092	0.000651	0.000000	0.178948	0.016964	0.020764

standardize signal averages AP							
AP1	0.000205	0.000003	0.000317	0.000021	0.003557	0.000384	0.000562
AP2	0.000063	0.000014	0.001040	0.000019	0.180861	0.016937	0.020650
AP3	0.000045	0.000062	0.000786	0.000008	0.211129	0.020299	0.024911
AP4	0.000042	0.000100	0.000765	0.000003	0.218320	0.020447	0.025128

linest from std sig ave							
	0.017361	0.149843	0.030283	2.883456	0.006756	0.071407	0.058263

standardize signal averages SRM							
srm614-2	0.000883	0.000016	0.005689	0.007185	0.008595	0.001203	0.001467
srm612-2	0.004345	0.001299	0.022181	0.006719	0.044948	0.005256	0.006446
srm610-2	0.067713	0.020704	0.041568	0.007838	0.132993	0.015461	0.018435

linest from std sig ave							
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Appendix A. Raw trace element datasheets from laser ablation.

	0.083552	0.262518	0.080685	149.780721	0.038690	0.332228	0.277366
concentration data							
	i.s. correction						
SRM614-19	85763.00	0.00	0.33	19.36	1698.21	3.43	5.28
SRM612-19	85763.00	2.17	15.24	88.76	1543.73	41.08	49.62
SRM610-19	85763.00	83.98	239.37	104.94	1794.22	76.46	92.19
AP1-19	398936	0.00	0.27	5.32	42.74	10.26	11.52
AP2-19	398936	0.00	0.94	15.46	43.55	635.40	625.87
AP3-19	398936	0.00	4.25	11.03	19.36	766.37	785.02
AP4-19	398936	0.00	6.46	10.61	7.70	694.51	681.70
34HP60-102-1	398936	0.00	0.17	6.87	61.10	431.16	453.71
34HP60-102-2	398936	0.00	0.16	6.92	71.18	394.74	393.59
34HP60-102-3	398936	0.00	0.12	8.18	46.93	401.07	411.91
34HP60-102-4	398936	0.00	0.00	2.78	6.58	608.41	641.55
34HP60-102-5	398936	0.00	0.05	4.86	19.23	469.30	495.37
34HP60-102-6	398936	0.00	0.23	7.32	61.56	522.01	576.60
34HP60-102-7	398936	0.00	0.19	3.85	0.00	672.21	692.85
34HP60-102-8	398936	0.00	0.46	8.42	35.07	717.27	744.55
34HP60-102-9	398936	0.00	0.59	9.38	19.25	816.83	848.27
34HP60-102-10	398936	0.00	0.59	7.45	46.24	686.09	701.30
34HP60-102-11	398936	0.00	0.52	6.74	33.90	685.60	691.09
34HP60-102-12	398936	0.00	0.69	7.62	42.03	714.57	729.76
34HP60-102-13	398936	0.00	0.50	4.26	34.48	483.34	486.58
34HP60-102-14	398936	0.00	0.30	3.58	28.51	474.52	476.81
34HP60-102-15	398936	0.00	0.20	3.75	36.23	476.64	472.69
34HP60-102-16	398936	0.00	0.05	2.48	3.50	526.70	561.71
34HP60-102-17	398936	0.00	0.12	2.20	10.84	475.42	488.04
34HP60-102-18	398936	0.00	0.00	2.00	7.94	454.32	476.93
SRM614-20	85763.00	2.63	0.07	10.19	1855.16	6.53	9.45
SRM612-20	85763.00	10.77	18.14	26.46	1779.51	11.01	14.76
SRM610-20	85763.00	117.65	292.76	110.98	2082.37	77.65	97.18
AP1-20	398936	2.85	0.14	2.34	5.10	8.91	10.34
AP2-20	398936	0.87	0.76	9.66	0.65	339.47	339.06
AP3-20	398936	0.63	3.15	7.97	0.00	371.66	371.46
AP4-20	398936	0.58	5.48	7.86	0.00	482.28	483.24
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-17	18121.98	70.52	6387.16	612.96	3254.94	780.80	2819.70
SRM614-17	19773.47	99.96	32256.10	12651.99	33598.15	4636.63	7334.28
SRM612-17	29936.53	1823.93	84558.63	11219.86	222918.78	25699.15	32533.82
SRM610-17	94308.57	17859.42	59675.34	8212.37	241382.72	27870.12	35178.08
AP1-17	27885.52	133.48	7598.16	1063.13	173664.70	20747.84	28079.64
AP2-17	27970.08	262.04	20687.96	858.48	3682962.80	336421.41	415582.97
AP3-17	28741.56	999.41	13841.52	945.37	3244916.50	285327.72	352692.34
AP4-17	32342.58	2105.97	19419.47	833.04	5517059.00	496603.00	615526.63
34HP60-24-1	29307.73	88.24	5043.31	829.28	660767.94	64949.97	80014.61
34HP60-24-2	30422.05	100.72	5519.11	826.20	513757.97	50443.00	61609.67
34HP60-24-3	31971.02	101.52	4409.90	741.44	424475.47	45073.45	55003.91
34HP60-24-4	33105.55	152.80	6540.28	793.24	774845.56	79096.20	97127.51
34HP60-24-5	34185.71	209.72	11662.63	803.92	1400459.60	136920.17	166710.63
34HP60-24-6	34892.48	227.48	11766.55	766.76	1436932.90	140998.31	171444.77
34HP60-24-7	35249.56	200.68	5973.55	736.32	1152415.90	117080.90	143343.97
34HP60-24-8	36270.61	179.24	5528.55	714.64	1233510.10	123637.45	150464.25
34HP60-24-9	36930.85	196.04	6331.76	804.72	1188851.60	119489.79	146082.47
34HP60-24-10	37909.90	218.92	5440.35	570.28	1309615.90	131101.81	159453.81
34HP60-24-11	39104.22	239.16	5997.31	665.56	1406931.00	135382.41	166427.14
34HP60-24-12	40476.15	264.76	6272.72	679.28	1613357.50	156962.44	191619.97
SRM614-18	44690.89	122.68	6652.20	9771.78	26330.47	3689.22	4665.23
SRM612-18	54536.83	2278.61	20572.56	11659.15	48494.63	6419.24	7892.56
SRM610-18	104557.55	18365.18	36386.84	7086.68	118489.79	14682.24	17682.94
AP1-18	47885.91	142.84	4733.51	697.32	51013.21	6027.91	8626.33
AP2-18	45702.74	249.04	11779.07	602.96	1551534.60	150261.25	183812.31
AP3-18	46755.47	854.64	10090.46	542.16	1717547.60	166140.70	202365.55
AP4-18	48586.19	1619.05	13321.96	533.36	3056430.00	297149.00	362492.00
blank-18	43473.00	72.12	1269.61	347.36	14787.52	1920.25	2280.81
blank average	30797.49	71.32	3828.38	480.16	9021.23	1350.53	2550.25
blank subtraction							

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	-11024.02	28.64	28427.72	12171.83	24576.92	3286.10	4784.03
SRM612-17	-860.96	1752.61	80730.25	10739.70	213897.55	24348.62	29983.57
SRM610-17	63511.08	17788.10	55846.95	7732.20	232361.49	26519.59	32627.82
AP1-17	-2911.98	62.16	3769.78	582.96	164643.47	19397.31	25529.38
AP2-17	-2827.42	190.72	16859.58	378.32	3673941.57	335070.88	413032.72
AP3-17	-2055.93	928.09	10013.14	465.20	3235895.27	283977.19	350142.09
AP4-17	1545.09	2034.65	15591.09	352.88	5508037.77	495252.47	612976.38
34HP60-24-1	-1489.77	16.92	1214.93	349.12	651746.71	63599.44	77464.35
34HP60-24-2	-375.44	29.40	1690.73	346.04	504736.74	49092.48	59059.41
34HP60-24-3	1173.53	30.20	581.52	261.28	415454.24	43722.93	52453.66
34HP60-24-4	2308.05	81.48	2711.90	313.08	765824.33	77745.68	94577.25
34HP60-24-5	3388.22	138.40	7834.24	323.76	1391438.37	135569.64	164160.38
34HP60-24-6	4094.98	156.16	7938.17	286.60	1427911.67	139647.78	168894.52
34HP60-24-7	4452.07	129.36	2145.17	256.16	1143394.67	115730.37	140793.72
34HP60-24-8	5473.11	107.92	1700.17	234.48	1224488.87	122286.92	147914.00
34HP60-24-9	6133.36	124.72	2503.37	324.56	1179830.37	118139.26	143532.22
34HP60-24-10	7112.40	147.60	1611.97	90.12	1300594.67	129751.28	156903.56
34HP60-24-11	8306.73	167.84	2168.93	185.40	1397909.77	134031.88	163876.89
34HP60-24-12	9678.66	193.44	2444.33	199.12	1604336.27	155611.91	189069.72
SRM614-18	13893.40	51.36	2823.82	9291.61	17309.24	2338.69	2114.97
SRM612-18	23739.34	2207.29	16744.18	11178.98	39473.40	5068.71	5342.31
SRM610-18	73760.06	18293.86	32558.46	6606.52	109468.56	13331.72	15132.68
AP1-18	17088.42	71.52	905.13	217.16	41991.98	4677.39	6076.07
AP2-18	14905.25	177.72	7950.68	122.80	1542513.37	148910.72	181262.06
AP3-18	15957.97	783.32	6262.08	62.00	1708526.37	164790.17	199815.30
AP4-18	17788.70	1547.73	9493.57	53.20	3047408.77	295798.47	359941.75

zero correction

SRM614-17	0.00	28.64	28427.72	12171.83	24576.92	3286.10	4784.03
SRM612-17	0.00	1752.61	80730.25	10739.70	213897.55	24348.62	29983.57
SRM610-17	63511.08	17788.10	55846.95	7732.20	232361.49	26519.59	32627.82
AP1-17	0.00	62.16	3769.78	582.96	164643.47	19397.31	25529.38
AP2-17	0.00	190.72	16859.58	378.32	3673941.57	335070.88	413032.72
AP3-17	0.00	928.09	10013.14	465.20	3235895.27	283977.19	350142.09
AP4-17	1545.09	2034.65	15591.09	352.88	5508037.77	495252.47	612976.38
34HP60-24-1	0.00	16.92	1214.93	349.12	651746.71	63599.44	77464.35
34HP60-24-2	0.00	29.40	1690.73	346.04	504736.74	49092.48	59059.41
34HP60-24-3	1173.53	30.20	581.52	261.28	415454.24	43722.93	52453.66
34HP60-24-4	2308.05	81.48	2711.90	313.08	765824.33	77745.68	94577.25
34HP60-24-5	3388.22	138.40	7834.24	323.76	1391438.37	135569.64	164160.38
34HP60-24-6	4094.98	156.16	7938.17	286.60	1427911.67	139647.78	168894.52
34HP60-24-7	4452.07	129.36	2145.17	256.16	1143394.67	115730.37	140793.72
34HP60-24-8	5473.11	107.92	1700.17	234.48	1224488.87	122286.92	147914.00
34HP60-24-9	6133.36	124.72	2503.37	324.56	1179830.37	118139.26	143532.22
34HP60-24-10	7112.40	147.60	1611.97	90.12	1300594.67	129751.28	156903.56
34HP60-24-11	8306.73	167.84	2168.93	185.40	1397909.77	134031.88	163876.89
34HP60-24-12	9678.66	193.44	2444.33	199.12	1604336.27	155611.91	189069.72
SRM614-18	13893.40	51.36	2823.82	9291.61	17309.24	2338.69	2114.97
SRM612-18	23739.34	2207.29	16744.18	11178.98	39473.40	5068.71	5342.31
SRM610-18	73760.06	18293.86	32558.46	6606.52	109468.56	13331.72	15132.68
AP1-18	17088.42	71.52	905.13	217.16	41991.98	4677.39	6076.07
AP2-18	14905.25	177.72	7950.68	122.80	1542513.37	148910.72	181262.06
AP3-18	15957.97	783.32	6262.08	62.00	1708526.37	164790.17	199815.30
AP4-18	17788.70	1547.73	9493.57	53.20	3047408.77	295798.47	359941.75

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-17	0.000000	0.000013	0.013218	0.005659	0.011427	0.001528	0.002224
SRM612-17	0.000000	0.000895	0.041215	0.005483	0.109200	0.012431	0.015307
SRM610-17	0.049199	0.013780	0.043262	0.005990	0.180001	0.020544	0.025275
AP1-17	0.000000	0.000004	0.000236	0.000037	0.010322	0.001216	0.001601

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000000	0.000012	0.001099	0.000025	0.239381	0.021832	0.026912
AP3-17	0.000000	0.000056	0.000603	0.000028	0.194949	0.017108	0.021095
AP4-17	0.000076	0.000100	0.000764	0.000017	0.269810	0.024260	0.030027
34HP60-24-1	0.000000	0.000004	0.000253	0.000073	0.135820	0.013254	0.016143
34HP60-24-2	0.000000	0.000006	0.000326	0.000067	0.097231	0.009457	0.011377
34HP60-24-3	0.000208	0.000005	0.000103	0.000046	0.073759	0.007763	0.009313
34HP60-24-4	0.000283	0.000010	0.000333	0.000038	0.093920	0.009535	0.011599
34HP60-24-5	0.000301	0.000012	0.000695	0.000029	0.123419	0.012025	0.014561
34HP60-24-6	0.000353	0.000013	0.000684	0.000025	0.122961	0.012025	0.014544
34HP60-24-7	0.000457	0.000013	0.000220	0.000026	0.117431	0.011886	0.014460
34HP60-24-8	0.000537	0.000011	0.000167	0.000023	0.120182	0.012002	0.014518
34HP60-24-9	0.000541	0.000011	0.000221	0.000029	0.104092	0.010423	0.012663
34HP60-24-10	0.000669	0.000014	0.000152	0.000008	0.122379	0.012209	0.014764
34HP60-24-11	0.000707	0.000014	0.000185	0.000016	0.118940	0.011404	0.013943
34HP60-24-12	0.000750	0.000015	0.000189	0.000015	0.124259	0.012052	0.014644
SRM614-18	0.011316	0.000042	0.002300	0.007568	0.014098	0.001905	0.001723
SRM612-18	0.015665	0.001457	0.011049	0.007377	0.026048	0.003345	0.003525
SRM610-18	0.090770	0.022513	0.040067	0.008130	0.134714	0.016406	0.018623
AP1-18	0.001510	0.000006	0.000080	0.000019	0.003711	0.000413	0.000537
AP2-18	0.001178	0.000014	0.000628	0.000010	0.121890	0.011767	0.014323
AP3-18	0.001145	0.000056	0.000449	0.000004	0.122544	0.011820	0.014332
AP4-18	0.001097	0.000095	0.000585	0.000003	0.187851	0.018234	0.022188

standardize signal averages AP

AP1	0.000755	0.000005	0.000158	0.000028	0.007016	0.000815	0.001069
AP2	0.000589	0.000013	0.000863	0.000017	0.180635	0.016799	0.020618
AP3	0.000572	0.000056	0.000526	0.000016	0.158746	0.014464	0.017713
AP4	0.000586	0.000098	0.000674	0.000010	0.228831	0.021247	0.026107

linest from std sig ave

	0.006810	0.156519	0.038338	3.225205	0.007179	0.077536	0.063163
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standardize signal averages SRM

srM614-2	0.005658	0.000028	0.007759	0.006614	0.012763	0.001716	0.001973
srM612-2	0.007833	0.001176	0.026132	0.006430	0.067624	0.007888	0.009416
srM610-2	0.069985	0.018146	0.041665	0.007060	0.157357	0.018475	0.021949

linest from std sig ave

	0.080010	0.299489	0.074112	162.383320	0.031174	0.265685	0.223432
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concentration data

i.s. correction

SRM614-17	85763.00	0.00	0.18	43.46	1565.41	7.04	10.16	12.05
SRM612-17	85763.00	0.00	12.01	135.51	1516.58	67.23	82.66	82.92
SRM610-17	85763.00	28.73	184.97	142.24	1656.80	110.82	136.61	136.92
AP1-17	398936	0.00	0.24	3.61	47.03	29.56	37.62	40.33
AP2-17	398936	0.00	0.78	16.80	31.72	685.55	675.31	678.12
AP3-17	398936	0.00	3.49	9.23	36.06	558.30	529.20	531.54
AP4-17	398936	0.21	6.22	11.68	22.24	772.69	750.41	756.61
34HP60-24-1	398936	0.00	0.22	3.87	93.61	388.96	409.96	406.77
34HP60-24-2	398936	0.00	0.35	4.98	85.77	278.45	292.53	286.68
34HP60-24-3	398936	0.57	0.33	1.58	59.68	211.23	240.11	234.66
34HP60-24-4	398936	0.77	0.62	5.09	49.40	268.97	294.93	292.27
34HP60-24-5	398936	0.82	0.77	10.63	36.95	353.45	371.96	366.90
34HP60-24-6	398936	0.96	0.84	10.45	31.75	352.14	371.97	366.48
34HP60-24-7	398936	1.24	0.83	3.37	33.85	336.30	367.66	364.36
34HP60-24-8	398936	1.46	0.66	2.55	29.61	344.18	371.26	365.81
34HP60-24-9	398936	1.47	0.69	3.38	36.84	298.10	322.40	319.09
34HP60-24-10	398936	1.82	0.87	2.32	10.91	350.47	377.65	372.02
34HP60-24-11	398936	1.92	0.89	2.82	20.30	340.62	352.75	351.34
34HP60-24-12	398936	2.04	0.94	2.90	19.84	355.86	372.81	368.99
SRM614-18	85763.00	6.61	0.56	7.56	2093.28	8.68	12.67	9.33
SRM612-18	85763.00	9.15	19.55	36.33	2040.49	16.04	22.24	19.10
SRM610-18	85763.00	53.01	302.20	131.74	2248.81	82.94	109.10	100.88
AP1-18	398936	4.10	0.39	1.22	24.69	10.63	12.78	13.53
AP2-18	398936	3.20	0.88	9.61	12.49	349.07	363.98	360.92
AP3-18	398936	3.11	3.51	6.87	5.72	350.95	365.60	361.13
AP4-18	398936	2.98	5.96	8.95	4.22	537.97	564.01	559.09

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

Li Be B Na Mg24 Mg25 Mg26

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-15	31142.46	58.96	2757.46	802.36	2420.69	555.24	1221.29
SRM614-15	30465.13	135.28	21512.76	20174.83	32012.54	4273.58	5922.95
SRM612-15	41316.83	2857.90	87655.73	21278.92	428622.22	47944.47	58677.41
SRM610-15	122252.29	24171.14	85467.96	13535.88	318893.56	35066.72	42067.12
AP1-15	32110.70	145.92	6824.40	1173.25	47610.03	5225.83	8333.53
AP2-15	31879.02	295.52	13185.79	939.37	1117586.40	102999.98	126368.95
AP3-15	33573.19	994.73	15249.33	911.29	2648614.50	247637.55	305450.00
AP4-15	33581.19	1463.17	12908.47	803.40	2201368.30	203987.42	252120.14
34BV166-1	33907.75	107.44	2043.89	959.37	676869.44	69545.31	84079.99
34BV166-2	35268.12	94.24	2269.65	932.45	586377.88	62314.07	75045.27
34BV166-3	36717.05	93.12	1893.77	848.76	457238.81	50277.60	59884.38
34BV166-4	37023.97	64.00	1983.93	780.52	515415.44	55931.04	67631.74
34BV166-5	38339.18	86.80	2046.09	794.28	660927.63	71971.81	86133.93
34BV166-6	39745.58	103.60	2306.89	866.36	862333.00	92253.16	110596.30
SRM614-16	45105.06	129.28	7854.32	13027.07	21083.80	3377.94	3970.30
SRM612-16	55678.83	2933.62	19609.23	16444.97	57603.48	7849.20	9602.37
SRM610-16	112898.31	22368.93	38378.02	9342.81	136051.69	17018.30	20477.80
AP1-16	46547.26	134.28	3918.38	1002.29	40695.43	4983.63	7454.72
AP2-16	42922.08	219.80	8299.05	845.20	743639.31	77076.95	94318.06
AP3-16	42908.48	827.72	11206.94	763.64	1791465.80	181090.91	220541.64
AP4-16	43149.48	1198.53	9113.69	696.96	1410389.30	142423.84	174393.22
blank-16	42586.64	96.12	1123.69	621.84	11533.39	1665.93	1735.57
blank average	36864.55	77.54	1940.57	712.10	6977.04	1110.59	1478.43
blank subtraction							
SRM614-15	-6399.42	57.74	19572.19	19462.73	25035.50	3163.00	4444.53
SRM612-15	4452.28	2780.36	85715.16	20566.82	421645.18	46833.88	57198.98
SRM610-15	85387.74	24093.60	83527.39	12823.77	311916.52	33956.13	40588.69
AP1-15	-4753.85	68.38	4883.83	461.14	40632.99	4115.24	6855.10
AP2-15	-4985.53	217.98	11245.22	227.26	1110609.36	101889.39	124890.52
AP3-15	-3291.36	917.19	13308.76	199.18	2641637.46	246526.96	303971.57
AP4-15	-3283.36	1385.63	10967.90	91.30	2194391.26	202876.83	250641.71
34BV166-1	-2956.80	29.90	103.32	247.26	669892.40	68434.73	82601.56
34BV166-2	-1596.43	16.70	329.08	220.34	579400.84	61203.48	73566.84
34BV166-3	-147.50	15.58	-46.80	136.66	450261.77	49167.02	58405.95
34BV166-4	159.42	-13.54	43.36	68.42	508438.40	54820.45	66153.31
34BV166-5	1474.63	9.26	105.52	82.18	653950.59	70861.22	84655.50
34BV166-6	2881.03	26.06	366.32	154.26	855355.96	91142.57	109117.87
SRM614-16	8240.51	51.74	5913.75	12314.97	14106.76	2267.35	2491.87
SRM612-16	18814.28	2856.08	17668.66	15732.87	50626.44	6738.62	8123.95
SRM610-16	76033.76	22291.39	36437.45	8630.71	129074.65	15907.71	18999.37
AP1-16	9682.71	56.74	1977.81	290.18	33718.39	3873.04	5976.29
AP2-16	6057.53	142.26	6358.48	133.10	736662.27	75966.37	92839.63
AP3-16	6043.94	750.18	9266.37	51.54	1784488.76	179980.32	219063.21
AP4-16	6284.93	1120.99	7173.12	-15.14	1403412.26	141313.25	172914.79
zero correction							
SRM614-15	0.00	57.74	19572.19	19462.73	25035.50	3163.00	4444.53
SRM612-15	4452.28	2780.36	85715.16	20566.82	421645.18	46833.88	57198.98
SRM610-15	85387.74	24093.60	83527.39	12823.77	311916.52	33956.13	40588.69
AP1-15	0.00	68.38	4883.83	461.14	40632.99	4115.24	6855.10
AP2-15	0.00	217.98	11245.22	227.26	1110609.36	101889.39	124890.52
AP3-15	0.00	917.19	13308.76	199.18	2641637.46	246526.96	303971.57
AP4-15	0.00	1385.63	10967.90	91.30	2194391.26	202876.83	250641.71
34BV166-1	0.00	29.90	103.32	247.26	669892.40	68434.73	82601.56
34BV166-2	0.00	16.70	329.08	220.34	579400.84	61203.48	73566.84
34BV166-3	0.00	15.58	0.00	136.66	450261.77	49167.02	58405.95
34BV166-4	159.42	0.00	43.36	68.42	508438.40	54820.45	66153.31
34BV166-5	1474.63	9.26	105.52	82.18	653950.59	70861.22	84655.50
34BV166-6	2881.03	26.06	366.32	154.26	855355.96	91142.57	109117.87
SRM614-16	8240.51	51.74	5913.75	12314.97	14106.76	2267.35	2491.87
SRM612-16	18814.28	2856.08	17668.66	15732.87	50626.44	6738.62	8123.95
SRM610-16	76033.76	22291.39	36437.45	8630.71	129074.65	15907.71	18999.37
AP1-16	9682.71	56.74	1977.81	290.18	33718.39	3873.04	5976.29
AP2-16	6057.53	142.26	6358.48	133.10	736662.27	75966.37	92839.63
AP3-16	6043.94	750.18	9266.37	51.54	1784488.76	179980.32	219063.21
AP4-16	6284.93	1120.99	7173.12	0.00	1403412.26	141313.25	172914.79
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373	
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903	
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425	
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084	
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136	
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336	
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632	
standardized signal								
SRM614-15	0.000000	0.000020	0.006873	0.006834	0.008791	0.001111	0.001561	
SRM612-15	0.001459	0.000911	0.028091	0.006740	0.138186	0.015349	0.018746	
SRM610-15	0.045864	0.012941	0.044865	0.006888	0.167539	0.018239	0.021801	
AP1-15	0.000000	0.000005	0.000364	0.000034	0.003027	0.000307	0.000511	
AP2-15	0.000000	0.000015	0.000793	0.000016	0.078359	0.007189	0.008812	
AP3-15	0.000000	0.000049	0.000713	0.000011	0.141445	0.013200	0.016276	
AP4-15	0.000000	0.000082	0.000646	0.000005	0.129295	0.011954	0.014768	
34BV166-1	0.000000	0.000007	0.000025	0.000059	0.161084	0.016456	0.019863	
34BV166-2	0.000000	0.000005	0.000093	0.000062	0.163370	0.017257	0.020743	
34BV166-3	0.000000	0.000005	0.000000	0.000042	0.138626	0.015137	0.017982	
34BV166-4	0.000055	0.000000	0.000015	0.000023	0.174613	0.018827	0.022719	
34BV166-5	0.000480	0.000003	0.000034	0.000027	0.212685	0.023046	0.027533	
34BV166-6	0.000679	0.000006	0.000086	0.000036	0.201631	0.021485	0.025722	
SRM614-16	0.004786	0.000030	0.003435	0.007152	0.008193	0.001317	0.001447	
SRM612-16	0.008123	0.001233	0.007628	0.006793	0.021857	0.002909	0.003507	
SRM610-16	0.068211	0.019998	0.032688	0.007743	0.115794	0.014271	0.017045	
AP1-16	0.000808	0.000005	0.000165	0.000024	0.002814	0.000323	0.000499	
AP2-16	0.000506	0.000012	0.000531	0.000011	0.061486	0.006341	0.007749	
AP3-16	0.000371	0.000046	0.000569	0.000003	0.109503	0.011044	0.013443	
AP4-16	0.000433	0.000077	0.000494	0.000000	0.096602	0.009727	0.011902	
standardize signal averages AP								
AP1	0.000404	0.000005	0.000264	0.000029	0.002921	0.000315	0.000505	
AP2	0.000253	0.000014	0.000662	0.000014	0.069922	0.006765	0.008280	
AP3	0.000185	0.000048	0.000641	0.000007	0.125474	0.012122	0.014859	
AP4	0.000216	0.000079	0.000570	0.000003	0.112949	0.010840	0.013335	
linest from std sig ave								
	0.012715	0.189484	0.041842	4.081923	0.012926	0.134066	0.109256	
standardize signal averages SRM								
srm614-2	0.002393	0.000025	0.005154	0.006993	0.008492	0.001214	0.001504	
srm612-2	0.004791	0.001072	0.017860	0.006766	0.080022	0.009129	0.011127	
srm610-2	0.057037	0.016470	0.038777	0.007315	0.141667	0.016255	0.019423	
linest from std sig ave								
	0.098922	0.329973	0.091054	154.979425	0.031796	0.277581	0.230444	
concentration data i.s. correction								
SRM614-15	85763.00	0.00	0.33	24.66	2392.49	9.75	12.77	14.62
SRM612-15	85763.00	1.59	14.81	100.81	2359.66	153.19	176.48	175.65
SRM610-15	85763.00	50.01	210.31	161.00	2411.34	185.72	209.71	204.28
AP1-15	398936	0.00	0.39	6.07	55.95	15.61	16.40	22.26
AP2-15	398936	0.00	1.16	13.24	26.11	404.06	384.46	384.06
AP3-15	398936	0.00	3.71	11.90	17.37	729.36	705.99	709.41
AP4-15	398936	0.00	6.17	10.79	8.76	666.71	639.33	643.68
34BV166-1	398936	0.00	0.54	0.41	96.82	830.63	880.13	865.73
34BV166-2	398936	0.00	0.36	1.55	101.17	842.42	922.98	904.12
34BV166-3	398936	0.00	0.36	0.00	68.52	714.83	809.61	783.76
34BV166-4	398936	0.28	0.00	0.25	38.26	900.40	1006.94	990.24
34BV166-5	398936	2.43	0.23	0.57	43.52	1096.72	1232.60	1200.04
34BV166-6	398936	3.44	0.46	1.44	59.22	1039.71	1149.09	1121.12
SRM614-16	85763.00	5.22	0.49	12.33	2503.89	9.08	15.14	13.56
SRM612-16	85763.00	8.86	20.04	27.37	2377.91	24.23	33.45	32.87
SRM610-16	85763.00	74.38	324.98	117.30	2710.55	128.36	164.09	159.71
AP1-16	398936	4.10	0.36	2.76	39.44	14.51	17.29	21.74
AP2-16	398936	2.56	0.90	8.86	18.09	317.05	339.12	337.74
AP3-16	398936	1.88	3.48	9.49	5.15	564.65	590.69	585.91
AP4-16	398936	2.19	5.83	8.24	0.00	498.13	520.24	518.78
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	

Appendix A. Raw trace element datasheets from laser ablation.

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-13	28675.40	63.92	2191.61	807.12	2962.54	765.64	1104.69
SRM614-13	28039.32	126.48	18050.58	21052.76	21234.80	3347.10	4407.42
SRM612-13	38783.10	2861.30	21906.32	19303.43	42130.60	6039.15	7796.60
SRM610-13	99634.48	18721.27	37984.09	9955.74	135487.00	16696.98	20010.27
AP1-13	34218.51	193.40	5400.15	1150.33	69288.23	8512.25	12386.07
AP2-13	31988.90	291.48	11100.10	957.81	1475294.40	143402.05	175578.75
AP3-13	32765.06	833.00	12795.67	848.08	2047170.40	202654.98	248745.31
AP4-13	34008.27	1260.57	11936.67	719.08	1909666.00	190163.19	233749.92
W3-1	33400.35	87.36	2987.62	1080.93	1267001.40	239661.80	281708.19
W3-2	33872.55	85.76	3220.46	866.56	549914.06	69089.83	82543.95
W3-3	35347.52	98.68	3044.78	938.21	563312.06	68683.87	82855.95
W3-4	36740.97	93.44	2871.90	933.17	642726.13	72944.29	87434.09
W3-5	37390.21	107.04	3201.90	1012.73	752824.38	82413.63	98638.59
W3-6	38218.86	101.28	3121.46	1008.69	813765.13	88458.86	106124.12
W3-7	39237.14	88.16	2489.13	973.37	529295.31	62997.59	75992.43
W3-8	39557.34	113.32	2743.34	1000.49	567224.25	64000.84	77136.35
W3-9	40163.95	98.96	2773.02	939.57	582185.69	65512.33	79053.45
W3-10	40432.39	74.04	3924.18	1077.77	1715920.60	183713.47	222936.77
W3-11	40978.79	88.68	4266.26	1109.13	1913750.80	201862.56	245441.50
W3-12	41196.47	115.68	4194.18	1174.13	1798605.10	189002.22	229318.17
SRM614-14	46591.98	139.36	6441.20	18558.58	26373.87	4184.98	4910.75
SRM612-14	58137.81	3014.22	12051.67	19474.11	38923.98	5777.23	7115.08
SRM610-14	108822.21	18981.39	30888.37	8874.37	113274.91	15044.25	17444.90
AP1-14	46937.15	131.24	3180.70	855.80	45336.30	5590.03	8019.29
AP2-14	43422.56	257.56	7748.84	742.12	887705.13	93248.52	113254.32
AP3-14	44218.61	774.60	9192.01	705.40	1640232.60	168670.42	205044.23
AP4-14	44525.09	1150.57	8243.65	684.04	1484265.30	152075.53	185602.69
blank-14	45453.30	80.16	932.13	458.40	17273.70	2417.65	2466.89
blank average	37064.35	72.04	1561.87	632.76	10118.12	1591.65	1785.79
blank subtraction							
SRM614-13	-9025.03	54.44	16488.71	20420.00	11116.68	1755.45	2621.63
SRM612-13	1718.75	2789.26	20344.46	18670.66	32012.48	4447.50	6010.81
SRM610-13	62570.13	18649.23	36422.23	9322.97	125368.88	15105.33	18224.48
AP1-13	-2845.84	121.36	3838.28	517.56	59170.12	6920.60	10600.28
AP2-13	-5075.45	219.44	9538.23	325.04	1465176.28	141810.40	173792.96
AP3-13	-4299.29	760.96	11233.80	215.32	2037052.28	201063.33	246959.52
AP4-13	-3056.08	1188.53	10374.80	86.32	1899547.88	188571.54	231964.13
W3-1	-3664.00	15.32	1425.75	448.16	1256883.28	238070.15	279922.40
W3-2	-3191.80	13.72	1658.59	233.80	539795.94	67498.18	80758.15
W3-3	-1716.83	26.64	1482.91	305.44	553193.94	67092.22	81070.15
W3-4	-323.38	21.40	1310.03	300.40	632608.01	71352.64	85648.30
W3-5	325.86	35.00	1640.03	379.96	742706.26	80821.98	96852.80
W3-6	1154.51	29.24	1559.59	375.92	803647.01	86867.21	104338.33
W3-7	2172.79	16.12	927.27	340.60	519177.19	61405.95	74206.64
W3-8	2492.99	41.28	1181.47	367.72	557106.13	62409.19	75350.56
W3-9	3099.60	26.92	1211.15	306.80	572067.57	63920.68	77267.65
W3-10	3368.04	2.00	2362.31	445.00	1705802.48	182121.82	221150.98
W3-11	3914.44	16.64	2704.40	476.36	1903632.68	200270.91	243655.71
W3-12	4132.12	43.64	2632.31	541.36	1788486.98	187410.57	227532.38
SRM614-14	9527.63	67.32	4879.33	17925.82	16255.75	2593.33	3124.96
SRM612-14	21073.46	2942.18	10489.80	18841.35	28805.86	4185.58	5329.29
SRM610-14	71757.86	18909.35	29326.50	8241.61	103156.79	13452.60	15659.11
AP1-14	9872.80	59.20	1618.83	223.04	35218.18	3998.38	6233.50
AP2-14	6358.21	185.52	6186.97	109.36	877587.01	91656.87	111468.53
AP3-14	7154.26	702.56	7630.14	72.64	1630114.48	167078.77	203258.44
AP4-14	7460.74	1078.53	6681.78	51.28	1474147.18	150483.88	183816.90
zero correction							
SRM614-13	0.00	54.44	16488.71	20420.00	11116.68	1755.45	2621.63
SRM612-13	1718.75	2789.26	20344.46	18670.66	32012.48	4447.50	6010.81
SRM610-13	62570.13	18649.23	36422.23	9322.97	125368.88	15105.33	18224.48
AP1-13	0.00	121.36	3838.28	517.56	59170.12	6920.60	10600.28
AP2-13	0.00	219.44	9538.23	325.04	1465176.28	141810.40	173792.96
AP3-13	0.00	760.96	11233.80	215.32	2037052.28	201063.33	246959.52
AP4-13	0.00	1188.53	10374.80	86.32	1899547.88	188571.54	231964.13
W3-1	0.00	15.32	1425.75	448.16	1256883.28	238070.15	279922.40
W3-2	0.00	13.72	1658.59	233.80	539795.94	67498.18	80758.15
W3-3	0.00	26.64	1482.91	305.44	553193.94	67092.22	81070.15
W3-4	0.00	21.40	1310.03	300.40	632608.01	71352.64	85648.30
W3-5	325.86	35.00	1640.03	379.96	742706.26	80821.98	96852.80
W3-6	1154.51	29.24	1559.59	375.92	803647.01	86867.21	104338.33
W3-7	2172.79	16.12	927.27	340.60	519177.19	61405.95	74206.64
W3-8	2492.99	41.28	1181.47	367.72	557106.13	62409.19	75350.56
W3-9	3099.60	26.92	1211.15	306.80	572067.57	63920.68	77267.65

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	3368.04	2.00	2362.31	445.00	1705802.48	182121.82	221150.98	
W3-11	3914.44	16.64	2704.40	476.36	1903632.68	200270.91	243655.71	
W3-12	4132.12	43.64	2632.31	541.36	1788486.98	187410.57	227532.38	
SRM614-14	9527.63	67.32	4879.33	17925.82	16255.75	2593.33	3124.96	
SRM612-14	21073.46	2942.18	10489.80	18841.35	28805.86	4185.58	5329.29	
SRM610-14	71757.86	18909.35	29326.50	8241.61	103156.79	13452.60	15659.11	
AP1-14	9872.80	59.20	1618.83	223.04	35218.18	3998.38	6233.50	
AP2-14	6358.21	185.52	6186.97	109.36	877587.01	91656.87	111468.53	
AP3-14	7154.26	702.56	7630.14	72.64	1630114.48	167078.77	203258.44	
AP4-14	7460.74	1078.53	6681.78	51.28	1474147.18	150483.88	183816.90	
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	
standardized concentration								
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373	
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903	
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425	
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084	
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136	
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336	
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632	
standardized signal								
SRM614-13	0.000000	0.000019	0.005658	0.007007	0.003814	0.000602	0.000900	
SRM612-13	0.000590	0.000958	0.006986	0.006411	0.010992	0.001527	0.002064	
SRM610-13	0.052865	0.015756	0.030773	0.007877	0.105923	0.012762	0.015398	
AP1-13	0.000000	0.000008	0.000245	0.000033	0.003784	0.000443	0.000678	
AP2-13	0.000000	0.000013	0.000583	0.000020	0.089479	0.008660	0.010614	
AP3-13	0.000000	0.000044	0.000649	0.000012	0.117771	0.011624	0.014278	
AP4-13	0.000000	0.000068	0.000593	0.000005	0.108633	0.010784	0.013266	
W3-1	0.000000	0.000003	0.000237	0.000074	0.208529	0.039498	0.046442	
W3-2	0.000000	0.000002	0.000257	0.000036	0.083539	0.010446	0.012498	
W3-3	0.000000	0.000004	0.000236	0.000049	0.088197	0.010697	0.012925	
W3-4	0.000000	0.000004	0.000227	0.000052	0.109491	0.012350	0.014824	
W3-5	0.000052	0.000006	0.000260	0.000060	0.117869	0.012827	0.015371	
W3-6	0.000180	0.000005	0.000243	0.000059	0.125231	0.013536	0.016259	
W3-7	0.000413	0.000003	0.000176	0.000065	0.098606	0.011663	0.014094	
W3-8	0.000415	0.000007	0.000197	0.000061	0.092699	0.010384	0.012538	
W3-9	0.000498	0.000004	0.000195	0.000049	0.091873	0.010266	0.012409	
W3-10	0.000385	0.000000	0.000270	0.000051	0.194983	0.020818	0.025279	
W3-11	0.000446	0.000002	0.000308	0.000054	0.216837	0.022812	0.027754	
W3-12	0.000463	0.000005	0.000295	0.000061	0.200324	0.020991	0.025485	
SRM614-14	0.004037	0.000029	0.002067	0.007595	0.006887	0.001099	0.001324	
SRM612-14	0.008402	0.001173	0.004182	0.007512	0.011485	0.001669	0.002125	
SRM610-14	0.076890	0.020262	0.031424	0.008831	0.110535	0.014415	0.016779	
AP1-14	0.000770	0.000005	0.000126	0.000017	0.002746	0.000312	0.000486	
AP2-14	0.000475	0.000014	0.000462	0.000008	0.065559	0.006847	0.008327	
AP3-14	0.000492	0.000048	0.000524	0.000005	0.111997	0.011479	0.013965	
AP4-14	0.000508	0.000073	0.000455	0.000003	0.100297	0.010239	0.012506	
standardize signal averages AP								
AP1	0.000385	0.000006	0.000186	0.000025	0.003265	0.000377	0.000582	
AP2	0.000237	0.000014	0.000522	0.000014	0.077519	0.007754	0.009470	
AP3	0.000246	0.000046	0.000587	0.000009	0.114884	0.011552	0.014121	
AP4	0.000254	0.000071	0.000524	0.000004	0.104465	0.010511	0.012886	
linest from std sig ave								
	0.014094	0.206513	0.048872	3.954244	0.013685	0.136204	0.111330	
standardize signal averages SRM								
srm614-2	0.002018	0.000024	0.003862	0.007301	0.005351	0.000851	0.001112	
srm612-2	0.004496	0.001065	0.005584	0.006961	0.011238	0.001598	0.002094	
srm610-2	0.064877	0.018009	0.031098	0.008354	0.108229	0.013589	0.016088	
linest from std sig ave								
	0.087119	0.301842	0.129781	143.680326	0.050498	0.401669	0.338777	
concentration data i.s. correction								
SRM614-13	85763.00	0.00	0.33	23.71	2376.10	4.48	7.04	8.59
SRM612-13	85763.00	0.71	16.96	29.28	2174.09	12.90	17.84	19.71
SRM610-13	85763.00	63.90	279.07	128.98	2671.26	124.32	149.08	147.02

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	398936	0.00	0.64	4.79	52.21	20.66	24.05	30.11
AP2-13	398936	0.00	1.10	11.36	31.31	488.52	470.58	471.39
AP3-13	398936	0.00	3.62	12.66	19.64	642.98	631.63	634.13
AP4-13	398936	0.00	5.60	11.57	7.79	593.10	585.98	589.18
W3-1	398936	0.00	0.21	4.61	117.29	1138.49	2146.20	2062.64
W3-2	398936	0.00	0.17	5.00	57.08	456.09	567.61	555.09
W3-3	398936	0.00	0.35	4.61	76.82	481.52	581.22	574.05
W3-4	398936	0.00	0.31	4.42	82.02	597.78	671.04	658.38
W3-5	398936	0.29	0.46	5.07	95.12	643.52	696.96	682.67
W3-6	398936	1.01	0.38	4.74	92.41	683.71	735.52	722.11
W3-7	398936	2.32	0.25	3.43	102.05	538.35	633.71	625.96
W3-8	398936	2.33	0.57	3.83	96.52	506.10	564.26	556.85
W3-9	398936	2.80	0.36	3.79	77.73	501.59	557.80	551.13
W3-10	398936	2.16	0.02	5.26	80.24	1064.53	1131.16	1122.72
W3-11	398936	2.51	0.16	6.01	85.60	1183.85	1239.55	1232.65
W3-12	398936	2.60	0.40	5.75	95.65	1093.69	1140.61	1131.89
SRM614-14	85763.00	4.88	0.51	8.66	2575.53	8.08	12.83	12.64
SRM612-14	85763.00	10.16	20.78	17.53	2547.50	13.48	19.49	20.29
SRM610-14	85763.00	92.94	358.86	131.71	2994.86	129.74	168.38	160.21
AP1-14	398936	4.33	0.38	2.46	27.43	14.99	16.94	21.59
AP2-14	398936	2.67	1.14	9.01	12.89	357.93	372.05	369.84
AP3-14	398936	2.76	3.98	10.22	7.87	611.46	623.74	620.23
AP4-14	398936	2.85	6.05	8.86	5.50	547.58	556.33	555.45

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-11	38956.42	77.20	1325.73	963.25	11065.94	1734.77	2179.01
SRM614-11	37333.01	121.24	12688.03	24588.46	25595.06	4236.38	5656.47
SRM612-11	47270.07	3081.06	17872.74	19019.63	209679.09	26422.91	31987.26
SRM610-11	108193.77	21654.16	33967.35	10139.62	230294.81	29284.09	35511.32
AP1-11	36984.25	150.08	4168.58	1308.89	426252.56	49811.12	63240.07
AP2-11	35685.40	287.56	10027.30	1239.41	2176265.00	230630.50	281744.53
AP3-11	37837.49	1087.09	13280.56	960.57	3379453.80	664620.19	448660.44
AP4-11	37256.21	1225.69	9096.13	813.96	1842044.30	195475.70	239659.70
W1-1	34305.95	94.92	15240.21	3017.10	7248765.50	898853.06	1095719.50
W1-2	35227.80	68.04	11285.06	2378.73	5456079.50	664620.56	809532.69
W1-3	35929.88	104.72	9117.01	2138.29	4463866.50	534759.00	651078.50
W1-4	34912.88	77.16	17942.66	3071.22	10015796.00	1214748.10	1486941.00
W1-5	34351.79	75.52	16337.37	2873.90	9341327.00	1122786.60	1373570.40
W1-6	35013.36	81.76	15497.09	2923.62	9237306.00	1103975.50	1352609.10
W1-7	34993.64	78.92	15601.17	2942.10	11046520.00	1358047.10	1658466.10
W1-8	34772.88	99.36	14294.32	2711.74	10211346.00	1239183.30	1514528.80
W1-9	35285.16	75.92	14128.76	2800.58	10360845.00	1263675.40	1545605.90
W1-10	34321.35	71.20	12921.35	3066.34	11514419.00	1405719.60	1716479.60
W1-11	34393.75	104.60	12501.03	3232.74	11805416.00	1443187.10	171830.80
W1-12	34987.88	73.80	11206.50	3117.82	11294911.00	1377515.80	1685059.10
W1-13	35475.24	89.72	3543.86	2662.98	9774645.00	1170566.60	1429602.10
W1-14	34915.80	72.44	3420.10	2890.10	10151748.00	1213493.30	1487496.30
W1-15	34776.80	73.60	3441.50	2783.86	10151244.00	1216862.30	1489154.00
W1-16	36711.29	68.56	2463.05	2047.17	6653653.00	763670.81	937618.94
W1-17	37208.65	73.36	2411.49	1981.13	6552489.50	753133.06	922606.25
W1-18	37563.69	85.48	2286.65	2015.85	6195113.50	708479.06	871324.44
SRM614-12	42685.00	120.16	3550.54	19035.71	56733.84	8064.97	8642.05
SRM612-12	52532.82	2662.30	7924.32	17227.58	61126.22	8730.57	9629.61
SRM610-12	102440.62	18237.78	26253.43	8771.13	136177.52	17700.74	20070.67
AP1-12	43059.12	123.88	1922.77	875.04	69766.75	8519.65	11178.38
AP2-12	40460.79	219.56	5962.87	665.36	980744.81	102483.09	124687.50
AP3-12	40585.35	710.60	7049.92	674.52	1511056.30	157495.38	192184.77
AP4-12	41011.43	1080.97	6672.04	579.60	1599471.10	165191.92	201757.81
blank-12	42903.76	64.48	366.64	443.80	59160.85	8048.73	7811.72
blank average	40930.09	70.84	846.18	703.52	35113.40	4891.75	4995.37
blank subtraction							
SRM614-11	-3597.08	50.40	11841.85	23884.94	-9518.33	-655.36	661.10
SRM612-11	6339.98	3010.22	17026.56	18316.10	174565.69	21531.16	26991.89
SRM610-11	67263.68	21583.32	33121.17	9436.09	195181.41	24392.34	30515.95
AP1-11	-3945.84	79.24	3322.40	605.36	391139.16	44919.37	58244.70
AP2-11	-5244.69	216.72	9181.11	535.88	2141151.60	225738.75	276749.16
AP3-11	-3092.60	1016.25	12434.37	257.04	3344340.40	360132.44	443665.07

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	-3673.88	1154.85	8249.95	110.44	1806930.90	190583.95	234664.33
W1-1	-6624.14	24.08	14394.02	2313.57	7213652.10	893961.31	1090724.13
W1-2	-5702.29	-2.80	10438.88	1675.21	5420966.10	659728.81	804537.32
W1-3	-5000.21	33.88	8270.83	1434.77	4428753.10	529867.25	646083.13
W1-4	-6017.22	6.32	17096.48	2367.69	9980682.60	1209856.35	1481945.63
W1-5	-6578.30	4.68	15491.19	2170.37	9306213.60	1117894.85	1368575.03
W1-6	-5916.73	10.92	14650.90	2220.09	9202192.60	1099083.75	1347613.73
W1-7	-5936.45	8.08	14754.98	2238.57	11011406.60	1353155.35	1653470.73
W1-8	-6157.22	28.52	13448.14	2008.21	10176232.60	1234291.55	1509533.43
W1-9	-5644.93	5.08	13282.58	2097.05	10325731.60	1258783.65	1540610.53
W1-10	-6608.74	0.36	12075.17	2362.81	11479305.60	1400827.85	1711484.23
W1-11	-6536.34	33.76	11654.85	2529.21	11770302.60	1438295.35	1756835.43
W1-12	-5942.21	2.96	10360.32	2414.29	11259797.60	1372624.05	1680063.73
W1-13	-5454.85	18.88	2697.68	1959.45	9739531.60	1165674.85	1424606.73
W1-14	-6014.29	1.60	2573.91	2186.57	10116634.60	1208601.55	1482500.93
W1-15	-6153.29	2.76	2595.31	2080.33	10116130.60	1211970.55	1484158.63
W1-16	-4218.80	-2.28	1616.87	1343.65	6618539.60	758779.06	932623.57
W1-17	-3721.44	2.52	1565.31	1277.61	6517376.10	748241.31	917610.88
W1-18	-3366.40	14.64	1440.47	1312.33	6160000.10	703587.31	866329.07
SRM614-12	1754.91	49.32	2704.36	18332.18	21620.44	3173.22	3646.68
SRM612-12	11602.73	2591.45	7078.14	16524.05	26012.83	3838.82	4634.25
SRM610-12	61510.53	18166.94	25407.24	8067.60	101064.12	12808.99	15075.30
AP1-12	2129.03	53.04	1076.59	171.52	34653.35	3627.90	6183.02
AP2-12	-469.30	148.72	5116.69	-38.16	945631.41	97591.34	119692.13
AP3-12	-344.74	639.76	6203.73	-29.00	1475942.90	152603.63	187189.40
AP4-12	81.34	1010.13	5825.85	-123.92	1564357.70	160300.17	196762.44

zero correction

SRM614-11	0.00	50.40	11841.85	23884.94	0.00	0.00	661.10
SRM612-11	6339.98	3010.22	17026.56	18316.10	174565.69	21531.16	26991.89
SRM610-11	67263.68	21583.32	33121.17	9436.09	195181.41	24392.34	30515.95
AP1-11	0.00	79.24	3322.40	605.36	391139.16	44919.37	58244.70
AP2-11	0.00	216.72	9181.11	535.88	2141151.60	225738.75	276749.16
AP3-11	0.00	1016.25	12434.37	257.04	3344340.40	360132.44	443665.07
AP4-11	0.00	1154.85	8249.95	110.44	1806930.90	190583.95	234664.33
W1-1	0.00	24.08	14394.02	2313.57	7213652.10	893961.31	1090724.13
W1-2	0.00	0.00	10438.88	1675.21	5420966.10	659728.81	804537.32
W1-3	0.00	33.88	8270.83	1434.77	4428753.10	529867.25	646083.13
W1-4	0.00	6.32	17096.48	2367.69	9980682.60	1209856.35	1481945.63
W1-5	0.00	4.68	15491.19	2170.37	9306213.60	1117894.85	1368575.03
W1-6	0.00	10.92	14650.90	2220.09	9202192.60	1099083.75	1347613.73
W1-7	0.00	8.08	14754.98	2238.57	11011406.60	1353155.35	1653470.73
W1-8	0.00	28.52	13448.14	2008.21	10176232.60	1234291.55	1509533.43
W1-9	0.00	5.08	13282.58	2097.05	10325731.60	1258783.65	1540610.53
W1-10	0.00	0.36	12075.17	2362.81	11479305.60	1400827.85	1711484.23
W1-11	0.00	33.76	11654.85	2529.21	11770302.60	1438295.35	1756835.43
W1-12	0.00	2.96	10360.32	2414.29	11259797.60	1372624.05	1680063.73
W1-13	0.00	18.88	2697.68	1959.45	9739531.60	1165674.85	1424606.73
W1-14	0.00	1.60	2573.91	2186.57	10116634.60	1208601.55	1482500.93
W1-15	0.00	2.76	2595.31	2080.33	10116130.60	1211970.55	1484158.63
W1-16	0.00	0.00	1616.87	1343.65	6618539.60	758779.06	932623.57
W1-17	0.00	2.52	1565.31	1277.61	6517376.10	748241.31	917610.88
W1-18	0.00	14.64	1440.47	1312.33	6160000.10	703587.31	866329.07
SRM614-12	1754.91	49.32	2704.36	18332.18	21620.44	3173.22	3646.68
SRM612-12	11602.73	2591.45	7078.14	16524.05	26012.83	3838.82	4634.25
SRM610-12	61510.53	18166.94	25407.24	8067.60	101064.12	12808.99	15075.30
AP1-12	2129.03	53.04	1076.59	171.52	34653.35	3627.90	6183.02
AP2-12	0.00	148.72	5116.69	0.00	945631.41	97591.34	119692.13
AP3-12	0.00	639.76	6203.73	0.00	1475942.90	152603.63	187189.40
AP4-12	81.34	1010.13	5825.85	0.00	1564357.70	160300.17	196762.44

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	0.000000	0.000014	0.003389	0.006836	0.000000	0.000000	0.000189	
SRM612-11	0.002066	0.000981	0.005548	0.005968	0.056876	0.007015	0.008794	
SRM610-11	0.050604	0.016238	0.024918	0.007099	0.146839	0.018351	0.022958	
AP1-11	0.000000	0.000004	0.000181	0.000033	0.021295	0.002446	0.003171	
AP2-11	0.000000	0.000012	0.000523	0.000030	0.121860	0.012848	0.015751	
AP3-11	0.000000	0.000055	0.000673	0.000014	0.181070	0.019498	0.024021	
AP4-11	0.000000	0.000071	0.000508	0.000007	0.111329	0.011742	0.014458	
W1-1	0.000000	0.000002	0.001111	0.000179	0.556757	0.068997	0.084183	
W1-2	0.000000	0.000000	0.001017	0.000163	0.528197	0.064281	0.078391	
W1-3	0.000000	0.000004	0.000977	0.000169	0.522985	0.062571	0.076295	
W1-4	0.000000	0.000000	0.000936	0.000130	0.546644	0.066264	0.081166	
W1-5	0.000000	0.000000	0.000933	0.000131	0.560485	0.067327	0.082425	
W1-6	0.000000	0.000001	0.000869	0.000132	0.545875	0.065198	0.079941	
W1-7	0.000000	0.000000	0.000798	0.000121	0.595395	0.073166	0.089404	
W1-8	0.000000	0.000002	0.000781	0.000117	0.591145	0.071701	0.087690	
W1-9	0.000000	0.000000	0.000761	0.000120	0.591384	0.072094	0.088235	
W1-10	0.000000	0.000000	0.000586	0.000115	0.556638	0.067927	0.082991	
W1-11	0.000000	0.000002	0.000559	0.000121	0.564072	0.068928	0.084193	
W1-12	0.000000	0.000000	0.000533	0.000124	0.579492	0.070643	0.086465	
W1-13	0.000000	0.000001	0.000144	0.000104	0.518985	0.062115	0.075912	
W1-14	0.000000	0.000000	0.000132	0.000112	0.519442	0.062056	0.076119	
W1-15	0.000000	0.000000	0.000138	0.000110	0.536188	0.064238	0.078665	
W1-16	0.000000	0.000000	0.000117	0.000097	0.479000	0.054915	0.067496	
W1-17	0.000000	0.000000	0.000113	0.000092	0.471779	0.054164	0.066424	
W1-18	0.000000	0.000001	0.000107	0.000098	0.458288	0.052345	0.064453	
SRM614-12	0.000762	0.000021	0.001174	0.007959	0.009386	0.001378	0.001583	
SRM612-12	0.005266	0.001176	0.003213	0.007500	0.011807	0.001742	0.002103	
SRM610-12	0.062642	0.018501	0.025875	0.008216	0.102924	0.013045	0.015353	
AP1-12	0.000163	0.000004	0.000082	0.000013	0.002653	0.000278	0.000473	
AP2-12	0.000000	0.000012	0.000419	0.000000	0.077402	0.009988	0.009797	
AP3-12	0.000000	0.000049	0.000475	0.000000	0.113046	0.011688	0.014337	
AP4-12	0.000006	0.000074	0.000427	0.000000	0.114651	0.011748	0.014421	
standardize signal averages AP								
AP1	0.000082	0.000004	0.000132	0.000023	0.011974	0.001362	0.001822	
AP2	0.000000	0.000012	0.000471	0.000015	0.099631	0.010418	0.012774	
AP3	0.000000	0.000052	0.000574	0.000007	0.147058	0.015593	0.019179	
AP4	0.000003	0.000073	0.000468	0.000003	0.112990	0.011745	0.014439	
linest from std sig ave								
	0.006320	0.195623	0.053229	3.632865	0.011135	0.105711	0.085969	
standardize signal averages SRM								
srm614-2	0.000381	0.000018	0.002282	0.007397	0.004693	0.000689	0.000886	
srm612-2	0.003666	0.001078	0.004380	0.006734	0.034341	0.004379	0.005449	
srm610-2	0.056623	0.017369	0.025396	0.007658	0.124881	0.015698	0.019155	
linest from std sig ave								
	0.099923	0.312923	0.160319	149.628905	0.042288	0.335920	0.274726	
concentration data								
	i.s. correction							
SRM614-11	85763.00	0.00	0.24	15.47	2129.88	0.00	0.00	1.40
SRM612-11	85763.00	1.12	16.45	25.33	1859.32	54.32	63.60	64.84
SRM610-11	85763.00	27.43	272.42	113.75	2211.80	140.23	166.37	169.27
AP1-11	398936	0.00	0.34	3.84	47.77	94.60	103.14	108.76
AP2-11	398936	0.00	0.96	11.10	44.20	541.34	541.81	540.19
AP3-11	398936	0.00	4.29	14.30	20.17	804.38	822.29	823.82
AP4-11	398936	0.00	5.55	10.79	9.86	494.56	495.20	495.86
W1-1	398936	0.00	0.15	23.59	258.79	2473.31	2909.74	2887.14
W1-2	398936	0.00	0.00	21.60	236.56	2346.44	2710.88	2688.49
W1-3	398936	0.00	0.31	20.74	245.55	2323.28	2638.76	2616.61
W1-4	398936	0.00	0.03	19.88	187.94	2428.38	2794.49	2783.68
W1-5	398936	0.00	0.02	19.81	189.44	2489.87	2839.34	2826.85
W1-6	398936	0.00	0.05	18.46	190.86	2424.97	2749.52	2741.64
W1-7	398936	0.00	0.03	16.94	175.42	2644.95	3085.57	3066.21
W1-8	398936	0.00	0.13	16.59	169.07	2626.07	3023.78	3007.41
W1-9	398936	0.00	0.02	16.15	174.06	2627.13	3040.36	3026.11
W1-10	398936	0.00	0.00	12.43	166.05	2472.78	2864.62	2846.25
W1-11	398936	0.00	0.13	11.86	175.67	2505.81	2906.83	2887.49
W1-12	398936	0.00	0.01	11.32	180.08	2574.30	2979.16	2965.41
W1-13	398936	0.00	0.08	3.05	151.32	2305.51	2619.50	2603.48
W1-14	398936	0.00	0.01	2.81	162.71	2307.54	2617.03	2610.59
W1-15	398936	0.00	0.01	2.92	159.80	2381.94	2709.07	2697.90
W1-16	398936	0.00	0.00	2.48	140.93	2127.89	2315.87	2314.85
W1-17	398936	0.00	0.01	2.41	134.03	2095.81	2284.19	2278.07
W1-18	398936	0.00	0.09	2.28	141.50	2035.87	2207.50	2210.46

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	85763.00	0.41	0.36	5.36	2479.63	8.96	12.49	11.67
SRM612-12	85763.00	2.85	19.73	14.67	2336.70	11.28	15.80	15.51
SRM610-12	85763.00	33.95	310.40	118.12	2559.84	98.29	118.26	113.19
AP1-12	398936	0.41	0.32	1.75	19.03	11.79	11.71	16.24
AP2-12	398936	0.00	0.95	8.89	0.00	343.85	336.88	336.00
AP3-12	398936	0.00	3.82	10.09	0.00	502.19	492.92	491.71
AP4-12	398936	0.02	5.78	9.07	0.00	509.32	495.45	494.57

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-9	43983.33	91.32	1204.93	670.32	2221.97	637.80	1139.13
SRM614-9	43648.45	131.84	11161.18	16144.21	20094.79	3353.14	4787.23
SRM612-9	53420.82	3097.22	18216.82	18467.42	95717.22	12842.79	16344.73
SRM610-9	113733.23	22657.69	33562.31	9526.69	190299.16	25189.58	30727.01
AP1-9	41375.87	148.36	5014.55	1175.61	200463.13	24765.90	32086.38
AP2-9	39146.50	342.96	10603.30	935.97	2087089.80	220508.88	271687.16
AP3-9	39856.50	1030.89	11966.43	792.40	2436771.50	262996.34	321536.50
AP4-9	40500.83	1595.69	10563.62	692.64	2218478.00	237910.27	291033.72
T2-1	35978.72	84.76	3986.22	4905.71	12856368.00	1600123.30	1956635.10
T2-2	35757.80	86.00	3183.50	4556.63	11841021.00	1464706.50	1784691.80
T2-3	35827.64	80.84	2739.26	4011.86	10034877.00	1225654.50	1496158.40
T2-4	35625.52	80.20	4695.67	8613.85	14087896.00	1895162.90	2299784.30
T2-5	35044.92	66.72	4726.99	8872.53	11413726.00	1465482.80	1781459.00
T2-6	35271.12	88.20	3483.34	7894.52	9758186.00	1238475.80	1505864.40
T2-7	36329.00	73.76	2845.30	3697.18	6970181.50	834782.88	1019061.80
T2-8	36639.77	72.48	2972.86	4139.14	7954569.00	964672.44	1178165.90
T2-9	37429.01	82.72	2764.30	3517.14	6637173.00	792296.25	968261.00
T2-10	40426.75	78.68	1413.89	989.89	862489.63	97018.38	116665.66
T2-11	42091.04	78.76	1509.73	1069.45	972863.31	102844.01	130135.61
T2-12	42945.36	75.68	1560.57	1079.21	953670.81	104859.39	127261.40
T2-13	43654.65	60.04	1245.81	1086.29	731602.38	84374.48	101207.85
T2-14	44493.37	60.80	1283.45	1240.89	733425.81	82684.82	100650.53
T2-15	44731.81	64.00	1312.73	1149.29	798401.69	90650.35	109465.77
T2-16	43769.21	63.32	1349.41	1442.61	1285517.60	152549.25	185173.92
T2-17	44482.49	65.76	2426.65	1631.57	1310653.60	145125.89	177836.64
T2-18	42498.36	85.28	1426.93	1656.53	1379622.50	149840.44	182552.06
SRM614-10	49976.44	114.56	3885.38	13276.56	29274.61	4336.18	4931.15
SRM612-10	59666.34	2736.70	8952.37	15875.05	39568.46	5779.39	6777.52
SRM610-10	113973.88	20203.39	27674.08	8643.85	119262.15	15957.89	18440.23
AP1-10	51001.21	109.56	2752.02	665.40	53802.38	6687.52	9253.41
AP2-10	47317.55	250.40	7175.28	660.08	1172752.40	124465.14	150688.45
AP3-10	48344.63	842.00	8143.61	595.64	1687856.50	178638.72	217671.47
AP4-10	49180.08	1178.41	7656.00	593.12	1614600.90	171049.00	209179.58
blank-10	49948.28	74.20	426.00	400.44	21365.60	3095.10	3029.66
blank average	46965.80	82.76	815.46	535.38	11793.79	1866.45	2084.39

blank subtraction

SRM614-9	-3317.36	49.08	10345.72	15608.83	8301.01	1486.69	2702.84
SRM612-9	6455.02	3014.46	17401.36	17932.04	83923.43	10976.34	14260.34
SRM610-9	66767.43	22574.93	32746.84	8991.31	178505.37	23323.13	28642.62
AP1-9	-5589.93	65.60	4199.08	640.22	188669.34	22899.45	30001.99
AP2-9	-7819.30	260.20	9787.84	400.58	2075296.01	218642.43	269602.77
AP3-9	-7109.30	948.13	11150.96	257.02	2424977.71	261129.89	319452.11
AP4-9	-6464.98	1512.93	9748.15	157.26	2206684.21	236043.82	288949.33
T2-1	-10987.08	2.00	3170.76	4370.32	12844574.21	1598256.85	1954550.71
T2-2	-11208.00	3.24	2368.03	4021.24	11829227.21	1462840.05	1782607.41
T2-3	-11138.16	-1.92	1923.79	3476.48	10023083.21	1223788.05	1494074.01
T2-4	-11340.28	-2.56	3880.20	8078.47	14076102.21	1893296.45	2297699.91
T2-5	-11920.89	-16.04	3911.52	8337.15	11401932.21	1463616.35	1779374.61
T2-6	-11694.69	5.44	2667.87	7359.14	9746392.21	1236609.35	1503780.01
T2-7	-10636.80	-9.00	2029.83	3161.80	6958387.71	832916.43	1016977.41
T2-8	-10326.04	-10.28	2157.39	3603.76	7942775.21	962805.99	1176081.51
T2-9	-9536.79	-0.04	1948.83	2981.76	6625379.21	790429.80	966176.61
T2-10	-6539.06	-4.08	598.42	454.50	850695.84	95151.93	114581.27
T2-11	-4874.77	-4.00	694.26	534.06	961069.52	106377.56	128051.22
T2-12	-4020.44	-7.08	745.10	543.82	941877.02	102992.94	125177.01
T2-13	-3311.16	-22.72	430.34	550.90	719808.59	82508.03	99123.46
T2-14	-2472.43	-21.96	467.98	705.50	721632.02	80818.37	98566.14
T2-15	-2233.99	-18.76	497.26	613.90	786607.90	88783.90	107381.38

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	-3196.60	-19.44	533.94	907.23	1273723.81	150682.80	183089.53
T2-17	-2483.31	-17.00	1611.19	1096.19	1298859.81	143259.44	175752.25
T2-18	-4467.45	2.52	611.46	1121.15	1367828.71	147973.99	180467.67
SRM614-10	3010.64	31.80	3069.92	12741.17	17480.82	2469.73	2846.76
SRM612-10	12700.53	2653.93	8136.91	15339.67	27774.67	3912.94	4693.13
SRM610-10	67008.08	20120.63	26858.61	8108.47	107468.36	14091.44	16355.83
AP1-10	4035.40	26.80	1936.55	130.02	42008.60	4821.07	7169.02
AP2-10	351.74	167.64	6359.82	124.70	1160958.61	122598.69	148604.06
AP3-10	1378.83	759.24	7328.14	60.26	1676062.71	176772.27	215587.08
AP4-10	2214.27	1095.65	6840.54	57.74	1602807.11	169182.55	207095.19
zero correction							
SRM614-9	0.00	49.08	10345.72	15608.83	8301.01	1486.69	2702.84
SRM612-9	6455.02	3014.46	17401.36	17932.04	83923.43	10976.34	14260.34
SRM610-9	66767.43	22574.93	32746.84	8991.31	178505.37	23323.13	28642.62
AP1-9	0.00	65.60	4199.08	640.22	188669.34	22899.45	30001.99
AP2-9	0.00	260.20	9787.84	400.58	2075296.01	218642.43	269602.77
AP3-9	0.00	948.13	11150.96	257.02	2424977.71	261129.89	319452.11
AP4-9	0.00	1512.93	9748.15	157.26	2206684.21	236043.82	288949.33
T2-1	0.00	2.00	3170.76	4370.32	12844574.21	1598256.85	1954550.71
T2-2	0.00	3.24	2368.03	4021.24	11829227.21	1462840.05	1782607.41
T2-3	0.00	0.00	1923.79	3476.48	10023083.21	1223788.05	1494074.01
T2-4	0.00	0.00	3880.20	8078.47	14076102.21	1893296.45	2297699.91
T2-5	0.00	0.00	3911.52	8337.15	11401932.21	1463616.35	1779374.61
T2-6	0.00	5.44	2667.87	7359.14	9746392.21	1236609.35	1503780.01
T2-7	0.00	0.00	2029.83	3161.80	6958387.71	832916.43	1016977.41
T2-8	0.00	0.00	2157.39	3603.76	7942775.21	962805.99	1176081.51
T2-9	0.00	0.00	1948.83	2981.76	6625379.21	790429.80	966176.61
T2-10	0.00	0.00	598.42	454.50	850695.84	95151.93	114581.27
T2-11	0.00	0.00	694.26	534.06	961069.52	106377.56	128051.22
T2-12	0.00	0.00	745.10	543.82	941877.02	102992.94	125177.01
T2-13	0.00	0.00	430.34	550.90	719808.59	82508.03	99123.46
T2-14	0.00	0.00	467.98	705.50	721632.02	80818.37	98566.14
T2-15	0.00	0.00	497.26	613.90	786607.90	88783.90	107381.38
T2-16	0.00	0.00	533.94	907.23	1273723.81	150682.80	183089.53
T2-17	0.00	0.00	1611.19	1096.19	1298859.81	143259.44	175752.25
T2-18	0.00	2.52	611.46	1121.15	1367828.71	147973.99	180467.67
SRM614-10	3010.64	31.80	3069.92	12741.17	17480.82	2469.73	2846.76
SRM612-10	12700.53	2653.93	8136.91	15339.67	27774.67	3912.94	4693.13
SRM610-10	67008.08	20120.63	26858.61	8108.47	107468.36	14091.44	16355.83
AP1-10	4035.40	26.80	1936.55	130.02	42008.60	4821.07	7169.02
AP2-10	351.74	167.64	6359.82	124.70	1160958.61	122598.69	148604.06
AP3-10	1378.83	759.24	7328.14	60.26	1676062.71	176772.27	215587.08
AP4-10	2214.27	1095.65	6840.54	57.74	1602807.11	169182.55	207095.19
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-9	0.000000	0.000018	0.003854	0.005814	0.003092	0.000554	0.001007
SRM612-9	0.002133	0.000996	0.005751	0.005927	0.027737	0.003628	0.004713
SRM610-9	0.050288	0.017003	0.024664	0.006772	0.134446	0.017566	0.021573
AP1-9	0.000000	0.000004	0.000229	0.000035	0.010294	0.001249	0.001637
AP2-9	0.000000	0.000014	0.000527	0.000022	0.111706	0.011769	0.014512
AP3-9	0.000000	0.000051	0.000604	0.000014	0.131441	0.014154	0.017315
AP4-9	0.000000	0.000082	0.000526	0.000008	0.118961	0.012725	0.015577
T2-1	0.000000	0.000000	0.000143	0.000198	0.581185	0.072317	0.088439
T2-2	0.000000	0.000000	0.000122	0.000207	0.608368	0.075233	0.091678
T2-3	0.000000	0.000000	0.000118	0.000213	0.615302	0.075126	0.091719
T2-4	0.000000	0.000000	0.000219	0.000455	0.793527	0.106733	0.129531
T2-5	0.000000	0.000000	0.000246	0.000525	0.717760	0.092136	0.112013
T2-6	0.000000	0.000000	0.000189	0.000522	0.691943	0.087793	0.106761
T2-7	0.000000	0.000000	0.000124	0.000193	0.424012	0.050754	0.061970

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000000	0.000000	0.000128	0.000214	0.471881	0.057200	0.069871	
T2-9	0.000000	0.000000	0.000120	0.000184	0.407981	0.048674	0.059496	
T2-10	0.000000	0.000000	0.000080	0.000060	0.113029	0.012643	0.015224	
T2-11	0.000000	0.000000	0.000081	0.000062	0.111910	0.012387	0.014911	
T2-12	0.000000	0.000000	0.000081	0.000059	0.102211	0.011177	0.013584	
T2-13	0.000000	0.000000	0.000043	0.000055	0.072467	0.008306	0.009979	
T2-14	0.000000	0.000000	0.000044	0.000066	0.067190	0.007525	0.009177	
T2-15	0.000000	0.000000	0.000043	0.000054	0.068627	0.007746	0.009368	
T2-16	0.000000	0.000000	0.000037	0.000064	0.089263	0.010560	0.012831	
T2-17	0.000000	0.000000	0.000102	0.000070	0.082574	0.009108	0.011173	
T2-18	0.000000	0.000000	0.000036	0.000066	0.080315	0.008689	0.010597	
SRM614-10	0.001613	0.000017	0.001645	0.006827	0.009367	0.001323	0.001525	
SRM612-10	0.005974	0.001248	0.003827	0.007215	0.013064	0.001841	0.002208	
SRM610-10	0.064931	0.019497	0.026026	0.007857	0.104137	0.013655	0.015849	
AP1-10	0.000293	0.000002	0.000140	0.000009	0.003046	0.000350	0.000520	
AP2-10	0.000025	0.000012	0.000446	0.000009	0.081398	0.008596	0.010419	
AP3-10	0.000099	0.000054	0.000525	0.000004	0.119977	0.012654	0.015432	
AP4-10	0.000157	0.000078	0.000486	0.000004	0.113854	0.012018	0.014711	
standardize signal averages AP								
AP1	0.000146	0.000003	0.000185	0.000022	0.006670	0.000799	0.001078	
AP2	0.000012	0.000013	0.000486	0.000015	0.096552	0.010182	0.012465	
AP3	0.000049	0.000053	0.000564	0.000009	0.125709	0.013404	0.016374	
AP4	0.000079	0.000080	0.000506	0.000006	0.116408	0.012371	0.015144	
linest from std sig ave								
	0.038125	0.183563	0.051030	3.656084	0.012092	0.113807	0.093041	
standardize signal averages SRM								
srm614-2	0.000807	0.000018	0.002749	0.006321	0.006230	0.000939	0.001266	
srm612-2	0.004054	0.001122	0.004789	0.006571	0.020401	0.002734	0.003460	
srm610-2	0.057609	0.018250	0.025345	0.007315	0.119292	0.015611	0.018711	
linest from std sig ave								
	0.098173	0.297832	0.159413	161.175838	0.045484	0.347210	0.289026	
concentration data								
i.s. correction								
SRM614-9	85763.00	0.00	0.29	16.87	1823.03	3.21	5.40	8.03
SRM612-9	85763.00	6.98	15.68	25.17	1858.32	28.77	35.41	37.61
SRM610-9	85763.00	164.42	267.68	107.94	2123.42	139.43	171.46	172.14
AP1-9	398936	0.00	0.26	4.66	50.95	49.66	56.72	60.76
AP2-9	398936	0.00	1.03	10.73	31.45	538.88	534.32	538.64
AP3-9	398936	0.00	3.76	12.30	20.32	634.08	642.62	642.70
AP4-9	398936	0.00	5.97	10.70	12.37	573.88	577.73	578.18
T2-1	398936	0.00	0.01	2.92	288.42	2803.67	3283.31	3282.62
T2-2	398936	0.00	0.01	2.48	301.64	2934.81	3415.68	3402.87
T2-3	398936	0.00	0.00	2.40	311.28	2968.25	3410.86	3404.38
T2-4	398936	0.00	0.00	4.45	664.24	3828.02	4845.83	4807.86
T2-5	398936	0.00	0.00	5.01	765.49	3462.52	4183.10	4157.65
T2-6	398936	0.00	0.03	3.86	762.03	3337.98	3985.93	3962.69
T2-7	398936	0.00	0.00	2.52	281.01	2045.46	2304.31	2300.17
T2-8	398936	0.00	0.00	2.61	312.27	2276.38	2596.98	2593.44
T2-9	398936	0.00	0.00	2.44	267.81	1968.13	2209.85	2208.34
T2-10	398936	0.00	0.00	1.62	88.08	545.26	573.99	565.08
T2-11	398936	0.00	0.00	1.65	90.70	539.86	562.39	553.45
T2-12	398936	0.00	0.00	1.65	86.08	493.07	507.43	504.20
T2-13	398936	0.00	0.00	0.88	80.89	349.58	377.13	370.41
T2-14	398936	0.00	0.00	0.89	95.81	324.13	341.64	340.64
T2-15	398936	0.00	0.00	0.88	78.12	331.06	351.68	347.73
T2-16	398936	0.00	0.00	0.76	92.73	430.61	479.44	476.25
T2-17	398936	0.00	0.00	2.09	101.64	398.34	413.50	414.73
T2-18	398936	0.00	0.01	0.73	96.02	387.44	394.48	393.32
SRM614-10	85763.00	5.27	0.27	7.20	2140.80	9.71	12.92	12.17
SRM612-10	85763.00	19.53	19.65	16.75	2262.42	13.55	17.96	17.61
SRM610-10	85763.00	212.30	306.94	113.90	2463.66	108.00	133.27	126.47
AP1-10	398936	4.45	0.14	2.86	13.75	14.69	15.87	19.29
AP2-10	398936	0.38	0.86	9.08	12.75	392.67	390.26	386.73
AP3-10	398936	1.50	3.98	10.68	6.29	578.78	574.50	572.81
AP4-10	398936	2.39	5.70	9.89	5.98	549.24	545.63	546.03
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	

Appendix A. Raw trace element datasheets from laser ablation.

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-1	15567.61	54.08	4807.63	734.00	1405.93	619.24	1374.37
SRM614-1	16089.49	160.04	52139.09	20993.76	21596.56	4180.74	5577.91
SRM612-1	30119.81	3463.90	52756.02	17765.30	145318.89	23284.37	28207.04
SRM610-1	111550.70	24965.70	51109.81	9286.09	220083.41	33186.39	39662.42
AP1-1	16686.22	129.48	7098.40	956.93	63179.44	9427.57	12956.31
AP2-1	18105.10	345.52	16191.13	952.61	2428606.80	299200.66	359704.38
AP3-1	23122.45	2024.05	20941.24	770.40	5377651.00	698308.38	840088.63
AP4-1	18219.22	1411.89	14160.32	707.72	1815041.30	219548.11	264722.50
41LU1-REDO-1	17000.34	95.12	5985.83	819.88	599322.75	75087.10	89924.51
41LU1-REDO-2	17872.22	73.20	6461.64	796.32	730509.44	89458.78	107568.25
41LU1-REDO-3	18556.58	89.72	6703.40	801.08	909491.50	108643.13	130313.02
41LU1-REDO-4	18910.43	83.96	4895.83	687.28	578185.56	71274.16	85476.16
41LU1-REDO-5	19436.11	85.52	5566.75	725.08	785772.25	93807.73	112654.44
41LU1-REDO-6	19897.15	71.32	4961.03	687.68	673921.19	81159.26	97582.07
41LU1-REDO-7	20638.88	72.24	4051.46	602.28	422546.84	52582.02	63348.48
41LU1REDO-8	21351.56	95.32	3932.38	647.92	468179.78	57724.32	69500.67
41LU1-REDO-9	22214.89	72.56	3979.02	612.44	441061.41	54820.35	65344.29
41LU1REDO-10	22510.29	74.44	3992.26	589.56	481020.03	58669.05	70205.31
41LU1-REDO-11	23303.81	81.24	3909.46	621.24	482177.41	58177.09	70024.67
41LU1REDO-12	24371.26	79.80	3603.50	568.76	445896.31	54392.31	64864.45
41LU1-REDO-13	24893.90	76.72	3090.46	545.48	415078.06	50656.36	60743.94
41LU1-REDO-14	25786.23	79.24	3616.14	604.64	459249.34	55093.11	66225.34
41LU1-REDO-15	25539.18	69.40	3833.98	654.28	498604.44	58629.73	70917.64
SRM614-2	25902.03	163.76	21402.20	20346.04	25899.27	4166.34	5290.87
SRM612-2	38879.14	3205.34	24788.26	18962.03	45462.34	7091.80	8390.73
SRM610-2	99426.52	23886.73	39917.34	9922.82	142293.23	18652.79	22712.49
AP1-2	27926.56	105.76	5047.75	692.72	35547.04	4421.50	6898.68
AP2-2	26838.15	303.76	12463.75	597.76	1862062.90	200644.58	243626.22
AP3-2	28833.92	1250.53	16635.33	594.40	3427369.30	381417.19	467079.22
AP4-2	27652.84	1326.09	11437.86	501.00	1655904.40	178512.36	217660.63
blank-2	27293.63	70.92	1724.21	351.40	9465.97	1447.69	1648.25
blank average	21430.62	62.50	3265.92	542.70	5435.95	1033.47	1511.31
blank subtraction							
SRM614-1	-5341.13	97.54	48873.18	20451.05	16160.61	3147.28	4066.60
SRM612-1	8689.19	3401.40	49490.10	17222.60	139882.94	22250.91	26695.73
SRM610-1	90120.08	24903.20	47843.89	8743.39	214647.46	32152.92	38151.11
AP1-1	-4744.41	66.98	3832.48	414.22	57743.49	8394.11	11445.00
AP2-1	-3325.52	283.02	12925.21	409.90	2423170.85	298167.19	358193.07
AP3-1	1691.83	1961.55	17675.32	227.70	5372215.05	697274.91	838577.32
AP4-1	-3211.40	1349.39	10894.40	165.02	1809605.35	218514.64	263211.19
41LU1-REDO-1	-4430.28	32.62	2719.92	277.18	593886.80	74053.64	88413.20
41LU1-REDO-2	-3558.40	10.70	3195.72	253.62	725073.49	88425.32	106056.94
41LU1-REDO-3	-2874.04	27.22	3437.48	258.38	904055.55	107609.66	128801.71
41LU1-REDO-4	-2520.19	21.46	1929.91	144.58	572749.61	70240.70	83964.86
41LU1-REDO-5	-1994.51	23.02	2300.83	182.38	780336.30	92774.26	111143.13
41LU1-REDO-6	-1533.47	8.82	1695.11	144.98	668485.24	80125.79	96070.76
41LU1-REDO-7	-791.74	9.74	785.54	59.58	417110.89	51548.55	61837.17
41LU1REDO-8	-79.06	32.82	666.46	105.22	462743.83	56690.86	67989.36
41LU1-REDO-9	784.26	10.06	713.10	69.74	435625.46	53786.88	63832.98
41LU1REDO-10	1079.67	11.94	726.34	46.86	475584.08	57635.59	68694.00
41LU1-REDO-11	1873.19	18.74	643.54	78.54	476741.46	57143.62	68513.36
41LU1REDO-12	2940.64	17.30	337.58	26.06	440460.36	53358.84	63353.14
41LU1-REDO-13	3463.28	14.22	-175.46	2.78	409642.11	49622.90	59232.63
41LU1-REDO-14	4355.61	16.74	350.22	61.94	453813.39	54059.64	64714.03
41LU1-REDO-15	4108.56	6.90	568.06	111.58	493168.49	57596.26	69406.33
SRM614-2	4471.41	101.26	18136.28	19803.33	20463.32	3132.88	3779.56
SRM612-2	17448.52	3142.84	21522.34	18419.32	40026.39	6058.33	6879.42
SRM610-2	77995.90	23824.23	36651.43	9380.11	136857.28	17619.32	21201.18
AP1-2	6495.94	43.26	1781.83	150.02	30111.09	3388.04	5387.37
AP2-2	5407.53	241.26	9197.83	55.06	1856626.95	199611.11	242114.91
AP3-2	7403.30	1188.03	13369.42	51.70	3421933.35	380383.72	465567.91
AP4-2	6222.22	1263.59	8171.95	-41.70	1650468.45	177478.89	216149.32
zero correction							
SRM614-1	0.00	97.54	48873.18	20451.05	16160.61	3147.28	4066.60
SRM612-1	8689.19	3401.40	49490.10	17222.60	139882.94	22250.91	26695.73
SRM610-1	90120.08	24903.20	47843.89	8743.39	214647.46	32152.92	38151.11
AP1-1	0.00	66.98	3832.48	414.22	57743.49	8394.11	11445.00
AP2-1	0.00	283.02	12925.21	409.90	2423170.85	298167.19	358193.07
AP3-1	1691.83	1961.55	17675.32	227.70	5372215.05	697274.91	838577.32
AP4-1	0.00	1349.39	10894.40	165.02	1809605.35	218514.64	263211.19
41LU1-REDO-1	0.00	32.62	2719.92	277.18	593886.80	74053.64	88413.20
41LU1-REDO-2	0.00	10.70	3195.72	253.62	725073.49	88425.32	106056.94
41LU1-REDO-3	0.00	27.22	3437.48	258.38	904055.55	107609.66	128801.71

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	0.00	21.46	1629.91	144.58	572749.61	70240.70	83964.86
41LU1-REDO-5	0.00	23.02	2300.83	182.38	780336.30	92774.26	111143.13
41LU1-REDO-6	0.00	8.82	1695.11	144.98	668485.24	80125.79	96070.76
41LU1-REDO-7	0.00	9.74	785.54	59.58	417110.89	51548.55	61837.17
41LU1REDO-8	0.00	32.82	666.46	105.22	462743.83	56690.86	67989.36
41LU1-REDO-9	784.26	10.06	713.10	69.74	435625.46	53786.88	63832.98
41LU1REDO-10	1079.67	11.94	726.34	46.86	475584.08	57635.59	68694.00
41LU1-REDO-11	1873.19	18.74	643.54	78.54	476741.46	57143.62	68513.36
41LU1REDO-12	2940.64	17.30	337.58	26.06	440460.36	53358.84	63353.14
41LU1-REDO-13	3463.28	14.22	0.00	2.78	409642.11	49622.90	59232.63
41LU1-REDO-14	4355.61	16.74	350.22	61.94	453813.39	54059.64	64714.03
41LU1-REDO-15	4108.56	6.90	568.06	111.58	493168.49	57596.26	69406.33
SRM614-2	4471.41	101.26	18136.28	19803.33	20463.32	3132.88	3779.56
SRM612-2	17448.52	3142.84	21522.34	18419.32	40026.39	6058.33	6879.42
SRM610-2	77995.90	23824.23	36651.43	9380.11	136857.28	17619.32	21201.18
AP1-2	6495.94	43.26	1781.83	150.02	30111.09	3388.04	5387.37
AP2-2	5407.53	241.26	9197.83	55.06	1856626.95	199611.11	242114.91
AP3-2	7403.30	1188.03	13369.42	51.70	3421933.35	380383.72	465567.91
AP4-2	6222.22	1263.59	8171.95	0.00	1650468.45	177478.89	216149.32

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-1	0.000000	0.000030	0.015218	0.006368	0.005032	0.000980	0.001266
SRM612-1	0.002929	0.001147	0.016683	0.005806	0.047155	0.007501	0.008999
SRM610-1	0.062684	0.017322	0.033279	0.006082	0.149301	0.022364	0.026537
AP1-1	0.000000	0.000007	0.000421	0.000046	0.006344	0.000922	0.001257
AP2-1	0.000000	0.000019	0.000850	0.000027	0.159347	0.019607	0.023555
AP3-1	0.000077	0.000089	0.000806	0.000010	0.245043	0.031805	0.038250
AP4-1	0.000000	0.000090	0.000729	0.000011	0.121035	0.014615	0.017605
41LU1-REDO-1	0.000000	0.000006	0.000485	0.000049	0.105866	0.013201	0.015761
41LU1-REDO-2	0.000000	0.000002	0.000470	0.000037	0.106702	0.013013	0.015607
41LU1-REDO-3	0.000000	0.000003	0.000432	0.000032	0.113571	0.013518	0.016181
41LU1-REDO-4	0.000000	0.000004	0.000330	0.000029	0.115987	0.014224	0.017004
41LU1-REDO-5	0.000000	0.000004	0.000390	0.000031	0.132393	0.015740	0.018857
41LU1-REDO-6	0.000000	0.000002	0.000316	0.000027	0.124618	0.014937	0.017909
41LU1-REDO-7	0.000000	0.000002	0.000192	0.000015	0.102142	0.012623	0.015143
41LU1REDO-8	0.000000	0.000007	0.000152	0.000024	0.105619	0.012939	0.015518
41LU1-REDO-9	0.000185	0.000002	0.000168	0.000016	0.102840	0.012698	0.015069
41LU1REDO-10	0.000228	0.000003	0.000153	0.000010	0.100431	0.012171	0.014506
41LU1-REDO-11	0.000406	0.000004	0.000140	0.000017	0.103432	0.012398	0.014864
41LU1REDO-12	0.000698	0.000004	0.000080	0.000006	0.104499	0.012659	0.015030
41LU1-REDO-13	0.000804	0.000003	0.000000	0.000001	0.095114	0.011522	0.013753
41LU1-REDO-14	0.000908	0.000003	0.000073	0.000013	0.094626	0.011272	0.013494
41LU1-REDO-15	0.000684	0.000001	0.000095	0.000019	0.082132	0.009592	0.011559
SRM614-2	0.001540	0.000035	0.006245	0.006819	0.007046	0.001079	0.001301
SRM612-2	0.006172	0.001112	0.007613	0.006516	0.014159	0.002143	0.002434
SRM610-2	0.057741	0.017637	0.027133	0.006944	0.101316	0.013044	0.015695
AP1-2	0.000650	0.000004	0.000178	0.000015	0.003012	0.000339	0.000539
AP2-2	0.000339	0.000015	0.000577	0.000003	0.116522	0.012528	0.015195
AP3-2	0.000341	0.000055	0.000617	0.000002	0.157827	0.017544	0.021473
AP4-2	0.000380	0.000077	0.000499	0.000000	0.100782	0.010837	0.013199

standardize signal averages AP							
AP1	0.000325	0.000006	0.000300	0.000030	0.004678	0.000631	0.000898
AP2	0.000170	0.000017	0.000714	0.000015	0.137935	0.016068	0.019375
AP3	0.000209	0.000072	0.000711	0.000006	0.201435	0.024674	0.029862
AP4	0.000190	0.000084	0.000614	0.000006	0.110909	0.012726	0.015402

linest from std sig ave							
	0.016903	0.155556	0.038219	3.643399	0.008443	0.069994	0.057887

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.000770	0.000033	0.010731	0.006593	0.006039	0.001029	0.001284
srM612-2	0.004551	0.001129	0.012148	0.006161	0.030657	0.004822	0.005716
srM610-2	0.060213	0.017479	0.030206	0.006513	0.125309	0.017704	0.021116

linest from std sig ave							
	0.093902	0.310916	0.111003	169.552462	0.042557	0.298421	0.250315

concentration data	i.s. correction							
SRM614-1	85763.00	0.00	0.41	49.88	1989.81	3.64	5.88	6.29
SRM612-1	85763.00	4.25	15.30	54.68	1814.14	34.15	45.03	44.68
SRM610-1	85763.00	90.87	231.09	109.08	1900.31	108.11	134.25	131.74
AP1-1	398936	0.00	0.46	6.42	66.15	21.37	25.75	29.04
AP2-1	398936	0.00	1.15	12.96	39.18	536.73	547.50	543.95
AP3-1	398936	0.52	5.55	12.29	15.10	825.38	888.09	883.31
AP4-1	398936	0.00	5.60	11.11	16.04	407.68	408.11	406.55
41LU1-REDO-1	398936	0.00	0.36	7.39	71.82	356.59	368.61	363.96
41LU1-REDO-2	398936	0.00	0.10	7.17	54.25	359.40	363.36	360.42
41LU1-REDO-3	398936	0.00	0.21	6.58	47.18	382.54	377.48	373.66
41LU1-REDO-4	398936	0.00	0.27	5.03	42.56	390.68	397.19	392.67
41LU1-REDO-5	398936	0.00	0.24	5.95	44.98	445.94	439.52	435.46
41LU1-REDO-6	398936	0.00	0.10	4.82	39.28	419.75	417.09	413.58
41LU1-REDO-7	398936	0.00	0.15	2.93	21.21	344.05	352.48	349.69
41LU1REDO-8	398936	0.00	0.46	2.32	34.91	355.76	361.31	358.36
41LU1-REDO-9	398936	1.25	0.15	2.57	23.93	346.40	354.56	348.00
41LU1REDO-10	398936	1.54	0.16	2.34	14.38	338.28	339.86	335.00
41LU1-REDO-11	398936	2.74	0.25	2.13	24.77	348.39	346.18	343.26
41LU1REDO-12	398936	4.70	0.25	1.22	8.99	351.98	353.49	347.10
41LU1-REDO-13	398936	5.42	0.20	0.00	0.94	320.37	321.73	317.60
41LU1-REDO-14	398936	6.12	0.22	1.11	18.77	318.73	314.76	311.61
41LU1-REDO-15	398936	4.61	0.07	1.44	27.01	276.65	267.84	266.93
SRM614-2	85763.00	2.23	0.47	20.47	2130.65	5.10	6.48	6.46
SRM612-2	85763.00	8.95	14.83	24.95	2035.92	10.25	12.86	12.08
SRM610-2	85763.00	83.70	235.30	88.94	2169.83	73.36	78.30	77.92
AP1-2	398936	4.38	0.27	2.72	21.81	10.15	9.46	12.44
AP2-2	398936	2.29	0.94	8.80	5.02	392.48	349.81	350.90
AP3-2	398936	2.30	3.40	9.40	3.47	531.61	489.89	495.88
AP4-2	398936	2.56	4.79	7.61	0.00	339.46	302.61	304.80

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-17	12063.11	46.40	2833.02	629.08	4315.94	1002.61	2302.69
SRM614-17	11884.07	99.72	16926.30	13581.80	12099.23	2164.93	3581.86
SRM612-17	23159.69	2214.77	22577.25	18264.34	37253.77	5295.63	7108.76
SRM610-17	76475.39	16984.94	39529.34	8990.97	135295.72	16028.85	20007.39
AP1-17	15207.21	81.52	8420.57	899.61	83881.07	8929.97	13626.36
AP2-17	15775.37	208.08	15668.85	746.76	2232299.00	197373.11	243017.92
AP3-17	16548.33	669.20	9128.53	774.60	1834740.10	167801.22	206875.56
AP4-17	16454.13	882.04	9182.33	565.36	1334032.50	119174.43	146091.73
41LU1-1	16434.37	92.68	4392.42	912.17	867804.44	78543.96	96012.31
41LU1-2	17178.98	74.48	5341.75	815.44	1091017.60	98398.35	120563.03
41LU1-3	16843.93	60.00	3516.62	656.84	658920.50	60651.42	74199.09
41LU1-4	17053.34	94.96	5559.95	782.84	907503.56	80753.34	98000.03
41LU1-5	17276.50	82.80	3894.70	695.20	556597.94	51761.06	62830.59
41LU1-6	17855.50	92.44	3821.62	651.84	555777.63	51633.77	62737.40
41LU1-7	18782.27	108.24	24902.82	1009.77	6133313.00	570124.31	703826.88
41LU1-8	17847.50	95.48	14999.69	740.08	2863606.80	243352.34	298595.41
41LU1-9	18848.87	105.80	15652.93	718.04	3135625.30	264130.72	325666.19
41LU1-10	19891.27	138.40	28019.88	805.68	5596387.00	484286.91	600938.00
41LU1-11	21752.24	153.12	42508.12	1060.69	9263124.00	852080.38	1057605.50
41LU1-12	21602.52	149.52	39536.86	1019.85	8330812.00	746760.63	925707.13
SRM614-18	19073.47	113.68	8884.45	15063.05	39568.50	5195.15	5822.99
SRM612-18	29432.01	2248.73	17631.98	20064.27	53112.14	6526.40	7779.68
SRM610-18	85319.20	20764.36	53651.90	10487.66	180524.30	19352.75	22816.77
AP1-18	22039.00	101.84	6055.15	678.96	66799.66	6819.24	9765.86
AP2-18	21233.72	212.84	16492.25	479.76	2033083.00	157863.81	195789.02
AP3-18	21759.28	628.40	10878.22	434.76	1810253.40	144122.61	176841.19
AP4-18	22600.29	835.12	9294.21	384.88	1180177.10	95140.98	117810.63
blank-18	21033.96	60.40	1091.21	221.20	39410.66	4821.39	5099.11

Appendix A. Raw trace element datasheets from laser ablation.

blank average	16548.53	53.40	1962.11	425.14	21863.30	2912.00	3700.90
blank subtraction							
SRM614-17	-4664.47	46.32	14964.18	13156.65	-9764.07	-747.06	-119.04
SRM612-17	6611.16	2161.37	20615.14	17839.20	15390.47	2383.63	3407.86
SRM610-17	59926.86	16931.54	37567.23	8565.83	113432.42	13116.85	16306.49
AP1-17	-1341.33	28.12	6458.46	474.46	62017.77	6017.97	9925.46
AP2-17	-773.16	154.68	13706.74	321.62	2210435.70	194461.11	239317.02
AP3-17	-0.20	615.80	7166.42	349.46	1812876.80	164889.22	203174.66
AP4-17	-94.40	828.64	7220.22	140.22	1312169.20	116262.43	142390.83
41LU1-1	-114.16	39.28	2430.31	487.02	845941.14	75631.96	92311.40
41LU1-2	630.44	21.08	3379.64	390.30	1069154.30	95486.36	116862.13
41LU1-3	295.40	6.60	1554.51	231.70	637057.20	57739.43	70498.19
41LU1-4	504.80	41.56	3597.84	357.70	885640.26	77841.34	94299.13
41LU1-5	727.97	29.40	1932.59	270.06	534734.64	48849.06	59129.69
41LU1-6	1306.97	39.04	1859.51	226.70	533914.33	48721.78	59036.49
41LU1-7	2233.73	54.84	22940.71	584.62	6111449.70	567212.31	700125.98
41LU1-8	1298.97	42.08	13037.57	314.94	2841743.50	240440.34	294894.51
41LU1-9	2300.33	52.40	13690.82	292.90	3113762.00	261218.72	321965.29
41LU1-10	3342.74	85.00	26057.77	380.54	5574523.70	481374.91	597237.10
41LU1-11	5203.71	99.72	40546.01	635.54	9241260.70	849168.38	1053904.60
41LU1-12	5053.99	96.12	37574.75	594.70	8308948.70	743848.63	922006.23
SRM614-18	2524.93	60.28	6922.34	14637.90	17705.20	2283.15	2122.09
SRM612-18	12883.47	2195.33	15669.87	19639.13	31248.83	3614.40	4078.78
SRM610-18	68770.66	20710.95	51689.79	10062.52	158661.00	16440.75	19115.87
AP1-18	5490.47	48.44	4093.04	253.82	44936.35	3907.24	6064.95
AP2-18	4685.19	159.44	14530.14	54.62	2011219.70	154951.81	192088.12
AP3-18	5210.75	575.00	8916.11	9.62	1788390.10	141210.61	173140.29
AP4-18	6051.75	781.72	7332.10	-40.26	1158313.80	92228.98	114109.73
zero correction							
SRM614-17	0.00	46.32	14964.18	13156.65	0.00	0.00	0.00
SRM612-17	6611.16	2161.37	20615.14	17839.20	15390.47	2383.63	3407.86
SRM610-17	59926.86	16931.54	37567.23	8565.83	113432.42	13116.85	16306.49
AP1-17	0.00	28.12	6458.46	474.46	62017.77	6017.97	9925.46
AP2-17	0.00	154.68	13706.74	321.62	2210435.70	194461.11	239317.02
AP3-17	0.00	615.80	7166.42	349.46	1812876.80	164889.22	203174.66
AP4-17	0.00	828.64	7220.22	140.22	1312169.20	116262.43	142390.83
41LU1-1	0.00	39.28	2430.31	487.02	845941.14	75631.96	92311.40
41LU1-2	630.44	21.08	3379.64	390.30	1069154.30	95486.36	116862.13
41LU1-3	295.40	6.60	1554.51	231.70	637057.20	57739.43	70498.19
41LU1-4	504.80	41.56	3597.84	357.70	885640.26	77841.34	94299.13
41LU1-5	727.97	29.40	1932.59	270.06	534734.64	48849.06	59129.69
41LU1-6	1306.97	39.04	1859.51	226.70	533914.33	48721.78	59036.49
41LU1-7	2233.73	54.84	22940.71	584.62	6111449.70	567212.31	700125.98
41LU1-8	1298.97	42.08	13037.57	314.94	2841743.50	240440.34	294894.51
41LU1-9	2300.33	52.40	13690.82	292.90	3113762.00	261218.72	321965.29
41LU1-10	3342.74	85.00	26057.77	380.54	5574523.70	481374.91	597237.10
41LU1-11	5203.71	99.72	40546.01	635.54	9241260.70	849168.38	1053904.60
41LU1-12	5053.99	96.12	37574.75	594.70	8308948.70	743848.63	922006.23
SRM614-18	2524.93	60.28	6922.34	14637.90	17705.20	2283.15	2122.09
SRM612-18	12883.47	2195.33	15669.87	19639.13	31248.83	3614.40	4078.78
SRM610-18	68770.66	20710.95	51689.79	10062.52	158661.00	16440.75	19115.87
AP1-18	5490.47	48.44	4093.04	253.82	44936.35	3907.24	6064.95
AP2-18	4685.19	159.44	14530.14	54.62	2011219.70	154951.81	192088.12
AP3-18	5210.75	575.00	8916.11	9.62	1788390.10	141210.61	173140.29
AP4-18	6051.75	781.72	7332.10	0.00	1158313.80	92228.98	114109.73
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-17	0.000000	0.000024	0.007913	0.006957	0.000000	0.000000	0.000000

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.002730	0.000892	0.008512	0.007365	0.006354	0.000984	0.001407
SRM610-17	0.050740	0.014336	0.031808	0.007253	0.096042	0.011106	0.013807
AP1-17	0.000000	0.000002	0.000485	0.000036	0.004661	0.000452	0.000746
AP2-17	0.000000	0.000012	0.001089	0.000026	0.175664	0.015454	0.019019
AP3-17	0.000000	0.000053	0.000620	0.000030	0.156873	0.014268	0.017581
AP4-17	0.000000	0.000076	0.000664	0.000013	0.120658	0.010691	0.013093
41LU1-1	0.000000	0.000006	0.000365	0.000073	0.126912	0.011347	0.013849
41LU1-2	0.000099	0.000003	0.000530	0.000061	0.167718	0.014979	0.018332
41LU1-3	0.000055	0.000001	0.000290	0.000043	0.118760	0.010764	0.013142
41LU1-4	0.000091	0.000008	0.000652	0.000065	0.160488	0.014106	0.017088
41LU1-5	0.000169	0.000007	0.000449	0.000063	0.124116	0.011338	0.013724
41LU1-6	0.000332	0.000010	0.000472	0.000058	0.135631	0.012377	0.014997
41LU1-7	0.000152	0.000004	0.001566	0.000040	0.417190	0.038720	0.047793
41LU1-8	0.000125	0.000004	0.001252	0.000030	0.272886	0.023089	0.028318
41LU1-9	0.000220	0.000005	0.001309	0.000028	0.297810	0.024984	0.030794
41LU1-10	0.000228	0.000006	0.001776	0.000026	0.379910	0.032806	0.040702
41LU1-11	0.000259	0.000005	0.002015	0.000032	0.459218	0.042197	0.052371
41LU1-12	0.000267	0.000005	0.001982	0.000031	0.438377	0.039245	0.048645
SRM614-18	0.001485	0.000035	0.004071	0.008609	0.010414	0.001343	0.001248
SRM612-18	0.005835	0.000994	0.007097	0.008894	0.014152	0.001637	0.001847
SRM610-18	0.052181	0.015715	0.039221	0.007635	0.120387	0.012475	0.014504
AP1-18	0.000368	0.000003	0.000274	0.000017	0.003009	0.000262	0.000406
AP2-18	0.000343	0.000012	0.001064	0.000004	0.147318	0.011350	0.014070
AP3-18	0.000390	0.000043	0.000667	0.000001	0.133836	0.010568	0.012957
AP4-18	0.000489	0.000063	0.000593	0.000000	0.093660	0.007458	0.009227
standardize signal averages AP							
AP1	0.000184	0.000003	0.000380	0.000026	0.003835	0.000357	0.000576
AP2	0.000172	0.000012	0.001077	0.000015	0.161491	0.013402	0.016544
AP3	0.000195	0.000048	0.000644	0.000015	0.145355	0.012418	0.015269
AP4	0.000245	0.000070	0.000628	0.000006	0.107159	0.009074	0.011160
linest from std sig ave							
	0.025258	0.206705	0.031114	3.748226	0.009418	0.112080	0.090954
standardize signal averages SRM							
srm614-2	0.000743	0.000030	0.005992	0.007783	0.005207	0.000671	0.000624
srm612-2	0.004282	0.000943	0.007804	0.008130	0.010253	0.001311	0.001627
srm610-2	0.051460	0.015025	0.035514	0.007444	0.108214	0.011790	0.014156
linest from std sig ave							
	0.109808	0.361731	0.110999	139.800932	0.050522	0.463248	0.385917
concentration data i.s. correction							
SRM614-17	85763.00	0.00	0.43	21.11	2236.34	0.00	0.00
SRM612-17	85763.00	5.91	15.82	22.71	2367.71	5.13	9.46
SRM610-17	85763.00	109.91	254.14	84.88	2331.42	77.58	106.75
AP1-17	398936	0.00	0.17	6.02	53.32	17.51	20.22
AP2-17	398936	0.00	1.01	13.52	38.22	660.01	690.99
AP3-17	398936	0.00	4.39	7.70	45.22	589.41	637.98
AP4-17	398936	0.00	6.28	8.24	19.28	453.34	478.01
41LU1-1	398936	0.00	0.49	4.53	109.25	476.84	507.34
41LU1-2	398936	1.00	0.27	6.58	91.55	630.15	669.75
41LU1-3	398936	0.55	0.10	3.60	64.59	446.21	481.28
41LU1-4	398936	0.92	0.62	8.09	96.92	602.99	630.71
41LU1-5	398936	1.70	0.56	5.57	93.73	466.33	506.97
41LU1-6	398936	3.35	0.82	5.86	86.11	509.60	553.41
41LU1-7	398936	1.54	0.31	19.44	59.68	1567.48	1731.28
41LU1-8	398936	1.26	0.33	15.54	45.22	1025.29	1032.37
41LU1-9	398936	2.22	0.41	16.25	41.89	1118.94	1117.10
41LU1-10	398936	2.30	0.48	22.04	38.78	1427.41	1466.86
41LU1-11	398936	2.61	0.41	25.01	47.22	1725.38	1886.75
41LU1-12	398936	2.69	0.42	24.61	46.92	1647.08	1754.76
SRM614-18	85763.00	3.22	0.63	10.86	2767.60	8.41	12.91
SRM612-18	85763.00	12.64	17.63	18.94	2859.20	11.43	15.73
SRM610-18	85763.00	113.03	278.59	104.66	2454.37	97.24	119.91
AP1-18	398936	3.70	0.27	3.40	25.42	11.31	11.70
AP2-18	398936	3.46	0.96	13.21	5.98	553.50	507.49
AP3-18	398936	3.93	3.55	8.28	1.08	502.85	472.51
AP4-18	398936	4.93	5.21	7.36	0.00	351.90	333.45
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-19	18240.06	89.60	777.12	960.61	9483.49	1867.41	3026.26
SRM614-19	18392.70	115.40	3003.06	15608.61	16627.81	2490.45	3913.66
SRM612-19	25934.39	1841.65	9428.77	15018.93	55292.27	6869.84	9089.85
SRM610-19	74463.18	14287.80	34860.84	9096.81	136877.41	15882.09	19239.83
AP1-19	20364.64	112.88	2025.85	1155.05	54526.31	6059.07	9022.89
AP2-19	19674.27	187.88	8600.65	1035.01	1476237.50	131618.94	161268.78
AP3-19	18727.71	561.72	6689.80	986.89	1230156.60	111331.02	136994.84
AP4-19	18103.02	729.44	5443.03	758.88	983621.88	89286.38	109851.41
THEO-1	19498.43	91.68	4031.50	880.40	1264635.30	118041.54	142384.36
THEO-2	20135.55	75.48	5081.03	939.61	2110211.00	195845.94	239842.19
THEO-2	20210.27	73.52	5263.27	989.61	2118208.30	193005.25	236079.56
THEO-3	22112.56	80.88	7806.64	806.52	1663703.10	151875.09	185140.64
THEO-4	23735.09	117.48	8909.37	900.97	2509150.80	239017.08	294631.81
THEO-5	22449.93	94.48	7510.24	935.33	1306844.50	118546.06	145904.09
THEO-6	22209.32	132.60	7396.00	752.00	2646709.50	244738.91	299683.53
THEO-7	21586.44	89.00	7504.68	822.96	2778034.80	254057.34	311445.75
THEO-8	20510.40	86.04	5628.23	672.68	1445604.00	127334.88	154961.39
THEO-9	20991.56	96.28	7392.12	806.56	2090262.60	184000.80	224461.06
THEO-10	20582.00	73.88	8309.65	790.36	1839999.50	161021.50	196012.98
THEO-11	21779.32	56.80	9007.21	837.28	2179630.00	192828.77	234608.31
THEO-12	22895.85	79.40	8626.85	676.52	2669046.80	238597.16	293735.22
THEO-13	21247.80	80.28	6398.60	681.64	1273477.60	115381.13	140667.83
THEO-14	21370.76	86.48	5990.83	540.00	1650530.40	147157.31	179405.97
THEO-15	21879.44	91.20	7345.68	592.84	1946861.60	176123.63	215824.53
THEO-16	22718.85	79.28	8533.29	698.56	2375688.50	212426.41	259394.63
THEO-17	22323.57	112.96	9855.90	778.72	2638872.30	231838.70	284478.16
THEO-18	21960.80	96.72	9217.13	749.72	2221937.30	193198.05	236146.08
SRM614-20	20516.88	118.24	1800.57	14225.32	33234.95	4121.26	4930.15
SRM612-20	26550.23	1716.77	6172.27	12680.51	38123.18	4965.03	5660.63
SRM610-20	69625.88	13838.40	29310.40	8089.81	113655.92	12926.51	15205.77
AP1-20	22296.93	122.92	1507.25	955.05	46652.34	5114.27	7260.88
AP2-20	19672.79	213.24	5729.39	739.32	875005.31	78998.69	96288.82
AP3-20	19137.03	656.76	7588.84	706.00	1529679.90	133350.11	163047.28
AP4-20	17825.58	658.00	4268.18	556.96	792104.31	71433.04	87318.85
blank-20	21832.84	60.28	300.04	306.44	33474.11	4012.34	4390.90
blank average	20036.45	74.94	538.58	633.52	21478.80	2939.88	3708.58
blank subtraction							
SRM614-19	-1643.75	40.46	2464.47	14975.08	-4850.99	-449.42	205.08
SRM612-19	5897.93	1766.71	8890.19	14385.40	33813.47	3929.96	5381.27
SRM610-19	54426.73	14212.86	34322.25	8463.29	115398.61	12942.21	15531.25
AP1-19	328.18	37.94	1487.27	521.52	33047.51	3119.20	5314.31
AP2-19	-362.18	112.94	8062.07	401.48	1454758.70	128679.06	157560.20
AP3-19	-1308.75	486.78	6151.21	353.36	1208677.80	106391.14	133286.26
AP4-19	-1933.43	654.50	4904.45	125.36	962143.08	86346.51	106142.83
THEO-1	-538.02	16.74	3492.92	246.88	1243156.50	115101.66	138675.78
THEO-2	99.10	0.54	4542.45	306.08	2088732.20	192906.06	236133.61
THEO-2	173.82	-1.42	4724.69	356.08	2096729.50	190065.37	232370.98
THEO-3	2076.11	5.94	7268.06	173.00	1642224.30	148935.21	181432.06
THEO-4	3698.64	42.54	8370.79	267.44	2487672.00	236077.20	290923.23
THEO-5	2413.47	19.54	6971.66	301.80	1285365.70	115606.18	142195.51
THEO-6	2172.87	57.66	6857.42	118.48	2625230.70	241799.03	295974.95
THEO-7	1549.99	14.06	6966.10	189.44	2756556.00	251117.46	307737.17
THEO-8	473.94	11.10	5089.65	39.16	1424125.20	124395.00	151252.81
THEO-9	955.11	21.34	6853.54	173.04	2068783.80	181060.92	220752.48
THEO-10	545.54	-1.06	7771.06	156.84	1818520.70	158081.62	192304.40
THEO-11	1742.87	-18.14	8468.63	203.76	2158151.20	189888.89	230899.73
THEO-12	2859.40	4.46	8088.27	43.00	2647568.00	235657.28	290026.64
THEO-13	1211.35	5.34	5860.01	48.12	1251998.80	112441.25	136959.25
THEO-14	1334.31	11.54	5452.25	-93.52	1629051.60	144217.43	175697.39
THEO-15	1842.99	16.26	6807.10	-40.68	1925382.80	173183.75	212115.95
THEO-16	2682.39	4.34	7994.71	65.04	2354209.70	209486.53	255686.05
THEO-17	2287.11	38.02	9317.31	145.20	2617393.50	228898.82	280769.58
THEO-18	1924.35	21.78	8678.55	116.20	2200458.50	190258.17	232437.50
SRM614-20	480.42	43.30	1261.99	13591.80	11756.14	1181.39	1221.57
SRM612-20	6513.78	1641.83	5633.69	12046.99	16644.37	2025.15	1952.05
SRM610-20	49589.42	13763.46	28771.82	7456.28	92177.12	9986.64	11497.19
AP1-20	2260.47	47.98	968.67	321.52	25173.54	2174.39	3552.30
AP2-20	-363.66	138.30	5190.81	105.80	853526.51	76058.81	92580.24
AP3-20	-899.43	581.82	7050.26	72.48	1508201.10	130410.23	159338.70
AP4-20	-2210.87	583.06	3729.60	-76.56	770625.51	68493.16	83610.27
zero correction							
SRM614-19	0.00	40.46	2464.47	14975.08	0.00	0.00	205.08

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	5897.93	1766.71	8890.19	14385.40	33813.47	3929.96	5381.27
SRM610-19	54426.73	14212.86	34322.25	8463.29	115398.61	12942.21	15531.25
AP1-19	328.18	37.94	1487.27	521.52	33047.51	3119.20	5314.31
AP2-19	0.00	112.94	8062.07	401.48	1454758.70	128679.06	157560.20
AP3-19	0.00	486.78	6151.21	353.36	1208677.80	108391.14	133286.26
AP4-19	0.00	654.50	4904.45	125.36	962143.08	86346.51	106142.83
THEO-1	0.00	16.74	3492.92	246.88	1243156.50	115101.66	138675.78
THEO-2	99.10	0.54	4542.45	306.08	2088732.20	192906.06	236133.61
THEO-2	173.82	0.00	4724.69	356.08	2096729.50	190065.37	232370.98
THEO-3	2076.11	5.94	7268.06	173.00	1642224.30	148935.21	181432.06
THEO-4	3698.64	42.54	8370.79	267.44	2487672.00	236077.20	290923.23
THEO-5	2413.47	19.54	6971.66	301.80	1285365.70	115606.18	142195.51
THEO-6	2172.87	57.66	6857.42	118.48	2625230.70	241799.03	295974.95
THEO-7	1549.99	14.06	6966.10	189.44	2756556.00	251117.46	307737.17
THEO-8	473.94	11.10	5089.65	39.16	1424125.20	124395.00	151252.81
THEO-9	955.11	21.34	6853.54	173.04	2068783.80	181060.92	220752.48
THEO-10	545.54	0.00	7771.06	156.84	1818520.70	158081.62	192304.40
THEO-11	1742.87	0.00	8468.63	203.76	2158151.20	189888.89	230899.73
THEO-12	2859.40	4.46	8088.27	43.00	2647568.00	235657.28	290026.64
THEO-13	1211.35	5.34	5860.01	48.12	1251998.80	112441.25	136959.25
THEO-14	1334.31	11.54	5452.25	0.00	1629051.60	144217.43	175697.39
THEO-15	1842.99	16.26	6807.10	0.00	1925382.80	173183.75	212115.95
THEO-16	2682.39	4.34	7994.71	65.04	2354209.70	209486.53	255686.05
THEO-17	2287.11	38.02	9317.31	145.20	2617393.50	228898.82	280769.58
THEO-18	1924.35	21.78	8678.55	116.20	2200458.50	190258.17	232437.50
SRM614-20	480.42	43.30	1261.99	13591.80	11756.14	1181.39	1221.57
SRM612-20	6513.78	1641.83	5633.69	12046.99	16644.37	2025.15	1952.05
SRM610-20	49589.42	13763.46	28771.82	7456.28	92177.12	9986.64	11497.19
AP1-20	2260.47	47.98	968.67	321.52	25173.54	2174.39	3552.30
AP2-20	0.00	138.30	5190.81	105.80	853526.51	76058.81	92580.24
AP3-20	0.00	581.82	7050.26	72.48	1508201.10	130410.23	159338.70
AP4-20	0.00	583.06	3729.60	0.00	770625.51	68493.16	83610.27

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-19	0.000000	0.000023	0.001372	0.008335	0.000000	0.000000	0.000114
SRM612-19	0.003287	0.000985	0.004955	0.008018	0.018847	0.002190	0.002999
SRM610-19	0.058898	0.015380	0.037142	0.009159	0.124878	0.014005	0.016807
AP1-19	0.000026	0.000003	0.000117	0.000041	0.002607	0.000246	0.000419
AP2-19	0.000000	0.000012	0.000840	0.000042	0.151574	0.013407	0.016417
AP3-19	0.000000	0.000036	0.000460	0.000026	0.090374	0.008104	0.009966
AP4-19	0.000000	0.000051	0.000380	0.000010	0.074564	0.006692	0.008226
THEO-1	0.000000	0.000004	0.000763	0.000054	0.271562	0.025143	0.030293
THEO-2	0.000016	0.000000	0.000717	0.000048	0.329548	0.030436	0.037256
THEO-2	0.000023	0.000000	0.000624	0.000047	0.277048	0.025114	0.030704
THEO-3	0.000366	0.000001	0.001282	0.000031	0.289776	0.026280	0.032014
THEO-4	0.000598	0.000007	0.001353	0.000043	0.402159	0.038164	0.047031
THEO-5	0.000310	0.000003	0.000895	0.000039	0.165098	0.014849	0.018264
THEO-6	0.000420	0.000011	0.001326	0.000023	0.507726	0.046764	0.057242
THEO-7	0.000237	0.000002	0.001065	0.000029	0.421429	0.038391	0.047048
THEO-8	0.000087	0.000002	0.000931	0.000007	0.260514	0.022756	0.027669
THEO-9	0.000148	0.000003	0.001065	0.000027	0.321361	0.028126	0.034291
THEO-10	0.000078	0.000000	0.001104	0.000022	0.258382	0.022461	0.027323
THEO-11	0.000263	0.000000	0.001276	0.000031	0.325192	0.028613	0.034792
THEO-12	0.000538	0.000001	0.001522	0.000008	0.498090	0.044335	0.054563
THEO-13	0.000202	0.000001	0.000977	0.000008	0.208708	0.018744	0.022831
THEO-14	0.000240	0.000002	0.000979	0.000000	0.292405	0.025886	0.031537
THEO-15	0.000320	0.000003	0.001181	0.000000	0.334100	0.030052	0.036807
THEO-16	0.000500	0.000001	0.001491	0.000012	0.439139	0.039076	0.047694
THEO-17	0.000327	0.000005	0.001334	0.000021	0.374776	0.032775	0.040203
THEO-18	0.000283	0.000003	0.001276	0.000017	0.323555	0.027976	0.034178

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000320	0.000029	0.000841	0.009054	0.007831	0.000787	0.000814
SRM612-20	0.004738	0.001194	0.004098	0.008762	0.012106	0.001473	0.001420
SRM610-20	0.064283	0.017842	0.037297	0.009666	0.119489	0.012946	0.014904
AP1-20	0.000211	0.000004	0.000090	0.000030	0.002345	0.000203	0.000331
AP2-20	0.000000	0.000018	0.000668	0.000014	0.109905	0.009794	0.011921
AP3-20	0.000000	0.000047	0.000564	0.000006	0.120596	0.010428	0.012741
AP4-20	0.000000	0.000054	0.000345	0.000000	0.071381	0.006344	0.007745

standardize signal averages AP

AP1	0.000118	0.000004	0.000104	0.000036	0.002476	0.000224	0.000375
AP2	0.000000	0.000015	0.000754	0.000028	0.130740	0.011601	0.014169
AP3	0.000000	0.000041	0.000512	0.000016	0.105485	0.009266	0.011353
AP4	0.000000	0.000052	0.000363	0.000005	0.072972	0.006518	0.007985

linest from std sig ave

	0.001230	0.255761	0.046871	1.997989	0.012183	0.137719	0.112637
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standardize signal averages SRM

srm614-2	0.000160	0.000026	0.001106	0.008694	0.003916	0.000393	0.000464
srm612-2	0.004013	0.001089	0.004526	0.008390	0.015477	0.001832	0.002210
srm610-2	0.061590	0.016611	0.037219	0.009412	0.122184	0.013476	0.015855

linest from std sig ave

	0.091865	0.327157	0.111233	123.106353	0.044675	0.404707	0.343833
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concentration data

i.s. correction

SRM614-19	85763.00	0.00	0.49	5.51	1428.15	0.00	0.00	1.10
SRM612-19	85763.00	0.35	21.60	19.92	1373.95	19.69	25.87	28.97
SRM610-19	85763.00	6.22	337.37	149.30	1569.34	130.48	165.42	162.36
AP1-19	398936	0.01	0.31	2.19	32.80	12.67	13.52	18.84
AP2-19	398936	0.00	1.20	15.71	33.34	736.72	736.62	737.68
AP3-19	398936	0.00	3.71	8.60	21.06	439.25	445.27	447.82
AP4-19	398936	0.00	5.18	7.11	7.74	362.41	367.65	369.63
THEO-1	398936	0.00	0.37	14.27	42.99	1319.91	1381.41	1361.23
THEO-2	398936	0.01	0.01	13.40	38.49	1601.74	1672.17	1674.09
THEO-2	398936	0.01	0.00	11.67	37.50	1346.57	1379.79	1379.69
THEO-3	398936	0.18	0.11	23.98	24.33	1408.43	1443.86	1438.56
THEO-4	398936	0.29	0.70	25.30	34.46	1954.66	2096.80	2113.34
THEO-5	398936	0.15	0.26	16.74	30.90	802.45	815.82	820.70
THEO-6	398936	0.21	1.14	24.80	18.26	2467.76	2569.30	2572.19
THEO-7	398936	0.12	0.22	19.91	23.08	2048.32	2109.27	2114.09
THEO-8	398936	0.04	0.21	17.41	5.71	1266.21	1250.21	1243.29
THEO-9	398936	0.07	0.34	19.91	21.43	1561.95	1545.26	1540.88
THEO-10	398936	0.04	0.00	20.65	17.76	1255.84	1234.02	1227.77
THEO-11	398936	0.13	0.00	23.86	24.47	1580.57	1572.01	1563.39
THEO-12	398936	0.26	0.09	28.45	6.45	2420.93	2435.79	2451.80
THEO-13	398936	0.10	0.09	18.27	6.39	1014.41	1029.81	1025.92
THEO-14	398936	0.12	0.21	18.30	0.00	1421.21	1422.22	1417.10
THEO-15	398936	0.16	0.29	22.09	0.00	1623.87	1651.07	1653.94
THEO-16	398936	0.25	0.08	27.88	9.67	2134.40	2146.90	2143.13
THEO-17	398936	0.16	0.56	24.95	16.57	1821.57	1800.71	1806.50
THEO-18	398936	0.14	0.33	23.86	13.62	1572.61	1537.01	1535.77
SRM614-20	85763.00	0.03	0.63	3.38	1551.42	8.18	9.29	7.86
SRM612-20	85763.00	0.50	26.19	16.47	1501.42	12.65	17.40	13.72
SRM610-20	85763.00	6.78	391.35	149.93	1656.23	124.85	152.90	143.97
AP1-20	398936	0.10	0.46	1.69	23.87	11.40	11.13	14.87
AP2-20	398936	0.00	1.82	12.50	10.86	534.19	538.08	535.68
AP3-20	398936	0.00	4.75	10.54	4.62	586.15	572.91	572.51
AP4-20	398937	0.00	5.51	6.46	0.00	346.94	348.57	348.01

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-15	20656.56	61.36	1031.93	588.20	2134.41	496.24	1264.73
SRM614-15	20992.16	102.92	6922.60	11004.90	15691.61	2548.05	3766.06
SRM612-15	26821.51	1602.61	11108.18	11901.99	50813.29	6446.08	8457.53
SRM610-15	72866.65	13930.32	29187.65	7906.28	103214.26	12084.31	15146.37
AP1-15	24775.38	181.24	3495.74	999.73	50096.64	5652.67	8675.37
AP2-15	22838.69	235.20	9971.10	829.24	1546171.90	138182.17	170622.28
AP3-15	22332.37	797.72	12228.15	686.28	2417883.50	216373.30	267622.78

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	21405.92	923.81	8163.49	566.08	1396637.80	127148.95	156187.48
LA3324-2-1	21899.28	75.88	1368.37	766.32	606765.56	61633.27	74481.62
LA3324-2-2	22794.73	103.88	1602.29	749.60	681606.00	68094.34	82851.70
LA3324-2-3	23339.57	97.76	2079.89	913.37	755398.25	75080.98	90933.48
LA3324-2-4	22600.65	79.80	1989.65	867.96	886839.44	87351.53	106132.08
LA3324-2-5	22851.33	73.84	2085.97	885.48	934670.56	91028.11	111002.95
LA3324-2-6	22509.41	79.92	2050.81	829.96	908337.69	88531.26	108417.65
LA3324-2-7	23588.85	86.76	1973.29	632.92	587645.19	60821.02	73049.93
LA3324-2-8	23370.33	78.08	1913.05	723.12	629082.06	63934.80	78165.32
LA3324-2-9	23905.73	61.08	1992.25	705.36	635306.50	65700.81	78640.00
LA3324-2-10	24547.70	75.40	2287.97	695.64	761297.56	76679.63	93229.88
LA3324-2-11	24593.10	83.80	2802.66	683.16	972747.69	95340.86	115410.17
LA3324-2-12	24701.62	92.64	6049.51	813.16	1727013.40	166183.97	204589.34
SRM614-16	25637.94	119.52	2995.62	10679.82	22033.32	3252.54	3783.86
SRM612-16	32547.50	1859.57	6848.00	11861.47	33039.83	4620.35	5561.35
SRM610-16	79620.97	16343.13	28746.28	7971.80	107897.33	13542.16	15670.25
AP1-16	27748.56	78.72	2449.09	843.80	41917.52	4830.43	7072.16
AP2-16	25772.58	230.36	7772.76	667.56	1118090.60	107571.37	131176.81
AP3-16	25340.30	811.68	10187.78	676.20	2110488.50	199229.80	245840.91
AP4-16	25122.70	892.77	6653.48	571.16	1273765.80	121191.16	148201.00
blank-16	25951.23	66.44	409.72	398.16	16938.86	2244.81	2441.13
blank average	23303.89	63.90	720.82	493.18	9536.63	1370.53	1852.93
blank subtraction							
SRM614-15	-2311.73	39.02	6201.78	10511.72	6154.97	1177.53	1913.13
SRM612-15	3517.62	1538.71	10387.36	11408.80	41276.65	5075.55	6604.60
SRM610-15	49562.76	13866.42	28466.82	7413.10	93677.63	10713.78	13293.43
AP1-15	1471.49	117.34	2774.92	506.54	40560.01	4282.14	6822.44
AP2-15	-465.20	171.30	9250.27	336.06	1536635.27	136811.64	168769.35
AP3-15	-971.53	733.82	11507.32	193.10	2408346.87	215002.77	265769.85
AP4-15	-1897.97	859.90	7442.66	72.90	1387101.17	125778.42	154334.55
LA3324-2-1	-1404.61	11.98	647.54	273.14	597228.93	60262.74	72628.69
LA3324-2-2	-509.16	39.98	881.46	256.42	672069.37	66723.82	80998.77
LA3324-2-3	35.68	33.86	1359.07	420.18	745861.62	73710.46	89080.55
LA3324-2-4	-703.25	15.90	1268.83	374.78	877302.81	85981.00	104279.15
LA3324-2-5	-452.56	9.94	1365.15	392.30	925133.93	89657.58	109150.02
LA3324-2-6	-794.49	16.02	1329.99	336.78	898801.06	87160.73	106564.72
LA3324-2-7	284.96	22.86	1252.47	139.74	578108.56	59450.50	71197.00
LA3324-2-8	66.44	14.18	1192.23	229.94	619545.43	62564.27	76312.39
LA3324-2-9	601.84	-2.82	1271.43	212.18	625769.87	64330.29	76787.07
LA3324-2-10	1243.81	11.50	1567.15	202.46	751760.93	75309.11	91376.95
LA3324-2-11	1289.21	19.90	2081.83	189.98	963211.06	93970.33	113557.24
LA3324-2-12	1397.73	28.74	5328.69	319.98	1717476.77	164813.44	202736.41
SRM614-16	2334.05	55.62	2274.79	10186.64	12496.69	1882.01	1930.93
SRM612-16	9243.61	1795.67	6127.17	11368.28	23503.19	3249.82	3708.42
SRM610-16	56317.08	16279.23	28025.46	7478.62	98360.70	12171.63	13817.32
AP1-16	4444.67	14.82	1728.27	350.62	32380.88	3459.90	5219.23
AP2-16	2468.69	166.46	7051.94	174.38	1108553.97	106200.84	129323.88
AP3-16	2036.41	747.78	9466.95	183.02	2100951.87	197859.27	243987.98
AP4-16	1818.81	828.86	5932.65	77.98	1264229.17	119820.63	146348.07
zero correction							
SRM614-15	0.00	39.02	6201.78	10511.72	6154.97	1177.53	1913.13
SRM612-15	3517.62	1538.71	10387.36	11408.80	41276.65	5075.55	6604.60
SRM610-15	49562.76	13866.42	28466.82	7413.10	93677.63	10713.78	13293.43
AP1-15	1471.49	117.34	2774.92	506.54	40560.01	4282.14	6822.44
AP2-15	0.00	171.30	9250.27	336.06	1536635.27	136811.64	168769.35
AP3-15	0.00	733.82	11507.32	193.10	2408346.87	215002.77	265769.85
AP4-15	0.00	859.90	7442.66	72.90	1387101.17	125778.42	154334.55
LA3324-2-1	0.00	11.98	647.54	273.14	597228.93	60262.74	72628.69
LA3324-2-2	0.00	39.98	881.46	256.42	672069.37	66723.82	80998.77
LA3324-2-3	35.68	33.86	1359.07	420.18	745861.62	73710.46	89080.55
LA3324-2-4	0.00	15.90	1268.83	374.78	877302.81	85981.00	104279.15
LA3324-2-5	0.00	9.94	1365.15	392.30	925133.93	89657.58	109150.02
LA3324-2-6	0.00	16.02	1329.99	336.78	898801.06	87160.73	106564.72
LA3324-2-7	284.96	22.86	1252.47	139.74	578108.56	59450.50	71197.00
LA3324-2-8	66.44	14.18	1192.23	229.94	619545.43	62564.27	76312.39
LA3324-2-9	601.84	0.00	1271.43	212.18	625769.87	64330.29	76787.07
LA3324-2-10	1243.81	11.50	1567.15	202.46	751760.93	75309.11	91376.95
LA3324-2-11	1289.21	19.90	2081.83	189.98	963211.06	93970.33	113557.24
LA3324-2-12	1397.73	28.74	5328.69	319.98	1717476.77	164813.44	202736.41
SRM614-16	2334.05	55.62	2274.79	10186.64	12496.69	1882.01	1930.93
SRM612-16	9243.61	1795.67	6127.17	11368.28	23503.19	3249.82	3708.42
SRM610-16	56317.08	16279.23	28025.46	7478.62	98360.70	12171.63	13817.32
AP1-16	4444.67	14.82	1728.27	350.62	32380.88	3459.90	5219.23
AP2-16	2468.69	166.46	7051.94	174.38	1108553.97	106200.84	129323.88
AP3-16	2036.41	747.78	9466.95	183.02	2100951.87	197859.27	243987.98
AP4-16	1818.81	828.86	5932.65	77.98	1264229.17	119820.63	146348.07

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-15	0.000000	0.000029	0.004559	0.007727	0.004524	0.000866	0.001406
SRM612-15	0.002453	0.001073	0.007244	0.007957	0.028788	0.003540	0.004606
SRM610-15	0.063853	0.017865	0.036675	0.009551	0.120688	0.013803	0.017126
AP1-15	0.000128	0.000010	0.000241	0.000044	0.003518	0.000371	0.000592
AP2-15	0.000000	0.000014	0.000751	0.000027	0.124798	0.011111	0.013707
AP3-15	0.000000	0.000044	0.000690	0.000012	0.144332	0.012885	0.015928
AP4-15	0.000000	0.000057	0.000493	0.000005	0.091967	0.008339	0.010233
LA3324-2-1	0.000000	0.000003	0.000169	0.000071	0.155619	0.015703	0.018925
LA3324-2-2	0.000000	0.000009	0.000189	0.000055	0.144103	0.014307	0.017368
LA3324-2-3	0.000007	0.000006	0.000258	0.000080	0.141500	0.013984	0.016900
LA3324-2-4	0.000000	0.000002	0.000179	0.000053	0.123807	0.012134	0.014716
LA3324-2-5	0.000000	0.000001	0.000188	0.000054	0.127622	0.012368	0.015057
LA3324-2-6	0.000000	0.000002	0.000184	0.000047	0.124566	0.012080	0.014769
LA3324-2-7	0.000060	0.000005	0.000262	0.000029	0.120737	0.012416	0.014869
LA3324-2-8	0.000012	0.000003	0.000222	0.000043	0.115608	0.011675	0.014240
LA3324-2-9	0.000110	0.000000	0.000232	0.000039	0.114206	0.011741	0.014014
LA3324-2-10	0.000226	0.000002	0.000285	0.000037	0.136814	0.013706	0.016630
LA3324-2-11	0.000190	0.000003	0.000307	0.000028	0.142044	0.013858	0.016746
LA3324-2-12	0.000144	0.000003	0.000549	0.000033	0.176996	0.016985	0.020893
SRM614-16	0.001727	0.000041	0.001684	0.007539	0.009248	0.001393	0.001429
SRM612-16	0.006536	0.001270	0.004333	0.008039	0.016620	0.002298	0.002622
SRM610-16	0.067988	0.019653	0.033833	0.009028	0.118745	0.014694	0.016681
AP1-16	0.000411	0.000001	0.000160	0.000032	0.002998	0.000320	0.000483
AP2-16	0.000214	0.000014	0.000611	0.000015	0.096014	0.009198	0.011201
AP3-16	0.000128	0.000047	0.000597	0.000012	0.132410	0.012470	0.015377
AP4-16	0.000125	0.000057	0.000409	0.000005	0.087057	0.008251	0.010078
standardize signal averages AP							
AP1	0.000270	0.000006	0.000200	0.000038	0.003258	0.000346	0.000537
AP2	0.000107	0.000014	0.000681	0.000021	0.110406	0.010155	0.012454
AP3	0.000064	0.000046	0.000643	0.000012	0.138371	0.012677	0.015652
AP4	0.000063	0.000057	0.000451	0.000005	0.089512	0.008295	0.010155
linest from std sig ave							
	0.014020	0.234625	0.044104	2.613368	0.011603	0.126347	0.102645
standardize signal averages SRM							
srm614-2	0.000864	0.000035	0.003121	0.007633	0.006886	0.001129	0.001418
srm612-2	0.004495	0.001171	0.005789	0.007998	0.022704	0.002919	0.003614
srm610-2	0.065921	0.018759	0.035254	0.009290	0.119716	0.014248	0.016904
linest from std sig ave							
	0.085807	0.289742	0.115735	130.247368	0.045155	0.377610	0.317487
concentration data							
i.s. correction							
SRM614-15	85763.00	0.00	0.58	17.24	1731.84	4.50	12.38
SRM612-15	85763.00	2.95	21.59	27.40	1783.37	28.65	40.55
SRM610-15	85763.00	76.78	359.47	138.72	2140.57	120.10	150.77
AP1-15	398936	0.71	0.95	4.23	45.80	16.28	24.23
AP2-15	398936	0.00	1.30	13.22	28.46	577.68	561.27
AP3-15	398936	0.00	4.12	12.13	12.07	668.10	652.21
AP4-15	398936	0.00	5.34	8.68	5.04	425.71	419.01
LA3324-2-1	398936	0.00	0.29	2.97	74.20	720.35	774.95
LA3324-2-2	398936	0.00	0.80	3.33	57.32	667.04	711.18
LA3324-2-3	398936	0.04	0.60	4.54	83.11	654.99	692.03
LA3324-2-4	398936	0.00	0.21	3.15	55.14	573.09	602.61
LA3324-2-5	398936	0.00	0.13	3.31	56.42	590.75	616.57
LA3324-2-6	398936	0.00	0.21	3.24	48.66	576.61	604.77

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	398936	0.33	0.45	4.60	30.43	558.88	625.83	608.88
LA3324-2-8	398936	0.07	0.25	3.91	44.73	535.14	588.45	583.11
LA3324-2-9	398936	0.61	0.00	4.08	40.37	528.65	591.77	573.86
LA3324-2-10	398936	1.27	0.20	5.02	38.41	633.30	690.82	680.97
LA3324-2-11	398936	1.06	0.27	5.40	29.21	657.51	698.49	685.74
LA3324-2-12	398936	0.81	0.28	9.66	34.38	819.30	856.11	855.55
SRM614-16	85763.00	2.08	0.83	6.37	1689.69	9.20	15.09	12.58
SRM612-16	85763.00	7.86	25.55	16.39	1801.74	16.54	24.90	23.08
SRM610-16	85763.00	81.75	395.46	127.98	2023.56	118.17	159.22	146.84
AP1-16	398936	2.30	0.13	2.82	33.84	13.88	16.15	19.79
AP2-16	398936	1.20	1.35	10.75	15.75	444.44	463.63	458.67
AP3-16	398936	0.72	4.41	10.50	12.03	612.92	628.53	629.67
AP4-16	398936	0.70	5.34	7.19	5.60	402.98	415.89	412.67

certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-13	22635.69	71.84	906.49	764.08	1989.61	442.44	1942.45
SRM614-13	22629.69	101.24	7133.60	14532.44	14982.28	2347.01	4289.30
SRM612-13	30995.62	1890.97	9329.85	13225.99	24740.18	3750.54	5729.51
SRM610-13	78196.40	15661.61	30586.37	8549.97	125625.23	15538.13	19325.83
AP1-13	26619.03	119.56	3751.34	1098.05	70821.08	8278.05	12335.67
AP2-13	25818.31	211.48	7883.84	1020.77	1055544.80	104143.59	127333.11
AP3-13	24701.38	733.68	9314.09	794.92	1608662.60	155354.39	191810.20
AP4-13	25453.58	1155.05	8600.05	687.04	1937366.60	188295.42	231925.06
LA3324-1-1	25497.42	92.76	4989.99	1065.53	1288443.80	128754.80	157296.05
LA3324-1-2	26084.11	89.32	3842.26	953.89	1066283.50	107168.00	130729.73
LA3324-1-3	26905.99	81.12	3458.98	925.97	867163.38	89134.26	108270.85
LA3324-1-4	27634.04	107.20	12245.27	1152.25	1520088.80	150247.72	183215.03
LA3324-1-5	26665.51	95.64	9518.37	1034.93	1174567.30	116413.49	142029.64
LA3324-1-6	26981.35	85.08	10247.22	1064.25	1303355.50	128058.48	156723.80
LA3324-1-7	27196.59	102.84	6931.16	1040.21	1391401.40	135452.95	166446.25
LA3324-1-8	27484.80	117.80	8086.53	1066.93	1801087.90	174625.83	214066.92
LA3324-1-9	28482.68	84.48	7493.12	1065.09	2140032.80	207745.20	254226.27
LA3324-1-10	27854.36	56.00	1798.37	605.84	520325.13	54358.51	65617.38
LA3324-1-11	28086.96	64.52	1402.57	595.52	405902.94	43172.04	51816.89
LA3324-1-12	28614.28	64.60	1468.49	555.56	392454.81	41420.99	50455.32
LA3324-1-13	28342.88	62.92	2186.37	740.48	596412.19	61383.70	75274.82
LA3324-1-14	27734.48	76.96	1544.29	588.40	419755.00	44263.57	53785.38
LA3324-1-15	28121.24	46.08	1467.05	644.28	384177.75	40853.87	49744.28
LA3324-1-16	28503.64	73.12	1322.01	656.40	618750.19	62928.79	77084.88
LA3324-1-17	28754.56	68.68	1404.25	622.80	691241.06	69678.16	85064.08
LA3324-1-18	28708.24	59.36	1403.21	667.92	683200.00	69140.19	83888.31
SRM614-14	28331.44	98.88	1866.69	11535.63	19804.47	2903.90	3426.06
SRM612-14	34307.67	1695.53	5388.11	12037.43	28539.24	4072.34	4810.71
SRM610-14	79280.09	15145.73	26007.07	7957.40	104826.83	12852.23	15149.57
AP1-14	28569.88	111.92	1771.49	847.20	44375.01	5153.03	7518.68
AP2-14	26838.55	187.20	4959.71	662.76	692325.44	68146.59	82640.27
AP3-14	25840.31	620.04	6761.44	616.84	1330618.90	124945.98	154355.75
AP4-14	25632.06	801.84	5137.51	524.64	1131888.50	108447.33	131294.38
blank-14	30733.17	57.32	245.36	338.36	15206.09	2023.05	2122.37
blank average	26684.43	64.58	575.92	551.22	8597.85	1232.75	2032.41

blank subtraction								
SRM614-13	-4054.74	36.66	6557.68	13981.22	6384.44	1114.27	2256.89	
SRM612-13	4311.18	1826.39	8753.93	12674.77	16142.33	2517.79	3697.10	
SRM610-13	51511.97	15597.03	30010.45	7998.74	117027.38	14305.38	17293.42	
AP1-13	-65.40	54.98	3175.42	546.82	62223.23	7045.30	10303.26	
AP2-13	-866.13	146.90	7307.92	469.54	1046946.95	102910.84	125300.70	
AP3-13	-1983.05	669.10	8738.17	243.70	1600064.75	154121.64	189777.79	
AP4-13	-1230.85	1090.47	8024.13	135.82	1928768.75	187062.67	229892.65	
LA3324-1-1	-1187.01	28.18	4414.07	514.30	1279845.95	127522.05	155263.64	
LA3324-1-2	-600.32	24.74	3266.34	402.66	1057685.65	105935.25	128697.32	
LA3324-1-3	221.56	16.54	2883.06	374.74	858565.53	87901.51	106238.44	
LA3324-1-4	949.60	42.62	11669.35	601.02	1511490.95	149014.97	181182.62	
LA3324-1-5	-18.92	31.06	8942.45	483.70	1165969.45	115180.74	139997.23	
LA3324-1-6	296.92	20.50	9671.29	513.02	1294757.65	126825.73	154691.39	
LA3324-1-7	512.16	38.26	6355.24	488.98	1382803.55	134220.20	164413.84	
LA3324-1-8	800.36	53.22	7110.60	515.70	1792490.05	173393.08	212034.51	
LA3324-1-9	1798.25	19.90	6917.20	513.86	2131434.95	206512.45	252193.86	

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	1169.93	-8.58	1222.45	54.62	511727.28	53125.76	63584.96
LA3324-1-11	1402.53	-0.06	826.64	44.30	397305.09	41939.30	49784.48
LA3324-1-12	1929.85	0.02	892.57	4.34	383856.96	40188.25	48422.91
LA3324-1-13	1658.45	-1.66	1610.45	189.26	587814.34	60150.96	73242.41
LA3324-1-14	1050.05	12.38	968.37	37.18	411157.15	43030.82	51752.97
LA3324-1-15	1436.81	-18.50	891.13	93.06	375579.90	39621.12	47711.87
LA3324-1-16	1819.21	8.54	746.08	105.18	610152.34	61696.05	75052.46
LA3324-1-17	2070.13	4.10	828.32	71.58	682643.21	68445.41	83031.67
LA3324-1-18	2023.81	-5.22	827.28	116.70	674602.15	67907.44	81855.90
SRM614-14	1647.01	34.30	1290.77	10984.40	11206.62	1671.15	1393.65
SRM612-14	7623.24	1630.95	4812.19	11486.20	19941.39	2839.60	2778.30
SRM610-14	52595.66	15081.14	25431.14	7406.18	96228.98	11619.49	13117.15
AP1-14	1885.45	47.34	1195.57	295.98	35777.16	3920.28	5486.27
AP2-14	154.12	122.62	4383.78	111.54	683727.59	66913.84	80607.85
AP3-14	-844.13	555.46	6185.51	65.62	1322021.05	123713.23	152323.34
AP4-14	-1052.37	737.26	4561.59	-26.58	1123290.65	107214.58	129261.97

zero correction							
SRM614-13	0.00	36.66	6557.68	13981.22	6384.44	1114.27	2256.89
SRM612-13	4311.18	1826.39	8753.93	12674.77	16142.33	2517.79	3697.10
SRM610-13	51511.97	15597.03	30010.45	7998.74	117027.38	14305.38	17293.42
AP1-13	0.00	54.98	3175.42	546.82	62223.23	7045.30	10303.26
AP2-13	0.00	146.90	7307.92	469.54	1046946.95	102910.84	125300.70
AP3-13	0.00	669.10	8738.17	243.70	1600064.75	154121.64	189777.79
AP4-13	0.00	1090.47	8024.13	135.82	1928768.75	187062.67	229892.65
LA3324-1-1	0.00	28.18	4414.07	514.30	1279845.95	127522.05	155263.64
LA3324-1-2	0.00	24.74	3266.34	402.66	1057685.65	105935.25	128697.32
LA3324-1-3	221.56	16.54	2883.06	374.74	858565.53	87901.51	106238.44
LA3324-1-4	949.60	42.62	11669.35	601.02	1511490.95	149014.97	181182.62
LA3324-1-5	0.00	31.06	8942.45	483.70	1165969.45	115180.74	139997.23
LA3324-1-6	296.92	20.50	9671.29	513.02	1294757.65	126825.73	154691.39
LA3324-1-7	512.16	38.26	6355.24	488.98	1382803.55	134220.20	164413.84
LA3324-1-8	800.36	53.22	7510.60	515.70	1792490.05	173393.08	212034.51
LA3324-1-9	1798.25	19.90	6917.20	513.86	2131434.95	206512.45	252193.86
LA3324-1-10	1169.93	0.00	1222.45	54.62	511727.28	53125.76	63584.96
LA3324-1-11	1402.53	0.00	826.64	44.30	397305.09	41939.30	49784.48
LA3324-1-12	1929.85	0.02	892.57	4.34	383856.96	40188.25	48422.91
LA3324-1-13	1658.45	0.00	1610.45	189.26	587814.34	60150.96	73242.41
LA3324-1-14	1050.05	12.38	968.37	37.18	411157.15	43030.82	51752.97
LA3324-1-15	1436.81	0.00	891.13	93.06	375579.90	39621.12	47711.87
LA3324-1-16	1819.21	8.54	746.08	105.18	610152.34	61696.05	75052.46
LA3324-1-17	2070.13	4.10	828.32	71.58	682643.21	68445.41	83031.67
LA3324-1-18	2023.81	0.00	827.28	116.70	674602.15	67907.44	81855.90
SRM614-14	1647.01	34.30	1290.77	10984.40	11206.62	1671.15	1393.65
SRM612-14	7623.24	1630.95	4812.19	11486.20	19941.39	2839.60	2778.30
SRM610-14	52595.66	15081.14	25431.14	7406.18	96228.98	11619.49	13117.15
AP1-14	1885.45	47.34	1195.57	295.98	35777.16	3920.28	5486.27
AP2-14	154.12	122.62	4383.78	111.54	683727.59	66913.84	80607.85
AP3-14	0.00	555.46	6185.51	65.62	1322021.05	123713.23	152323.34
AP4-14	0.00	737.26	4561.59	0.00	1123290.65	107214.58	129261.97

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-13	0.000000	0.000019	0.003386	0.007220	0.003297	0.000575	0.001165
SRM612-13	0.002494	0.001057	0.005064	0.007332	0.009338	0.001457	0.002139
SRM610-13	0.053393	0.016167	0.031106	0.008291	0.121301	0.014828	0.017925
AP1-13	0.000000	0.000004	0.000212	0.000036	0.004153	0.000470	0.000688
AP2-13	0.000000	0.000012	0.000602	0.000039	0.086283	0.008481	0.010326
AP3-13	0.000000	0.000037	0.000487	0.000014	0.089096	0.008582	0.010567
AP4-13	0.000000	0.000069	0.000505	0.000009	0.121267	0.011761	0.014454
LA3324-1-1	0.000000	0.000003	0.000536	0.000062	0.155476	0.015491	0.018861

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000000	0.000004	0.000465	0.000057	0.150692	0.015093	0.018336	
LA3324-1-3	0.000038	0.000003	0.000497	0.000065	0.147885	0.015141	0.018299	
LA3324-1-4	0.000082	0.000004	0.001006	0.000052	0.130323	0.012848	0.015622	
LA3324-1-5	0.000000	0.000003	0.000915	0.000049	0.119293	0.011784	0.014323	
LA3324-1-6	0.000028	0.000002	0.000906	0.000048	0.121310	0.011883	0.014494	
LA3324-1-7	0.000046	0.000003	0.000570	0.000044	0.123930	0.012029	0.014735	
LA3324-1-8	0.000063	0.000004	0.000591	0.000041	0.141007	0.013640	0.016680	
LA3324-1-9	0.000145	0.000002	0.000559	0.000042	0.172300	0.016694	0.020387	
LA3324-1-10	0.000206	0.000000	0.000215	0.000010	0.090072	0.009351	0.011192	
LA3324-1-11	0.000285	0.000000	0.000168	0.000009	0.080822	0.008532	0.010127	
LA3324-1-12	0.000386	0.000000	0.000178	0.000001	0.076684	0.008029	0.009674	
LA3324-1-13	0.000231	0.000000	0.000224	0.000026	0.081863	0.008377	0.010200	
LA3324-1-14	0.000145	0.000002	0.000134	0.000005	0.056913	0.005956	0.007164	
LA3324-1-15	0.000202	0.000000	0.000125	0.000013	0.052744	0.005564	0.006700	
LA3324-1-16	0.000285	0.000001	0.000117	0.000017	0.095739	0.009681	0.011777	
LA3324-1-17	0.000290	0.000001	0.000116	0.000010	0.095471	0.009572	0.011612	
LA3324-1-18	0.000278	0.000000	0.000114	0.000016	0.092651	0.009327	0.011242	
SRM614-14	0.001246	0.000026	0.000976	0.008309	0.008478	0.001264	0.001054	
SRM612-14	0.005636	0.001206	0.003557	0.008491	0.014742	0.002099	0.002054	
SRM610-14	0.064235	0.018419	0.031059	0.009045	0.117525	0.014191	0.016020	
AP1-14	0.000151	0.000004	0.000096	0.000024	0.002872	0.000315	0.000440	
AP2-14	0.000016	0.000013	0.000464	0.000012	0.072419	0.007087	0.008538	
AP3-14	0.000000	0.000038	0.000424	0.000005	0.090660	0.008484	0.010446	
AP4-14	0.000000	0.000059	0.000365	0.000000	0.089817	0.008573	0.010336	
standardize signal averages AP								
AP1	0.000076	0.000004	0.000154	0.000030	0.003513	0.000392	0.000564	
AP2	0.000008	0.000013	0.000533	0.000025	0.079351	0.007784	0.009432	
AP3	0.000000	0.000038	0.000455	0.000009	0.089878	0.008533	0.010507	
AP4	0.000000	0.000064	0.000435	0.000004	0.105542	0.010167	0.012395	
linest from std sig ave								
	0.004782	0.236190	0.056225	2.193555	0.014996	0.155626	0.127460	
standardize signal averages SRM								
srm614-2	0.000623	0.000022	0.002181	0.007765	0.005887	0.000920	0.001110	
srm612-2	0.004065	0.001131	0.004311	0.007912	0.012040	0.001778	0.002096	
srm610-2	0.058814	0.017293	0.031083	0.008668	0.119413	0.014509	0.016973	
linest from std sig ave								
	0.096175	0.314263	0.132306	133.984942	0.045774	0.376023	0.321390	
concentration data i.s. correction								
SRM614-13	85763.00	0.00	0.38	16.33	1358.22	4.24	7.68	12.74
SRM612-13	85763.00	1.02	21.40	24.42	1379.42	12.01	19.44	23.38
SRM610-13	85763.00	21.90	327.48	150.00	1559.73	156.01	197.91	195.94
AP1-13	398936	0.00	0.35	4.75	31.94	24.84	29.19	34.96
AP2-13	398936	0.00	1.14	13.51	33.86	516.19	526.56	525.08
AP3-13	398936	0.00	3.51	10.91	11.87	533.02	532.81	537.33
AP4-13	398936	0.00	6.46	11.32	7.47	725.49	730.19	734.96
LA3324-1-1	398936	0.00	0.32	12.03	54.67	930.15	961.78	959.07
LA3324-1-2	398936	0.00	0.33	10.44	50.20	901.53	937.05	932.35
LA3324-1-3	398936	0.07	0.27	11.14	56.49	884.73	940.01	930.48
LA3324-1-4	398936	0.16	0.35	22.57	45.35	779.67	797.68	794.34
LA3324-1-5	398936	0.00	0.30	20.52	43.31	713.68	731.63	728.32
LA3324-1-6	398936	0.05	0.18	20.32	42.06	725.75	737.74	736.97
LA3324-1-7	398936	0.09	0.32	12.78	38.35	741.43	746.83	749.26
LA3324-1-8	398936	0.12	0.39	13.25	35.50	843.59	846.84	848.14
LA3324-1-9	398936	0.28	0.15	12.54	36.35	1030.80	1036.45	1036.63
LA3324-1-10	398936	0.39	0.00	4.83	8.41	538.86	580.55	569.09
LA3324-1-11	398936	0.54	0.00	3.77	7.89	483.53	529.68	514.96
LA3324-1-12	398936	0.74	0.00	4.00	0.76	458.77	498.45	491.88
LA3324-1-13	398936	0.44	0.00	5.03	23.07	489.76	520.09	518.67
LA3324-1-14	398936	0.28	0.16	3.01	4.50	340.49	369.80	364.27
LA3324-1-15	398936	0.38	0.00	2.81	11.44	315.55	345.45	340.70
LA3324-1-16	398936	0.54	0.13	2.63	14.44	572.77	601.03	598.82
LA3324-1-17	398936	0.55	0.05	2.60	8.76	571.16	594.30	590.47
LA3324-1-18	398936	0.53	0.00	2.55	14.03	554.29	579.04	571.65
SRM614-14	85763.00	0.51	0.53	4.71	1563.22	10.90	16.87	11.52
SRM612-14	85763.00	2.31	24.42	17.15	1597.44	18.96	28.02	22.45
SRM610-14	85763.00	26.34	373.10	149.77	1701.64	151.15	189.41	175.12
AP1-14	398936	0.29	0.36	2.15	20.79	17.18	19.54	22.40
AP2-14	398936	0.03	1.22	10.41	10.34	433.25	440.02	434.13
AP3-14	398936	0.00	3.59	9.51	3.94	542.38	526.72	531.15
AP4-14	398936	0.00	5.55	8.18	0.00	537.34	532.24	525.55
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-11	16124.77	48.04	2678.46	581.72	2789.46	895.09	2863.54
SRM614-11	16536.33	108.52	18204.98	12413.91	14879.08	2992.22	5316.47
SRM612-11	23624.57	1671.89	20468.96	12423.39	41612.31	5913.23	8538.93
SRM610-11	69418.51	13745.68	31395.06	7578.16	121720.45	15496.41	19434.39
AP1-11	19510.47	79.00	6632.48	794.00	58047.69	7719.32	11837.19
AP2-11	18699.66	190.96	10462.34	700.40	1207330.40	113480.28	140731.27
AP3-11	19964.35	667.48	12698.23	591.12	1846073.60	172814.05	213693.69
AP4-11	20010.59	895.57	10972.62	424.48	1379293.00	128694.37	159576.34
M17-24-141-1	19937.71	72.56	3801.14	567.32	207961.48	22931.57	27960.84
M17-24-141-2	21147.12	62.60	4301.50	554.76	215174.17	23351.37	28738.12
M17-24-141-3	22541.21	76.84	4456.91	495.28	240420.19	25775.06	31556.66
M17-24-141-4	22641.09	90.60	3798.38	577.52	312967.31	32232.42	39643.06
M17-24-141-5	23303.33	71.12	3895.02	604.20	308585.00	32255.14	39499.10
M17-24-141-6	23765.41	78.52	3476.74	537.92	338652.22	34994.28	42456.96
M17-24-141-7	24445.66	86.56	4364.26	522.08	444976.59	44381.01	53851.66
M17-24-141-8	25331.30	72.60	3754.82	545.48	389373.75	39117.26	47864.51
M17-24-141-9	25770.03	77.48	3776.30	485.32	401521.28	40287.27	49308.64
M17-24-141-10	26485.95	80.48	13397.68	668.48	647649.31	61916.71	75484.34
M17-24-141-11	26248.83	110.36	22377.49	803.96	925698.31	85135.28	105195.03
M17-24-141-12	25549.15	134.80	36370.45	784.76	1158928.10	104677.27	128165.56
M17-24-141-13	25631.42	273.96	161018.83	1287.97	3316877.80	298112.53	369125.69
M17-24-141-14	24544.98	260.72	160894.83	1244.85	3215676.80	284058.81	352646.53
M17-24-141-15	24018.06	283.56	159876.17	1181.09	3152246.30	277416.69	343012.94
M17-24-141-16	24476.42	178.88	63190.76	1060.65	3124069.50	276562.25	341370.94
M17-24-141-17	23835.33	155.48	51853.65	1010.01	2863210.30	249830.97	310194.69
M17-24-141-18	24240.54	159.40	44221.69	1145.33	2954883.80	257836.73	320482.94
SRM614-12	26258.55	101.56	7575.52	11398.30	22312.97	3084.90	4043.42
SRM612-12	34649.80	2129.29	12516.75	14365.88	35552.56	4807.15	6116.35
SRM610-12	83643.79	16559.93	33878.47	8989.77	128452.88	15545.01	18736.98
AP1-12	29669.29	92.76	4966.39	526.24	44170.69	5012.79	7765.36
AP2-12	28725.56	241.60	9611.85	492.12	1121175.30	100206.77	122793.21
AP3-12	29281.89	699.92	11084.06	446.36	1786964.80	157656.28	195272.25
AP4-12	29887.49	1107.93	10124.30	353.92	1837895.50	161733.39	200757.05
blank-12	26826.83	64.76	1031.17	261.00	16110.93	2135.13	2536.33
blank average	21475.80	56.40	1854.81	421.36	9450.19	1515.11	2699.94

blank subtraction	Li	Be	B	Na	Mg24	Mg25	Mg26
SRM614-11	-4939.47	52.12	16350.17	11992.55	5428.89	1477.11	2616.53
SRM612-11	2148.77	1615.49	18614.14	12002.03	32162.12	4398.12	5838.99
SRM610-11	47942.71	13689.28	29540.25	7156.80	112270.26	13981.30	16734.45
AP1-11	-1965.33	22.60	4777.67	372.64	48597.49	6204.21	9137.25
AP2-11	-2776.14	134.56	8607.53	279.04	1197880.21	111965.17	138031.33
AP3-11	-1511.45	611.08	10843.42	169.76	1836623.41	171298.94	210993.75
AP4-11	-1465.21	839.16	9117.81	3.12	1369842.81	127179.26	156876.40
M17-24-141-1	-1538.09	16.16	1946.33	145.96	198511.29	21416.46	25260.90
M17-24-141-2	-328.68	6.20	2446.69	133.40	205723.98	21836.26	26038.19
M17-24-141-3	1065.41	20.44	2602.09	73.92	230970.00	24259.96	28856.72
M17-24-141-4	1165.29	34.20	1943.57	156.16	303517.12	30717.31	36943.13
M17-24-141-5	1827.53	14.72	2040.21	182.84	299134.81	30740.03	36799.17
M17-24-141-6	2289.61	22.12	1621.93	116.56	329202.03	33479.17	39757.03
M17-24-141-7	2969.86	30.16	2509.45	100.72	435526.40	42865.90	51151.73
M17-24-141-8	3855.50	16.20	1900.01	124.12	379923.56	37602.15	45164.57
M17-24-141-9	4294.22	21.08	1921.49	63.96	392071.09	38772.16	46608.70
M17-24-141-10	5010.15	24.08	11542.86	247.12	638199.12	60401.60	72784.41
M17-24-141-11	4773.03	53.96	20522.68	382.60	916248.12	83620.17	102495.09
M17-24-141-12	4073.34	78.40	34515.63	363.40	1149477.91	103162.16	125465.62
M17-24-141-13	4155.62	217.56	159164.02	866.60	3307427.61	296597.42	366425.75
M17-24-141-14	3069.18	204.32	159040.02	823.48	3206226.61	282543.70	349946.59
M17-24-141-15	2542.25	227.16	158021.36	759.72	3142796.11	275901.58	340313.00
M17-24-141-16	3000.62	122.48	61335.95	639.28	3114619.31	275047.14	338671.00
M17-24-141-17	2359.53	99.08	49998.84	588.64	2853760.11	248315.86	307494.75
M17-24-141-18	2764.74	103.00	42366.88	723.96	2945433.61	256321.62	317783.00
SRM614-12	4782.75	45.16	5720.71	10976.94	12862.77	1569.79	1343.49
SRM612-12	13174.00	2072.89	10661.94	13944.52	26102.37	3292.04	3416.42
SRM610-12	62167.99	16503.53	32023.66	8568.41	119002.69	14029.90	16037.05
AP1-12	8193.49	36.36	3111.58	104.88	34720.49	3497.68	5065.43
AP2-12	7249.76	185.20	7757.04	70.76	1111725.11	98691.66	120093.27
AP3-12	7806.08	643.52	9229.25	25.00	1777514.61	156141.17	192572.31
AP4-12	8411.69	1051.53	8269.49	-67.44	1828445.31	160218.28	198057.11

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-11	0.00	52.12	16350.17	11992.55	5428.89	1477.11	2616.53
SRM612-11	2148.77	1615.49	18614.14	12002.03	32162.12	4398.12	5838.99
SRM610-11	47942.71	13689.28	29540.25	7156.80	112270.26	13981.30	16734.45
AP1-11	0.00	22.60	4777.67	372.64	48597.49	6204.21	9137.25
AP2-11	0.00	134.56	8607.53	279.04	1197880.21	111965.17	138031.33
AP3-11	0.00	611.08	10843.42	169.76	1836623.41	171298.94	210993.75
AP4-11	0.00	839.16	9117.81	3.12	1369842.81	127179.26	156876.40
M17-24-141-1	0.00	16.16	1946.33	145.96	198511.29	21416.46	25260.90
M17-24-141-2	0.00	6.20	2446.69	133.40	205723.98	21836.26	26038.19
M17-24-141-3	1065.41	20.44	2602.09	73.92	230970.00	24259.96	28856.72
M17-24-141-4	1165.29	34.20	1943.57	156.16	303517.12	30717.31	36943.13
M17-24-141-5	1827.53	14.72	2040.21	182.84	299134.81	30740.03	36799.17
M17-24-141-6	2289.61	22.12	1621.93	116.56	329202.03	33479.17	39757.03
M17-24-141-7	2969.86	30.16	2509.45	100.72	435526.40	42865.90	51151.73
M17-24-141-8	3855.50	16.20	1900.01	124.12	379923.56	37602.15	45164.57
M17-24-141-9	4294.22	21.08	1921.49	63.96	392071.09	38772.16	46608.70
M17-24-141-10	5010.15	24.08	11542.86	247.12	638199.12	60401.60	72784.41
M17-24-141-11	4773.03	53.96	20522.68	382.60	916248.12	83620.17	102495.09
M17-24-141-12	4073.34	78.40	34515.63	363.40	1149477.91	103162.16	125465.62
M17-24-141-13	4155.62	217.56	159164.02	866.60	3307427.61	296597.42	366425.75
M17-24-141-14	3069.18	204.32	159040.02	823.48	3206226.61	282543.70	349946.59
M17-24-141-15	2542.25	227.16	158021.36	759.72	3142796.11	275901.58	340313.00
M17-24-141-16	3000.62	122.48	61335.95	639.28	3114619.31	275047.14	338671.00
M17-24-141-17	2359.53	99.08	49998.84	588.64	2853760.11	248315.86	307494.75
M17-24-141-18	2764.74	103.00	42366.88	723.96	2945433.61	256321.62	317783.00
SRM614-12	4782.75	45.16	5720.71	10976.94	12862.77	1569.79	1343.49
SRM612-12	13174.00	2072.89	10661.94	13944.52	26102.37	3292.04	3416.42
SRM610-12	62167.99	16503.53	32023.66	8568.41	119002.69	14029.90	16037.05
AP1-12	8193.49	36.36	3111.58	104.88	34720.49	3497.68	5065.43
AP2-12	7249.76	185.20	7757.04	70.76	1111725.11	98691.66	120093.27
AP3-12	7806.08	643.52	9229.25	25.00	1777514.61	156141.17	192572.31
AP4-12	8411.69	1051.53	8269.49	0.00	1828445.31	160218.28	198057.11
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-11	0.000000	0.000028	0.008789	0.006446	0.002918	0.000794	0.001406
SRM612-11	0.001111	0.000835	0.009625	0.006206	0.016631	0.002274	0.003019
SRM610-11	0.046904	0.013393	0.028900	0.007002	0.109838	0.013678	0.016372
AP1-11	0.000000	0.000002	0.000417	0.000032	0.004237	0.000541	0.000797
AP2-11	0.000000	0.000013	0.000802	0.000026	0.111576	0.010429	0.012857
AP3-11	0.000000	0.000043	0.000762	0.000012	0.129043	0.012036	0.014825
AP4-11	0.000000	0.000062	0.000671	0.000000	0.100866	0.009365	0.011551
M17-24-141-1	0.000000	0.000007	0.000886	0.000066	0.090367	0.009749	0.011499
M17-24-141-2	0.000000	0.000003	0.001000	0.000055	0.084086	0.008925	0.010643
M17-24-141-3	0.000397	0.000008	0.000969	0.000028	0.085967	0.009030	0.010740
M17-24-141-4	0.000346	0.000010	0.000577	0.000046	0.090039	0.009112	0.010959
M17-24-141-5	0.000572	0.000005	0.000639	0.000057	0.093685	0.009627	0.011525
M17-24-141-6	0.000726	0.000007	0.000515	0.000037	0.104448	0.010622	0.012614
M17-24-141-7	0.001006	0.000010	0.000850	0.000034	0.147565	0.014524	0.017331
M17-24-141-8	0.001360	0.000006	0.000670	0.000044	0.134013	0.013264	0.015931
M17-24-141-9	0.001417	0.000007	0.000634	0.000021	0.129342	0.012791	0.015376
M17-24-141-10	0.001078	0.000005	0.002485	0.000053	0.137372	0.013001	0.015667
M17-24-141-11	0.000747	0.000008	0.003211	0.000060	0.143343	0.013082	0.016035
M17-24-141-12	0.000550	0.000011	0.004662	0.000049	0.155261	0.013934	0.016947
M17-24-141-13	0.000248	0.000013	0.009515	0.000052	0.197714	0.017730	0.021904
M17-24-141-14	0.000183	0.000012	0.009460	0.000049	0.190704	0.016806	0.020815
M17-24-141-15	0.000150	0.000013	0.009313	0.000045	0.185217	0.016260	0.020056
M17-24-141-16	0.000168	0.000007	0.003435	0.000036	0.174419	0.015403	0.018966
M17-24-141-17	0.000128	0.000005	0.002719	0.000032	0.155205	0.013505	0.016723

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000149	0.000006	0.002283	0.000039	0.158725	0.013813	0.017125
SRM614-12	0.003249	0.000031	0.003886	0.007456	0.008737	0.001066	0.000913
SRM612-12	0.006971	0.001097	0.005642	0.007379	0.013812	0.001742	0.001808
SRM610-12	0.061671	0.016372	0.031767	0.008500	0.118051	0.013918	0.015909
AP1-12	0.000680	0.000003	0.000258	0.000009	0.002880	0.000290	0.000420
AP2-12	0.000595	0.000015	0.000637	0.000006	0.091290	0.008104	0.009862
AP3-12	0.000471	0.000039	0.000557	0.000002	0.107228	0.009419	0.011617
AP4-12	0.000521	0.000065	0.000512	0.000000	0.113227	0.009922	0.012265

standardize signal averages AP							
AP1	0.000340	0.000002	0.000337	0.000021	0.003558	0.000415	0.000608
AP2	0.000298	0.000014	0.000719	0.000016	0.101433	0.009267	0.011359
AP3	0.000235	0.000041	0.000659	0.000007	0.118135	0.010727	0.013221
AP4	0.000260	0.000063	0.000592	0.000000	0.107046	0.009643	0.011908

linest from std sig ave							
	0.014548	0.231092	0.038693	3.484032	0.012546	0.138164	0.112238

standardize signal averages SRM							
srm614-2	0.001624	0.000029	0.006337	0.006951	0.005828	0.000930	0.001160
srm612-2	0.004041	0.000966	0.007633	0.006792	0.015221	0.002008	0.002414
srm610-2	0.054287	0.014882	0.030334	0.007751	0.113944	0.013798	0.016140

linest from std sig ave							
	0.104089	0.365175	0.126793	151.592766	0.047861	0.394404	0.336895

concentration data		i.s. correction						
SRM614-11	85763.00	0.00	0.56	29.17	1926.21	3.14	9.41	13.54
SRM612-11	85763.00	1.39	16.56	31.94	1854.38	17.89	26.95	29.06
SRM610-11	85763.00	58.52	265.43	95.90	2092.13	118.18	162.08	157.59
AP1-11	398936	0.00	0.18	6.43	45.15	21.20	29.81	35.67
AP2-11	398936	0.00	1.16	12.38	36.13	558.45	574.83	575.67
AP3-11	398936	0.00	3.96	11.76	16.58	645.87	663.39	663.78
AP4-11	398936	0.00	5.70	10.36	0.32	504.84	516.16	517.22
M17-24-141-1	398936	0.00	0.68	13.68	92.35	452.30	537.37	514.89
M17-24-141-2	398936	0.00	0.23	15.44	75.79	420.86	491.94	476.53
M17-24-141-3	398936	2.30	0.70	14.95	38.24	430.27	497.70	480.91
M17-24-141-4	398936	2.01	0.94	8.90	64.39	450.66	502.26	490.71
M17-24-141-5	398936	3.32	0.43	9.86	79.59	468.90	530.65	516.04
M17-24-141-6	398936	4.22	0.65	7.94	51.40	522.77	585.47	564.80
M17-24-141-7	398936	5.84	0.94	13.12	47.43	738.58	800.53	776.01
M17-24-141-8	398936	7.89	0.53	10.35	60.85	670.75	731.07	713.33
M17-24-141-9	398936	8.22	0.64	9.78	29.33	647.37	705.00	688.47
M17-24-141-10	398936	6.26	0.48	38.35	73.93	687.56	716.62	701.49
M17-24-141-11	398936	4.33	0.78	49.56	83.19	717.45	721.06	717.97
M17-24-141-12	398936	3.19	0.98	71.96	68.22	777.10	768.03	758.80
M17-24-141-13	398936	1.44	1.20	146.87	72.00	989.58	977.26	980.78
M17-24-141-14	398936	1.06	1.12	146.02	68.08	954.49	926.30	931.99
M17-24-141-15	398936	0.87	1.23	143.75	62.23	927.03	896.22	898.01
M17-24-141-16	398936	0.98	0.63	53.02	49.76	872.98	848.97	849.19
M17-24-141-17	398936	0.74	0.50	41.97	44.50	776.82	744.37	748.80
M17-24-141-18	398936	0.86	0.51	35.24	54.22	794.43	761.34	766.77
SRM614-12	85763.00	4.05	0.61	12.89	2227.85	9.40	12.63	8.78
SRM612-12	85763.00	8.70	21.74	18.72	2204.74	14.86	20.64	17.40
SRM610-12	85763.00	76.95	324.47	105.42	2539.77	127.02	164.92	153.13
AP1-12	398936	3.94	0.28	3.98	12.09	14.41	15.99	18.81
AP2-12	398936	3.46	1.40	9.83	8.08	456.91	446.69	441.55
AP3-12	398936	2.73	3.58	8.59	2.10	536.68	519.17	520.15
AP4-12	398936	3.02	6.00	7.90	0.00	566.71	546.86	549.16

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-9	31757.02	68.32	884.44	796.04	2308.81	513.64	1509.29
SRM614-9	30912.41	114.04	7436.60	17582.54	17326.38	2873.98	4484.75
SRM612-9	36078.56	1832.41	9170.89	12842.43	46141.50	6187.03	8453.05
SRM610-9	82021.63	15663.73	29465.33	9054.37	135495.69	17425.06	21889.08
AP1-9	30722.49	174.60	3622.50	1096.21	59225.25	7206.20	10888.90
AP2-9	28611.04	191.20	7841.44	971.09	1133716.00	113690.32	139729.91
AP3-9	27610.56	662.96	8282.09	789.52	1504626.60	149682.20	184995.33

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	27684.40	1087.49	7693.60	683.00	1875495.10	186824.22	230297.30
M17-24-97-1	27347.95	127.56	2491.17	1024.45	801090.19	86141.20	104316.63
M17-24-97-2	27876.40	94.52	2004.45	936.01	653725.50	70560.59	85559.76
M17-24-97-3	28321.20	133.36	2153.21	932.93	744700.13	79415.69	96637.31
M17-24-97-4	28988.68	81.80	1874.77	818.44	632827.63	70156.95	85790.84
M17-24-97-5	28804.08	97.04	1403.97	716.88	498793.84	54388.11	66516.06
M17-24-97-6	29036.80	69.36	1553.21	766.56	558564.63	61135.47	74306.66
M17-24-97-7	29710.17	91.16	1345.17	740.84	530621.44	58360.25	70832.84
M17-24-97-8	30682.45	59.52	1162.57	685.84	438598.63	48465.40	58702.81
M17-24-97-9	30099.41	87.84	1201.89	680.56	468247.91	51844.01	62392.07
M17-24-97-10	31267.06	69.80	1190.49	630.88	404023.94	46032.14	55194.19
M17-24-97-11	31555.82	56.60	1147.77	643.64	437024.94	48767.84	59145.57
M17-24-97-12	31118.30	70.20	1248.05	717.24	477425.31	53276.58	64036.24
M17-24-97-13	31950.02	79.56	2068.77	665.76	766008.31	83286.79	101088.29
M17-24-97-14	30864.49	87.20	1304.93	652.88	511673.31	56209.72	68144.98
M17-24-97-15	31621.82	65.60	1210.77	634.88	451046.69	50214.96	60778.22
M17-24-97-16	31366.82	88.40	1915.85	688.44	736733.13	79905.49	96945.23
M17-24-97-17	30911.37	60.88	1509.89	707.56	612383.19	66338.38	79472.53
M17-24-97-18	30884.21	55.64	1793.01	661.24	775757.63	82744.11	99942.36
SRM614-10	30023.61	90.92	2295.29	17132.50	21899.92	3420.86	4018.18
SRM612-10	35054.56	1693.29	4737.55	12401.99	27518.76	4026.46	4695.39
SRM610-10	75463.31	14815.20	21482.08	8046.85	94763.38	12415.15	14591.04
AP1-10	30238.57	120.32	1622.41	909.25	36414.09	4408.42	6420.32
AP2-10	26414.19	175.40	5017.31	720.36	750795.44	76468.15	93606.97
AP3-10	25807.19	618.92	6484.40	631.72	1403279.40	139522.66	171858.08
AP4-10	25856.19	941.81	5499.43	579.00	1511294.50	149980.72	183824.75
blank-10	33841.27	74.72	262.32	324.48	15094.97	2121.61	2231.25
blank average	32799.15	71.52	573.38	560.26	8701.89	1317.63	1870.27
blank subtraction							
SRM614-9	-1886.73	42.52	6863.22	17022.28	8624.49	1556.35	2614.47
SRM612-9	3279.42	1760.89	8597.51	12282.17	37439.61	4869.41	6582.78
SRM610-9	49222.48	15592.21	28891.94	8494.11	126793.80	16107.43	20018.81
AP1-9	-2076.65	103.08	3049.12	535.94	50523.37	5888.57	9018.63
AP2-9	-4188.10	119.68	7268.06	410.82	1125014.11	112372.69	137859.64
AP3-9	-5188.59	591.44	7708.70	229.26	1495924.71	148364.57	183125.06
AP4-9	-5114.75	1015.97	7120.22	122.74	1866793.21	185506.59	228427.03
M17-24-97-1	-5451.19	56.04	1917.79	464.18	792388.30	84823.58	102446.36
M17-24-97-2	-4922.75	23.00	1431.07	375.74	645023.61	69242.97	83689.49
M17-24-97-3	-4477.95	61.84	1579.83	372.66	735998.24	78098.06	94767.03
M17-24-97-4	-3810.46	10.28	1301.39	258.18	624125.74	68839.33	83920.57
M17-24-97-5	-3995.06	25.52	830.58	156.62	490091.95	53070.48	64645.78
M17-24-97-6	-3762.34	-2.16	979.83	206.30	549862.74	59817.84	72436.39
M17-24-97-7	-3088.98	19.64	771.78	180.58	521919.55	57042.62	68962.57
M17-24-97-8	-2116.69	-12.00	589.18	125.58	429896.74	47147.77	56832.54
M17-24-97-9	-2699.74	16.32	628.50	120.30	459546.02	50526.38	60521.80
M17-24-97-10	-1532.09	-1.72	617.10	70.62	395322.05	44714.51	53323.92
M17-24-97-11	-1243.33	-14.92	574.38	83.38	428323.05	47450.21	57275.30
M17-24-97-12	-1680.85	-1.32	674.66	156.98	468723.42	51958.95	62165.97
M17-24-97-13	-849.12	8.04	1495.39	105.50	757306.42	81969.16	99218.02
M17-24-97-14	-1934.65	15.68	731.54	92.62	502971.42	54892.09	66274.71
M17-24-97-15	-1177.33	-5.92	637.38	74.62	442344.80	48897.33	58907.95
M17-24-97-16	-1432.33	16.88	1342.47	128.18	728031.24	78587.86	95074.96
M17-24-97-17	-1887.77	-10.64	936.51	147.30	603681.30	65020.75	77602.26
M17-24-97-18	-1914.93	-15.88	1219.63	100.98	767055.74	81426.48	98072.09
SRM614-10	-2775.54	19.40	1721.91	16572.23	13198.04	2103.23	2147.91
SRM612-10	2255.41	1621.77	4164.16	11841.73	18816.87	2708.84	2825.12
SRM610-10	42664.16	14743.68	20908.70	7486.58	86061.49	11097.52	12720.77
AP1-10	-2560.58	48.80	1049.03	348.98	27712.20	3090.80	4550.05
AP2-10	-6384.96	103.88	4443.92	160.10	742093.55	75150.52	91736.70
AP3-10	-6991.96	547.40	5911.01	71.46	1394577.51	138205.03	169987.81
AP4-10	-6942.96	870.28	4926.05	18.74	1502592.61	148663.09	181954.48
zero correction							
SRM614-9	0.00	42.52	6863.22	17022.28	8624.49	1556.35	2614.47
SRM612-9	3279.42	1760.89	8597.51	12282.17	37439.61	4869.41	6582.78
SRM610-9	49222.48	15592.21	28891.94	8494.11	126793.80	16107.43	20018.81
AP1-9	0.00	103.08	3049.12	535.94	50523.37	5888.57	9018.63
AP2-9	0.00	119.68	7268.06	410.82	1125014.11	112372.69	137859.64
AP3-9	0.00	591.44	7708.70	229.26	1495924.71	148364.57	183125.06
AP4-9	0.00	1015.97	7120.22	122.74	1866793.21	185506.59	228427.03
M17-24-97-1	0.00	56.04	1917.79	464.18	792388.30	84823.58	102446.36
M17-24-97-2	0.00	23.00	1431.07	375.74	645023.61	69242.97	83689.49
M17-24-97-3	0.00	61.84	1579.83	372.66	735998.24	78098.06	94767.03
M17-24-97-4	0.00	10.28	1301.39	258.18	624125.74	68839.33	83920.57
M17-24-97-5	0.00	25.52	830.58	156.62	490091.95	53070.48	64645.78
M17-24-97-6	0.00	0.00	979.83	206.30	549862.74	59817.84	72436.39
M17-24-97-7	0.00	19.64	771.78	180.58	521919.55	57042.62	68962.57

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	0.00	0.00	589.18	125.58	429896.74	47147.77	56832.54
M17-24-97-9	0.00	16.32	628.50	120.30	459546.02	50526.38	60521.80
M17-24-97-10	0.00	0.00	617.10	70.62	395322.05	44714.51	53323.92
M17-24-97-11	0.00	0.00	574.38	83.38	428323.05	47450.21	57275.30
M17-24-97-12	0.00	0.00	674.66	156.98	468723.42	51958.95	62165.97
M17-24-97-13	0.00	8.04	1495.39	105.50	757306.42	81969.16	99218.02
M17-24-97-14	0.00	15.68	731.54	92.62	502971.42	54892.09	66274.71
M17-24-97-15	0.00	0.00	637.38	74.62	442344.80	48897.33	58907.95
M17-24-97-16	0.00	16.88	1342.47	128.18	728031.24	78587.86	95074.96
M17-24-97-17	0.00	0.00	936.51	147.30	603681.30	65020.75	77602.26
M17-24-97-18	0.00	0.00	1219.63	100.98	767055.74	81426.48	98072.09
SRM614-10	0.00	19.40	1721.91	16572.23	13198.04	2103.23	2147.91
SRM612-10	2255.41	1621.77	4164.16	11841.73	18816.87	2708.84	2825.12
SRM610-10	42664.16	14743.68	20908.70	7486.58	86061.49	11097.52	12720.77
AP1-10	0.00	48.80	1049.03	348.98	27712.20	3090.80	4550.05
AP2-10	0.00	103.88	4443.92	160.10	742093.55	75150.52	91736.70
AP3-10	0.00	547.40	5911.01	71.46	1394577.51	138205.03	169987.81
AP4-10	0.00	870.28	4926.05	18.74	1502592.61	148663.09	181954.48

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-9	0.000000	0.000018	0.002919	0.007241	0.003669	0.000662	0.001112
SRM612-9	0.001813	0.000973	0.004753	0.006790	0.020696	0.002692	0.003639
SRM610-9	0.049044	0.015536	0.028787	0.008463	0.126333	0.016049	0.019946
AP1-9	0.000000	0.000008	0.000239	0.000042	0.003968	0.000463	0.000708
AP2-9	0.000000	0.000009	0.000542	0.000031	0.083864	0.008377	0.010277
AP3-9	0.000000	0.000033	0.000431	0.000013	0.083713	0.008303	0.010248
AP4-9	0.000000	0.000063	0.000439	0.000008	0.115025	0.011430	0.014075
M17-24-97-1	0.000000	0.000007	0.000255	0.000062	0.105533	0.011297	0.013644
M17-24-97-2	0.000000	0.000003	0.000207	0.000054	0.093120	0.009996	0.012082
M17-24-97-3	0.000000	0.000008	0.000205	0.000048	0.095634	0.010148	0.012314
M17-24-97-4	0.000000	0.000002	0.000242	0.000048	0.115827	0.012775	0.015574
M17-24-97-5	0.000000	0.000005	0.000153	0.000029	0.090479	0.009798	0.011935
M17-24-97-6	0.000000	0.000000	0.000171	0.000036	0.095733	0.010415	0.012611
M17-24-97-7	0.000000	0.000004	0.000156	0.000036	0.105392	0.011519	0.013926
M17-24-97-8	0.000000	0.000000	0.000129	0.000028	0.094167	0.010327	0.012449
M17-24-97-9	0.000000	0.000003	0.000121	0.000023	0.088835	0.009767	0.011699
M17-24-97-10	0.000000	0.000000	0.000153	0.000018	0.098136	0.011100	0.013237
M17-24-97-11	0.000000	0.000000	0.000124	0.000018	0.092316	0.010227	0.012344
M17-24-97-12	0.000000	0.000000	0.000136	0.000032	0.094542	0.010480	0.012539
M17-24-97-13	0.000000	0.000002	0.000343	0.000024	0.173819	0.018814	0.022773
M17-24-97-14	0.000000	0.000003	0.000155	0.000020	0.106416	0.011614	0.014022
M17-24-97-15	0.000000	0.000000	0.000137	0.000016	0.094896	0.010490	0.012637
M17-24-97-16	0.000000	0.000003	0.000250	0.000024	0.135348	0.014610	0.017675
M17-24-97-17	0.000000	0.000000	0.000158	0.000025	0.101919	0.010977	0.013102
M17-24-97-18	0.000000	0.000000	0.000203	0.000017	0.127856	0.013572	0.016347
SRM614-10	0.000000	0.000010	0.000871	0.008383	0.006676	0.001064	0.001087
SRM612-10	0.001651	0.001188	0.003049	0.008671	0.013778	0.001983	0.002069
SRM610-10	0.053183	0.018379	0.026064	0.009332	0.107280	0.013834	0.015857
AP1-10	0.000000	0.000005	0.000101	0.000034	0.002664	0.000297	0.000437
AP2-10	0.000000	0.000010	0.000411	0.000015	0.068674	0.006954	0.008489
AP3-10	0.000000	0.000037	0.000404	0.000005	0.095407	0.009455	0.011629
AP4-10	0.000000	0.000063	0.000359	0.000001	0.109382	0.010822	0.013245

standardize signal averages AP							
AP1	0.000000	0.000006	0.000170	0.000038	0.003316	0.000380	0.000573
AP2	0.000000	0.000009	0.000477	0.000023	0.076269	0.007666	0.009383
AP3	0.000000	0.000035	0.000418	0.000009	0.089560	0.008879	0.010939
AP4	0.000000	0.000063	0.000399	0.000004	0.112204	0.011126	0.013660

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.000000	0.242372	0.060998	2.438319	0.014741	0.148220	0.120671
standardize signal averages SRM							
srm614-2	0.000000	0.000014	0.001895	0.007812	0.005173	0.000863	0.001099
srm612-2	0.001732	0.001080	0.003901	0.007730	0.017237	0.002338	0.002854
srm610-2	0.051113	0.016957	0.027425	0.008898	0.116807	0.014941	0.017902

linest from std sig ave							
	0.110742	0.320507	0.149878	133.209702	0.046623	0.363893	0.303532

concentration data	i.s. correction							
SRM614-9	85763.00	0.00	0.38	15.27	1514.21	4.64	8.42	11.51
SRM612-9	85763.00	0.00	20.23	24.86	1419.81	26.16	34.22	37.66
SRM610-9	85763.00	0.00	322.93	150.60	1769.82	159.71	204.01	206.42
AP1-9	398936	0.00	0.78	5.83	40.95	23.34	27.35	34.10
AP2-9	398936	0.00	0.86	13.18	29.79	493.18	495.32	494.72
AP3-9	398936	0.00	3.20	10.50	12.48	492.29	490.94	493.33
AP4-9	398936	0.00	6.05	10.68	7.36	676.43	675.88	677.56
M17-24-97-1	398936	0.00	0.72	6.22	60.14	620.61	668.00	656.83
M17-24-97-2	398936	0.00	0.32	5.03	52.77	547.61	591.09	581.63
M17-24-97-3	398936	0.00	0.78	5.00	47.10	562.40	600.05	592.79
M17-24-97-4	398936	0.00	0.18	5.88	46.61	681.14	755.41	749.74
M17-24-97-5	398936	0.00	0.46	3.73	28.13	532.08	579.34	574.54
M17-24-97-6	398936	0.00	0.00	4.15	34.94	562.98	615.81	607.12
M17-24-97-7	398936	0.00	0.38	3.79	35.47	619.78	681.10	670.38
M17-24-97-8	398936	0.00	0.00	3.14	26.76	553.77	610.67	599.29
M17-24-97-9	398936	0.00	0.31	2.96	22.62	522.41	577.54	563.21
M17-24-97-10	398936	0.00	0.00	3.73	17.05	577.11	656.35	637.24
M17-24-97-11	398936	0.00	0.00	3.01	17.48	542.88	604.72	594.26
M17-24-97-12	398936	0.00	0.00	3.31	30.80	555.97	619.70	603.63
M17-24-97-13	398936	0.00	0.18	8.35	23.55	1022.17	1112.46	1096.28
M17-24-97-14	398936	0.00	0.32	3.77	19.06	625.80	686.73	675.02
M17-24-97-15	398936	0.00	0.00	3.33	15.57	558.05	620.27	608.37
M17-24-97-16	398936	0.00	0.30	6.07	23.18	795.94	863.91	850.89
M17-24-97-17	398936	0.00	0.00	3.85	24.19	599.36	649.10	630.71
M17-24-97-18	398936	0.00	0.00	4.95	16.37	751.88	802.54	786.95
SRM614-10	85763.00	0.00	0.20	4.56	1753.09	8.44	13.52	11.24
SRM612-10	85763.00	0.00	24.68	15.95	1813.23	17.42	25.21	21.41
SRM610-10	85763.00	0.00	382.03	136.35	1951.56	135.63	175.85	164.11
AP1-10	398936	0.00	0.45	2.45	32.64	15.67	17.57	21.06
AP2-10	398936	0.00	0.93	10.01	14.41	403.85	411.22	408.68
AP3-10	398936	0.00	3.62	9.84	4.76	561.06	559.08	559.84
AP4-10	398936	0.00	6.13	8.73	1.33	643.24	639.91	637.64

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-7	20010.67	67.84	2486.01	618.44	4054.94	1057.25	4034.82
SRM614-7	19806.91	85.96	17884.34	13616.24	14014.80	2542.41	5837.43
SRM612-7	26963.75	1703.37	17848.22	11445.78	46470.46	7013.68	10564.62
SRM610-7	69129.03	12926.11	30010.65	6913.44	155955.88	20729.60	27016.75
AP1-7	24007.46	103.96	6557.88	851.32	69258.63	8542.05	13563.64
AP2-7	22907.89	187.32	11740.23	617.40	1513155.50	145169.34	180195.50
AP3-7	23713.01	819.28	12979.15	573.12	2610437.80	254249.39	314118.59
AP4-7	23742.85	1041.45	10607.90	479.36	1854346.80	179074.33	220503.33
34HP45-837-1	23087.01	80.80	2340.65	590.16	694440.25	70327.08	86301.37
34HP45-837-2	24591.78	75.32	2224.13	616.56	788163.00	79791.73	97194.19
34HP45-837-3	25637.66	83.84	1992.65	627.68	711687.56	73944.82	89473.91
34HP45-837-4	25307.02	91.52	3968.14	694.64	1661942.00	158815.22	195551.06
34HP45-837-5	26220.71	88.36	3159.02	744.16	1450215.40	137979.97	169089.95
34HP45-837-6	26939.87	104.16	2985.94	730.60	1331954.40	131330.30	161204.03
34HP45-837-7	27299.63	110.92	3431.30	785.80	2577134.50	262994.19	323626.47
34HP45-837-8	27670.96	92.00	3304.62	719.72	1902923.40	183382.55	225316.19
34HP45-837-9	28516.56	86.08	3058.86	623.28	1525160.90	151893.38	185433.05
34HP45-837-10	30220.77	88.60	2497.29	561.52	1301650.80	131805.30	160778.78
34HP45-837-11	30706.05	80.56	2519.85	564.20	1248324.00	119319.55	145796.91
34HP45-837-12	30908.57	84.84	2709.14	603.92	1446806.50	138585.34	169823.44
34HP45-837-13	33110.75	98.36	2148.49	544.40	2263473.30	279754.47	338992.63
34HP45-837-14	34260.67	80.24	1868.97	504.24	1506158.00	169526.39	205741.56
34HP45-837-15	35128.52	76.04	2009.61	484.68	1543161.30	171372.97	207940.33

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	35957.32	122.40	6434.92	15676.69	32250.30	4738.79	6030.87
SRM612-8	44468.53	1987.37	9009.21	13502.00	39452.82	5840.79	7172.92
SRM610-8	98459.95	18986.67	31463.10	9861.18	144260.53	18777.75	22463.61
AP1-8	38470.54	105.64	4102.54	742.72	53364.66	6754.00	10215.34
AP2-8	34761.43	216.08	9808.62	591.72	1557647.90	151058.30	186146.17
AP3-8	35217.40	942.05	10838.94	592.60	2442865.30	240940.59	297731.78
AP4-8	34795.04	1205.97	8459.93	474.44	1859508.90	184136.56	225743.95
blank-8	37534.45	75.64	733.40	273.84	28731.16	4115.82	4454.71
blank average	28772.56	71.74	1609.71	446.14	16393.05	2586.53	4244.76
blank subtraction							
SRM614-7	-8965.65	14.22	16274.63	13170.09	-2378.25	-44.12	1592.67
SRM612-7	-1808.81	1631.63	16238.51	10999.64	30077.41	4427.14	6319.86
SRM610-7	40356.47	12854.37	28400.94	6467.30	139562.83	18143.06	22771.99
AP1-7	-4765.11	32.22	4948.17	405.18	52865.58	5955.51	9318.87
AP2-7	-5864.67	115.58	10130.52	171.26	1496762.45	142582.81	175950.74
AP3-7	-5059.55	747.54	11369.44	126.98	2594044.75	251662.86	309873.83
AP4-7	-5029.71	969.71	8998.19	33.22	1837953.75	176487.80	216258.57
34HP45-837-1	-5685.55	9.06	730.94	144.02	678047.20	67740.54	82056.60
34HP45-837-2	-4180.78	3.58	614.42	170.42	771769.95	77205.19	92949.42
34HP45-837-3	-3134.90	12.10	382.94	181.54	695294.51	71358.29	85229.14
34HP45-837-4	-3465.54	19.78	2358.43	248.50	1645548.95	156228.69	191306.30
34HP45-837-5	-2551.86	16.62	1549.31	298.02	1433822.35	135393.44	164845.19
34HP45-837-6	-1832.69	32.42	1376.23	284.46	1315561.35	128743.77	156959.27
34HP45-837-7	-1472.93	39.18	1821.59	339.66	2560741.45	260407.66	319381.71
34HP45-837-8	-1101.61	20.26	1694.91	273.58	1886530.35	180796.02	221071.43
34HP45-837-9	-256.00	14.34	1449.15	177.14	1508767.85	149306.85	181188.29
34HP45-837-10	1448.21	16.86	887.59	115.38	1285257.75	129218.77	156534.02
34HP45-837-11	1933.49	8.82	910.15	118.06	1231930.95	116733.02	141552.15
34HP45-837-12	2136.01	13.10	1099.43	157.78	1430413.45	135998.81	165578.68
34HP45-837-13	4338.18	26.62	538.78	98.26	2247080.25	277167.94	334747.87
34HP45-837-14	5488.11	8.50	259.26	58.10	1489764.95	166939.86	201496.80
34HP45-837-15	6355.96	4.30	399.90	38.54	1526768.25	168786.44	203695.57
SRM614-8	7184.76	50.66	4825.21	15230.55	15857.25	2152.25	1786.11
SRM612-8	15695.97	1915.63	7399.50	13055.85	23059.77	3254.26	2928.16
SRM610-8	69687.39	18914.93	29853.39	9415.03	127867.48	16191.21	18218.84
AP1-8	9697.97	33.90	2492.83	296.58	36971.61	4167.46	5970.57
AP2-8	5988.87	144.34	8198.91	145.58	1541254.85	148471.77	181901.41
AP3-8	6444.84	870.30	9229.23	146.46	2426472.25	238354.06	293487.02
AP4-8	6022.47	1134.23	6850.22	28.30	1843115.85	181550.03	221499.19
zero correction							
SRM614-7	0.00	14.22	16274.63	13170.09	0.00	0.00	1592.67
SRM612-7	0.00	1631.63	16238.51	10999.64	30077.41	4427.14	6319.86
SRM610-7	40356.47	12854.37	28400.94	6467.30	139562.83	18143.06	22771.99
AP1-7	0.00	32.22	4948.17	405.18	52865.58	5955.51	9318.87
AP2-7	0.00	115.58	10130.52	171.26	1496762.45	142582.81	175950.74
AP3-7	0.00	747.54	11369.44	126.98	2594044.75	251662.86	309873.83
AP4-7	0.00	969.71	8998.19	33.22	1837953.75	176487.80	216258.57
34HP45-837-1	0.00	9.06	730.94	144.02	678047.20	67740.54	82056.60
34HP45-837-2	0.00	3.58	614.42	170.42	771769.95	77205.19	92949.42
34HP45-837-3	0.00	12.10	382.94	181.54	695294.51	71358.29	85229.14
34HP45-837-4	0.00	19.78	2358.43	248.50	1645548.95	156228.69	191306.30
34HP45-837-5	0.00	16.62	1549.31	298.02	1433822.35	135393.44	164845.19
34HP45-837-6	0.00	32.42	1376.23	284.46	1315561.35	128743.77	156959.27
34HP45-837-7	0.00	39.18	1821.59	339.66	2560741.45	260407.66	319381.71
34HP45-837-8	0.00	20.26	1694.91	273.58	1886530.35	180796.02	221071.43
34HP45-837-9	0.00	14.34	1449.15	177.14	1508767.85	149306.85	181188.29
34HP45-837-10	1448.21	16.86	887.59	115.38	1285257.75	129218.77	156534.02
34HP45-837-11	1933.49	8.82	910.15	118.06	1231930.95	116733.02	141552.15
34HP45-837-12	2136.01	13.10	1099.43	157.78	1430413.45	135998.81	165578.68
34HP45-837-13	4338.18	26.62	538.78	98.26	2247080.25	277167.94	334747.87
34HP45-837-14	5488.11	8.50	259.26	58.10	1489764.95	166939.86	201496.80
34HP45-837-15	6355.96	4.30	399.90	38.54	1526768.25	168786.44	203695.57
SRM614-8	7184.76	50.66	4825.21	15230.55	15857.25	2152.25	1786.11
SRM612-8	15695.97	1915.63	7399.50	13055.85	23059.77	3254.26	2928.16
SRM610-8	69687.39	18914.93	29853.39	9415.03	127867.48	16191.21	18218.84
AP1-8	9697.97	33.90	2492.83	296.58	36971.61	4167.46	5970.57
AP2-8	5988.87	144.34	8198.91	145.58	1541254.85	148471.77	181901.41
AP3-8	6444.84	870.30	9229.23	146.46	2426472.25	238354.06	293487.02
AP4-8	6022.47	1134.23	6850.22	28.30	1843115.85	181550.03	221499.19
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	
standardized concentration								
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373	
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903	
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425	
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084	
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136	
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336	
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632	
standardized signal								
SRM614-7	0.000000	0.000006	0.007333	0.005934	0.000000	0.000000	0.000718	
SRM612-7	0.000000	0.000878	0.008735	0.005917	0.016179	0.002381	0.003399	
SRM610-7	0.041680	0.013276	0.029332	0.006679	0.144140	0.018738	0.023519	
AP1-7	0.000000	0.000003	0.000475	0.000039	0.005072	0.000571	0.000894	
AP2-7	0.000000	0.000010	0.000840	0.000014	0.124109	0.011823	0.014590	
AP3-7	0.000000	0.000045	0.000691	0.000008	0.157604	0.015290	0.018827	
AP4-7	0.000000	0.000067	0.000622	0.000002	0.127013	0.012196	0.014945	
34HP45-837-1	0.000000	0.000002	0.000179	0.000035	0.166364	0.016621	0.020133	
34HP45-837-2	0.000000	0.000001	0.000155	0.000043	0.194146	0.019422	0.023382	
34HP45-837-3	0.000000	0.000004	0.000116	0.000055	0.209966	0.021549	0.025738	
34HP45-837-4	0.000000	0.000002	0.000256	0.000027	0.178775	0.016973	0.020784	
34HP45-837-5	0.000000	0.000002	0.000182	0.000035	0.168085	0.015872	0.019325	
34HP45-837-6	0.000000	0.000004	0.000174	0.000036	0.165998	0.016245	0.019805	
34HP45-837-7	0.000000	0.000005	0.000230	0.000043	0.323300	0.032877	0.040323	
34HP45-837-8	0.000000	0.000003	0.000211	0.000034	0.235319	0.022552	0.027576	
34HP45-837-9	0.000000	0.000002	0.000225	0.000027	0.233972	0.023154	0.028098	
34HP45-837-10	0.000298	0.000003	0.000183	0.000024	0.264542	0.026597	0.032219	
34HP45-837-11	0.000364	0.000002	0.000171	0.000022	0.231920	0.021976	0.026648	
34HP45-837-12	0.000374	0.000002	0.000192	0.000028	0.250211	0.023789	0.028963	
34HP45-837-13	0.001201	0.000007	0.000149	0.000027	0.622227	0.076749	0.092693	
34HP45-837-14	0.001489	0.000002	0.000070	0.000016	0.404118	0.045285	0.054659	
34HP45-837-15	0.001590	0.000001	0.000100	0.000010	0.381972	0.042228	0.050961	
SRM614-8	0.004011	0.000028	0.002693	0.008502	0.008852	0.001201	0.000997	
SRM612-8	0.009617	0.001174	0.004534	0.008000	0.014129	0.001994	0.001794	
SRM610-8	0.070375	0.019101	0.030148	0.009508	0.129129	0.016351	0.018399	
AP1-8	0.000731	0.000003	0.000188	0.000022	0.002785	0.000314	0.000450	
AP2-8	0.000384	0.000009	0.000526	0.000009	0.098870	0.009524	0.011669	
AP3-8	0.000331	0.000045	0.000474	0.000008	0.124596	0.012239	0.015070	
AP4-8	0.000357	0.000067	0.000406	0.000002	0.109221	0.010759	0.013126	
standardize signal averages AP								
AP1	0.000365	0.000003	0.000331	0.000031	0.003929	0.000443	0.000672	
AP2	0.000192	0.000009	0.000683	0.000012	0.111489	0.010674	0.013129	
AP3	0.000165	0.000045	0.000582	0.000008	0.141100	0.013765	0.016948	
AP4	0.000178	0.000067	0.000514	0.000002	0.118117	0.011477	0.014035	
linest from std sig ave								
	0.014302	0.217325	0.042006	4.706902	0.010977	0.113224	0.092116	
standardize signal averages SRM								
srM614-2	0.002005	0.000017	0.005013	0.007218	0.004426	0.000601	0.000857	
srM612-2	0.004809	0.001026	0.006634	0.006958	0.015154	0.002188	0.002597	
srM610-2	0.056027	0.016189	0.029740	0.008094	0.136634	0.017544	0.020959	
linest from std sig ave								
	0.100735	0.335727	0.132417	146.188979	0.039995	0.311181	0.260494	
concentration data i.s. correction								
SRM614-7	85763.00	0.00	0.12	26.42	2395.59	0.00	0.00	5.67
SRM612-7	85763.00	0.00	16.36	31.47	2388.45	15.23	23.12	26.86
SRM610-7	85763.00	51.12	247.44	105.67	2696.32	135.70	181.96	185.80
AP1-7	398936	0.00	0.27	7.96	72.99	22.21	25.81	32.85
AP2-7	398936	0.00	0.83	14.08	26.67	543.50	534.02	536.14
AP3-7	398936	0.00	3.94	11.58	14.49	690.18	690.64	691.85
AP4-7	398936	0.00	5.81	10.42	4.31	556.22	550.90	549.20
34HP45-837-1	398936	0.00	0.19	3.01	66.35	728.54	750.74	739.87
34HP45-837-2	398936	0.00	0.08	2.59	80.50	850.21	877.27	859.27
34HP45-837-3	398936	0.00	0.32	1.94	102.94	919.48	973.35	945.82
34HP45-837-4	398936	0.00	0.19	4.29	50.69	782.89	766.65	763.77
34HP45-837-5	398936	0.00	0.17	3.04	65.60	736.08	716.93	710.15
34HP45-837-6	398936	0.00	0.35	2.91	67.40	726.94	733.77	727.81
34HP45-837-7	398936	0.00	0.43	3.85	80.52	1415.80	1485.04	1481.80
34HP45-837-8	398936	0.00	0.22	3.54	64.08	1030.51	1018.65	1013.36
34HP45-837-9	398936	0.00	0.19	3.77	51.58	1024.61	1045.84	1032.55
34HP45-837-10	398936	1.70	0.30	3.06	44.59	1158.48	1201.36	1184.00

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	398936	2.08	0.14	2.87	41.73	1015.63	992.63	979.28
34HP45-837-12	398936	2.13	0.20	3.22	51.82	1095.72	1074.54	1064.36
34HP45-837-13	398936	6.85	0.64	2.50	51.09	2724.86	3466.70	3406.34
34HP45-837-14	398936	8.49	0.20	1.18	29.59	1769.72	2045.47	2008.62
34HP45-837-15	398936	9.07	0.09	1.68	18.11	1672.73	1907.39	1872.75
SRM614-8	85763.00	4.92	0.53	9.70	3432.01	8.33	11.67	7.88
SRM612-8	85763.00	11.80	21.88	16.33	3229.27	13.30	19.36	14.17
SRM610-8	85763.00	86.32	356.02	108.61	3838.12	121.57	158.77	145.35
AP1-8	398936	4.17	0.22	3.15	41.96	12.20	14.18	16.53
AP2-8	398936	2.19	0.80	8.81	17.54	432.97	430.21	428.81
AP3-8	398936	1.89	3.87	7.94	14.12	545.63	552.83	553.80
AP4-8	398936	2.04	5.83	6.80	3.15	478.30	485.95	482.36

certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data	Li	Be	B	Na	Mg24	Mg25	Mg26	
blank-5	26975.11	49.16	2764.26	496.84	9206.49	1763.17	4021.70	
SRM614-5	27264.55	82.88	17999.22	8772.21	18328.38	3165.50	5866.43	
SRM612-5	32725.98	1564.25	19760.75	10483.54	172047.30	24870.94	32111.46	
SRM610-5	83832.07	14368.16	30238.21	7559.76	198212.39	27281.03	34218.35	
AP1-5	27354.11	109.84	6183.31	727.68	143609.61	18878.51	25938.07	
AP2-5	26384.99	242.28	13104.71	659.84	1930380.40	197805.91	243600.97	
AP3-5	26863.79	944.73	14534.60	569.88	2962708.50	301302.09	371207.63	
AP4-5	25967.87	1087.41	11291.82	453.36	1533336.50	153961.86	189486.75	
34HP45-718-1	26625.07	104.52	6361.52	771.20	5463982.50	684282.06	835090.44	
34HP45-718-2	26951.27	117.84	8079.77	1080.05	4458281.00	488528.75	598407.63	
34HP45-718-3	28226.24	96.28	9926.78	1104.41	10032014.00	1222065.80	1495839.30	
34HP45-718-4	27774.32	267.48	27853.76	1745.29	7067235.00	755385.19	934473.81	
34HP45-718-5	28081.60	201.60	20075.07	1533.93	5219322.00	535109.44	662255.00	
34HP45-718-6	28631.52	159.12	18650.66	1468.41	5397920.50	556187.06	687762.13	
34HP45-718-7	28808.44	142.48	14042.76	1414.93	6845058.50	733104.50	906432.38	
34HP45-718-8	28846.92	186.80	14714.40	1412.73	6884343.00	730116.13	902144.00	
34HP45-718-9	29462.73	166.20	15156.45	1504.61	7622243.50	817476.13	1011134.90	
34HP45-718-10	30703.17	145.80	13134.71	1089.81	8068062.50	904978.50	1115334.90	
34HP45-718-11	30973.98	125.88	14196.32	1208.97	6448204.50	682243.56	844591.81	
34HP45-718-12	30615.65	122.72	15131.09	1136.81	6202529.00	656103.00	814150.31	
34HP45-718-13	34193.79	163.12	11193.58	821.72	22559460.00	3432166.00	4169486.00	
34HP45-718-14	33631.71	137.64	11438.82	817.00	23009370.00	3702830.50	4490420.00	
34HP45-718-15	32892.39	108.96	12693.95	867.76	21633894.00	3062425.50	3725569.00	
34HP45-718-16	31868.50	119.56	16524.49	951.53	4638689.50	479687.09	593467.31	
34HP45-718-17	32431.46	111.80	18663.63	1039.17	5086435.00	516791.34	638200.69	
34HP45-718-18	32788.31	124.40	16284.65	981.65	4699342.00	476298.47	589272.25	
SRM614-6	34207.55	88.88	4337.58	10208.14	63562.12	8794.33	9607.69	
SRM612-6	41109.47	1781.45	7519.72	11953.07	78901.24	11324.50	12610.87	
SRM610-6	96710.18	17813.30	28365.44	9863.82	164119.95	20788.28	24307.34	
AP1-6	35538.88	90.92	3330.90	503.16	74986.18	9092.61	12187.59	
AP2-6	34380.36	213.12	9173.73	427.12	1509911.10	147542.59	180634.33	
AP3-6	36247.81	910.29	10600.50	401.00	2732289.80	272353.78	336633.38	
AP4-6	35108.84	1016.21	6745.68	347.08	1302764.30	127897.16	158255.84	
blank-6	36964.41	95.84	614.76	217.80	58587.13	7874.20	8048.85	
blank average	31969.76	72.50	1689.51	357.32	33896.81	4818.69	6035.27	

blank subtraction								
SRM614-5	-4705.21	10.38	16309.71	8414.89	-15568.43	-1653.19	-168.84	
SRM612-5	756.23	1491.75	18071.24	10126.22	138150.49	20052.25	26076.19	
SRM610-5	51862.31	14295.66	28548.70	7202.44	164315.58	22462.35	28183.08	
AP1-5	-4615.65	37.34	4493.81	370.36	109712.80	14059.82	19902.79	
AP2-5	-5584.77	169.78	11415.20	302.52	1896483.59	192987.22	237565.70	
AP3-5	-5105.97	872.22	12845.09	212.56	2928811.69	296483.40	365172.36	
AP4-5	-6001.89	1014.91	9602.31	96.04	1499439.69	149143.17	183451.48	
34HP45-718-1	-5344.69	32.02	4672.01	413.88	5430085.69	679463.37	829055.17	
34HP45-718-2	-5018.49	45.34	6390.26	722.72	4424384.19	483710.06	592372.36	
34HP45-718-3	-3743.52	23.78	8237.27	747.08	9998117.19	1217247.11	1489804.03	
34HP45-718-4	-4195.44	194.98	26164.25	1387.97	7033338.19	750566.50	928438.54	
34HP45-718-5	-3888.16	129.10	18385.56	1176.61	5185425.19	530290.75	656219.73	
34HP45-718-6	-3338.24	86.62	16961.15	1111.09	5364023.69	551368.37	681726.86	
34HP45-718-7	-3161.32	69.98	12353.25	1057.61	6811161.69	728285.81	900397.11	
34HP45-718-8	-3122.84	114.30	13024.89	1055.41	6850446.19	725297.44	896108.73	
34HP45-718-9	-2507.03	93.70	13466.94	1147.29	7588346.69	812657.44	1005099.63	
34HP45-718-10	-1266.58	73.30	11445.20	732.48	8034165.69	900159.81	1109299.63	

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	-995.78	53.38	12506.81	851.64	6414307.69	677424.87	838556.54
34HP45-718-12	-1354.11	50.22	13441.58	779.48	6168632.19	651284.31	808115.04
34HP45-718-13	2224.03	90.62	9504.07	464.40	22525563.19	3427347.31	4163450.73
34HP45-718-14	1661.95	65.14	9749.31	459.68	22975473.19	3698011.81	4484384.73
34HP45-718-15	922.63	36.46	11004.44	510.44	21599997.19	3057606.81	3719533.73
34HP45-718-16	-101.26	47.06	14834.98	594.20	4604792.69	474868.40	587432.04
34HP45-718-17	461.70	39.30	16974.12	681.84	5052538.19	511972.65	632165.42
34HP45-718-18	818.55	51.90	14595.14	624.32	4665445.19	471479.78	583236.98
SRM614-6	2237.79	16.38	2648.07	9850.82	29665.31	3975.64	3572.42
SRM612-6	9139.71	1708.95	5830.21	11595.74	45004.43	6505.82	6575.60
SRM610-6	64740.42	17740.80	26675.93	9506.49	130223.14	15969.59	18272.06
AP1-6	3569.12	18.42	1641.39	145.84	41089.37	4273.92	6152.32
AP2-6	2410.60	140.62	7484.22	69.80	1476014.29	142723.90	174599.06
AP3-6	4278.05	837.78	8910.99	43.68	2698392.99	267535.09	330598.11
AP4-6	3139.08	943.71	5056.17	-10.24	1268867.49	123078.47	152220.57

zero correction

SRM614-5	0.00	10.38	16309.71	8414.89	0.00	0.00	0.00
SRM612-5	756.23	1491.75	18071.24	10126.22	138150.49	20052.25	26076.19
SRM610-5	51862.31	14295.66	28548.70	7202.44	164315.58	22462.35	28183.08
AP1-5	0.00	37.34	4493.81	370.36	109712.80	14059.82	19902.79
AP2-5	0.00	169.78	11415.20	302.52	1896483.59	192987.22	237565.70
AP3-5	0.00	872.22	12845.09	212.56	2928811.69	296483.40	365172.36
AP4-5	0.00	1014.91	9602.31	96.04	1499439.69	149143.17	183451.48
34HP45-718-1	0.00	32.02	4672.01	413.88	5430085.69	679463.37	829055.17
34HP45-718-2	0.00	45.34	6390.26	722.72	4424384.19	483710.06	592372.36
34HP45-718-3	0.00	23.78	8237.27	747.08	9998117.19	1217247.11	1489804.03
34HP45-718-4	0.00	194.98	26164.25	1387.97	7033338.19	750566.50	928438.54
34HP45-718-5	0.00	129.10	18385.56	1176.61	5185425.19	530290.75	656219.73
34HP45-718-6	0.00	86.62	16961.15	1111.09	5364023.69	551368.37	681726.86
34HP45-718-7	0.00	69.98	12353.25	1057.61	6811161.69	728285.81	900397.11
34HP45-718-8	0.00	114.30	13024.89	1055.41	6850446.19	725297.44	896108.73
34HP45-718-9	0.00	93.70	13466.94	1147.29	7588346.69	812657.44	1005099.63
34HP45-718-10	0.00	73.30	11445.20	732.48	8034165.69	900159.81	1109299.63
34HP45-718-11	0.00	53.38	12506.81	851.64	6414307.69	677424.87	838556.54
34HP45-718-12	0.00	50.22	13441.58	779.48	6168632.19	651284.31	808115.04
34HP45-718-13	2224.03	90.62	9504.07	464.40	22525563.19	3427347.31	4163450.73
34HP45-718-14	1661.95	65.14	9749.31	459.68	22975473.19	3698011.81	4484384.73
34HP45-718-15	922.63	36.46	11004.44	510.44	21599997.19	3057606.81	3719533.73
34HP45-718-16	0.00	47.06	14834.98	594.20	4604792.69	474868.40	587432.04
34HP45-718-17	461.70	39.30	16974.12	681.84	5052538.19	511972.65	632165.42
34HP45-718-18	818.55	51.90	14595.14	624.32	4665445.19	471479.78	583236.98
SRM614-6	2237.79	16.38	2648.07	9850.82	29665.31	3975.64	3572.42
SRM612-6	9139.71	1708.95	5830.21	11595.74	45004.43	6505.82	6575.60
SRM610-6	64740.42	17740.80	26675.93	9506.49	130223.14	15969.59	18272.06
AP1-6	3569.12	18.42	1641.39	145.84	41089.37	4273.92	6152.32
AP2-6	2410.60	140.62	7484.22	69.80	1476014.29	142723.90	174599.06
AP3-6	4278.05	837.78	8910.99	43.68	2698392.99	267535.09	330598.11
AP4-6	3139.08	943.71	5056.17	0.00	1268867.49	123078.47	152220.57

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-5	0.000000	0.000007	0.010851	0.005599	0.000000	0.000000	0.000000
SRM612-5	0.000436	0.000859	0.010411	0.005834	0.079591	0.011552	0.015023
SRM610-5	0.048686	0.013420	0.026800	0.006761	0.154251	0.021086	0.026457
AP1-5	0.000000	0.000003	0.000343	0.000028	0.008370	0.001073	0.001518
AP2-5	0.000000	0.000012	0.000808	0.000021	0.134185	0.013655	0.016809
AP3-5	0.000000	0.000051	0.000746	0.000012	0.170155	0.017225	0.021215
AP4-5	0.000000	0.000061	0.000577	0.000006	0.090134	0.008965	0.011028
34HP45-718-1	0.000000	0.000004	0.000552	0.000049	0.641773	0.080305	0.097985
34HP45-718-2	0.000000	0.000004	0.000503	0.000057	0.348263	0.038075	0.046628

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000000	0.000002	0.000550	0.000050	0.666985	0.081204	0.099386
34HP45-718-4	0.000000	0.000009	0.001235	0.000066	0.332090	0.035439	0.043838
34HP45-718-5	0.000000	0.000008	0.001115	0.000071	0.314424	0.032155	0.039791
34HP45-718-6	0.000000	0.000006	0.001077	0.000071	0.340671	0.035018	0.043297
34HP45-718-7	0.000000	0.000004	0.000716	0.000061	0.395046	0.042240	0.052223
34HP45-718-8	0.000000	0.000006	0.000715	0.000058	0.376240	0.039835	0.049216
34HP45-718-9	0.000000	0.000005	0.000706	0.000060	0.397635	0.042584	0.052668
34HP45-718-10	0.000000	0.000005	0.000721	0.000046	0.506138	0.056708	0.069884
34HP45-718-11	0.000000	0.000003	0.000737	0.000050	0.377920	0.039913	0.049406
34HP45-718-12	0.000000	0.000003	0.000739	0.000043	0.339089	0.035801	0.044422
34HP45-718-13	0.000140	0.000006	0.000598	0.000029	1.417071	0.215613	0.261920
34HP45-718-14	0.000103	0.000004	0.000603	0.000028	1.421744	0.228836	0.277498
34HP45-718-15	0.000052	0.000002	0.000616	0.000029	1.209856	0.171262	0.208338
34HP45-718-16	0.000000	0.000003	0.000931	0.000037	0.288887	0.029791	0.036853
34HP45-718-17	0.000025	0.000002	0.000911	0.000037	0.271312	0.027492	0.033946
34HP45-718-18	0.000049	0.000003	0.000867	0.000037	0.277230	0.028016	0.034657
SRM614-6	0.001843	0.000013	0.002181	0.008112	0.024429	0.003274	0.002942
SRM612-6	0.006059	0.001133	0.003865	0.007688	0.029837	0.004313	0.004360
SRM610-6	0.064617	0.017707	0.026625	0.009488	0.129974	0.015939	0.018237
AP1-6	0.000255	0.000001	0.000117	0.000010	0.002940	0.000306	0.000440
AP2-6	0.000159	0.000009	0.000492	0.000005	0.097072	0.009386	0.011483
AP3-6	0.000229	0.000045	0.000478	0.000002	0.144681	0.014345	0.017726
AP4-6	0.000185	0.000056	0.000298	0.000000	0.074671	0.007243	0.008958
standardize signal averages AP							
AP1	0.000128	0.000002	0.000230	0.000019	0.005655	0.000689	0.000979
AP2	0.000079	0.000011	0.000650	0.000013	0.115628	0.011521	0.014146
AP3	0.000115	0.000048	0.000612	0.000007	0.157418	0.015785	0.019471
AP4	0.000092	0.000058	0.000437	0.000003	0.082403	0.008104	0.009993
linest from std sig ave							
	0.041339	0.229880	0.045448	4.262241	0.010599	0.105940	0.085996
standardize signal averages SRM							
srm614-2	0.000921	0.000010	0.006516	0.006855	0.012214	0.001637	0.001471
srm612-2	0.003248	0.000996	0.007138	0.006761	0.054714	0.007933	0.009691
srm610-2	0.056651	0.015563	0.026712	0.008125	0.142113	0.018513	0.022347
linest from std sig ave							
	0.099882	0.349203	0.141143	149.287410	0.035348	0.265013	0.219224
concentration data i.s. correction							
SRM614-5	85763.00	0.00	0.14	42.30	2046.58	0.00	0.00
SRM612-5	85763.00	1.54	16.94	40.58	2132.53	72.35	104.96
SRM610-5	85763.00	172.61	264.58	104.46	2471.53	140.22	191.59
AP1-5	398936	0.00	0.26	6.22	48.04	35.39	45.33
AP2-5	398936	0.00	1.10	14.64	36.40	567.39	577.10
AP3-5	398936	0.00	4.65	13.53	21.00	719.48	727.98
AP4-5	398936	0.00	5.59	10.47	9.82	381.12	378.90
34HP45-718-1	398936	0.00	0.35	10.01	83.17	2713.67	3393.95
34HP45-718-2	398936	0.00	0.33	9.12	96.73	1472.59	1609.18
34HP45-718-3	398936	0.00	0.15	9.96	84.74	2820.27	3431.95
34HP45-718-4	398936	0.00	0.84	22.40	111.43	1404.21	1497.78
34HP45-718-5	398936	0.00	0.72	20.21	121.31	1329.51	1358.97
34HP45-718-6	398936	0.00	0.50	19.53	119.99	1440.49	1479.96
34HP45-718-7	398936	0.00	0.37	12.99	104.30	1670.41	1785.23
34HP45-718-8	398936	0.00	0.58	12.97	98.56	1590.89	1683.55
34HP45-718-9	398936	0.00	0.45	12.79	102.22	1681.36	1799.74
34HP45-718-10	398936	0.00	0.42	13.07	78.46	2140.15	2396.69
34HP45-718-11	398936	0.00	0.29	13.36	85.32	1598.00	1686.85
34HP45-718-12	398936	0.00	0.25	13.40	72.86	1433.80	1513.07
34HP45-718-13	398936	2.31	0.52	10.84	49.68	5991.94	9112.54
34HP45-718-14	398936	1.70	0.37	10.94	48.37	6011.69	9671.42
34HP45-718-15	398936	0.85	0.19	11.18	48.61	5115.75	7238.14
34HP45-718-16	398936	0.00	0.27	16.87	63.39	1221.53	1259.09
34HP45-718-17	398936	0.41	0.19	16.53	62.26	1147.21	1161.91
34HP45-718-18	398936	0.80	0.28	15.72	63.08	1172.24	1184.06
SRM614-6	85763.00	6.53	0.27	8.50	2965.26	22.21	29.75
SRM612-6	85763.00	21.48	22.34	15.07	2810.22	27.12	39.19
SRM610-6	85763.00	229.09	349.10	103.78	3468.39	118.15	144.82
AP1-6	398936	4.21	0.12	2.13	17.74	12.43	12.92
AP2-6	398936	2.61	0.85	8.92	7.81	410.46	396.70
AP3-6	398936	3.78	4.12	8.66	3.98	611.77	606.25
AP4-6	398936	3.05	5.09	5.39	0.00	315.74	306.12
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-3	27561.64	64.76	3427.54	623.28	7621.24	1614.97	4442.38
SRM614-3	27446.91	115.04	24516.34	13632.52	34188.87	6115.75	9600.45
SRM612-3	35753.44	2260.49	30895.49	14480.72	378680.78	66371.26	80533.34
SRM610-3	87276.21	16516.05	32961.47	7587.76	543093.38	88395.09	106619.56
AP1-3	29223.13	126.68	6874.04	967.25	297389.16	46882.54	59774.70
AP2-3	27281.43	254.60	13757.64	748.68	2523679.00	285825.88	350452.34
AP3-3	31042.81	1602.93	16987.58	750.08	5569514.50	653876.38	801281.00
AP4-3	28386.92	1334.77	12817.87	561.64	2211290.30	245901.14	301071.94
34HP45-856-1	28468.36	89.32	14638.92	1174.93	12100367.00	1534342.40	1878201.00
34HP45-856-2	28377.40	95.60	13237.68	1073.93	12432830.00	1563010.90	1913632.50
34HP45-856-3	29319.85	113.80	12285.55	926.01	13359393.00	1760003.40	2150056.00
34HP45-856-4	32407.58	109.44	8904.97	1010.05	24613734.00	3953879.00	4771579.50
34HP45-856-5	33718.47	83.88	9674.97	977.49	27201040.00	4885418.00	5887646.50
34HP45-856-6	34431.04	111.04	9602.81	955.05	27105624.00	5355566.50	6441028.00
34HP45-856-7	36535.52	104.08	9436.77	861.24	32485192.00	8358546.50	9981060.00
34HP45-856-8	37486.17	106.92	9953.70	1002.61	32167698.00	8152294.00	9742223.00
34HP45-856-9	38601.50	126.28	9416.29	1303.89	33367234.00	8615256.00	10294378.00
34HP45-856-10	35238.00	86.48	9348.81	937.77	12613242.00	1583944.40	1945136.40
34HP45-856-11	36701.01	85.24	9710.93	979.21	11858232.00	1446438.90	1777608.40
34HP45-856-12	37493.57	83.48	10423.50	980.01	15104126.00	1991834.90	2429763.00
34HP45-856-13	36640.73	105.44	10805.90	955.49	18510048.00	3084474.30	3728516.80
34HP45-856-14	37381.01	89.08	9672.05	922.89	17725052.00	3616533.80	4349457.00
34HP45-856-15	37441.73	84.72	7788.96	857.48	16028525.00	3410839.80	4097091.30
34HP45-856-16	38887.82	99.84	4559.39	709.40	6826738.50	812205.38	990129.13
34HP45-856-17	39085.54	89.24	3681.34	662.60	4360302.50	482825.09	588308.50
34HP45-856-18	39811.18	80.96	3049.54	542.20	4156553.50	468322.56	569405.19
SRM614-4	40638.35	101.36	5353.51	11995.59	135418.64	19030.31	20341.48
SRM612-4	49864.76	2338.61	9762.42	15464.29	167510.98	24668.06	27172.15
SRM610-4	116784.70	22588.57	33012.63	11498.27	260698.70	33111.75	37738.90
AP1-4	42052.00	102.00	3981.22	639.52	132962.59	16618.93	20534.76
AP2-4	39336.30	256.36	10337.46	516.20	1874654.50	190922.47	234549.67
AP3-4	40624.91	1365.81	14716.80	513.40	4370286.00	470132.84	577998.63
AP4-4	39154.50	1405.81	9792.82	442.48	2341215.80	240847.31	295868.22
blank-4	43805.65	76.76	727.12	222.36	149313.20	20148.99	20377.56
blank average	35683.64	70.76	2077.33	422.82	78467.22	10881.98	12409.97

blank subtraction							
SRM614-3	-8236.73	44.28	22439.01	13209.69	-44278.35	-4766.23	-2809.52
SRM612-3	69.80	2189.73	28818.16	14057.90	300213.56	55489.28	68123.37
SRM610-3	51592.57	16445.29	30884.13	7164.94	464626.16	77513.11	94209.59
AP1-3	-6460.52	55.92	4796.71	544.42	218921.94	36000.56	47364.73
AP2-3	-8402.21	183.84	11680.31	325.86	2445211.78	274943.90	338042.37
AP3-3	-4640.83	1532.17	14910.24	327.26	5491047.28	642994.40	788871.03
AP4-3	-7296.72	1264.01	10740.54	138.82	2132823.08	235019.16	288661.97
34HP45-856-1	-7215.28	18.56	12561.59	752.10	12021899.78	1523460.42	1865791.03
34HP45-856-2	-7306.24	24.84	11160.34	651.10	12354362.78	1552128.92	1901222.53
34HP45-856-3	-6363.80	43.00	10208.22	503.18	13280925.78	1749121.42	2137646.03
34HP45-856-4	-3276.06	38.68	6827.64	587.22	24535266.78	3942997.02	4759169.53
34HP45-856-5	-1965.17	13.12	7597.64	554.66	27122572.78	4874536.02	5875236.53
34HP45-856-6	-1252.61	40.28	7525.48	532.22	27027156.78	5344684.52	6428618.03
34HP45-856-7	851.88	33.32	7359.44	438.42	32406724.78	8347664.52	9968650.03
34HP45-856-8	1802.53	36.16	7876.36	579.78	32089230.78	8141412.02	9729813.03
34HP45-856-9	2917.85	55.52	7338.96	881.06	33288766.78	8604374.02	10281968.03
34HP45-856-10	-445.64	15.72	7271.48	514.94	12534774.78	1573062.42	1932726.43
34HP45-856-11	1017.37	14.48	7633.60	556.38	11779764.78	1435556.92	1765198.43
34HP45-856-12	1809.93	12.72	8346.17	557.18	15025658.78	1980952.92	2417353.03
34HP45-856-13	957.09	34.68	8728.57	532.66	18431580.78	3073592.32	3716106.83
34HP45-856-14	1697.37	18.32	7594.72	500.06	17646584.78	3605651.82	4337047.03
34HP45-856-15	1758.09	13.96	5111.63	434.66	15950057.78	3399957.82	4084681.33
34HP45-856-16	3204.17	29.08	2482.05	286.58	6748271.28	801323.40	977719.16
34HP45-856-17	3401.90	18.48	1604.01	239.78	4281835.28	471943.11	575898.53
34HP45-856-18	4127.54	10.20	972.21	119.38	4078086.28	457440.58	56995.22
SRM614-4	4954.71	30.60	3726.18	11572.77	56951.42	8148.33	7931.51
SRM612-4	14181.12	2267.85	7685.08	15041.46	89043.76	13786.08	14762.18
SRM610-4	81101.06	22517.81	30935.29	11075.44	182231.48	22229.76	25328.93
AP1-4	6368.35	31.24	1903.89	216.70	54495.37	5736.95	8124.79
AP2-4	3652.66	185.60	8260.13	93.38	1796187.28	180040.49	222139.70
AP3-4	4941.27	1295.05	12639.47	90.58	4291818.78	459250.86	565588.66
AP4-4	3470.86	1335.05	7715.48	19.66	2262748.58	229965.33	283458.25

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-3	0.00	44.28	22439.01	13209.69	0.00	0.00	0.00
SRM612-3	69.80	2189.73	28818.16	14057.90	300213.56	55489.28	68123.37
SRM610-3	51592.57	16445.29	30884.13	7164.94	464626.16	77513.11	94209.59
AP1-3	0.00	55.92	4796.71	544.42	218921.94	36000.56	47364.73
AP2-3	0.00	183.84	11680.31	325.86	2445211.78	274943.90	338042.37
AP3-3	0.00	1532.17	14910.24	327.26	5491047.28	642994.40	788871.03
AP4-3	0.00	1264.01	10740.54	138.82	2132823.08	235019.16	288661.97
34HP45-856-1	0.00	18.56	12561.59	752.10	12021899.78	1523460.42	1865791.03
34HP45-856-2	0.00	24.84	11160.34	651.10	12354362.78	1552128.92	1901222.53
34HP45-856-3	0.00	43.04	10208.22	503.18	13280925.78	1749121.42	2137646.03
34HP45-856-4	0.00	38.68	6827.64	587.22	24535266.78	3942997.02	4759169.53
34HP45-856-5	0.00	13.12	7597.64	554.66	27122572.78	4874536.02	5875236.53
34HP45-856-6	0.00	40.28	7525.48	532.22	27027156.78	5344684.52	6428618.03
34HP45-856-7	851.88	33.32	7359.44	438.42	32406724.78	8347664.52	9968650.03
34HP45-856-8	1802.53	36.16	7876.36	579.78	32089230.78	8141412.02	9729813.03
34HP45-856-9	2917.85	55.52	7338.96	881.06	33288766.78	8604374.02	10281968.03
34HP45-856-10	0.00	15.72	7271.48	514.94	12534774.78	1573062.42	1932726.43
34HP45-856-11	1017.37	14.48	7633.60	556.38	11779764.78	1435556.92	1765198.43
34HP45-856-12	1809.93	12.72	8346.17	557.18	15025658.78	1980952.92	2417353.03
34HP45-856-13	957.09	34.68	8728.57	532.66	18431580.78	3073592.32	3716106.83
34HP45-856-14	1697.37	18.32	7594.72	500.06	17646584.78	3605651.82	4337047.03
34HP45-856-15	1758.09	13.96	5711.63	434.66	15950057.78	3399957.82	4084681.33
34HP45-856-16	3204.17	29.08	2482.05	286.58	6748271.28	801323.40	977719.16
34HP45-856-17	3401.90	18.48	1604.01	239.78	4281835.28	471943.11	575898.53
34HP45-856-18	4127.54	10.20	972.21	119.38	4078086.28	457440.58	556995.22
SRM614-4	4954.71	30.60	3276.18	11572.77	56951.42	8148.33	7931.51
SRM612-4	14181.12	2267.85	7685.08	15041.46	89043.76	13786.08	14762.18
SRM610-4	81101.06	22517.81	30935.29	11075.44	182231.48	22229.76	25328.93
AP1-4	6368.35	31.24	1903.89	216.70	54495.37	5736.95	8124.79
AP2-4	3652.66	185.60	8260.13	93.38	1796187.28	180040.49	222139.70
AP3-4	4941.27	1295.05	12639.47	90.58	4291818.78	459250.86	565588.66
AP4-4	3470.86	1335.05	7715.48	19.66	2262748.58	229965.33	283458.25

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-3	0.000000	0.000019	0.009472	0.005576	0.000000	0.000000	0.000000
SRM612-3	0.000028	0.000886	0.011661	0.005688	0.121478	0.022453	0.027565
SRM610-3	0.037305	0.011891	0.022331	0.005181	0.335953	0.056047	0.068119
AP1-3	0.000000	0.000004	0.000316	0.000036	0.014425	0.002372	0.003121
AP2-3	0.000000	0.000011	0.000717	0.000020	0.150148	0.016883	0.020757
AP3-3	0.000000	0.000069	0.000668	0.000015	0.246088	0.028817	0.035354
AP4-3	0.000000	0.000067	0.000570	0.000007	0.113282	0.012483	0.015332
34HP45-856-1	0.000000	0.000001	0.000739	0.000044	0.706940	0.089586	0.109717
34HP45-856-2	0.000000	0.000002	0.000680	0.000040	0.752444	0.094533	0.115794
34HP45-856-3	0.000000	0.000003	0.000675	0.000033	0.878324	0.115677	0.141372
34HP45-856-4	0.000000	0.000003	0.000537	0.000046	1.930100	0.310181	0.374386
34HP45-856-5	0.000000	0.000001	0.000527	0.000039	1.882821	0.338385	0.407853
34HP45-856-6	0.000000	0.000003	0.000481	0.000034	1.726716	0.341462	0.410713
34HP45-856-7	0.000063	0.000002	0.000545	0.000032	2.399957	0.618206	0.738252
34HP45-856-8	0.000130	0.000003	0.000567	0.000042	2.310216	0.586129	0.700483
34HP45-856-9	0.000217	0.000004	0.000546	0.000066	2.476596	0.640143	0.764951
34HP45-856-10	0.000000	0.000001	0.000489	0.000035	0.843011	0.105794	0.129983
34HP45-856-11	0.000067	0.000001	0.000503	0.000037	0.776318	0.094607	0.116331
34HP45-856-12	0.000119	0.000001	0.000547	0.000037	0.984665	0.129816	0.158415
34HP45-856-13	0.000061	0.000002	0.000556	0.000034	1.173087	0.195620	0.236513
34HP45-856-14	0.000118	0.000001	0.000527	0.000035	1.225652	0.250432	0.301232
34HP45-856-15	0.000140	0.000001	0.000456	0.000035	1.272739	0.271301	0.325938
34HP45-856-16	0.000340	0.000003	0.000263	0.000030	0.715424	0.084953	0.103654
34HP45-856-17	0.000354	0.000002	0.000167	0.000025	0.444970	0.049045	0.059848
34HP45-856-18	0.000524	0.000001	0.000124	0.000015	0.518080	0.058113	0.070761

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.003334	0.000021	0.002205	0.007788	0.038324	0.005483	0.005337
SRM612-4	0.007522	0.001203	0.004076	0.007978	0.047230	0.007312	0.007830
SRM610-4	0.065496	0.018185	0.024983	0.008944	0.147169	0.017953	0.020455
AP1-4	0.000413	0.000002	0.000123	0.000014	0.003530	0.000372	0.000526
AP2-4	0.000217	0.000011	0.000491	0.000006	0.106837	0.010709	0.013213
AP3-4	0.000214	0.000056	0.000547	0.000004	0.185662	0.019867	0.024467
AP4-4	0.000169	0.000065	0.000375	0.000001	0.109853	0.011164	0.013761

standardize signal averages AP							
AP1	0.000206	0.000003	0.000220	0.000025	0.008978	0.001372	0.001824
AP2	0.000109	0.000011	0.000604	0.000013	0.128493	0.013796	0.016985
AP3	0.000107	0.000062	0.000607	0.000009	0.215875	0.024342	0.029911
AP4	0.000084	0.000066	0.000473	0.000004	0.111568	0.011824	0.014547

linest from std sig ave							
	0.024305	0.188325	0.046555	4.334186	0.008161	0.073132	0.059482

standardize signal averages SRM							
srm614-2	0.001667	0.000020	0.005838	0.006682	0.019162	0.002742	0.002669
srm612-2	0.003775	0.001044	0.007869	0.006833	0.084354	0.014883	0.017698
srm610-2	0.051401	0.015038	0.023657	0.007063	0.241561	0.037000	0.044287

linest from std sig ave							
	0.109926	0.361301	0.154801	158.805330	0.021173	0.134670	0.112746

concentration data							
	i.s. correction						
SRM614-3	85763.00	0.00	0.30	37.82	2072.71	0.00	0.00
SRM612-3	85763.00	0.06	14.31	46.56	2114.43	85.02	140.83
SRM610-3	85763.00	77.76	192.05	89.16	1925.73	235.13	351.53
AP1-3	398936	0.00	0.28	5.87	62.03	46.96	69.21
AP2-3	398936	0.00	0.85	13.32	34.60	488.83	492.56
AP3-3	398936	0.00	5.16	12.41	25.36	801.18	840.73
AP4-3	398936	0.00	5.04	10.60	12.75	368.81	364.19
34HP45-856-1	398936	0.00	0.08	13.72	76.47	2301.55	2613.69
34HP45-856-2	398936	0.00	0.11	12.62	68.57	2449.70	2758.00
34HP45-856-3	398936	0.00	0.21	12.54	57.54	2859.52	3374.89
34HP45-856-4	398936	0.00	0.23	9.98	79.87	6283.74	9049.59
34HP45-856-5	398936	0.00	0.07	9.80	66.58	6129.81	9872.45
34HP45-856-6	398936	0.00	0.19	8.93	58.79	5621.59	9962.21
34HP45-856-7	398936	0.61	0.19	10.12	56.14	7813.43	18036.27
34HP45-856-8	398936	1.26	0.20	10.53	72.17	7521.26	17100.41
34HP45-856-9	398936	2.10	0.31	10.14	113.34	8062.94	18676.27
34HP45-856-10	398936	0.00	0.08	9.08	59.88	2744.55	3086.57
34HP45-856-11	398936	0.65	0.07	9.34	63.40	2527.42	2760.18
34HP45-856-12	398936	1.15	0.06	10.16	63.13	3205.73	3787.41
34HP45-856-13	398936	0.59	0.17	10.32	58.62	3819.16	5707.25
34HP45-856-14	398936	1.14	0.10	9.80	60.05	3990.30	7306.40
34HP45-856-15	398936	1.36	0.08	8.46	59.97	4143.60	7915.24
34HP45-856-16	398936	3.29	0.23	4.89	52.53	2329.17	2478.52
34HP45-856-17	398936	3.43	0.14	3.10	43.09	1448.67	1430.88
34HP45-856-18	398936	5.08	0.10	2.29	26.22	1686.69	1695.46
SRM614-4	85763.00	6.95	0.33	8.80	2894.77	26.82	34.39
SRM612-4	85763.00	15.68	19.43	16.28	2965.62	33.06	45.86
SRM610-4	85763.00	136.52	293.71	99.75	3324.76	103.00	112.60
AP1-4	398936	0.86	0.03	0.49	5.22	2.47	2.33
AP2-4	398936	0.45	0.18	1.96	2.06	74.78	67.17
AP3-4	398936	0.45	0.90	2.18	1.46	129.94	124.61
AP4-4	398936	1.63	4.87	6.96	1.65	357.64	325.73

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data							
	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-1	32813.91	72.24	3668.82	767.24	3960.82	862.00	3101.86
SRM614-1	33111.15	104.52	28668.80	12615.23	24139.54	5040.11	8232.85
SRM612-1	41159.59	2535.53	32871.75	14618.12	351946.28	76524.23	91344.67
SRM610-1	119605.11	24283.26	47171.43	10784.74	337422.50	64052.36	76601.43
AP1-1	31138.73	107.40	10585.18	938.09	196587.94	36867.93	47071.59
AP2-1	28842.28	305.56	17520.22	860.84	2149790.80	268692.94	326887.47
AP3-1	30015.25	1146.49	17185.62	775.52	3067380.30	391813.25	476997.75
AP4-1	30887.22	1757.21	15564.33	650.88	2815694.50	338894.84	413857.03

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	30515.73	98.12	5027.67	1145.01	2558231.30	334125.25	402895.97
34HP45-695-2	32763.18	93.36	4270.38	854.64	2087048.50	260959.55	317097.38
34HP45-695-3	34435.75	72.96	4662.71	1054.77	2304695.00	300423.84	363111.53
34HP45-695-4	40902.87	122.44	15030.17	1265.05	43791240.00	20177166.00	23302334.00
34HP45-695-5	41214.43	96.48	11974.07	1095.49	41722332.00	17886386.00	20832742.00
34HP45-695-6	42634.00	96.64	11322.06	973.37	40426944.00	16403583.00	19214986.00
34HP45-695-7	40912.51	123.64	8642.77	988.33	26032560.00	8988304.00	10510322.00
34HP45-695-8	41361.79	89.88	8734.69	939.21	30524414.00	8946691.00	10528076.00
34HP45-695-9	42693.44	105.08	9254.89	936.77	34744156.00	11295739.00	13269244.00
34HP45-695-10	42080.60	99.24	6593.80	863.72	21142452.00	4652437.00	5527595.50
34HP45-695-11	41938.88	72.64	5739.03	800.72	16403817.00	3079468.00	3673337.80
34HP45-695-12	43748.53	100.04	5532.11	881.64	14105238.00	2548030.80	3041860.00
34HP45-695-13	45188.61	79.92	6156.35	919.01	22611526.00	4499423.50	5351721.50
34HP45-695-14	43966.09	90.88	4632.99	763.12	12621131.00	1933564.80	2314596.50
34HP45-695-15	45340.25	94.92	5748.11	830.24	22360332.00	5587412.50	6611377.00
34HP45-695-16	46205.90	98.28	3755.34	831.60	5178386.50	673372.50	808379.44
34HP45-695-17	46295.14	71.28	3116.82	861.44	3442196.50	395921.06	477531.22
34HP45-695-18	46115.26	82.08	3333.58	863.44	3843007.50	455237.41	548583.69
SRM614-2	49638.64	111.80	5402.31	12214.71	162216.23	22089.00	23298.93
SRM612-2	58737.69	2321.21	9314.29	14168.40	168261.91	23933.06	25709.19
SRM610-2	120667.72	22482.21	30819.49	10649.86	267543.59	33715.99	38236.66
AP1-2	49852.60	94.08	4283.30	645.32	144876.94	14834.39	22221.77
AP2-2	47980.99	257.00	9080.41	560.24	1398048.60	148539.44	179398.13
AP3-2	47961.91	946.81	10075.62	485.08	2247668.30	240303.95	293088.66
AP4-2	48238.67	1484.49	9461.25	431.88	2438368.50	258731.25	316577.63
blank-2	52254.38	76.80	659.16	257.24	177299.59	24855.46	25323.58
blank average	42534.14	74.52	2163.99	512.24	90630.21	12858.73	14212.72
blank subtraction							
SRM614-1	-9423.00	30.00	26504.81	12102.99	-66490.67	-7818.62	-5979.87
SRM612-1	-1374.55	2461.01	30707.75	14105.88	261316.07	63665.50	77131.95
SRM610-1	77070.97	24208.74	45007.43	10272.50	246792.29	51193.63	62388.71
AP1-1	-11395.41	32.88	8421.19	425.84	105957.73	24009.19	32858.87
AP2-1	-13691.86	231.04	15356.23	348.60	2059160.59	255834.21	312674.75
AP3-1	-12518.89	1071.97	15021.62	263.28	2976750.09	378954.52	462785.03
AP4-1	-11646.93	1682.69	13400.33	138.64	2725064.29	326036.11	399644.31
34HP45-695-1	-12018.41	23.60	2863.68	632.76	2467601.09	321266.52	388683.25
34HP45-695-2	-9770.96	18.84	2106.39	342.40	1996418.29	248100.82	302884.66
34HP45-695-3	-8098.39	-1.56	2498.71	542.52	2214064.79	287565.11	348898.81
34HP45-695-4	-1631.27	47.92	12866.17	752.80	43700609.79	20164307.27	23288121.28
34HP45-695-5	-1319.71	21.96	9810.07	583.24	41631701.79	17873527.27	20818529.28
34HP45-695-6	99.86	22.12	9158.07	461.12	40336313.79	16390724.27	19200773.28
34HP45-695-7	-1621.63	49.12	6478.78	476.08	25941929.79	8975445.27	10496109.28
34HP45-695-8	-1172.35	15.36	6570.70	426.96	30433783.79	8933832.27	10513863.28
34HP45-695-9	159.30	30.56	7090.90	424.52	34653525.79	11282880.27	13255031.28
34HP45-695-10	-453.54	24.72	4429.80	351.48	21051821.79	4639578.27	5513382.78
34HP45-695-11	-595.27	-1.88	3575.04	288.48	16313186.79	3066609.27	3659125.08
34HP45-695-12	1214.39	25.52	3368.12	369.40	14014607.79	2535172.07	3027647.28
34HP45-695-13	2654.47	5.40	3992.36	406.76	22520895.79	4486564.77	5337508.78
34HP45-695-14	1431.95	16.36	2468.99	250.88	12530500.79	1920706.07	2300383.78
34HP45-695-15	2806.11	20.40	3584.12	318.00	22269701.79	5574553.77	6597164.28
34HP45-695-16	3671.76	23.76	1591.35	319.36	5087756.29	660513.77	794166.72
34HP45-695-17	3761.00	-3.24	952.83	349.20	3351566.29	383062.33	463318.50
34HP45-695-18	3581.12	7.56	1169.59	351.20	3752377.29	442378.68	534370.97
SRM614-2	7104.50	37.28	3238.32	11702.47	71586.02	9230.27	9086.21
SRM612-2	16203.55	2246.69	7150.30	13656.16	77631.70	11074.32	11496.47
SRM610-2	78133.58	22407.69	28655.50	10137.62	176913.38	20857.26	24023.94
AP1-2	7318.46	19.56	2119.31	133.08	54246.73	5975.65	8009.05
AP2-2	5446.85	182.48	6916.42	48.00	1307418.39	135680.71	165185.41
AP3-2	5427.77	872.28	7911.62	-27.16	2157038.09	227445.22	278875.94
AP4-2	5704.53	1409.97	7297.26	-80.36	2347738.29	245872.52	302364.91
zero correction							
SRM614-1	0.00	30.00	26504.81	12102.99	0.00	0.00	0.00
SRM612-1	0.00	2461.01	30707.75	14105.88	261316.07	63665.50	77131.95
SRM610-1	77070.97	24208.74	45007.43	10272.50	246792.29	51193.63	62388.71
AP1-1	0.00	32.88	8421.19	425.84	105957.73	24009.19	32858.87
AP2-1	0.00	231.04	15356.23	348.60	2059160.59	255834.21	312674.75
AP3-1	0.00	1071.97	15021.62	263.28	2976750.09	378954.52	462785.03
AP4-1	0.00	1682.69	13400.33	138.64	2725064.29	326036.11	399644.31
34HP45-695-1	0.00	23.60	2863.68	632.76	2467601.09	321266.52	388683.25
34HP45-695-2	0.00	18.84	2106.39	342.40	1996418.29	248100.82	302884.66
34HP45-695-3	0.00	0.00	2498.71	542.52	2214064.79	287565.11	348898.81
34HP45-695-4	0.00	47.92	12866.17	752.80	43700609.79	20164307.27	23288121.28
34HP45-695-5	0.00	21.96	9810.07	583.24	41631701.79	17873527.27	20818529.28
34HP45-695-6	99.86	22.12	9158.07	461.12	40336313.79	16390724.27	19200773.28
34HP45-695-7	0.00	49.12	6478.78	476.08	25941929.79	8975445.27	10496109.28
34HP45-695-8	0.00	15.36	6570.70	426.96	30433783.79	8933832.27	10513863.28

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	159.30	30.56	7090.90	424.52	34653525.79	11282880.27	13255031.28
34HP45-695-10	0.00	24.72	4429.80	351.48	21051821.79	4639578.27	5513382.78
34HP45-695-11	0.00	0.00	3575.04	288.48	16313186.79	3066609.27	3659125.08
34HP45-695-12	1214.39	25.52	3368.12	369.40	14014607.79	2535172.07	3027647.28
34HP45-695-13	2654.47	5.40	3992.36	406.76	22520895.79	4486564.77	5337508.78
34HP45-695-14	1431.95	16.36	2468.99	250.88	12530500.79	1920706.07	2300383.78
34HP45-695-15	2806.11	20.40	3584.12	318.00	22269701.79	5574553.77	6597164.28
34HP45-695-16	3671.76	23.76	1591.35	319.36	5087756.29	660513.77	794166.72
34HP45-695-17	3761.00	0.00	952.83	349.20	3351566.29	383062.33	463318.50
34HP45-695-18	3581.12	7.56	1169.59	351.20	3752377.29	442378.68	534370.97
SRM614-2	7104.50	37.28	3238.32	11702.47	71586.02	9230.27	9086.21
SRM612-2	16203.55	2246.69	7150.30	13656.16	77631.70	11074.32	11496.47
SRM610-2	78133.58	22407.69	28655.50	10137.62	176913.38	20857.26	24023.94
AP1-2	7318.46	19.56	2119.31	133.08	54246.73	5975.65	8009.05
AP2-2	5446.85	182.48	6916.42	48.00	1307418.39	135680.71	165185.41
AP3-2	5427.77	872.28	7911.62	0.00	2157038.09	227445.22	278875.94
AP4-2	5704.53	1409.97	7297.26	0.00	2347738.29	245872.52	302364.91

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-1	0.000000	0.000015	0.012995	0.005934	0.000000	0.000000	0.000000
SRM612-1	0.000000	0.001066	0.013305	0.006112	0.113222	0.027585	0.033419
SRM610-1	0.050198	0.015768	0.029314	0.006691	0.160742	0.033344	0.040635
AP1-1	0.000000	0.000002	0.000530	0.000027	0.006673	0.001512	0.002069
AP2-1	0.000000	0.000013	0.000865	0.000020	0.116030	0.014416	0.017619
AP3-1	0.000000	0.000048	0.000671	0.000012	0.133048	0.016938	0.020685
AP4-1	0.000000	0.000074	0.000593	0.000006	0.120543	0.014422	0.017678
34HP45-695-1	0.000000	0.000002	0.000260	0.000057	0.223645	0.029117	0.035227
34HP45-695-2	0.000000	0.000002	0.000254	0.000041	0.240533	0.029892	0.036492
34HP45-695-3	0.000000	0.000000	0.000288	0.000063	0.255472	0.033181	0.040258
34HP45-695-4	0.000000	0.000003	0.000770	0.000045	2.614847	1.206541	1.393456
34HP45-695-5	0.000000	0.000001	0.000665	0.000040	2.823807	1.212331	1.412085
34HP45-695-6	0.000008	0.000002	0.000761	0.000038	3.353311	1.362623	1.596233
34HP45-695-7	0.000000	0.000003	0.000422	0.000031	1.689110	0.584402	0.683414
34HP45-695-8	0.000000	0.000001	0.000432	0.000028	2.002833	0.587931	0.691912
34HP45-695-9	0.000010	0.000002	0.000443	0.000027	2.166332	0.705339	0.828626
34HP45-695-10	0.000000	0.000002	0.000339	0.000027	1.613366	0.355567	0.422534
34HP45-695-11	0.000000	0.000000	0.000281	0.000023	1.281096	0.240825	0.287356
34HP45-695-12	0.000109	0.000002	0.000302	0.000033	1.258396	0.227637	0.271858
34HP45-695-13	0.000196	0.000000	0.000295	0.000030	1.662837	0.331267	0.394096
34HP45-695-14	0.000112	0.000001	0.000194	0.000020	0.983889	0.150813	0.180625
34HP45-695-15	0.000218	0.000002	0.000278	0.000025	1.729202	0.432854	0.512258
34HP45-695-16	0.000299	0.000002	0.000130	0.000026	0.414243	0.053779	0.064661
34HP45-695-17	0.000320	0.000000	0.000081	0.000030	0.285538	0.032635	0.039473
34HP45-695-18	0.000287	0.000001	0.000094	0.000028	0.300913	0.035475	0.042853
SRM614-2	0.004516	0.000024	0.002059	0.007439	0.045508	0.005868	0.005776
SRM612-2	0.009235	0.001281	0.004075	0.007783	0.044247	0.063312	0.065553
SRM610-2	0.067439	0.019340	0.024733	0.008750	0.152697	0.018002	0.020736
AP1-2	0.000518	0.000001	0.000150	0.000009	0.003842	0.000423	0.000567
AP2-2	0.000365	0.000012	0.000464	0.000003	0.087633	0.009094	0.011072
AP3-2	0.000287	0.000046	0.000419	0.000000	0.114114	0.012033	0.014753
AP4-2	0.000283	0.000070	0.000361	0.000000	0.116286	0.012178	0.014976

standardize signal averages AP

AP1	0.000259	0.000002	0.000340	0.000018	0.005257	0.000968	0.001318
AP2	0.000183	0.000013	0.000664	0.000011	0.101832	0.011755	0.014345
AP3	0.000144	0.000047	0.000545	0.000006	0.123581	0.014485	0.017719
AP4	0.000141	0.000072	0.000477	0.000003	0.118414	0.013300	0.016327

linest from std sig ave

	0.019396	0.203803	0.043439	4.846730	0.011955	0.103643	0.084678
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Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srms614-2	0.002258	0.000019	0.007527	0.006687	0.022754	0.002934	0.002888
srms612-2	0.004618	0.001173	0.008690	0.006948	0.078734	0.016948	0.019986
srms610-2	0.058818	0.017554	0.027024	0.007720	0.156719	0.025673	0.030685
linest from std sig ave							
	0.095992	0.309560	0.134291	152.527772	0.029729	0.163029	0.137549
concentration data i.s. correction							
SRM614-1	85763.00	0.00	0.26	48.41	2466.61	0.00	0.00
SRM612-1	85763.00	0.00	18.64	49.57	2540.46	116.09	245.19
SRM610-1	85763.00	83.50	275.60	109.21	2781.13	164.81	296.38
AP1-1	398936	0.00	0.17	9.19	51.85	31.83	62.52
AP2-1	398936	0.00	1.06	14.99	37.98	553.40	596.05
AP3-1	398936	0.00	3.90	11.63	22.75	634.56	700.32
AP4-1	398936	0.00	6.05	10.27	11.86	574.92	596.31
34HP45-695-1	398936	0.00	0.17	4.50	110.89	1066.66	1203.90
34HP45-695-2	398936	0.00	0.18	4.40	79.76	1147.21	1235.93
34HP45-695-3	398936	0.00	0.00	5.00	121.04	1218.46	1371.93
34HP45-695-4	398936	0.00	0.23	13.34	87.09	12471.34	49886.56
34HP45-695-5	398936	0.00	0.12	11.53	76.49	13467.96	50125.95
34HP45-695-6	398936	0.06	0.15	13.19	74.12	15993.39	56340.05
34HP45-695-7	398936	0.00	0.26	7.31	59.94	8056.09	24163.12
34HP45-695-8	398936	0.00	0.08	7.49	54.33	9552.38	24309.06
34HP45-695-9	398936	0.08	0.16	7.68	51.31	10332.18	29163.47
34HP45-695-10	398936	0.00	0.15	5.88	52.08	7694.84	14701.55
34HP45-695-11	398936	0.00	0.00	4.87	43.80	6110.10	9957.33
34HP45-695-12	398936	0.84	0.19	5.24	64.13	6001.83	9412.07
34HP45-695-13	398936	1.52	0.03	5.11	58.07	7930.79	13696.81
34HP45-695-14	398936	0.87	0.10	3.36	38.09	4692.59	6235.63
34HP45-695-15	398936	1.69	0.13	4.82	47.74	8247.31	17897.12
34HP45-695-16	398936	2.31	0.16	2.25	50.28	1975.70	2223.58
34HP45-695-17	398936	2.48	0.00	1.41	57.52	1361.86	1349.36
34HP45-695-18	398936	2.22	0.05	1.63	54.46	1435.18	1466.80
SRM614-2	85763.00	7.51	0.41	7.67	3092.30	46.66	52.16
SRM612-2	85763.00	15.36	22.38	15.18	3235.35	45.37	56.10
SRM610-2	85763.00	112.18	338.05	92.14	3637.10	156.56	160.02
AP1-2	398936	4.01	0.11	2.60	18.22	18.32	17.50
AP2-2	398936	2.83	0.99	8.03	6.22	417.96	376.02
AP3-2	398936	2.22	3.75	7.25	0.00	544.26	497.51
AP4-2	398936	2.19	5.68	6.26	0.00	554.62	503.53
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
raw data							
	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-1	355977.16	96.12	3695.54	10211252.00	2242.53	627.80	924.93
SRM614-1	349717.53	234.12	23283.65	57928184.00	119901.12	18206.98	16341.21
SRM612-1	380234.56	2008.41	15577.01	37323804.00	121105.80	16522.13	17601.86
SRM610-1	460873.56	16120.85	45011.65	32418812.00	197833.80	26710.19	30330.93
AP1-1	402737.91	147.76	7591.44	21215004.00	132039.30	16598.05	21791.12
AP2-1	340163.56	314.96	13426.32	18904830.00	2175051.30	240879.06	288407.53
AP3-1	298005.81	1038.93	10195.22	16506045.00	2394493.00	269536.75	321757.28
AP4-1	282911.75	1818.57	8715.65	14400353.00	2633666.50	293808.69	353957.31
MZ1-1	283928.72	92.04	3123.42	20092428.00	1737249.10	193624.56	231347.45
MZ1-2	288043.22	85.52	2461.01	18685040.00	1522673.30	171277.81	203757.94
MZ1-3	304075.22	95.84	2283.73	17101642.00	1217475.90	137641.94	162603.72
MZ1-4	300735.69	106.00	2687.02	16827330.00	2059786.50	235184.20	280546.81
MZ1-5	305850.28	91.48	2169.61	16221108.00	1891149.60	214826.41	255958.00
MZ1-6	314079.72	76.60	2046.37	14903661.00	1657238.40	192072.48	228769.28
MZ1-7	320622.53	74.88	2552.61	15763079.00	1982763.80	222750.61	266745.53
MZ1-8	341599.44	102.08	2596.53	16096170.00	2356934.00	263503.84	315065.22
MZ1-9	344755.31	99.56	2444.89	15214156.00	2175015.80	243427.97	291120.97
MZ1-10	348037.00	116.16	1854.81	13155055.00	1673265.00	189178.06	224063.33
MZ1-11	350456.06	59.12	1871.77	13451415.00	1682871.40	188417.73	225001.75
MZ1-12	355020.03	96.80	1923.69	13197646.00	1664937.00	188571.17	224089.45
MZ1-13	352720.97	96.60	2173.37	14074360.00	2232132.30	254164.91	302250.00
MZ1-14	344653.09	86.76	2498.21	15976640.00	2657664.80	300498.25	359132.53
MZ1-15	337455.22	84.80	2403.53	15914537.00	2628854.80	295949.56	353219.19
MZ1-16	349969.13	106.44	2041.61	12997555.00	1411742.00	160748.27	190917.27

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	354130.09	69.40	2185.93	13887637.00	1542581.90	173005.30	205235.72
MZ1-18	343001.91	99.96	3154.58	18398436.00	4290161.50	504215.28	602410.38
MZ1-19	319726.84	87.08	3340.46	24404478.00	10148412.00	1234303.50	1483827.80
MZ1-20	305900.41	92.60	2874.34	24200242.00	10071112.00	1231740.60	1476184.40
MZ1-21	300565.81	75.36	2962.30	24938352.00	10500323.00	1279500.10	1535219.60
srm614-2	386280.69	149.24	5713.79	50584208.00	81558.98	12058.15	9688.21
srm612-2	392162.63	1352.93	4763.71	34531868.00	51185.17	7232.04	6692.44
srm610-2	442097.22	13605.32	19938.31	30205990.00	109942.78	14524.84	15316.81
AP1-2	372882.25	108.80	2782.38	11691301.00	54768.31	6742.28	8806.09
AP2-2	358145.25	231.72	5689.99	9870759.00	918300.13	102772.98	122244.77
AP3-2	348083.41	740.44	6280.20	8579394.00	1393473.40	154650.19	183850.23
AP4-2	345833.19	1298.57	5991.87	7685222.50	1687874.90	185436.64	222053.56
blank-2	373146.66	98.24	533.64	6258005.50	41020.71	5079.63	5264.27
blank ave	364561.91	97.18	2114.59	8234628.75	21631.62	2853.72	3094.60

blank subtraction							
SRM614-1	-14844.38	136.94	21169.06	49693555.25	98269.50	15353.27	13246.61
SRM612-1	15672.65	1911.23	13462.42	29089175.25	99474.18	13668.42	14507.26
SRM610-1	96311.65	16023.67	42897.06	24184183.25	176202.18	23856.47	27236.33
AP1-1	38176.00	50.58	5476.85	12980375.25	110407.68	13744.34	18696.53
AP2-1	-24398.35	217.78	11311.72	10670201.25	2153419.68	238025.34	285312.93
AP3-1	-66556.10	941.75	8080.63	8271416.25	2372861.38	266683.03	318662.68
AP4-1	-81650.16	1721.39	6601.06	6165724.25	2612034.88	290954.97	350862.71
MZ1-1	-80633.19	-5.14	1008.83	11857799.25	1715617.48	190770.84	228252.85
MZ1-2	-76518.69	-11.66	346.42	10450411.25	1501041.68	168424.09	200663.34
MZ1-3	-60486.69	-1.34	169.14	8867013.25	1195844.28	134788.22	159509.12
MZ1-4	-63826.22	8.82	572.42	8592701.25	2038154.88	232330.48	277452.21
MZ1-5	-58711.63	-5.70	55.02	7986479.25	1869517.98	211972.69	252863.40
MZ1-6	-50482.19	-20.58	-68.22	6669032.25	1635606.78	189218.76	225674.68
MZ1-7	-43939.38	-22.30	438.02	7528450.25	1961132.18	219896.89	263650.93
MZ1-8	-22962.47	4.90	481.94	7861541.25	2335302.38	260650.12	311970.62
MZ1-9	-19806.60	2.38	330.30	6979527.25	2153384.18	240574.25	288026.37
MZ1-10	-16524.91	18.98	-259.78	4920426.25	1651633.38	186324.34	220968.73
MZ1-11	-14105.85	-38.06	-242.82	5216786.25	1661239.78	185564.01	221907.15
MZ1-12	-9541.88	-0.38	-190.90	4963017.25	1643305.38	185717.45	220994.85
MZ1-13	-11840.94	-0.58	58.78	5839731.25	2210500.68	251311.19	299155.40
MZ1-14	-19908.82	-10.42	383.62	7742011.25	2636033.18	297644.53	356037.93
MZ1-15	-27106.69	-12.38	288.94	7679908.25	2607223.18	293095.84	350124.59
MZ1-16	-14592.78	9.26	-72.98	4762926.25	1390110.38	157894.55	187822.67
MZ1-17	-10431.82	-27.78	71.34	5653008.25	1520950.28	170151.58	202141.12
MZ1-18	-21560.00	2.78	1039.99	10163807.25	4268529.88	501361.56	599315.78
MZ1-19	-44835.07	-10.10	1225.87	16169849.25	10126780.38	1231449.78	1480733.20
MZ1-20	-58661.50	-4.58	759.74	15965613.25	10049480.38	1228886.88	1473089.80
MZ1-21	-63996.10	-21.82	847.70	16703723.25	10478691.38	1276646.38	1532125.00
srm614-2	21718.78	52.06	3599.20	42349579.25	59927.36	9204.43	6593.62
srm612-2	27600.72	1255.75	2649.11	26297239.25	29553.55	4378.32	3597.84
srm610-2	77535.31	13508.14	17823.72	21971361.25	88311.16	11671.13	12222.21
AP1-2	8320.34	11.62	667.78	3456672.25	33136.69	3888.56	5711.49
AP2-2	-6416.66	134.54	3575.40	1636130.25	896668.51	99919.26	119150.17
AP3-2	-16478.50	643.26	4165.60	344765.25	1371841.78	151796.47	180755.63
AP4-2	-18728.72	1201.39	3877.28	-549406.25	1666243.28	182582.92	218958.96

zero correction							
SRM614-1	0.00	136.94	21169.06	49693555.25	98269.50	15353.27	13246.61
SRM612-1	15672.65	1911.23	13462.42	29089175.25	99474.18	13668.42	14507.26
SRM610-1	96311.65	16023.67	42897.06	24184183.25	176202.18	23856.47	27236.33
AP1-1	38176.00	50.58	5476.85	12980375.25	110407.68	13744.34	18696.53
AP2-1	0.00	217.78	11311.72	10670201.25	2153419.68	238025.34	285312.93
AP3-1	0.00	941.75	8080.63	8271416.25	2372861.38	266683.03	318662.68
AP4-1	0.00	1721.39	6601.06	6165724.25	2612034.88	290954.97	350862.71
MZ1-1	0.00	0.00	1008.83	11857799.25	1715617.48	190770.84	228252.85
MZ1-2	0.00	0.00	346.42	10450411.25	1501041.68	168424.09	200663.34
MZ1-3	0.00	0.00	169.14	8867013.25	1195844.28	134788.22	159509.12
MZ1-4	0.00	8.82	572.42	8592701.25	2038154.88	232330.48	277452.21
MZ1-5	0.00	0.00	55.02	7986479.25	1869517.98	211972.69	252863.40
MZ1-6	0.00	0.00	0.00	6669032.25	1635606.78	189218.76	225674.68
MZ1-7	0.00	0.00	438.02	7528450.25	1961132.18	219896.89	263650.93
MZ1-8	0.00	4.90	481.94	7861541.25	2335302.38	260650.12	311970.62
MZ1-9	0.00	2.38	330.30	6979527.25	2153384.18	240574.25	288026.37
MZ1-10	0.00	18.98	0.00	4920426.25	1651633.38	186324.34	220968.73
MZ1-11	0.00	0.00	0.00	5216786.25	1661239.78	185564.01	221907.15
MZ1-12	0.00	0.00	0.00	4963017.25	1643305.38	185717.45	220994.85
MZ1-13	0.00	0.00	58.78	5839731.25	2210500.68	251311.19	299155.40
MZ1-14	0.00	0.00	383.62	7742011.25	2636033.18	297644.53	356037.93
MZ1-15	0.00	0.00	288.94	7679908.25	2607223.18	293095.84	350124.59
MZ1-16	0.00	9.26	0.00	4762926.25	1390110.38	157894.55	187822.67
MZ1-17	0.00	0.00	71.34	5653008.25	1520950.28	170151.58	202141.12
MZ1-18	0.00	2.78	1039.99	10163807.25	4268529.88	501361.56	599315.78

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	0.00	0.00	1225.87	16169849.25	10126780.38	1231449.78	1480733.20
MZ1-20	0.00	0.00	759.74	15965613.25	10049480.38	1228886.88	1473089.80
MZ1-21	0.00	0.00	847.70	16703723.25	10478691.38	1276646.38	1532125.00
srm614-2	21718.78	52.06	3599.20	42349579.25	59927.36	9204.43	6593.62
srm612-2	27600.72	1255.75	2649.11	26297239.25	29553.55	4378.32	3597.84
srm610-2	77535.31	13508.14	17823.72	21971361.25	88311.16	11671.13	12222.21
AP1-2	8320.34	11.62	667.78	3456672.25	33136.69	3888.56	5711.49
AP2-2	0.00	134.54	3575.40	1636130.25	896668.51	99919.26	119150.17
AP3-2	0.00	643.26	4165.60	344765.25	1371841.78	151796.47	180755.63
AP4-2	0.00	1201.39	3877.28	0.00	1666243.28	182582.92	218958.96

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-1	0.000000	0.000031	0.004722	11.085647	0.021922	0.003425	0.002955
SRM612-1	0.012269	0.001496	0.010539	22.771996	0.077872	0.010700	0.011357
SRM610-1	0.140233	0.023331	0.062460	35.213037	0.256557	0.034736	0.039657
AP1-1	0.002220	0.000003	0.000318	0.754836	0.006420	0.000799	0.001087
AP2-1	0.000000	0.000015	0.000781	0.737032	0.148745	0.016441	0.019708
AP3-1	0.000000	0.000050	0.000429	0.439195	0.125994	0.014160	0.016920
AP4-1	0.000000	0.000100	0.000384	0.358895	0.152042	0.016936	0.020423
MZ1-1	0.000000	0.000000	0.000087	1.019368	0.147485	0.016400	0.019622
MZ1-2	0.000000	0.000000	0.000034	1.019910	0.146494	0.016437	0.019584
MZ1-3	0.000000	0.000000	0.000019	0.993326	0.133964	0.015100	0.017869
MZ1-4	0.000000	0.000001	0.000054	0.818015	0.194030	0.022118	0.026413
MZ1-5	0.000000	0.000000	0.000005	0.796822	0.186524	0.021149	0.025229
MZ1-6	0.000000	0.000000	0.000000	0.768737	0.188536	0.021811	0.026013
MZ1-7	0.000000	0.000000	0.000037	0.635141	0.165452	0.018552	0.022243
MZ1-8	0.000000	0.000000	0.000038	0.623186	0.185120	0.020662	0.024730
MZ1-9	0.000000	0.000000	0.000030	0.626866	0.193406	0.021607	0.025869
MZ1-10	0.000000	0.000002	0.000000	0.618367	0.207566	0.023416	0.027770
MZ1-11	0.000000	0.000000	0.000000	0.627894	0.199947	0.022335	0.026709
MZ1-12	0.000000	0.000000	0.000000	0.591285	0.195780	0.022126	0.026329
MZ1-13	0.000000	0.000000	0.000006	0.596985	0.225975	0.025691	0.030582
MZ1-14	0.000000	0.000000	0.000032	0.646271	0.220045	0.024846	0.029721
MZ1-15	0.000000	0.000000	0.000024	0.638553	0.216780	0.024370	0.029111
MZ1-16	0.000000	0.000001	0.000000	0.605128	0.176613	0.020060	0.023863
MZ1-17	0.000000	0.000000	0.000008	0.613433	0.165045	0.018464	0.021935
MZ1-18	0.000000	0.000000	0.000078	0.759004	0.318762	0.037440	0.044755
MZ1-19	0.000000	0.000000	0.000068	0.892538	0.558974	0.067973	0.081733
MZ1-20	0.000000	0.000000	0.000042	0.888121	0.559024	0.068359	0.081944
MZ1-21	0.000000	0.000000	0.000045	0.881812	0.553184	0.067396	0.080883
srm614-2	0.007705	0.000018	0.001277	15.023928	0.021260	0.003265	0.002339
srm612-2	0.036023	0.001639	0.003458	34.321965	0.038572	0.005714	0.004696
srm610-2	0.140727	0.024517	0.032350	39.878122	0.160285	0.021183	0.022183
AP1-2	0.000874	0.000001	0.000070	0.363225	0.003482	0.000409	0.000600
AP2-2	0.000000	0.000017	0.000440	0.201422	0.110388	0.012301	0.014668
AP3-2	0.000000	0.000052	0.000335	0.027692	0.110190	0.012193	0.014519
AP4-2	0.000000	0.000097	0.000312	0.000000	0.133909	0.014673	0.017597

standardize signal averages AP							
AP1	0.001547	0.000002	0.000194	0.559030	0.004951	0.000604	0.000844
AP2	0.000000	0.000016	0.000611	0.469227	0.129566	0.014371	0.017188
AP3	0.000000	0.000051	0.000382	0.233444	0.118092	0.013176	0.015720
AP4	0.000000	0.000098	0.000348	0.179448	0.142975	0.015805	0.019010

linest from std sig ave							
	0.000094	0.158845	0.055359	0.000118	0.010523	0.094841	0.079180

standardize signal averages SRM							
srm614-2	0.003852	0.000025	0.003000	13.054787	0.021591	0.003345	0.002647
srm612-2	0.024146	0.001568	0.006998	28.546980	0.058222	0.008207	0.008026

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	0.140480	0.023924	0.047405	37.545580	0.208421	0.027960	0.030920	
linest from std sig ave								
	0.039619	0.227151	0.086687	0.036016	0.025191	0.186393	0.171282	
concentration data i.s. correction								
SRM614-1	85763.00	0.00	0.42	22.42	112.25	19.78	27.86	20.07
SRM612-1	85763.00	0.10	20.38	50.04	230.58	70.28	87.03	77.12
SRM610-1	85763.00	1.13	317.84	296.54	356.55	231.53	282.54	269.30
AP1-1	398936	0.08	0.19	7.03	35.55	26.95	30.24	34.34
AP2-1	398936	0.00	0.95	17.26	34.71	624.41	622.06	622.52
AP3-1	398936	0.00	3.17	9.48	20.69	528.90	535.76	534.47
AP4-1	398936	0.00	6.35	8.49	16.90	638.25	640.78	645.12
MZ1-1	398936	0.00	0.00	1.92	48.01	619.12	620.49	619.81
MZ1-2	398936	0.00	0.00	0.75	48.04	614.96	621.91	618.61
MZ1-3	398936	0.00	0.00	0.42	46.79	562.36	571.30	564.44
MZ1-4	398936	0.00	0.05	1.20	38.53	814.51	836.83	834.33
MZ1-5	398936	0.00	0.00	0.12	37.53	783.00	800.17	796.91
MZ1-6	398936	0.00	0.00	0.00	36.21	791.44	825.23	821.70
MZ1-7	398936	0.00	0.00	0.82	29.92	694.54	701.91	702.60
MZ1-8	398936	0.00	0.02	0.84	29.35	777.10	781.75	781.16
MZ1-9	398936	0.00	0.01	0.66	29.53	811.89	817.51	817.14
MZ1-10	398936	0.00	0.15	0.00	29.13	871.33	885.95	877.19
MZ1-11	398936	0.00	0.00	0.00	29.57	839.35	845.03	843.67
MZ1-12	398936	0.00	0.00	0.00	27.85	821.86	837.15	831.67
MZ1-13	398936	0.00	0.00	0.13	28.12	948.61	972.03	966.02
MZ1-14	398936	0.00	0.00	0.71	30.44	923.72	940.06	938.80
MZ1-15	398936	0.00	0.00	0.53	30.08	910.01	922.04	919.56
MZ1-16	398936	0.00	0.07	0.00	28.50	741.39	758.99	753.77
MZ1-17	398936	0.00	0.00	0.17	28.89	692.83	698.59	692.88
MZ1-18	398936	0.00	0.01	1.72	35.75	1338.11	1416.56	1413.71
MZ1-19	398936	0.00	0.00	1.49	42.04	2346.49	2571.78	2581.75
MZ1-20	398936	0.00	0.00	0.93	41.83	2346.70	2586.40	2588.41
MZ1-21	398936	0.00	0.00	0.99	41.53	2322.18	2549.94	2554.90
srm614-2	85763.00	0.06	0.25	6.06	152.13	19.19	26.56	15.88
srm612-2	85763.00	0.29	22.33	16.42	347.53	34.81	46.48	31.89
srm610-2	85763.00	1.13	334.00	153.59	403.79	144.65	172.30	150.64
AP1-2	398936	0.03	0.08	1.55	17.11	14.62	15.46	18.96
AP2-2	398936	0.00	1.05	9.72	9.49	463.39	465.41	463.34
AP3-2	398936	0.00	3.27	7.39	1.30	462.56	461.31	458.61
AP4-2	398936	0.00	6.12	6.88	0.00	562.13	555.17	555.84
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06	
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16	
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16	
raw data								
	Li	Be	B	Na	Mg24	Mg25	Mg26	
blank-5	265521.78	79.80	139.00	3240385.80	4364.66	883.52	645.32	
SRM614-5	255474.80	149.40	5107.91	38795148.00	32599.18	5472.23	4280.46	
SRM612-5	247581.36	2413.33	8854.49	43112392.00	46555.78	7432.04	5785.99	
SRM610-5	285051.75	15948.37	21007.16	34223444.00	104739.95	14005.80	15120.05	
AP1-5	228386.97	136.32	3473.14	20232692.00	59735.46	7687.16	9705.46	
AP2-5	215248.38	212.16	6993.32	17873110.00	932025.69	104442.55	124601.42	
AP3-5	212895.77	501.32	3912.34	15689915.00	799357.63	91005.20	107861.57	
AP4-5	206476.52	913.29	3784.10	13603456.00	942639.56	105515.67	126718.31	
MZ2-1b	217550.91	70.48	1210.37	13601529.00	485008.19	56411.80	66374.62	
MZ2-2b	226125.39	122.68	1183.09	13638704.00	587727.63	68017.14	80069.93	
MZ2-3b	230150.98	98.84	1075.25	13011592.00	466072.25	54755.11	64517.48	
MZ2-4b	231216.81	76.64	1239.77	12485521.00	506235.75	59198.73	69589.03	
MZ2-5b	231687.47	82.44	1302.65	12341751.00	677085.00	77175.27	91458.72	
MZ2-6b	233966.39	55.56	1114.33	11796182.00	581157.44	67316.66	78672.25	
MZ2-7b	233213.52	79.76	1309.33	11859485.00	783074.06	89818.87	105919.91	
MZ2-8b	232804.55	66.24	1311.01	11476971.00	758924.44	87159.05	102702.98	
MZ2-9b	234522.44	84.60	1224.29	10889057.00	640056.56	74076.73	87356.13	
MZ2-10b	238437.06	90.64	1160.33	10797044.00	597185.13	69255.11	81749.22	
MZ2-11b	240794.31	107.88	1100.65	10479233.00	553706.50	65163.57	76158.66	
MZ2-12b	243496.81	84.24	1084.33	10065153.00	456380.69	53362.66	63056.04	
MZ2-13b	243586.53	98.68	1162.49	10888109.00	793477.75	90000.79	105990.84	
MZ2-14b	239649.75	96.92	1211.01	11345246.00	978873.25	110143.38	130082.73	
MZ2-15b	238176.50	70.44	1450.17	11556486.00	1266285.50	140202.55	167255.11	
srm614-6	269330.44	133.76	1935.49	36640520.00	28461.60	4631.15	3525.62	
srm612-6	271761.56	1623.45	5029.39	39377556.00	38768.66	6266.28	4787.83	

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	300437.97	12076.79	14944.77	32001904.00	81881.82	11036.38	11672.43
AP1-6	245939.27	115.48	2194.09	15313016.00	34161.95	4595.39	5465.79
AP2-6	236683.53	215.48	4692.47	12939429.00	618763.50	70870.04	83733.47
AP3-6	235355.52	410.40	3308.70	11418569.00	675664.75	77113.59	91536.31
AP4-6	226979.11	828.24	3381.38	10007770.00	879153.69	98393.44	116881.73
blank-6	261952.80	81.84	478.40	8008797.50	13956.76	2160.69	1891.49
blank ave	263737.29	80.82	308.70	5624591.65	9160.71	1522.11	1268.41
blank subtraction							
SRM614-5	-8262.49	68.58	4799.21	33170556.35	23438.47	3950.12	3012.06
SRM612-5	-16155.93	2332.51	8545.79	37487800.35	37395.07	5909.93	4517.59
SRM610-5	21314.46	15867.55	20698.46	28598852.35	95579.24	12483.69	13851.64
AP1-5	-35350.32	55.50	3164.44	14608100.35	50574.75	6165.05	8437.05
AP2-5	-48488.91	131.34	6684.62	12248518.35	922864.98	102920.44	123333.01
AP3-5	-50841.52	420.50	3603.64	10065323.35	790196.92	89483.09	106593.16
AP4-5	-57260.77	832.46	3475.40	7978864.35	933478.85	103993.56	125449.90
MZ2-1b	-46186.38	-10.34	901.67	7976937.35	475847.48	54889.69	65106.21
MZ2-2b	-37611.90	41.86	874.38	8014112.35	578566.92	66495.03	78801.52
MZ2-3b	-33586.31	18.02	766.54	7387000.35	456911.54	53233.00	63249.08
MZ2-4b	-32520.48	-4.18	931.07	6860929.35	497075.04	57676.63	68320.62
MZ2-5b	-32049.82	1.62	993.95	6717159.35	667924.29	75653.16	90190.31
MZ2-6b	-29770.90	-25.26	805.62	6171590.35	571996.73	65794.56	77403.84
MZ2-7b	-30523.77	-1.06	1000.63	6234893.35	773913.35	88296.76	104651.50
MZ2-8b	-30932.74	-14.58	1002.31	5852379.35	749763.73	85636.94	101434.57
MZ2-9b	-29214.85	3.78	915.59	5264465.35	630895.85	72554.63	86087.73
MZ2-10b	-25300.23	9.82	851.62	5172452.35	588024.42	67733.00	80480.81
MZ2-11b	-22942.98	27.06	791.94	4854641.35	544545.79	63641.46	74890.26
MZ2-12b	-20240.48	3.42	775.62	4440561.35	447219.98	51840.55	61787.63
MZ2-13b	-20150.76	17.86	853.78	5263517.35	784317.04	88478.68	104722.43
MZ2-14b	-24087.54	16.10	902.31	5720654.35	969712.54	108621.27	128814.32
MZ2-15b	-25560.79	-10.38	1141.47	5931894.35	1257124.79	138680.44	165986.70
srm614-6	5593.15	52.94	1626.79	31015928.35	19300.89	3109.04	2257.21
srm612-6	8024.27	1542.63	4720.69	33752964.35	29607.94	4744.17	3519.42
srm610-6	36700.68	11995.97	14636.06	26377312.35	72721.11	9514.27	10404.02
AP1-6	-17798.02	34.66	1885.39	9688424.35	25001.24	3073.28	4197.38
AP2-6	-27053.76	134.66	4383.76	7314837.35	609602.79	69347.93	82465.06
AP3-6	-28381.77	329.58	3000.00	5793977.35	666504.04	75591.49	90267.91
AP4-6	-36758.18	747.42	3072.68	4383178.35	869992.98	96871.33	115613.32
zero correction							
SRM614-5	0.00	68.58	4799.21	33170556.35	23438.47	3950.12	3012.06
SRM612-5	0.00	2332.51	8545.79	37487800.35	37395.07	5909.93	4517.59
SRM610-5	21314.46	15867.55	20698.46	28598852.35	95579.24	12483.69	13851.64
AP1-5	0.00	55.50	3164.44	14608100.35	50574.75	6165.05	8437.05
AP2-5	0.00	131.34	6684.62	12248518.35	922864.98	102920.44	123333.01
AP3-5	0.00	420.50	3603.64	10065323.35	790196.92	89483.09	106593.16
AP4-5	0.00	832.46	3475.40	7978864.35	933478.85	103993.56	125449.90
MZ2-1b	0.00	0.00	901.67	7976937.35	475847.48	54889.69	65106.21
MZ2-2b	0.00	41.86	874.38	8014112.35	578566.92	66495.03	78801.52
MZ2-3b	0.00	18.02	766.54	7387000.35	456911.54	53233.00	63249.08
MZ2-4b	0.00	0.00	931.07	6860929.35	497075.04	57676.63	68320.62
MZ2-5b	0.00	1.62	993.95	6717159.35	667924.29	75653.16	90190.31
MZ2-6b	0.00	0.00	805.62	6171590.35	571996.73	65794.56	77403.84
MZ2-7b	0.00	0.00	1000.63	6234893.35	773913.35	88296.76	104651.50
MZ2-8b	0.00	0.00	1002.31	5852379.35	749763.73	85636.94	101434.57
MZ2-9b	0.00	3.78	915.59	5264465.35	630895.85	72554.63	86087.73
MZ2-10b	0.00	9.82	851.62	5172452.35	588024.42	67733.00	80480.81
MZ2-11b	0.00	27.06	791.94	4854641.35	544545.79	63641.46	74890.26
MZ2-12b	0.00	3.42	775.62	4440561.35	447219.98	51840.55	61787.63
MZ2-13b	0.00	17.86	853.78	5263517.35	784317.04	88478.68	104722.43
MZ2-14b	0.00	16.10	902.31	5720654.35	969712.54	108621.27	128814.32
MZ2-15b	0.00	0.00	1141.47	5931894.35	1257124.79	138680.44	165986.70
srm614-6	5593.15	52.94	1626.79	31015928.35	19300.89	3109.04	2257.21
srm612-6	8024.27	1542.63	4720.69	33752964.35	29607.94	4744.17	3519.42
srm610-6	36700.68	11995.97	14636.06	26377312.35	72721.11	9514.27	10404.02
AP1-6	0.00	34.66	1885.39	9688424.35	25001.24	3073.28	4197.38
AP2-6	0.00	134.66	4383.76	7314837.35	609602.79	69347.93	82465.06
AP3-6	0.00	329.58	3000.00	5793977.35	666504.04	75591.49	90267.91
AP4-6	0.00	747.42	3072.68	4383178.35	869992.98	96871.33	115613.32
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373	
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903	
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425	
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084	
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136	
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336	
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632	
standardized signal								
SRM614-5	0.000000	0.000057	0.004014	27.741418	0.019602	0.003304	0.002519	
SRM612-5	0.000000	0.001569	0.005749	25.219183	0.025157	0.003976	0.003039	
SRM610-5	0.031770	0.023651	0.030852	42.627924	0.142465	0.018608	0.020647	
AP1-5	0.000000	0.000008	0.000434	2.002198	0.006932	0.000845	0.001156	
AP2-5	0.000000	0.000017	0.000854	1.564151	0.117851	0.013143	0.015750	
AP3-5	0.000000	0.000062	0.000531	1.482966	0.116423	0.013184	0.015705	
AP4-5	0.000000	0.000082	0.000343	0.787073	0.092083	0.010258	0.012375	
MZ2-1b	0.000000	0.000000	0.000268	2.367949	0.141255	0.016294	0.019327	
MZ2-2b	0.000000	0.000011	0.000234	2.147594	0.155042	0.017819	0.021117	
MZ2-3b	0.000000	0.000005	0.000230	2.219228	0.137267	0.015992	0.019002	
MZ2-4b	0.000000	0.000000	0.000204	1.500729	0.108728	0.012616	0.014944	
MZ2-5b	0.000000	0.000000	0.000212	1.431392	0.142331	0.016121	0.019219	
MZ2-6b	0.000000	0.000000	0.000198	1.519216	0.140804	0.016196	0.019054	
MZ2-7b	0.000000	0.000000	0.000193	1.204035	0.149452	0.017051	0.020210	
MZ2-8b	0.000000	0.000000	0.000192	1.120700	0.143576	0.016399	0.019424	
MZ2-9b	0.000000	0.000001	0.000200	1.148391	0.137624	0.015827	0.018779	
MZ2-10b	0.000000	0.000002	0.000209	1.272023	0.144608	0.016657	0.019792	
MZ2-11b	0.000000	0.000007	0.000212	1.299175	0.145729	0.017031	0.020042	
MZ2-12b	0.000000	0.000001	0.000241	1.382403	0.139225	0.016139	0.019235	
MZ2-13b	0.000000	0.000004	0.000182	1.119305	0.166788	0.018815	0.022270	
MZ2-14b	0.000000	0.000003	0.000163	1.036286	0.175662	0.019677	0.023334	
MZ2-15b	0.000000	0.000000	0.000191	0.995171	0.210903	0.023266	0.027847	
sr614-6	0.006172	0.000058	0.001795	34.228361	0.021300	0.003431	0.002491	
sr612-6	0.007433	0.001429	0.004373	31.265522	0.027426	0.004395	0.003260	
sr610-6	0.066364	0.021692	0.026466	47.696938	0.131498	0.017204	0.018813	
AP1-6	0.000000	0.000006	0.000335	1.723174	0.004447	0.000547	0.000747	
AP2-6	0.000000	0.000022	0.000708	1.181554	0.098468	0.011202	0.013320	
AP3-6	0.000000	0.000055	0.000500	0.965481	0.111063	0.012596	0.015042	
AP4-6	0.000000	0.000083	0.000340	0.485517	0.096368	0.010730	0.012806	
standardize signal averages AP								
AP1	0.000000	0.000007	0.000385	1.862686	0.005689	0.000696	0.000951	
AP2	0.000000	0.000019	0.000781	1.372852	0.108160	0.012172	0.014535	
AP3	0.000000	0.000058	0.000515	1.224224	0.113743	0.012890	0.015373	
AP4	0.000000	0.000082	0.000342	0.636295	0.094225	0.010494	0.012591	
linest from std sig ave								
	0.000000	0.171151	0.040276	0.000026	0.012792	0.113519	0.095024	
standardize signal averages SRM								
sr614-2	0.003086	0.000058	0.002904	30.984890	0.020451	0.003367	0.002505	
sr612-2	0.003716	0.001499	0.005061	28.242353	0.026291	0.004185	0.003150	
sr610-2	0.049067	0.022672	0.028659	45.162431	0.136982	0.017906	0.019730	
linest from std sig ave								
	0.641267	1.043231	1.081317	0.920907	1.035421	1.032828	1.043835	
concentration data i.s. correction								
SRM614-5	85763.00	0.00	0.84	13.86	60.94	21.50	32.16	20.53
SRM612-5	85763.00	0.00	23.03	19.86	55.40	27.60	38.71	24.77
SRM610-5	85763.00	0.00	347.16	106.57	93.64	156.29	181.16	168.26
AP1-5	398936	0.00	0.52	6.97	20.46	35.37	38.27	43.84
AP2-5	398936	0.00	1.15	13.72	15.98	601.40	595.21	597.05
AP3-5	398936	0.00	4.23	8.53	15.15	594.12	597.06	595.35
AP4-5	398936	0.00	5.61	5.51	8.04	469.91	464.57	469.12
MZ2-1b	398936	0.00	0.00	4.30	24.19	720.83	737.90	732.65
MZ2-2b	398936	0.00	0.77	3.76	21.94	791.19	806.97	800.52
MZ2-3b	398936	0.00	0.37	3.70	22.68	700.48	724.25	720.32
MZ2-4b	398936	0.00	0.00	3.27	15.33	554.85	571.33	566.51
MZ2-5b	398936	0.00	0.02	3.40	14.63	726.33	730.08	728.57
MZ2-6b	398936	0.00	0.00	3.19	15.52	718.53	733.47	722.31
MZ2-7b	398936	0.00	0.00	3.10	12.30	762.67	772.19	766.11
MZ2-8b	398936	0.00	0.00	3.08	11.45	732.68	742.66	736.34
MZ2-9b	398936	0.00	0.06	3.21	11.73	702.30	716.76	711.89
MZ2-10b	398936	0.00	0.16	3.37	13.00	737.95	754.35	750.29
MZ2-11b	398936	0.00	0.49	3.41	13.27	743.66	771.30	759.76
MZ2-12b	398936	0.00	0.07	3.88	14.12	710.48	730.87	729.18

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	398936	0.00	0.26	2.92	11.44	851.13	852.08	844.21
MZ2-14b	398936	0.00	0.20	2.63	10.59	896.41	891.09	884.58
MZ2-15b	398936	0.00	0.00	3.08	10.17	1076.25	1053.64	1055.64
srM614-6	85763.00	0.00	0.86	6.20	75.19	23.37	33.40	20.30
srM612-6	85763.00	0.00	20.97	15.10	68.68	30.09	42.78	26.57
srM610-6	85763.00	0.00	318.40	91.42	104.77	144.26	167.50	153.32
AP1-6	398936	0.00	0.42	5.39	17.61	22.69	24.75	28.30
AP2-6	398936	0.00	1.49	11.38	12.07	502.49	507.29	504.96
AP3-6	398936	0.00	3.75	8.03	9.86	566.76	570.44	570.21
AP4-6	398936	0.00	5.65	5.47	4.96	491.77	485.94	485.47

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

raw data	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-7	42694.68	77.92	1464.25	809.56	3102.54	711.84	1677.69
SRM614-7	42443.00	91.00	18152.50	18502.26	21855.28	3510.14	5246.27
SRM612-7	51446.65	2645.65	20754.80	16659.29	91312.11	13873.24	16995.06
SRM610-7	118031.91	24186.30	45893.86	10892.38	220340.56	29632.93	35766.76
AP1-7	43377.92	177.76	6852.32	1050.73	118881.06	14623.44	20237.27
AP2-7	41222.75	258.64	11809.67	975.69	1225799.90	131973.50	162895.28
AP3-7	41414.07	930.49	13436.80	851.48	1955155.30	206759.69	253830.34
AP4-7	41645.23	1632.01	10587.26	656.16	1551531.80	164281.08	200418.81
T1-1	41184.51	89.24	2345.09	2084.97	6210223.00	718114.88	879740.69
T1-2	42874.36	80.76	1884.33	1460.61	4099993.80	463067.91	566829.00
T1-3	44093.53	85.52	1737.05	1167.65	2026765.30	225422.70	273615.38
T1-4	44779.45	95.60	2006.65	1367.21	1683146.90	189421.27	231292.47
T1-5	45384.38	88.24	2216.13	1502.85	1822875.00	196425.50	240661.55
T1-6	45169.06	77.04	2276.53	1441.25	1928620.50	207834.86	252819.66
T1-7	47059.43	88.68	2080.93	1315.29	2434028.00	269544.88	328730.94
T1-8	48554.83	56.60	2164.41	1178.37	2004372.90	216662.30	263464.81
T1-9	49833.28	73.68	2079.53	1338.17	2466156.50	268696.78	326229.44
T1-10	50219.13	87.32	2045.49	1496.93	2703883.00	302727.97	368167.47
T1-11	51031.57	73.92	2267.57	1442.25	2730661.80	298781.66	364489.56
T1-12	52189.70	114.04	2197.77	1540.85	2646740.00	288874.16	351397.41
T1-13	52223.86	95.32	2232.53	1641.33	3110842.80	345134.47	421007.53
T1-14	51998.25	100.16	2353.29	1640.93	3240719.30	354859.41	433088.91
T1-15	52885.50	95.48	2285.61	1654.17	3276450.30	360088.66	440152.59
T1-16	53824.94	64.96	1751.65	1912.77	5775196.50	718068.75	874556.75
T1-17	53568.86	59.40	2057.25	2136.33	7929251.50	1002607.70	1222264.30
T1-18	54719.95	76.88	2015.37	2031.61	5270270.50	611410.63	745021.25
SRM614-8	61715.87	170.64	4407.78	13577.48	43488.20	6370.60	6779.36
SRM612-8	71381.09	2484.77	8296.69	13477.48	50318.00	7351.96	8156.69
SRM610-8	126781.63	21613.36	31177.50	9059.13	146795.86	19290.47	22628.65
AP1-8	62064.47	135.12	2864.22	685.16	51408.05	6596.28	8868.33
AP2-8	56937.92	261.48	6803.36	644.12	733839.88	80851.94	98426.95
AP3-8	56541.88	787.24	8895.61	569.48	1662310.30	177756.80	216773.38
AP4-8	56709.52	1053.41	6082.95	471.60	1133952.60	122970.70	149610.17
blank-8	61027.74	83.36	372.80	342.68	44385.29	5835.63	5971.43
blank average	51861.21	80.64	918.53	576.12	23743.91	3273.74	3824.56

blank subtraction

SRM614-7	-9418.21	10.36	17233.98	17926.14	-1888.63	236.40	1421.71
SRM612-7	-414.56	2565.01	19836.27	16083.17	67568.20	10599.50	13170.50
SRM610-7	66170.70	24105.66	44975.33	10316.26	196596.65	26359.19	31942.20
AP1-7	-8483.29	97.12	5933.79	474.60	95137.15	11349.70	16412.71
AP2-7	-10638.46	178.00	10891.14	399.56	1202055.99	128699.76	159070.72
AP3-7	-10447.14	849.84	12518.27	275.36	1931411.39	203485.95	250005.78
AP4-7	-10215.98	1551.37	9668.73	80.04	1527787.89	161007.34	196594.25
T1-1	-10676.70	8.60	1426.57	1508.85	6186479.09	714841.14	875916.13
T1-2	-8986.85	0.12	965.81	884.49	4076249.89	459794.17	563004.44
T1-3	-7767.68	4.88	818.52	591.52	2003021.39	222148.96	269790.82
T1-4	-7081.76	14.96	1088.13	791.08	1659402.99	186147.53	227467.91
T1-5	-6476.84	7.60	1297.61	926.73	1799131.09	193151.76	236836.99
T1-6	-6692.16	-3.60	1358.01	865.12	1904876.59	204561.12	248995.10
T1-7	-4801.79	8.04	1162.41	739.16	2410284.09	266271.14	324906.38
T1-8	-3306.38	-24.04	1245.89	602.24	1980628.99	213388.56	259640.25
T1-9	-2027.93	-6.96	1161.01	762.04	2442412.59	265423.04	322404.88
T1-10	-1642.09	6.68	1126.97	920.81	2680139.09	299454.23	364342.91
T1-11	-829.64	-6.72	1349.05	866.12	2706917.89	295507.92	360665.00
T1-12	328.48	33.40	1279.25	964.73	2622996.09	285600.42	347572.85

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	362.64	14.68	1314.01	1065.21	3087098.89	341860.73	417182.97
T1-14	137.04	19.52	1434.77	1064.81	3216975.39	351585.67	429264.35
T1-15	1024.29	14.84	1367.09	1078.05	3252706.39	356814.92	436328.03
T1-16	1963.73	-15.68	833.12	1336.65	5751452.59	714795.01	870732.19
T1-17	1707.65	-21.24	1138.73	1560.21	7905507.59	999333.96	1218439.74
T1-18	2858.74	-3.76	1096.85	1455.49	5246526.59	608136.89	741196.69
SRM614-8	9854.66	90.00	3489.26	13001.35	19744.29	3096.86	2954.80
SRM612-8	19519.88	2404.13	7378.16	12901.35	26574.09	4078.22	4332.12
SRM610-8	74920.42	21532.72	30258.97	8483.01	123051.95	16016.73	18804.08
AP1-8	10203.26	54.48	1945.69	109.04	27664.14	3322.54	5043.77
AP2-8	5076.71	180.84	5884.83	68.00	710095.97	77578.20	94602.39
AP3-8	4680.67	706.60	7977.08	-6.64	1638566.39	174483.06	212948.82
AP4-8	4848.31	972.77	5164.43	-104.52	1110208.69	119696.96	145785.61
zero correction							
SRM614-7	0.00	10.36	17233.98	17926.14	0.00	236.40	1421.71
SRM612-7	0.00	2565.01	19836.27	16083.17	67568.20	10599.50	13170.50
SRM610-7	66170.70	24105.66	44975.33	10316.26	196596.65	26359.19	31942.20
AP1-7	0.00	97.12	5933.79	474.60	95137.15	11349.70	16412.71
AP2-7	0.00	178.00	10891.14	399.56	1202055.99	128699.76	159070.72
AP3-7	0.00	849.84	12518.27	275.36	1931411.39	203485.95	250005.78
AP4-7	0.00	1551.37	9668.73	80.04	1527787.89	161007.34	196594.25
T1-1	0.00	8.60	1426.57	1508.85	6186479.09	714841.14	875916.13
T1-2	0.00	0.12	965.81	884.49	4076249.89	459794.17	563004.44
T1-3	0.00	4.88	818.52	591.52	2003021.39	222148.96	269790.82
T1-4	0.00	14.96	1088.13	791.08	1659402.99	186147.53	227467.91
T1-5	0.00	7.60	1297.61	926.73	1799131.09	193151.76	236836.99
T1-6	0.00	0.00	1358.01	865.12	1904876.59	204561.12	248995.10
T1-7	0.00	8.04	1162.41	739.16	2410284.09	266271.14	324906.38
T1-8	0.00	0.00	1245.89	602.24	1980628.99	213388.56	259640.25
T1-9	0.00	0.00	1161.01	762.04	2442412.59	265423.04	322404.88
T1-10	0.00	6.68	1126.97	920.81	2680139.09	299454.23	364342.91
T1-11	0.00	0.00	1349.05	866.12	2706917.89	295507.92	360665.00
T1-12	328.48	33.40	1279.25	964.73	2622996.09	285600.42	347572.85
T1-13	362.64	14.68	1314.01	1065.21	3087098.89	341860.73	417182.97
T1-14	137.04	19.52	1434.77	1064.81	3216975.39	351585.67	429264.35
T1-15	1024.29	14.84	1367.09	1078.05	3252706.39	356814.92	436328.03
T1-16	1963.73	0.00	833.12	1336.65	5751452.59	714795.01	870732.19
T1-17	1707.65	0.00	1138.73	1560.21	7905507.59	999333.96	1218439.74
T1-18	2858.74	0.00	1096.85	1455.49	5246526.59	608136.89	741196.69
SRM614-8	9854.66	90.00	3489.26	13001.35	19744.29	3096.86	2954.80
SRM612-8	19519.88	2404.13	7378.16	12901.35	26574.09	4078.22	4332.12
SRM610-8	74920.42	21532.72	30258.97	8483.01	123051.95	16016.73	18804.08
AP1-8	10203.26	54.48	1945.69	109.04	27664.14	3322.54	5043.77
AP2-8	5076.71	180.84	5884.83	68.00	710095.97	77578.20	94602.39
AP3-8	4680.67	706.60	7977.08	0.00	1638566.39	174483.06	212948.82
AP4-8	4848.31	972.77	5164.43	0.00	1110208.69	119696.96	145785.61
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16
standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632
standardized signal							
SRM614-7	0.000000	0.000004	0.006072	0.006316	0.000000	0.000083	0.000501
SRM612-7	0.000000	0.000933	0.007213	0.005849	0.024571	0.003854	0.004789
SRM610-7	0.040044	0.014588	0.027217	0.006243	0.118971	0.015951	0.019330
AP1-7	0.000000	0.000006	0.000366	0.000029	0.005874	0.000701	0.001013
AP2-7	0.000000	0.000011	0.000643	0.000024	0.070992	0.007601	0.009395
AP3-7	0.000000	0.000041	0.000611	0.000013	0.094298	0.009935	0.012206
AP4-7	0.000000	0.000089	0.000556	0.000005	0.087871	0.009260	0.011307
T1-1	0.000000	0.000001	0.000095	0.000101	0.412413	0.047654	0.058392
T1-2	0.000000	0.000000	0.000086	0.000079	0.362192	0.040855	0.050025
T1-3	0.000000	0.000001	0.000096	0.000069	0.234600	0.026019	0.031599
T1-4	0.000000	0.000001	0.000077	0.000056	0.117233	0.013151	0.016070

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000000	0.000001	0.000089	0.000063	0.122733	0.013176	0.016157	
T1-6	0.000000	0.000000	0.000089	0.000057	0.125138	0.013438	0.016357	
T1-7	0.000000	0.000001	0.000105	0.000067	0.216852	0.023956	0.029232	
T1-8	0.000000	0.000000	0.000118	0.000057	0.187758	0.020229	0.024613	
T1-9	0.000000	0.000000	0.000096	0.000063	0.202248	0.021979	0.026697	
T1-10	0.000000	0.000001	0.000097	0.000079	0.230663	0.025772	0.031357	
T1-11	0.000000	0.000000	0.000109	0.000070	0.219079	0.023916	0.029190	
T1-12	0.000027	0.000003	0.000103	0.000078	0.211825	0.023064	0.028069	
T1-13	0.000027	0.000001	0.000098	0.000080	0.230549	0.025531	0.031156	
T1-14	0.000010	0.000001	0.000101	0.000075	0.225485	0.024643	0.030088	
T1-15	0.000076	0.000001	0.000102	0.000080	0.242474	0.026599	0.032526	
T1-16	0.000168	0.000000	0.000071	0.000115	0.493125	0.061286	0.074656	
T1-17	0.000124	0.000000	0.000083	0.000114	0.575250	0.072717	0.088661	
T1-18	0.000212	0.000000	0.000082	0.000108	0.389879	0.045192	0.055080	
SRM614-8	0.005572	0.000051	0.001973	0.007351	0.011164	0.001751	0.001671	
SRM612-8	0.010141	0.001249	0.003833	0.006703	0.013806	0.002119	0.002251	
SRM610-8	0.063811	0.018340	0.025772	0.007225	0.104805	0.013642	0.016016	
AP1-8	0.000872	0.000005	0.000166	0.000009	0.002364	0.000284	0.000431	
AP2-8	0.000381	0.000014	0.000442	0.000005	0.053291	0.005822	0.007100	
AP3-8	0.000289	0.000044	0.000493	0.000000	0.101257	0.010782	0.013159	
AP4-8	0.000363	0.000073	0.000387	0.000000	0.083123	0.008962	0.010915	
standardize signal averages AP								
AP1	0.000436	0.000005	0.000266	0.000019	0.004119	0.000492	0.000722	
AP2	0.000190	0.000012	0.000542	0.000014	0.062142	0.006711	0.008247	
AP3	0.000145	0.000043	0.000552	0.000007	0.097777	0.010359	0.012683	
AP4	0.000182	0.000081	0.000471	0.000002	0.085497	0.009111	0.011111	
linest from std sig ave								
	0.011392	0.191847	0.048747	3.860424	0.016442	0.154408	0.126152	
standardize signal averages SRM								
srm614-2	0.002786	0.000027	0.004022	0.006834	0.005582	0.000917	0.001086	
srm612-2	0.005071	0.001091	0.005523	0.006276	0.019189	0.002987	0.003520	
srm610-2	0.051927	0.016464	0.026494	0.006734	0.111888	0.014797	0.017673	
linest from std sig ave								
	0.108401	0.330073	0.150055	164.547133	0.048493	0.364307	0.305206	
concentration data								
	i.s. correction							
SRM614-7	85763.00	0.00	0.06	25.38	2091.07	0.00	1.10	5.42
SRM612-7	85763.00	0.00	15.35	30.16	1936.34	34.65	51.04	51.82
SRM610-7	85763.00	39.12	240.02	113.78	2066.92	167.76	211.24	209.13
AP1-7	398936	0.00	0.46	7.13	45.13	38.53	43.17	51.00
AP2-7	398936	0.00	0.80	12.51	36.34	465.65	468.21	472.80
AP3-7	398936	0.00	3.18	11.89	20.70	618.51	611.98	614.29
AP4-7	398936	0.00	6.83	10.81	7.09	576.36	570.43	569.05
T1-1	398936	0.00	0.04	1.85	154.91	2705.09	2935.43	2938.66
T1-2	398936	0.00	0.00	1.67	121.03	2375.68	2516.61	2517.61
T1-3	398936	0.00	0.04	1.86	106.70	1538.78	1602.73	1590.26
T1-4	398936	0.00	0.08	1.49	86.07	768.95	810.08	808.75
T1-5	398936	0.00	0.04	1.72	97.36	805.03	811.66	813.11
T1-6	398936	0.00	0.00	1.73	87.53	820.80	827.79	823.21
T1-7	398936	0.00	0.06	2.03	102.42	1422.37	1475.68	1471.13
T1-8	398936	0.00	0.00	2.30	87.92	1231.54	1246.06	1238.70
T1-9	398936	0.00	0.00	1.87	97.18	1326.58	1353.87	1343.58
T1-10	398936	0.00	0.04	1.89	122.05	1512.96	1587.54	1578.08
T1-11	398936	0.00	0.00	2.12	107.96	1436.97	1473.22	1469.02
T1-12	398936	0.12	0.21	2.01	119.98	1389.40	1420.73	1412.61
T1-13	398936	0.12	0.08	1.91	122.51	1512.21	1572.66	1567.97
T1-14	398936	0.04	0.10	1.96	114.94	1479.00	1518.01	1514.23
T1-15	398936	0.35	0.08	1.98	123.76	1590.43	1638.46	1636.93
T1-16	398936	0.77	0.00	1.39	176.50	3234.49	3775.15	3757.18
T1-17	398936	0.56	0.00	1.61	174.84	3773.16	4479.31	4461.99
T1-18	398936	0.97	0.00	1.59	166.57	2557.29	2783.77	2771.98
SRM614-8	85763.00	5.44	0.84	8.25	2433.88	15.74	23.19	18.08
SRM612-8	85763.00	9.91	20.55	16.03	2219.18	19.47	28.06	24.35
SRM610-8	85763.00	62.34	301.75	107.74	2392.09	147.78	180.65	173.28
AP1-8	398936	3.96	0.36	3.23	14.35	15.50	17.49	21.69
AP2-8	398936	1.73	1.04	8.59	7.86	349.55	358.64	357.31
AP3-8	398936	1.31	3.34	9.59	0.00	664.16	664.18	662.27
AP4-8	398936	1.65	5.57	7.52	0.00	545.22	552.04	549.33
certified concentration								
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00	
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44	
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30	
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39	

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-5	39800.79	88.04	58.16	165253.56	5206.59	853.88	1599.29
SRM614-5	38940.94	128.48	119.72	3049844.50	32856.31	5320.59	6757.08
SRM612-5	52473.34	3474.18	145.24	1810076.90	188989.22	25510.23	30252.05
SRM610-5	131552.34	23558.77	298.24	766223.75	312942.47	40044.59	47489.43
AP1-5	44434.65	131.12	108.80	216550.27	295886.03	36998.97	44917.61
AP2-5	43959.61	292.76	138.00	168032.39	2121418.30	240772.92	286522.19
AP3-5	46500.30	1457.61	211.32	135921.36	5088562.00	599047.81	716598.44
AP4-5	45601.94	1409.25	179.48	104173.74	2006439.10	223777.19	266421.63
TGP12-1	47611.11	89.72	81.56	112906.40	458199.31	55397.23	64709.65
TGP12-2	50313.72	101.20	71.56	101841.81	465526.78	55083.11	65645.13
TGP12-3	53186.54	86.96	81.36	97700.31	441671.13	52009.45	61728.51
TGP12-4	54907.99	73.24	87.28	112123.35	1822433.40	204248.44	242939.48
TGP12-5	55677.35	85.52	86.40	191045.23	3795428.00	444693.81	529898.44
TGP12-6	55967.23	75.68	107.12	212275.31	10277171.00	1275700.30	1523487.30
TGP12-7	54163.15	70.40	109.96	251641.58	14909796.00	1948325.40	2312954.80
TGP12-8	53175.78	69.56	112.44	198589.80	15138872.00	1980125.90	2351539.30
TGP12-9	53558.54	70.20	109.92	182857.88	13991529.00	1806851.40	2149208.30
TGP12-10	55105.75	73.20	88.96	123158.09	10275518.00	1275620.90	1520794.10
TGP12-11	56585.60	77.08	107.56	125356.55	10613544.00	1315748.30	1571812.90
TGP12-12	58126.01	62.56	104.20	117256.98	10519040.00	1307182.00	1558675.10
TGP12-13	61599.55	80.80	66.84	68888.35	1247153.10	137499.45	161374.06
TGP12-14	62649.59	65.20	70.12	71376.84	1294316.90	143159.97	167812.42
TGP12-15	65246.45	64.84	67.24	68447.75	1296982.50	142733.05	168143.34
TGP12-16	66097.49	67.36	72.88	95089.53	2760874.00	301497.94	359088.75
TGP12-17	66874.22	68.28	79.28	91293.07	2686013.80	293440.97	348755.31
TGP12-18	68303.46	61.24	69.52	81611.46	2253841.00	246102.50	291977.69
SRM614-6	72933.49	107.32	101.04	1010995.30	43704.48	6390.12	6928.00
SRM612-6	82331.46	2862.34	197.56	839256.69	52571.10	7238.72	8258.57
SRM610-6	143352.36	20522.36	499.32	465278.81	133426.19	17759.62	20158.51
AP1-6	71598.81	104.76	86.20	140131.70	63462.92	7691.96	10223.54
AP2-6	65675.45	257.00	175.32	109266.38	1328552.40	145472.17	172190.86
AP3-6	65638.93	1292.89	230.76	93885.37	3306386.80	368508.06	439105.56
AP4-6	64122.52	1189.61	155.60	75714.34	1468123.40	161814.27	192888.33
blank-6	74517.46	45.48	61.68	50060.12	41669.43	5423.95	5439.31
blank average	57159.12	66.76	59.92	107656.84	23438.01	3138.92	3519.30
blank subtraction							
SRM614-5	-18218.19	61.72	59.80	2942187.66	9418.29	2181.67	3237.78
SRM612-5	-4685.79	3407.42	85.32	1702420.06	165551.21	22371.31	26732.75
SRM610-5	74393.22	23492.01	238.32	658566.91	289504.46	36905.67	43970.13
AP1-5	-12724.48	64.36	48.88	108893.43	272448.02	33860.05	41398.31
AP2-5	-13199.52	226.00	78.08	60375.55	2097980.29	237634.00	283002.89
AP3-5	-10658.82	1390.85	151.40	28264.52	5065123.99	595908.89	713079.14
AP4-5	-11557.19	1342.49	119.56	-3483.10	1983001.09	220638.27	262902.33
TGP12-1	-9548.01	22.96	21.64	5249.56	434761.30	52258.31	61190.35
TGP12-2	-6845.40	34.44	11.64	-5815.03	442088.77	51944.19	62125.83
TGP12-3	-3972.58	20.20	21.44	-9956.53	418233.12	48870.54	58209.21
TGP12-4	-2251.14	6.48	27.36	4466.51	1798995.39	201109.52	239420.18
TGP12-5	-1481.77	18.76	26.48	83388.39	3771989.99	441554.89	526379.14
TGP12-6	-1191.89	8.92	47.20	104618.47	10253732.99	1272561.38	1519968.00
TGP12-7	-2995.98	3.64	50.04	143984.74	14886357.99	1945186.48	2309435.50
TGP12-8	-3983.35	2.80	52.52	90932.96	15115433.99	1976986.98	2348020.00
TGP12-9	-3600.58	3.44	50.00	75201.04	13968090.99	1803712.48	2145689.00
TGP12-10	-2053.37	6.44	29.04	15501.25	10252079.99	1272481.98	1517274.80
TGP12-11	-573.53	10.32	47.64	17699.71	10590105.99	1312609.38	1568293.60
TGP12-12	966.89	-4.20	44.28	9600.14	10495601.99	1304043.08	1555155.80
TGP12-13	4440.42	14.04	6.92	-38768.49	1223715.09	134360.53	157854.76
TGP12-14	5490.47	-1.56	10.20	-36280.00	1270878.89	140021.05	164293.12
TGP12-15	8087.32	-1.92	7.32	-39209.09	1273544.49	139594.13	164624.04
TGP12-16	8938.37	0.60	12.96	-12567.31	2737435.99	298359.02	355669.45
TGP12-17	9715.10	1.52	19.36	-16363.77	2662575.79	290302.05	345236.01
TGP12-18	11144.34	-5.52	9.60	-26045.38	2230402.99	242963.58	288458.39
SRM614-6	15774.37	40.56	41.12	903338.46	20266.47	3251.20	3408.70
SRM612-6	25172.34	2795.58	137.64	731599.85	29133.09	4099.80	4739.27
SRM610-6	86193.24	20455.59	439.40	357621.97	109988.18	14620.70	16639.21
AP1-6	14439.68	38.00	26.28	32474.86	40024.91	4553.05	6704.24
AP2-6	8516.33	190.24	115.40	1609.54	1305114.39	142333.25	168671.56
AP3-6	8479.81	1226.13	170.84	-13771.47	3282948.79	365369.14	435586.26
AP4-6	6963.40	1122.85	95.68	-31942.50	1444685.39	158675.35	189369.03
zero correction							
SRM614-5	0.00	61.72	59.80	2942187.66	9418.29	2181.67	3237.78

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	0.00	3407.42	85.32	1702420.06	165551.21	22371.31	26732.75
SRM610-5	74393.22	23492.01	238.32	658566.91	289504.46	36905.67	43970.13
AP1-5	0.00	64.36	48.88	108893.43	272448.02	33860.05	41398.31
AP2-5	0.00	226.00	78.08	60375.55	2097980.29	237634.00	283002.89
AP3-5	0.00	1390.85	151.40	28264.52	5065123.99	595908.89	713079.14
AP4-5	0.00	1342.49	119.56	0.00	1983001.09	220638.27	262902.33
TGP12-1	0.00	22.96	21.64	5249.56	434761.30	52258.31	61190.35
TGP12-2	0.00	34.44	11.64	0.00	442088.77	51944.19	62125.83
TGP12-3	0.00	20.20	21.44	0.00	418233.12	48870.54	58209.21
TGP12-4	0.00	6.48	27.36	4466.51	1798995.39	201109.52	239420.18
TGP12-5	0.00	18.76	26.48	83388.39	3771989.99	441554.89	526379.14
TGP12-6	0.00	8.92	47.20	104618.47	10253732.99	1272561.38	1519968.00
TGP12-7	0.00	3.64	50.04	143984.74	14886357.99	1945186.48	2309435.50
TGP12-8	0.00	2.80	52.52	90932.96	15115433.99	1976986.98	2348020.00
TGP12-9	0.00	3.44	50.00	75201.04	13968090.99	1803712.48	2145689.00
TGP12-10	0.00	6.44	29.04	15501.25	10252079.99	1272481.98	1517274.80
TGP12-11	0.00	10.32	47.64	17699.71	10590105.99	1312609.38	1568293.60
TGP12-12	966.89	0.00	44.28	9600.14	10495601.99	1304043.08	1555155.80
TGP12-13	4440.42	14.04	6.92	0.00	1223715.09	134360.53	157854.76
TGP12-14	5490.47	0.00	10.20	0.00	1270878.89	140021.05	164293.12
TGP12-15	8087.32	0.00	7.32	0.00	1273544.49	139594.13	164624.04
TGP12-16	8938.37	0.60	12.96	0.00	2737435.99	298359.02	355569.45
TGP12-17	9715.10	1.52	19.36	0.00	2662575.79	290302.05	345236.01
TGP12-18	11144.34	0.00	9.60	0.00	2230402.99	242963.58	288458.39
SRM614-6	15774.37	40.56	41.12	903338.46	20266.47	3251.20	3408.70
SRM612-6	25172.34	2795.58	137.64	731599.85	29133.09	4099.80	4739.27
SRM610-6	86193.24	20455.59	439.40	357621.97	109988.18	14620.70	16639.21
AP1-6	14439.68	38.00	26.28	32474.86	40024.91	4553.05	6704.24
AP2-6	8516.33	190.24	115.40	1609.54	1305114.39	142333.25	168671.56
AP3-6	8479.81	1226.13	170.84	0.00	3282948.79	365369.14	435586.26
AP4-6	6963.40	1122.85	95.68	0.00	1444685.39	158675.35	189369.03

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-5	0.000000	0.000016	0.000016	0.781760	0.002503	0.000580	0.000860
SRM612-5	0.000000	0.001061	0.000027	0.529894	0.051529	0.006963	0.008321
SRM610-5	0.052270	0.016506	0.000167	0.462724	0.203412	0.025931	0.030891
AP1-5	0.000000	0.000004	0.000003	0.006535	0.016350	0.002032	0.002484
AP2-5	0.000000	0.000012	0.000004	0.003236	0.112458	0.012738	0.015170
AP3-5	0.000000	0.000054	0.000006	0.001091	0.195438	0.022993	0.027514
AP4-5	0.000000	0.000083	0.000007	0.000000	0.122910	0.013676	0.016295
TGP12-1	0.000000	0.000005	0.000005	0.001230	0.101905	0.012249	0.014343
TGP12-2	0.000000	0.000009	0.000003	0.000000	0.109470	0.012862	0.015384
TGP12-3	0.000000	0.000006	0.000006	0.000000	0.116445	0.013607	0.016207
TGP12-4	0.000000	0.000001	0.000004	0.000717	0.288854	0.032291	0.038442
TGP12-5	0.000000	0.000002	0.000003	0.010324	0.466985	0.054666	0.065167
TGP12-6	0.000000	0.000001	0.000003	0.006659	0.652624	0.080995	0.096742
TGP12-7	0.000000	0.000000	0.000003	0.007488	0.774123	0.101154	0.120096
TGP12-8	0.000000	0.000000	0.000003	0.004798	0.797567	0.104316	0.123893
TGP12-9	0.000000	0.000000	0.000003	0.004055	0.753102	0.097249	0.115687
TGP12-10	0.000000	0.000000	0.000002	0.001111	0.734824	0.091206	0.108752
TGP12-11	0.000000	0.000001	0.000003	0.001256	0.751766	0.093179	0.111329
TGP12-12	0.000070	0.000000	0.000003	0.000693	0.757447	0.094110	0.112233
TGP12-13	0.000661	0.000002	0.000001	0.000000	0.182179	0.020003	0.023500
TGP12-14	0.000797	0.000000	0.000001	0.000000	0.184430	0.020320	0.023842
TGP12-15	0.001141	0.000000	0.000001	0.000000	0.179611	0.019687	0.023217
TGP12-16	0.000711	0.000000	0.000001	0.000000	0.217798	0.023738	0.028290
TGP12-17	0.000798	0.000000	0.000002	0.000000	0.218816	0.023858	0.028372
TGP12-18	0.001029	0.000000	0.000001	0.000000	0.205846	0.022423	0.026622
SRM614-6	0.006635	0.000017	0.000017	0.379935	0.008524	0.001367	0.001434
SRM612-6	0.012083	0.001342	0.000066	0.351169	0.013984	0.001968	0.002275

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.092919	0.022052	0.000474	0.385528	0.118571	0.015762	0.017938
AP1-6	0.001097	0.000003	0.000002	0.002468	0.003041	0.000346	0.000509
AP2-6	0.000578	0.000013	0.000008	0.000109	0.088569	0.009659	0.011447
AP3-6	0.000399	0.000058	0.000008	0.000000	0.154592	0.017205	0.020511
AP4-6	0.000514	0.000083	0.000007	0.000000	0.106729	0.011722	0.013990

standardize signal averages AP

AP1	0.000549	0.000003	0.000002	0.004501	0.009696	0.001189	0.001497
AP2	0.000289	0.000013	0.000006	0.001673	0.100514	0.011199	0.013308
AP3	0.000200	0.000056	0.000007	0.000545	0.175015	0.020099	0.024013
AP4	0.000257	0.000083	0.000007	0.000000	0.114819	0.012699	0.015143

linest from std sig ave

	0.009213	0.175541	3.912661	0.033118	0.009929	0.087285	0.073125
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standardize signal averages SRM

srm614-2	0.003317	0.000017	0.000017	0.580848	0.005513	0.000974	0.001147
srm612-2	0.006041	0.001201	0.000046	0.440531	0.032757	0.004466	0.005298
srm610-2	0.072595	0.019279	0.000321	0.424126	0.160992	0.020846	0.024416

linest from std sig ave

	0.077703	0.281926	12.843314	2.214692	0.033495	0.257974	0.220101
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concentration data

i.s. correction

SRM614-5	85763.00	0.00	0.25	5.33	2220.45	2.13	4.34	5.40
SRM612-5	85763.00	0.00	15.97	8.91	1505.07	43.88	52.13	52.18
SRM610-5	85763.00	41.30	248.50	56.19	1314.28	173.21	194.11	193.75
AP1-5	398936	0.00	0.27	4.58	86.34	64.76	70.76	72.48
AP2-5	398936	0.00	0.85	6.53	42.76	445.45	443.55	442.54
AP3-5	398936	0.00	3.76	9.12	14.41	774.14	800.65	802.65
AP4-5	398936	0.00	5.83	11.57	0.00	486.85	476.20	475.37
TGP12-1	398936	0.00	0.38	7.92	16.26	403.65	426.53	418.41
TGP12-2	398936	0.00	0.60	4.50	0.00	433.62	447.89	448.77
TGP12-3	398936	0.00	0.39	9.32	0.00	461.24	473.80	472.78
TGP12-4	398936	0.00	0.07	6.86	9.48	1144.16	1124.41	1121.45
TGP12-5	398936	0.00	0.16	5.12	136.40	1849.75	1903.54	1901.08
TGP12-6	398936	0.00	0.04	4.69	87.98	2585.07	2820.36	2822.18
TGP12-7	398936	0.00	0.01	4.06	98.93	3066.34	3522.31	3503.46
TGP12-8	398936	0.00	0.01	4.33	63.39	3159.20	3632.42	3614.25
TGP12-9	398936	0.00	0.01	4.21	53.57	2983.07	3386.33	3374.84
TGP12-10	398936	0.00	0.03	3.25	14.68	2910.67	3175.91	3172.52
TGP12-11	398936	0.00	0.05	5.28	16.60	2977.78	3244.61	3247.72
TGP12-12	398936	0.26	0.00	4.99	9.15	3000.28	3277.04	3274.07
TGP12-13	398936	2.43	0.15	1.61	0.00	721.62	696.52	685.56
TGP12-14	398936	2.93	0.00	2.31	0.00	730.53	707.56	695.53
TGP12-15	398936	4.19	0.00	1.61	0.00	711.45	685.54	677.30
TGP12-16	398936	2.61	0.00	1.61	0.00	862.71	826.60	825.28
TGP12-17	398936	2.93	0.01	2.48	0.00	866.74	830.75	827.68
TGP12-18	398936	3.78	0.00	1.38	0.00	815.37	780.81	776.63
SRM614-6	85763.00	5.24	0.26	5.80	1079.14	7.26	10.24	8.99
SRM612-6	85763.00	9.55	20.20	22.17	997.43	11.91	14.73	14.27
SRM610-6	85763.00	73.42	331.99	158.95	1095.02	100.97	117.99	112.49
AP1-6	398936	4.03	0.20	3.12	32.60	12.05	12.05	14.86
AP2-6	398936	2.12	0.90	12.22	1.44	350.83	336.35	333.92
AP3-6	398936	1.47	4.04	12.56	0.00	612.34	599.10	598.36
AP4-6	398936	1.89	5.81	11.03	0.00	422.76	408.19	408.12

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-1	64887.04	77.96	3430.30	949.85	2852.10	770.00	1278.61
SRM614-1	58913.45	162.60	25649.63	25025.54	42343.40	6845.52	8731.93
SRM612-1	68582.59	4118.82	30783.97	21054.04	64036.48	9337.81	11901.07
SRM610-1	142310.56	25957.39	41780.84	10882.46	170251.41	22549.97	27065.11
AP1-1	53050.26	151.20	8497.53	1248.49	120169.84	15134.89	20881.68
AP2-1	49230.76	420.76	16268.33	1128.41	2986894.50	331234.66	406280.03
AP3-1	50260.44	1497.29	16671.37	964.13	3968720.50	453277.00	554104.38
AP4-1	52693.46	2152.97	14691.16	793.88	3493809.80	397630.56	482983.88
TGP18-1	47698.99	113.80	4048.90	2109.69	2308589.00	254835.28	309213.66
TGP18-2	49007.68	100.48	3371.74	1857.57	2024859.80	221576.92	269921.56

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	50996.13	103.20	3399.74	1728.81	1813329.90	201314.81	243848.22
TGP18-4	48257.19	85.96	6042.99	4331.18	5471517.50	624756.06	766463.94
TGP18-5	48237.51	91.60	5811.99	4205.06	5244411.50	595297.13	731443.06
TGP18-6	49556.12	65.56	4441.59	2411.85	4726972.50	531953.19	650983.50
TGP18-7	51784.45	82.48	5157.63	2998.90	6518429.00	758416.31	926944.38
TGP18-8	53369.74	103.28	4888.35	3140.90	6579366.00	765429.69	935613.56
TGP18-9	53755.42	96.16	5210.27	3267.58	6660437.00	777955.31	949894.75
TGP18-10	53342.46	69.48	5110.19	4388.10	7989986.50	950762.50	1164089.10
TGP18-11	52449.54	95.56	5100.99	4825.95	8951538.00	1073982.60	1313662.60
TGP18-12	52225.17	103.16	5196.27	5153.83	8116047.50	956461.88	1170334.90
SRM614-2	69471.75	131.84	6519.36	14508.72	40375.31	5884.11	6561.72
SRM612-2	82712.31	3291.02	11865.95	18148.42	51646.21	7608.28	8905.85
SRM610-2	140744.27	21733.44	29054.92	9196.61	131911.39	17857.50	20484.32
AP1-2	69823.63	112.44	4135.54	664.48	66683.38	8239.05	11253.14
AP2-2	66465.02	297.44	9677.81	635.72	1696512.00	180158.89	219747.95
AP3-2	67265.14	1322.05	12744.55	596.32	3352043.80	36247.88	446148.44
AP4-2	68997.83	1927.13	11463.74	695.12	3143435.50	342693.00	416186.44
blank-2	67041.26	97.92	750.88	407.68	30529.05	4577.11	4375.02
blank ave	65964.15	87.94	2090.59	678.76	16690.57	2673.56	2826.82
blank subtraction							
SRM614-1	-7050.70	74.66	23559.03	24346.78	25652.82	4171.96	5905.11
SRM612-1	2618.44	4030.88	28693.38	20375.28	47345.91	6664.26	9074.25
SRM610-1	76346.41	25869.45	39690.24	10203.70	153560.84	19876.41	24238.30
AP1-1	-12913.89	63.26	6406.94	569.72	103479.27	12461.33	18054.86
AP2-1	-16733.39	332.82	14177.74	449.64	2970203.93	328561.10	403453.21
AP3-1	-15703.71	1409.35	14580.78	285.36	3952029.93	450603.44	551277.56
AP4-1	-13270.69	2065.03	12600.57	115.12	3477119.23	394957.00	480157.06
TGP18-1	-18265.16	25.86	1958.31	1430.93	2291898.43	252161.72	306386.84
TGP18-2	-16956.47	12.54	1281.15	1178.81	2008169.23	218903.36	267094.74
TGP18-3	-14968.03	15.26	1309.15	1050.05	1796639.33	198641.25	241021.40
TGP18-4	-17706.96	-1.98	3952.40	3652.42	5454826.93	622082.50	763637.12
TGP18-5	-17726.64	3.66	3721.40	3526.30	5227720.93	592623.57	728616.24
TGP18-6	-16408.03	-22.38	2350.99	1733.09	4710281.93	529279.63	648156.68
TGP18-7	-14179.70	-5.46	3067.04	2320.13	6501738.43	755742.75	924117.56
TGP18-8	-12594.41	15.34	2797.76	2462.13	6562675.43	762756.13	932786.74
TGP18-9	-12208.73	8.22	3119.68	2588.81	6643746.43	775281.75	947067.93
TGP18-10	-12621.69	-18.46	3019.60	3709.34	7973295.93	948088.94	1161262.28
TGP18-11	-13514.62	7.62	3010.40	4147.18	8934847.43	1071309.04	1310835.78
TGP18-12	-13738.98	15.22	3105.68	4475.07	8099356.93	953788.32	1167508.08
SRM614-2	3507.60	43.90	4428.76	13829.96	23684.74	3210.56	3734.90
SRM612-2	16748.15	3203.08	9775.36	17469.66	34955.64	4934.73	6079.03
SRM610-2	74780.12	21645.50	26964.33	8517.85	115220.82	15183.94	17657.50
AP1-2	3859.48	24.50	2044.95	-14.28	49992.80	5565.49	8426.33
AP2-2	500.87	209.50	7587.22	-43.04	1679821.43	177485.33	216921.13
AP3-2	1300.99	1234.11	10653.96	-82.44	3335353.23	363574.32	443321.62
AP4-2	3033.68	1839.19	9373.15	16.36	3126744.93	340019.44	413359.62
zero correction							
SRM614-1	0.00	74.66	23559.03	24346.78	25652.82	4171.96	5905.11
SRM612-1	2618.44	4030.88	28693.38	20375.28	47345.91	6664.26	9074.25
SRM610-1	76346.41	25869.45	39690.24	10203.70	153560.84	19876.41	24238.30
AP1-1	0.00	63.26	6406.94	569.72	103479.27	12461.33	18054.86
AP2-1	0.00	332.82	14177.74	449.64	2970203.93	328561.10	403453.21
AP3-1	0.00	1409.35	14580.78	285.36	3952029.93	450603.44	551277.56
AP4-1	0.00	2065.03	12600.57	115.12	3477119.23	394957.00	480157.06
TGP18-1	0.00	25.86	1958.31	1430.93	2291898.43	252161.72	306386.84
TGP18-2	0.00	12.54	1281.15	1178.81	2008169.23	218903.36	267094.74
TGP18-3	0.00	15.26	1309.15	1050.05	1796639.33	198641.25	241021.40
TGP18-4	0.00	0.00	3952.40	3652.42	5454826.93	622082.50	763637.12
TGP18-5	0.00	3.66	3721.40	3526.30	5227720.93	592623.57	728616.24
TGP18-6	0.00	0.00	2350.99	1733.09	4710281.93	529279.63	648156.68
TGP18-7	0.00	0.00	3067.04	2320.13	6501738.43	755742.75	924117.56
TGP18-8	0.00	15.34	2797.76	2462.13	6562675.43	762756.13	932786.74
TGP18-9	0.00	8.22	3119.68	2588.81	6643746.43	775281.75	947067.93
TGP18-10	0.00	0.00	3019.60	3709.34	7973295.93	948088.94	1161262.28
TGP18-11	0.00	7.62	3010.40	4147.18	8934847.43	1071309.04	1310835.78
TGP18-12	0.00	15.22	3105.68	4475.07	8099356.93	953788.32	1167508.08
SRM614-2	3507.60	43.90	4428.76	13829.96	23684.74	3210.56	3734.90
SRM612-2	16748.15	3203.08	9775.36	17469.66	34955.64	4934.73	6079.03
SRM610-2	74780.12	21645.50	26964.33	8517.85	115220.82	15183.94	17657.50
AP1-2	3859.48	24.50	2044.95	0.00	49992.80	5565.49	8426.33
AP2-2	500.87	209.50	7587.22	0.00	1679821.43	177485.33	216921.13
AP3-2	1300.99	1234.11	10653.96	0.00	3335353.23	363574.32	443321.62
AP4-2	3033.68	1839.19	9373.15	16.36	3126744.93	340019.44	413359.62
certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-1	0.000000	0.000019	0.005953	0.006152	0.006482	0.001054	0.001492
SRM612-1	0.000715	0.001101	0.007838	0.005565	0.012932	0.001820	0.002479
SRM610-1	0.053119	0.017999	0.027615	0.007099	0.106842	0.013829	0.016864
AP1-1	0.000000	0.000003	0.000292	0.000026	0.004712	0.000567	0.000822
AP2-1	0.000000	0.000014	0.000596	0.000019	0.124962	0.013823	0.016974
AP3-1	0.000000	0.000059	0.000610	0.000012	0.165262	0.018843	0.023053
AP4-1	0.000000	0.000093	0.000565	0.000005	0.156032	0.017723	0.021547
TGP18-1	0.000000	0.000001	0.000084	0.000061	0.098349	0.010821	0.013148
TGP18-2	0.000000	0.000001	0.000066	0.000060	0.103013	0.011229	0.013701
TGP18-3	0.000000	0.000001	0.000074	0.000059	0.100915	0.011157	0.013538
TGP18-4	0.000000	0.000000	0.000125	0.000116	0.172992	0.019728	0.024218
TGP18-5	0.000000	0.000000	0.000122	0.000115	0.170946	0.019379	0.023826
TGP18-6	0.000000	0.000000	0.000100	0.000074	0.201153	0.022603	0.027680
TGP18-7	0.000000	0.000000	0.000110	0.000083	0.233363	0.027125	0.033169
TGP18-8	0.000000	0.000001	0.000100	0.000088	0.234336	0.027236	0.033307
TGP18-9	0.000000	0.000000	0.000108	0.000090	0.230812	0.026934	0.032902
TGP18-10	0.000000	0.000000	0.000102	0.000125	0.268494	0.031926	0.039104
TGP18-11	0.000000	0.000000	0.000094	0.000129	0.278614	0.033406	0.040876
TGP18-12	0.000000	0.000000	0.000095	0.000137	0.247489	0.029144	0.035675
SRM614-2	0.001886	0.000024	0.002381	0.007435	0.012733	0.001726	0.002008
SRM612-2	0.006680	0.001277	0.003899	0.006967	0.013941	0.001968	0.002425
SRM610-2	0.069892	0.020231	0.025202	0.007961	0.107689	0.014191	0.016503
AP1-2	0.000245	0.000002	0.000130	0.000000	0.003170	0.000353	0.000534
AP2-2	0.000028	0.000012	0.000421	0.000000	0.093290	0.009857	0.012047
AP3-2	0.000069	0.000066	0.000567	0.000000	0.177392	0.019337	0.023578
AP4-2	0.000167	0.000101	0.000516	0.000001	0.172002	0.018704	0.022739

standardize signal averages AP							
AP1	0.000122	0.000002	0.000211	0.000013	0.003941	0.000460	0.000678
AP2	0.000014	0.000013	0.000509	0.000009	0.109126	0.011840	0.014510
AP3	0.000035	0.000062	0.000588	0.000006	0.171327	0.019090	0.023316
AP4	0.000083	0.000097	0.000541	0.000003	0.164017	0.018214	0.022143

linest from std sig ave							
	0.047449	0.152870	0.048182	5.856974	0.009108	0.082154	0.067344

standardize signal averages SRM							
srm614-2	0.000943	0.000021	0.004167	0.006794	0.009608	0.001390	0.001750
srm612-2	0.003697	0.001189	0.005868	0.006266	0.013437	0.001894	0.002452
srm610-2	0.061506	0.019115	0.026408	0.007530	0.107266	0.014010	0.016684

linest from std sig ave							
	0.000103	0.941565	1.067891	160.421027	0.993017	0.984421	1.009132

concentration data		i.s. correction						
SRM614-1	85763.00	0.00	0.25	24.60	3090.37	5.06	7.43	8.62
SRM612-1	85763.00	2.91	14.44	32.39	2795.59	10.10	12.83	14.32
SRM610-1	85763.00	216.16	235.98	114.11	3566.10	83.45	97.44	97.40
AP1-1	398936	0.00	0.18	5.61	60.61	17.12	18.60	22.09
AP2-1	398936	0.00	0.85	11.47	44.20	454.03	453.04	456.02
AP3-1	398936	0.00	3.59	11.72	27.88	600.46	617.56	619.33
AP4-1	398936	0.00	5.65	10.87	12.07	566.92	580.86	578.87
TGP18-1	398936	0.00	0.07	1.62	143.47	357.34	354.64	353.22
TGP18-2	398936	0.00	0.04	1.26	141.29	374.29	368.02	368.09
TGP18-3	398936	0.00	0.05	1.41	137.81	366.66	365.68	363.71
TGP18-4	398936	0.00	0.00	2.41	270.65	628.54	646.58	650.63
TGP18-5	398936	0.00	0.01	2.34	269.43	621.11	635.12	640.10
TGP18-6	398936	0.00	0.00	1.93	172.93	730.86	740.79	743.64
TGP18-7	398936	0.00	0.00	2.12	194.58	847.89	889.01	891.11
TGP18-8	398936	0.00	0.03	1.92	205.42	851.43	892.64	894.83
TGP18-9	398936	0.00	0.02	2.08	210.15	838.62	882.74	883.95

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	398936	0.00	0.00	1.95	291.86	975.54	1046.35	1050.58
TGP18-11	398936	0.00	0.01	1.80	302.17	1012.31	1094.86	1098.16
TGP18-12	398936	0.00	0.03	1.82	319.51	899.22	955.18	958.44
SRM614-2	398936	35.69	1.44	45.77	17372.56	46.26	56.57	53.94
SRM612-2	85763.00	27.18	16.75	16.11	3499.84	10.89	13.87	14.00
SRM610-2	85763.00	284.41	265.24	104.14	3998.95	84.12	99.99	95.32
AP1-2	85763.00	1.00	0.02	0.54	0.00	2.48	2.49	3.09
AP2-2	398936	0.53	0.71	8.10	0.00	338.96	323.05	323.65
AP3-2	398936	1.31	4.00	10.89	0.00	644.53	633.75	633.45
AP4-2	398936	3.16	6.17	9.91	2.10	624.95	613.02	610.90

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
blank-7b	173990	94	111	3126241	1819	538	255
SRM614-7b	182629	122	4864	42883284	33658	5770	3947
SRM612-7	181486	2290	9422	44527492	49613	7705	6222
SRM610-7	223755	16988	22533	34953940	113141	15209	16050
AP1-7	167647	146	4338	21507830	45661	5839	7548
AP2-7	156769	210	8890	18330424	1171366	129715	153791
AP3-7	150925	451	3165	15717253	501960	58593	70031
AP4-7	151356	671	4034	13709394	733183	84297	99675
MZ3-1	158137	94	1292	14915599	740935	84649	100054
MZ3-2	162154	78	1279	14156230	804747	90876	107332
MZ3-3	165173	98	1189	13170285	678789	77414	91473
MZ3-4	155384	93	3758	21793542	9277283	1126931	1352510
MZ3-5	150284	77	2894	18232010	7170124	861391	1032127
MZ3-6	150268	79	3557	19892658	9598280	1160958	1393608
MZ3-7	149736	98	3443	18615502	13885276	1765336	2111109
MZ3-8	150958	94	3323	18075668	14504869	1853324	2217575
MZ3-9	146387	100	3335	17558690	14541986	1861475	2230031
srm614-8	173187	128	2003	38026100	85725	11471	10345
srm612-8	182141	1669	5386	39447816	79559	10809	9680
srm610-8	216027	13311	16587	32290064	122468	15944	16967
AP1-8	169835	122	2668	14347574	59363	7341	8673
AP2-8	166393	156	5898	11961298	821098	91273	108133
AP3-8	165546	369	2593	10325689	524352	60829	71295
AP4-8	191023	631	2866	7884899	605124	69520	82305
blank-8	177228	73	380	9731421	26782	3519	3530
blank ave	175609	83	245	6428831	14301	2028	1892

blank subtraction

SRM614-7b	7019.75	38.64	4618.51	36454453.25	19356.93	3741.70	2054.49
SRM612-7	5876.47	2206.93	9177.29	38098661.25	35312.14	5676.67	4329.54
SRM610-7	48145.47	16904.74	22287.92	28525109.25	98840.10	13180.39	14158.00
AP1-7	-7961.92	62.48	4093.10	15078999.25	31360.36	3810.82	5655.71
AP2-7	-18840.19	127.16	8644.69	11901593.25	1157065.10	127686.56	151898.69
AP3-7	-24684.34	367.48	2919.62	9288422.25	487659.33	56564.08	68138.79
AP4-7	-24252.63	587.40	3788.54	7280563.25	718881.99	82268.70	97782.67
MZ3-1	-17471.70	10.28	1047.21	8486768.25	726633.80	82620.59	98161.63
MZ3-2	-13454.88	-4.88	1033.65	7727399.25	790445.80	88847.30	105439.91
MZ3-3	-10435.86	14.36	943.69	6741454.25	664488.11	75385.23	89580.66
MZ3-4	-20225.47	9.80	3512.38	15364711.25	9262982.30	1124902.61	1350617.63
MZ3-5	-25325.58	-6.24	2648.49	11803179.25	7155823.30	859362.64	1030234.13
MZ3-6	-25340.98	-3.80	3311.66	13463827.25	9583979.30	1158929.51	1391715.93
MZ3-7	-25872.75	14.68	3197.46	12186671.25	13870975.30	1763307.91	2109216.13
MZ3-8	-24651.42	10.32	3078.14	11646837.25	14490568.30	1851295.01	2215682.43
MZ3-9	-29222.61	16.60	3089.70	11129859.25	14527685.30	1859446.01	2228138.13
srm614-8	-2422.53	45.12	1757.37	31597269.25	71424.22	9442.13	8452.49
srm612-8	6531.48	1585.93	5140.95	33018985.25	65258.19	8780.61	7787.52
srm610-8	40417.95	13227.47	16341.45	25861233.25	108166.87	13915.12	15075.13
AP1-8	-5774.47	38.36	2423.33	7918743.25	45062.59	5312.91	6780.96
AP2-8	-9216.09	72.84	5652.51	5532467.25	806797.30	89244.74	106240.76
AP3-8	-10062.89	285.36	2347.53	3896858.25	510050.93	58800.61	69402.47
AP4-8	15414.08	547.52	2620.53	1456068.25	590823.30	67491.62	80412.17

zero correction

SRM614-7b	7019.75	38.64	4618.51	36454453.25	19356.93	3741.70	2054.49
SRM612-7	5876.47	2206.93	9177.29	38098661.25	35312.14	5676.67	4329.54
SRM610-7	48145.47	16904.74	22287.92	28525109.25	98840.10	13180.39	14158.00

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	0.00	62.48	4093.10	15078999.25	31360.36	3810.82	5655.71
AP2-7	0.00	127.16	8644.69	11901593.25	1157065.10	127686.56	151898.69
AP3-7	0.00	367.48	2919.62	9288422.25	487659.33	56564.08	68138.79
AP4-7	0.00	587.40	3788.54	7280563.25	718881.99	82268.70	97782.67
MZ3-1	0.00	10.28	1047.21	8486768.25	726633.80	82620.59	98161.63
MZ3-2	0.00	0.00	1033.65	7727399.25	790445.80	88847.30	105439.91
MZ3-3	0.00	14.36	943.69	6741454.25	664488.11	75385.23	89580.66
MZ3-4	0.00	9.80	3512.38	15364711.25	9262982.30	1124902.61	1350617.63
MZ3-5	0.00	0.00	2648.49	11803179.25	7155823.30	859362.64	1030234.13
MZ3-6	0.00	0.00	3311.66	13463827.25	9583979.30	1158929.51	1391715.93
MZ3-7	0.00	14.68	3197.46	12186671.25	13870975.30	1763307.91	2109216.13
MZ3-8	0.00	10.32	3078.14	11646837.25	14490568.30	1851295.01	2215682.43
MZ3-9	0.00	16.60	3089.70	11129859.25	14527685.30	1859446.01	2228138.13
srm614-8	0.00	45.12	1757.37	31597269.25	71424.22	9442.13	8452.49
srm612-8	6531.48	1585.93	5140.95	33018985.25	65258.19	8780.61	7787.52
srm610-8	40417.95	13227.47	16341.45	25861233.25	108166.87	13915.12	15075.13
AP1-8	0.00	38.36	2423.33	7918743.25	45062.59	5312.91	6780.96
AP2-8	0.00	72.84	5652.51	5532467.25	806797.30	89244.74	106240.76
AP3-8	0.00	285.36	2347.53	3896858.25	510050.93	58800.61	69402.47
AP4-8	15414.08	547.52	2620.53	1456068.25	590823.30	67491.62	80412.17

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-7b	0.004956	0.000027	0.003261	25.736250	0.013666	0.002642	0.001450
SRM612-7	0.003808	0.001430	0.005947	24.687744	0.022882	0.003678	0.002806
SRM610-7	0.067862	0.023828	0.031415	40.206648	0.139317	0.018578	0.019956
AP1-7	0.000000	0.000007	0.000452	1.665133	0.003463	0.000421	0.000625
AP2-7	0.000000	0.000015	0.001031	1.419318	0.137985	0.015227	0.018115
AP3-7	0.000000	0.000044	0.000349	1.111226	0.058341	0.006767	0.008152
AP4-7	0.000000	0.000075	0.000485	0.932012	0.092027	0.010532	0.012518
MZ3-1	0.000000	0.000002	0.000231	1.876030	0.160625	0.018264	0.021699
MZ3-2	0.000000	0.000000	0.000226	1.688666	0.172736	0.019416	0.023042
MZ3-3	0.000000	0.000003	0.000229	1.637109	0.161366	0.018307	0.021754
MZ3-4	0.000000	0.000001	0.000263	1.148899	0.692641	0.084115	0.100993
MZ3-5	0.000000	0.000000	0.000256	1.138674	0.690335	0.082904	0.099389
MZ3-6	0.000000	0.000000	0.000260	1.056115	0.751776	0.090908	0.109168
MZ3-7	0.000000	0.000001	0.000253	0.963029	1.096128	0.139342	0.166677
MZ3-8	0.000000	0.000001	0.000247	0.935397	1.163787	0.148684	0.177949
MZ3-9	0.000000	0.000001	0.000247	0.890277	1.162069	0.148737	0.178229
srm614-8	0.000000	0.000044	0.001731	31.122870	0.070352	0.009300	0.008326
srm612-8	0.005969	0.001449	0.004698	30.175274	0.059638	0.008024	0.007117
srm610-8	0.064846	0.021222	0.026218	41.491472	0.173542	0.022325	0.024186
AP1-8	0.000000	0.000005	0.000344	1.124492	0.006399	0.000754	0.000963
AP2-8	0.000000	0.000010	0.000801	0.783898	0.114316	0.012645	0.015053
AP3-8	0.000000	0.000037	0.000304	0.504321	0.066009	0.007610	0.008982
AP4-8	0.002187	0.000078	0.000372	0.206567	0.083818	0.009575	0.011408

standardize signal averages AP

AP1	0.000000	0.000006	0.000398	1.394812	0.004931	0.000588	0.000794
AP2	0.000000	0.000013	0.000916	1.101608	0.126150	0.013936	0.016584
AP3	0.000000	0.000040	0.000327	0.807773	0.062175	0.007188	0.008567
AP4	0.001093	0.000076	0.000428	0.569290	0.087922	0.010053	0.011963

linest from std sig ave

	0.009263	0.202402	0.036542	0.000050	0.013448	0.120622	0.101341
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standardize signal averages SRM

srm614-2	0.002478	0.000036	0.002496	28.429560	0.042009	0.005971	0.004888
srm612-2	0.004888	0.001440	0.005323	27.431509	0.041260	0.005851	0.004961
srm610-2	0.066354	0.022525	0.028817	40.849060	0.156429	0.020452	0.022071

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
		1.022765	1.057573	1.092622	0.944857	0.834421	0.854733	0.861507
concentration data i.s. correction								
SRM614-7b	85763.00	3.94	0.47	10.22	111.00	15.76	27.33	12.61
SRM612-7	85763.00	3.03	24.82	18.64	106.48	26.39	38.05	24.38
SRM610-7	85763.00	53.91	413.61	98.45	173.41	160.68	192.19	173.44
AP1-7	398936	0.00	0.56	6.59	33.41	18.58	20.25	25.25
AP2-7	398936	0.00	1.22	15.03	28.47	740.28	732.74	732.35
AP3-7	398936	0.00	3.55	5.09	22.29	313.00	325.64	329.57
AP4-7	398936	0.00	6.07	7.07	18.70	493.72	506.78	506.07
MZ3-1	398936	0.00	0.18	3.37	37.64	861.74	878.85	877.26
MZ3-2	398936	0.00	0.00	3.29	33.88	926.71	934.30	931.55
MZ3-3	398936	0.00	0.28	3.34	32.84	865.71	880.93	879.48
MZ3-4	398936	0.00	0.06	3.83	23.05	3715.95	4047.65	4083.00
MZ3-5	398936	0.00	0.00	3.72	22.84	3703.59	3989.40	4018.15
MZ3-6	398936	0.00	0.00	3.79	21.19	4033.21	4374.52	4413.50
MZ3-7	398936	0.00	0.09	3.68	19.32	5880.62	6705.21	6738.53
MZ3-8	398936	0.00	0.07	3.60	18.77	6243.61	7154.74	7194.25
MZ3-9	398936	0.00	0.11	3.60	17.86	6234.39	7157.30	7205.55
srm614-8	85763.00	0.00	0.77	5.42	134.23	81.14	96.21	72.36
srm612-8	85763.00	4.74	25.16	14.72	130.14	68.78	83.01	61.85
srm610-8	85763.00	51.52	368.38	82.17	178.95	200.15	230.95	210.21
AP1-8	398936	0.00	0.44	5.02	22.56	34.33	36.30	38.93
AP2-8	398936	0.00	0.83	11.68	15.73	613.29	608.49	608.59
AP3-8	398936	0.00	2.98	4.43	10.12	354.13	366.19	363.13
AP4-8	398936	8.08	6.27	5.42	4.14	449.68	460.74	461.20
certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16
raw data								
		Li	Be	B	Na	Mg24	Mg25	Mg26
blank-5		93309.41	106.96	3688.90	1539127.30	7276.24	1319.97	1542.33
SRM614-5		80931.58	226.04	14304.48	58224392.00	72277.37	11542.55	8085.37
SRM612-5		100110.84	5425.59	18743.67	55123848.00	91176.47	13928.92	11404.74
SRM610-5		180583.63	27948.28	38252.78	39818724.00	163382.56	21145.16	22227.69
AP1-5		89338.22	173.04	5874.55	19682094.00	88495.50	11246.38	14995.96
AP2-5		87759.73	445.92	19553.79	15910031.00	3179982.30	346400.75	414955.38
AP3-5		85542.48	1455.65	11936.23	11914770.00	3264837.30	357060.78	427126.00
AP4-5		93429.84	2894.66	15438.29	9563272.00	5012066.50	562723.63	676178.94
V1-1		93839.29	102.76	2573.73	13590677.00	4496051.00	604979.69	718046.88
V1-2		95461.98	91.32	3022.02	14480104.00	5879077.00	782969.38	932285.19
V1-3		100073.96	97.96	2281.17	12252485.00	3659852.30	452480.63	537705.50
V1-4		102905.54	96.28	2530.89	11934411.00	1879193.30	207838.73	247827.03
V1-5		106285.27	74.68	2296.09	11787633.00	1888603.00	205318.47	244501.45
V1-6		107732.37	92.36	2109.65	11189734.00	1723905.40	186357.28	221619.45
V1-7		111875.47	81.32	2012.53	10707756.00	1516264.30	165220.89	197039.78
V1-8		112979.68	113.72	1993.13	10860681.00	1585444.10	172273.56	204195.95
V1-9		112333.67	126.88	2635.62	12463201.00	2060993.00	220690.44	264145.84
V1-10		115984.77	86.80	1622.01	8638836.00	1015636.30	112951.76	133952.11
V1-11		118520.30	76.24	1593.77	8997995.00	1092522.50	121303.80	143506.69
V1-12		120798.32	107.72	1529.81	8932972.00	1080100.50	121002.20	142694.28
V1-13		124057.41	81.40	2044.85	9123331.00	1350207.10	151709.13	180337.86
V1-14		126084.31	83.48	1480.05	8758357.00	1116471.90	123833.62	146449.47
V1-15		125886.91	83.80	1748.65	9237608.00	1330192.80	147971.75	175175.83
SRM614-6		139939.47	119.32	2601.61	38309596.00	40508.67	6200.67	4916.79
SRM612-6		149077.31	3371.02	9258.05	47464636.00	70768.84	10674.78	8832.69
SRM610-6		225507.34	25046.90	35328.80	39099156.00	164331.25	21086.56	22084.81
AP1-6		124217.54	132.96	2602.53	14102590.00	46573.78	5726.07	7421.32
AP2-6		113449.44	280.68	10569.94	10793482.00	1694457.60	180301.22	215895.73
AP3-6		107080.36	1072.29	9182.01	8249874.00	2275690.30	243837.02	294368.63
AP4-6		113106.12	1735.49	9186.01	7072715.00	2880583.80	312491.63	376113.53
blank-6		136929.61	83.96	554.92	4376198.50	24052.26	3318.90	3330.18
blank average		115119.51	95.46	2121.91	2957662.90	15664.25	2319.43	2436.25
blank subtraction								
SRM614-5		-34187.93	130.58	12182.57	55266729.10	56613.12	9223.11	5649.11
SRM612-5		-15008.67	5330.13	16621.75	52166185.10	7512.22	11609.49	8968.49
SRM610-5		65464.12	27852.82	36130.87	36861061.10	147718.31	18825.73	19791.43
AP1-5		-25781.29	77.58	3752.64	16724431.10	72831.25	8926.95	12559.71
AP2-5		-27359.77	350.46	17431.88	12952368.10	3164318.05	344081.32	412519.13

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	-29577.02	1360.19	9814.32	8957107.10	3249173.05	354741.35	424689.75
AP4-5	-21689.66	2799.20	13316.38	6605609.10	4996402.25	560404.20	673742.69
V1-1	-21280.22	7.30	451.82	10633014.10	4480386.75	602660.26	715610.63
V1-2	-19657.53	-4.14	900.11	11522441.10	5863412.75	780649.95	929848.94
V1-3	-15045.55	2.50	159.26	9294822.10	3644188.05	450161.20	535269.25
V1-4	-12213.97	0.82	408.98	8976748.10	1863529.05	205519.30	245390.78
V1-5	-8834.24	-20.78	174.18	8829970.10	1872938.75	202999.04	242065.20
V1-6	-7387.14	-3.10	-12.26	8232071.10	1708241.15	184037.85	219183.20
V1-7	-3244.04	-14.14	-109.38	7750093.10	1500600.05	162901.46	194603.53
V1-8	-2139.83	18.26	-128.78	7903018.10	1569779.85	169954.13	201759.70
V1-9	-2785.84	31.42	513.70	9505538.10	2045328.75	218371.01	261709.59
V1-10	865.26	-8.66	-499.90	5681173.10	999972.05	110632.33	131515.86
V1-11	3400.79	-19.22	-528.14	6040332.10	1076858.25	118984.37	141070.44
V1-12	5678.81	12.26	-592.10	5975309.10	1064436.25	118682.77	140258.03
V1-13	8937.90	-14.06	-77.06	6165668.10	1334542.85	149389.70	177901.61
V1-14	10964.80	-11.98	-641.86	5800694.10	1100807.65	121514.19	144013.22
V1-15	10767.40	-11.66	-373.26	6279945.10	1314528.55	145652.32	172739.58
SRM614-6	24819.96	23.86	479.70	35351933.10	24844.42	3881.24	2480.53
SRM612-6	33957.80	3275.56	7136.14	44506973.10	55104.59	8355.35	6396.44
SRM610-6	110387.83	24951.44	33206.89	36141493.10	148667.00	18767.13	19648.55
AP1-6	9098.03	37.50	480.62	11144927.10	30909.53	3406.64	4985.07
AP2-6	-1670.07	185.22	8448.03	7835819.10	1678793.35	177981.79	213459.48
AP3-6	-8039.15	976.83	7060.10	5292211.10	2260026.05	241517.59	291932.38
AP4-6	-2013.39	1640.03	7064.10	4115052.10	2864919.55	310172.20	373677.28

zero correction

SRM614-5	0.00	130.58	12182.57	55266729.10	56613.12	9223.11	5649.11
SRM612-5	0.00	5330.13	16621.75	52166185.10	75512.22	11609.49	8968.49
SRM610-5	65464.12	27852.82	36130.87	36861061.10	147718.31	18825.73	19791.43
AP1-5	0.00	77.58	3752.64	16724431.10	72831.25	8926.95	12559.71
AP2-5	0.00	350.46	17431.88	12952368.10	3164318.05	344081.32	412519.13
AP3-5	0.00	1360.19	9814.32	8957107.10	3249173.05	354741.35	424689.75
AP4-5	0.00	2799.20	13316.38	6605609.10	4996402.25	560404.20	673742.69
V1-1	0.00	7.30	451.82	10633014.10	4480386.75	602660.26	715610.63
V1-2	0.00	0.00	900.11	11522441.10	5863412.75	780649.95	929848.94
V1-3	0.00	2.50	159.26	9294822.10	3644188.05	450161.20	535269.25
V1-4	0.00	0.82	408.98	8976748.10	1863529.05	205519.30	245390.78
V1-5	0.00	0.00	174.18	8829970.10	1872938.75	202999.04	242065.20
V1-6	0.00	0.00	0.00	8232071.10	1708241.15	184037.85	219183.20
V1-7	0.00	0.00	0.00	7750093.10	1500600.05	162901.46	194603.53
V1-8	0.00	18.26	0.00	7903018.10	1569779.85	169954.13	201759.70
V1-9	0.00	31.42	513.70	9505538.10	2045328.75	218371.01	261709.59
V1-10	865.26	0.00	0.00	5681173.10	999972.05	110632.33	131515.86
V1-11	3400.79	0.00	0.00	6040332.10	1076858.25	118984.37	141070.44
V1-12	5678.81	12.26	0.00	5975309.10	1064436.25	118682.77	140258.03
V1-13	8937.90	0.00	0.00	6165668.10	1334542.85	149389.70	177901.61
V1-14	10964.80	0.00	0.00	5800694.10	1100807.65	121514.19	144013.22
V1-15	10767.40	0.00	0.00	6279945.10	1314528.55	145652.32	172739.58
SRM614-6	24819.96	23.86	479.70	35351933.10	24844.42	3881.24	2480.53
SRM612-6	33957.80	3275.56	7136.14	44506973.10	55104.59	8355.35	6396.44
SRM610-6	110387.83	24951.44	33206.89	36141493.10	148667.00	18767.13	19648.55
AP1-6	9098.03	37.50	480.62	11144927.10	30909.53	3406.64	4985.07
AP2-6	0.00	185.22	8448.03	7835819.10	1678793.35	177981.79	213459.48
AP3-6	0.00	976.83	7060.10	5292211.10	2260026.05	241517.59	291932.38
AP4-6	0.00	1640.03	7064.10	4115052.10	2864919.55	310172.20	373677.28

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration

SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal

SRM614-5	0.000000	0.000033	0.003067	13.912981	0.014252	0.002322	0.001422
SRM612-5	0.000000	0.001524	0.004753	14.916192	0.021592	0.003320	0.002564
SRM610-5	0.060188	0.025608	0.033219	33.890308	0.135813	0.017309	0.018196

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000000	0.000005	0.000241	1.075107	0.004682	0.000574	0.000807
AP2-5	0.000000	0.000016	0.000793	0.589121	0.143925	0.015650	0.018763
AP3-5	0.000000	0.000070	0.000507	0.462315	0.167704	0.018310	0.021920
AP4-5	0.000000	0.000143	0.000680	0.337158	0.255023	0.028604	0.034389
V1-1	0.000000	0.000001	0.000049	1.143653	0.481896	0.064820	0.076969
V1-2	0.000000	0.000000	0.000080	1.021641	0.519882	0.069217	0.082445
V1-3	0.000000	0.000000	0.000019	1.095181	0.429384	0.053041	0.063069
V1-4	0.000000	0.000000	0.000046	1.001079	0.207819	0.022919	0.027366
V1-5	0.000000	0.000000	0.000018	0.915574	0.194204	0.021049	0.025100
V1-6	0.000000	0.000000	0.000000	0.936109	0.194253	0.020928	0.024924
V1-7	0.000000	0.000000	0.000000	0.913390	0.176854	0.019199	0.022935
V1-8	0.000000	0.000002	0.000000	0.904334	0.179628	0.019448	0.023087
V1-9	0.000000	0.000003	0.000045	0.839714	0.180683	0.019291	0.023119
V1-10	0.000127	0.000000	0.000000	0.832247	0.146488	0.016207	0.019266
V1-11	0.000474	0.000000	0.000000	0.841384	0.150000	0.016574	0.019650
V1-12	0.000854	0.000002	0.000000	0.898858	0.160122	0.017853	0.021099
V1-13	0.001426	0.000000	0.000000	0.983713	0.212922	0.023835	0.028384
V1-14	0.001854	0.000000	0.000000	0.980817	0.186131	0.020546	0.024351
V1-15	0.001661	0.000000	0.000000	0.969004	0.202833	0.022474	0.026654
SRM614-6	0.021500	0.000021	0.000416	30.623558	0.021521	0.003362	0.002149
SRM612-6	0.014917	0.001439	0.003135	19.550905	0.024206	0.003670	0.002810
SRM610-6	0.100207	0.022650	0.030144	32.808349	0.134956	0.017036	0.017836
AP1-6	0.000882	0.000004	0.000047	1.080131	0.002996	0.000330	0.000483
AP2-6	0.000000	0.000011	0.000504	0.467510	0.100162	0.010619	0.012736
AP3-6	0.000000	0.000055	0.000397	0.297332	0.126975	0.013569	0.016402
AP4-6	0.000000	0.000120	0.000519	0.302341	0.210491	0.022789	0.027455

standardize signal averages AP

AP1	0.000441	0.000004	0.000144	1.077619	0.003839	0.000452	0.000645
AP2	0.000000	0.000013	0.000648	0.528316	0.122044	0.013135	0.015749
AP3	0.000000	0.000063	0.000452	0.379824	0.147340	0.015939	0.019161
AP4	0.000000	0.000132	0.000599	0.319750	0.232757	0.025696	0.030922

linest from std sig ave

0.000330	0.120791	0.047088	0.000105	0.007883	0.071935	0.059818
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standardize signal averages SRM

srm614-2	0.010750	0.000027	0.001741	22.268269	0.017887	0.002842	0.001785
srm612-2	0.007458	0.001481	0.003944	17.233549	0.022899	0.003495	0.002687
srm610-2	0.080198	0.024129	0.031682	33.349328	0.135385	0.017172	0.018016

linest from std sig ave

0.069209	0.225264	0.130346	0.041677	0.039736	0.308975	0.301012
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concentration data

i.s. correction

SRM614-5	85763.00	0.00	0.34	12.39	125.12	9.64	14.32	7.30
SRM612-5	85763.00	0.00	15.79	19.19	134.14	14.60	20.48	13.16
SRM610-5	85763.00	1.70	265.28	134.15	304.78	91.82	106.78	93.35
AP1-5	398936	0.00	0.24	4.53	44.97	14.72	16.47	19.27
AP2-5	398936	0.00	0.77	14.89	24.64	452.63	449.12	447.75
AP3-5	398936	0.00	3.38	9.52	19.34	527.41	525.44	523.09
AP4-5	398936	0.00	6.88	12.77	14.10	802.02	820.85	820.64
V1-1	398936	0.00	0.04	0.91	47.84	1515.52	1860.16	1836.76
V1-2	398936	0.00	0.00	1.50	42.74	1634.98	1986.33	1967.45
V1-3	398936	0.00	0.01	0.35	45.81	1350.37	1522.14	1505.06
V1-4	398936	0.00	0.00	0.86	41.88	653.57	657.72	653.05
V1-5	398936	0.00	0.00	0.34	38.30	610.75	604.04	598.97
V1-6	398936	0.00	0.00	0.00	39.16	610.91	600.57	594.79
V1-7	398936	0.00	0.00	0.00	38.21	556.19	550.95	547.31
V1-8	398936	0.00	0.10	0.00	37.83	564.91	558.10	550.94
V1-9	398936	0.00	0.13	0.85	35.13	568.23	553.59	551.71
V1-10	398936	0.02	0.00	0.00	34.81	460.69	465.09	459.76
V1-11	398936	0.06	0.00	0.00	35.20	471.74	475.62	468.93
V1-12	398936	0.11	0.09	0.00	37.60	503.57	512.34	503.50
V1-13	398936	0.19	0.00	0.00	41.15	669.62	683.99	677.34
V1-14	398936	0.24	0.00	0.00	41.03	585.36	589.63	581.10
V1-15	398936	0.22	0.00	0.00	40.54	637.89	644.95	636.06
SRM614-6	85763.00	0.61	0.21	1.68	275.40	14.55	20.74	11.02
SRM612-6	85763.00	0.42	14.91	12.66	175.82	16.37	22.64	14.41
SRM610-6	85763.00	2.84	234.64	121.74	295.05	91.24	105.10	91.50
AP1-6	398936	0.12	0.18	0.88	45.18	9.42	9.47	11.53
AP2-6	398936	0.00	0.53	9.47	19.56	315.00	304.74	303.92
AP3-6	398936	0.00	2.64	7.45	12.44	399.32	389.40	391.40
AP4-6	398936	0.00	5.81	9.75	12.65	661.97	653.98	655.17

certified concentration

SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

	Li	Be	B	Na	Mg24	Mg25	Mg26
raw data							
blank-3	98530.03	71.92	1736.21	2379819.80	4099.70	775.28	756.28
SRM614-3	88227.18	178.52	14432.44	50816340.00	59605.54	9532.21	7305.84
SRM612-3	96956.15	3863.10	21082.68	49229044.00	74802.70	11358.14	9564.89
SRM610-3	159401.97	22869.25	33407.15	38183652.00	158416.58	20305.59	21930.40
AP1-3	75388.46	121.88	7756.80	17308382.00	118947.67	14373.56	19674.99
AP2-3	70272.99	360.92	13044.71	12611587.00	2832883.50	304657.34	365038.91
AP3-3	68827.51	1259.89	13411.08	9493117.00	2679409.00	290384.47	347415.63
AP4-3	70240.71	2061.69	10160.54	7688305.50	2922157.80	317423.31	381300.75
V3-1	76819.15	87.36	1741.89	10123457.00	948775.56	105835.95	125406.19
V3-2	80350.49	108.20	1927.65	10223191.00	1009322.10	110737.27	130724.09
V3-3	83117.35	81.16	2059.33	10423322.00	1230210.40	134096.36	160227.27
V3-4	86952.33	97.64	2577.61	12288723.00	2981477.50	345045.53	414652.00
V3-5	88190.26	80.36	2255.57	11979867.00	3061108.80	357652.00	426656.91
V3-6	86681.20	68.24	2859.54	14015602.00	4319845.50	504869.94	604096.75
V3-7	81827.86	95.08	3658.06	22021232.00	13056087.00	1640211.10	1967701.00
V3-8	77770.36	85.20	3930.70	23082102.00	15304700.00	1992242.50	2382830.30
V3-9	76368.83	102.52	4300.78	23835810.00	17705588.00	2481175.80	2959058.30
SRM614-4	90935.23	139.84	5244.27	43300696.00	90280.55	12412.95	10794.18
SRM612-4	103982.34	2720.46	9951.62	43485336.00	90745.51	12624.19	11199.06
SRM610-4	163730.75	18926.71	27547.40	36192344.00	161337.34	20757.44	21520.64
AP1-4	86903.21	117.40	4437.83	11673168.00	84381.67	10221.78	13609.20
AP2-4	84594.44	278.64	7899.80	8794952.00	1469140.10	155734.91	187491.02
AP3-4	83648.63	1111.05	10222.54	7386066.00	2235240.00	238965.31	286345.00
AP4-4	85128.16	1490.09	7189.44	6303615.00	1943252.60	207575.45	248677.92
blank-4	85460.28	58.24	537.88	4568268.50	79741.97	10217.06	10083.86
blank average	91995.16	65.08	1137.05	3474044.15	41920.84	5496.17	5420.07

blank subtraction							
SRM614-3	-3767.98	113.44	13295.39	47342295.85	17684.70	4036.04	1885.77
SRM612-3	4960.99	3798.02	19945.63	45754999.85	32881.87	5861.97	4144.82
SRM610-3	67406.81	22804.17	32270.10	34709607.85	116495.74	14809.42	16510.33
AP1-3	-16606.70	56.80	6619.76	13834337.85	77026.83	8877.39	14254.92
AP2-3	-21722.16	295.84	11907.67	9137542.85	2790962.66	299161.17	359618.84
AP3-3	-23167.65	1194.81	12274.03	6019072.85	2637488.16	284888.30	341995.56
AP4-3	-21754.45	1996.61	9023.49	4214261.35	2880236.96	311927.14	375880.68
V3-1	-15176.01	22.28	604.84	6649412.85	906854.72	100339.78	119986.12
V3-2	-11644.66	43.12	790.60	6749146.85	967401.26	105241.10	125304.02
V3-3	-8877.80	16.08	922.29	6949277.85	1188289.56	128600.19	154807.20
V3-4	-5042.83	32.56	1440.57	8814678.85	2939556.66	339549.36	409231.93
V3-5	-3804.90	15.28	1118.53	8505822.85	3019187.96	352155.83	421236.84
V3-6	-5313.95	3.16	1722.49	10541557.85	4277924.66	499373.77	598676.68
V3-7	-10167.30	30.00	2521.01	18547187.85	13014166.16	1634714.93	1962280.93
V3-8	-14224.80	20.12	2793.66	19608057.85	15262779.16	1986746.33	2377410.23
V3-9	-15626.33	37.44	3163.74	20361765.85	17663667.16	2475679.63	2953638.23
SRM614-4	-1059.92	74.76	4107.22	39826651.85	48359.71	6916.78	5374.11
SRM612-4	11987.18	2655.37	8814.57	40011291.85	48824.67	7128.02	5778.99
SRM610-4	71735.59	18861.63	26410.35	32718299.85	119416.50	15261.26	16100.57
AP1-4	-5091.95	52.32	3300.78	8199123.85	42460.84	4725.61	8189.13
AP2-4	-7400.72	213.56	6762.76	5320907.85	1427219.26	150238.74	182070.95
AP3-4	-8346.52	1045.97	9085.49	3912021.85	2193319.16	233469.14	280924.93
AP4-4	-6867.00	1425.01	6052.39	2829570.85	1901331.76	202079.28	243257.85

zero correction							
SRM614-3	0.00	113.44	13295.39	47342295.85	17684.70	4036.04	1885.77
SRM612-3	4960.99	3798.02	19945.63	45754999.85	32881.87	5861.97	4144.82
SRM610-3	67406.81	22804.17	32270.10	34709607.85	116495.74	14809.42	16510.33
AP1-3	0.00	56.80	6619.76	13834337.85	77026.83	8877.39	14254.92
AP2-3	0.00	295.84	11907.67	9137542.85	2790962.66	299161.17	359618.84
AP3-3	0.00	1194.81	12274.03	6019072.85	2637488.16	284888.30	341995.56
AP4-3	0.00	1996.61	9023.49	4214261.35	2880236.96	311927.14	375880.68
V3-1	0.00	22.28	604.84	6649412.85	906854.72	100339.78	119986.12
V3-2	0.00	43.12	790.60	6749146.85	967401.26	105241.10	125304.02
V3-3	0.00	16.08	922.29	6949277.85	1188289.56	128600.19	154807.20
V3-4	0.00	32.56	1440.57	8814678.85	2939556.66	339549.36	409231.93
V3-5	0.00	15.28	1118.53	8505822.85	3019187.96	352155.83	421236.84
V3-6	0.00	3.16	1722.49	10541557.85	4277924.66	499373.77	598676.68
V3-7	0.00	30.00	2521.01	18547187.85	13014166.16	1634714.93	1962280.93
V3-8	0.00	20.12	2793.66	19608057.85	15262779.16	1986746.33	2377410.23
V3-9	0.00	37.44	3163.74	20361765.85	17663667.16	2475679.63	2953638.23
SRM614-4	0.00	74.76	4107.22	39826651.85	48359.71	6916.78	5374.11

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	11987.18	2655.37	8814.57	40011291.85	48824.67	7128.02	5778.99
SRM610-4	71735.59	18861.63	26410.35	32718299.85	119416.50	15261.26	16100.57
AP1-4	0.00	52.32	3300.78	8199123.85	42460.84	4725.61	8189.13
AP2-4	0.00	213.56	6762.76	5320907.85	1427219.26	150238.74	182070.95
AP3-4	0.00	1045.97	9085.49	3912021.85	2193319.16	233469.14	280924.93
AP4-4	0.00	1425.01	6052.39	2829570.85	1901331.76	202079.28	243257.85

certified concentration							
SRM614	1.70	0.74		93469.00	32.00	32.00	32.00
SRM612	41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610	484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1	0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2	0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3	2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4	4.04	6.11	10.77	19.04	651.16	651.16	651.16

standardized concentration							
SRM614	0.000020	0.000009	0.000000	1.089852	0.000373	0.000373	0.000373
SRM612	0.000484	0.000440	0.000405	1.089852	0.000903	0.000903	0.000903
SRM610	0.005650	0.005429	0.004156	1.089852	0.005425	0.005425	0.005425
STD AP1	0.000000	0.000000	0.000000	0.000033	0.000084	0.000084	0.000084
STD AP2	0.000002	0.000003	0.000029	0.000055	0.001136	0.001136	0.001136
STD AP3	0.000006	0.000009	0.000027	0.000049	0.001336	0.001336	0.001336
STD AP4	0.000010	0.000015	0.000027	0.000048	0.001632	0.001632	0.001632

standardized signal							
SRM614-3	0.000000	0.000041	0.004853	17.281888	0.006456	0.001473	0.000688
SRM612-3	0.001885	0.001443	0.007579	17.385639	0.012494	0.002227	0.001575
SRM610-3	0.068656	0.023227	0.032868	35.352856	0.118655	0.015084	0.016816
AP1-3	0.000000	0.000002	0.000282	0.589729	0.003283	0.000378	0.000608
AP2-3	0.000000	0.000016	0.000652	0.500205	0.152782	0.016377	0.019686
AP3-3	0.000000	0.000055	0.000567	0.277929	0.121785	0.013155	0.015792
AP4-3	0.000000	0.000107	0.000484	0.226227	0.154615	0.016745	0.020178
V3-1	0.000000	0.000004	0.000099	1.087031	0.148251	0.016403	0.019615
V3-2	0.000000	0.000006	0.000111	0.950555	0.136250	0.014822	0.017648
V3-3	0.000000	0.000002	0.000115	0.870139	0.148789	0.016102	0.019384
V3-4	0.000000	0.000003	0.000153	0.935345	0.311923	0.036030	0.043424
V3-5	0.000000	0.000002	0.000123	0.937969	0.332937	0.038834	0.046451
V3-6	0.000000	0.000000	0.000144	0.883225	0.358426	0.041840	0.050160
V3-7	0.000000	0.000001	0.000114	0.842146	0.590916	0.074225	0.089099
V3-8	0.000000	0.000001	0.000118	0.825129	0.642275	0.083605	0.100044
V3-9	0.000000	0.000001	0.000126	0.813757	0.705927	0.098940	0.118042
SRM614-4	0.000000	0.000040	0.002177	21.112380	0.025636	0.003667	0.002849
SRM612-4	0.006154	0.001363	0.004525	20.541669	0.025066	0.003660	0.002967
SRM610-4	0.085717	0.022538	0.031558	39.095046	0.142691	0.018236	0.019239
AP1-4	0.000000	0.000003	0.000180	0.447747	0.002319	0.000258	0.000447
AP2-4	0.000000	0.000016	0.000504	0.396334	0.106308	0.011191	0.013562
AP3-4	0.000000	0.000056	0.000487	0.209867	0.117665	0.012525	0.015071
AP4-4	0.000000	0.000090	0.000380	0.177761	0.119447	0.012695	0.015282

standardize signal averages AP							
AP1	0.000000	0.000003	0.000231	0.518738	0.002801	0.000318	0.000527
AP2	0.000000	0.000016	0.000578	0.448270	0.129545	0.013784	0.016624
AP3	0.000000	0.000056	0.000527	0.243898	0.119725	0.012840	0.015431
AP4	0.000000	0.000098	0.000432	0.201994	0.137031	0.014720	0.017730

linest from std sig ave							
	0.000000	0.155720	0.050213	0.000124	0.010642	0.099482	0.082602

standardize signal averages SRM							
srm614-2	0.000000	0.000041	0.003515	19.197134	0.016046	0.002570	0.001769
srm612-2	0.004020	0.001403	0.006052	18.963654	0.018780	0.002943	0.002271
srm610-2	0.077186	0.022882	0.032213	37.223951	0.130673	0.016660	0.018027

linest from std sig ave							
	0.073333	0.237540	0.125445	0.038868	0.041384	0.321030	0.301605

concentration data i.s. correction							
SRM614-3	85763.00	0.00	0.55	20.90	183.17	5.89	12.57
SRM612-3	85763.00	0.00	19.27	32.64	184.27	11.40	19.00
SRM610-3	85763.00	0.00	310.19	141.54	374.70	108.29	128.69
AP1-3	398936	0.00	0.15	5.65	29.07	13.94	15.02
AP2-3	398936	0.00	1.01	13.06	24.66	648.61	649.94
AP3-3	398936	0.00	3.43	11.35	13.70	517.02	522.07
AP4-3	398936	0.00	6.66	9.70	11.15	656.39	664.54
V3-1	398936	0.00	0.23	1.98	53.59	629.37	651.00
V3-2	398936	0.00	0.38	2.23	46.86	578.42	588.25
V3-3	398936	0.00	0.13	2.31	42.90	631.66	639.06

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	398936	0.00	0.21	3.06	46.11	1324.21	1429.94	1430.97
V3-5	398936	0.00	0.10	2.47	46.24	1413.42	1541.19	1530.71
V3-6	398936	0.00	0.02	2.89	43.54	1521.63	1660.51	1652.93
V3-7	398936	0.00	0.08	2.29	41.52	2508.62	2945.78	2936.07
V3-8	398936	0.00	0.05	2.35	40.68	2726.66	3318.01	3296.76
V3-9	398936	0.00	0.09	2.53	40.12	2996.88	3926.65	3889.84
SRM614-4	85763.00	0.00	0.53	9.38	223.77	23.40	31.28	20.18
SRM612-4	85763.00	0.00	18.21	19.49	217.72	22.88	31.22	21.02
SRM610-4	85763.00	0.00	300.99	135.90	414.37	130.23	155.58	136.29
AP1-4	398936	0.00	0.18	3.61	22.07	9.84	10.24	14.74
AP2-4	398936	0.00	0.99	10.09	19.54	451.31	444.13	446.90
AP3-4	398936	0.00	3.49	9.76	10.35	499.52	497.07	496.63
AP4-4	398936	0.00	5.56	7.62	8.76	507.09	503.83	503.59
certified concentration								
SRM614		1.70	0.74		93469.00	32.00	32.00	32.00
SRM612		41.54	37.73	34.73	93469.00	77.44	77.44	77.44
SRM610		484.60	465.60	356.40	93469.00	465.30	465.30	465.30
STD AP1		0.06	0.00	0.00	13.08	33.39	33.39	33.39
STD AP2		0.82	1.19	11.59	22.10	453.06	453.06	453.06
STD AP3		2.48	3.41	10.84	19.67	533.16	533.16	533.16
STD AP4		4.04	6.11	10.77	19.04	651.16	651.16	651.16

Appendix A. Raw trace element datasheets from laser ablation.

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-3	51588.57	180482.50	1683.33	3764.86	437521.34	23291.77	3736.62	737.16
SRM614-3	11664100.00	10808579.00	6582.00	6492.12	517987.44	4122857.80	28963.92	2203.89
SRM612-3	10850957.00	9389921.00	5662.95	6946.60	820851.06	3612687.80	54345.31	4914.79
SRM610-3	4692407.50	4033773.30	2855.66	5720.11	1020372.10	1337597.90	177504.84	15273.13
AP1-3	96379.90	68352.70	1546.37	4613.03	321082.03	20086868.00	10809.74	49145.68
AP2-3	100119.09	60278.18	1523.89	4788.91	317541.78	21024072.00	10511.50	51840.13
AP3-3	247416.19	57760.16	1851.89	4338.38	317339.19	23444352.00	15203.81	87383.81
AP4-3	314044.88	58451.25	1725.73	4277.10	280775.06	20222492.00	15324.77	67317.94
EVA2.5-1	27213.99	38815.14	1148.09	76552.47	8615378.00	11592944.00	5490.47	31428.50
EVA2.5-2	24001.50	37698.45	875.44	68489.02	9615512.00	7968591.00	4246.50	21745.48
EVA2.5-3	25967.83	34497.20	800.48	71097.44	8172960.50	8772800.00	4444.87	21998.52
EVA2.5-4	17960.14	26823.59	1092.45	61143.47	4412539.50	14626501.00	6242.31	34538.95
EVA2.5-5	13199.27	26086.23	1295.57	72367.24	4639349.00	17765778.00	7508.44	42157.16
EVA2.5-6	13214.91	23565.85	1233.29	76716.55	4683152.50	18730276.00	7762.00	43907.29
EVA2.5-7	13019.67	21593.24	853.56	24027.46	1456556.30	11860975.00	5051.79	21001.04
EVA2.5-8	11316.18	19310.83	959.97	26708.95	1294630.50	12881650.00	5425.71	23476.25
EVA2.5-9	11849.19	17871.62	989.37	28140.24	1431576.80	13608675.00	5752.67	23914.62
EVA2.5-10	10820.14	18563.62	748.32	20276.67	965154.75	9510482.00	4359.34	16762.17
EVA2.5-11	10400.02	16860.41	775.48	24143.14	996047.19	11169163.00	4909.27	20944.04
EVA2.5-12	10387.06	16375.93	951.17	26297.79	1152363.50	11941080.00	5144.43	22179.32
EVA2.5-13	11852.43	15962.25	929.65	24443.50	1268054.30	11681613.00	4990.35	19799.79
EVA2.5-14	9430.13	14447.04	1026.01	26095.27	1263978.10	12996145.00	5474.23	21535.84
EVA2.5-15	9793.94	14867.92	932.17	26302.43	1507588.80	12751854.00	5282.59	21341.24
SRM614-4	7219232.00	7761125.00	3932.62	4302.50	317089.63	2465336.80	9615.05	1681.41
SRM612-4	7008282.50	7178870.50	3707.34	4374.26	406627.09	2313343.30	32723.11	3492.82
SRM610-4	3359951.30	3316863.50	1794.21	3694.58	606852.75	991454.56	139183.78	12238.19
AP1-4	67085.50	15785.69	900.41	3060.50	266779.59	14427607.00	7421.52	19707.27
AP2-4	56295.40	12686.75	993.13	3036.58	206124.41	14709053.00	6831.56	20062.79
AP3-4	191938.56	19845.95	1300.33	2974.82	225426.70	16678101.00	10080.18	40487.27
AP4-4	167653.34	19786.71	922.45	3062.10	187384.86	13350571.00	9560.89	24069.22
blank-4	7873.16	12821.71	234.56	2307.21	292033.09	74992.66	1044.13	1144.73
blank average	29730.87	96652.11	958.95	3036.04	364777.22	49142.22	2390.37	940.95
blank subtraction								
SRM614-3	11634369.13	10711926.89	5623.05	3456.08	153210.23	4073715.58	26573.55	1262.95
SRM612-3	10821226.13	9293268.89	4704.01	3910.56	456073.85	3563545.58	51954.93	3973.84
SRM610-3	4662676.63	3937121.19	1896.71	2684.08	655594.89	1288455.68	175114.47	14332.18
AP1-3	66649.03	-28299.40	587.42	1576.99	-43695.19	20037725.78	8419.37	48204.73
AP2-3	70388.22	-36373.93	564.94	1752.87	-47235.44	20974929.78	8121.13	50899.19
AP3-3	217685.32	-38891.94	892.94	1302.35	-47438.03	23395209.78	12813.43	86442.87
AP4-3	284314.01	-38200.86	766.78	1241.07	-84002.16	20173349.78	12934.39	66376.99
EVA2.5-1	-2516.88	-57836.97	189.14	73516.43	8250600.79	11543801.78	3100.10	30487.55
EVA2.5-2	-5729.37	-58953.65	-83.50	65452.99	9250734.79	7919448.78	1856.13	20804.54
EVA2.5-3	-3763.04	-62154.91	-158.46	68061.40	7808183.29	8723657.78	2054.49	21057.58
EVA2.5-4	-11770.73	-69828.52	133.50	58107.43	4047762.29	14577358.78	3851.94	33598.01
EVA2.5-5	-16531.59	-70565.88	336.62	69331.20	4274571.79	17716635.78	5118.07	41216.21
EVA2.5-6	-16515.95	-73086.25	274.34	73680.51	4318375.29	18681133.78	5371.63	42966.34
EVA2.5-7	-16711.19	-75058.86	-105.38	20991.42	1091779.09	11811832.78	2661.42	20060.09
EVA2.5-8	-18414.68	-77341.28	1.02	23672.91	929853.29	12832507.78	3035.34	22535.31
EVA2.5-9	-17881.68	-78780.49	30.42	25104.20	1066799.59	13559532.78	3362.30	22973.67
EVA2.5-10	-18910.73	-78088.48	-210.62	17240.64	600377.54	9461339.78	1968.97	15821.23
EVA2.5-11	-19330.85	-79791.69	-183.46	21107.10	631269.98	11120020.78	2518.89	20003.09
EVA2.5-12	-19343.81	-80276.17	-7.78	23261.75	787586.29	11891937.78	2754.06	21238.38
EVA2.5-13	-17878.44	-80689.86	-29.30	21407.46	903277.09	11632470.78	2599.97	18858.85
EVA2.5-14	-20300.73	-82205.07	67.06	23059.23	899200.89	12947002.78	3083.86	20594.90
EVA2.5-15	-19936.93	-81784.18	-26.78	23266.39	1142811.59	12702711.78	2892.22	20400.29
SRM614-4	7189501.13	7664472.89	2973.68	1266.47	-47687.59	2416194.58	7224.68	740.46
SRM612-4	6978551.63	7082218.39	2748.40	1338.23	41849.88	2264201.08	30332.73	2551.87
SRM610-4	3330220.43	3220211.39	835.26	658.54	242075.54	942312.34	136793.41	11297.24
AP1-4	37354.63	-80866.42	-58.54	24.46	-97997.63	14378464.78	5031.15	18766.33
AP2-4	26564.53	-83965.36	34.18	0.54	-158652.81	14659910.78	4441.19	19121.85
AP3-4	162207.69	-76806.16	341.38	-61.22	-139350.52	16628958.78	7689.80	39546.32
AP4-4	137922.47	-76865.40	-36.50	26.06	-177392.36	13301428.78	7170.52	23128.27
zero correction								
SRM614-3	11634369.13	10711926.89	5623.05	3456.08	1259434.80	4073715.58	26573.55	1262.95
SRM612-3	10821226.13	9293268.89	4704.01	3910.56	1467977.40	3563545.58	51954.93	3973.84

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	4662676.63	3937121.19	1896.71	2684.08	1565305.60	1288455.68	175114.47	14332.18
AP1-3	66649.03	0.00	587.42	1576.99	397940.13	20037725.78	8419.37	48204.73
AP2-3	70388.22	0.00	564.94	1752.87	314931.06	20974929.78	8121.13	50899.19
AP3-3	217685.32	0.00	892.94	1302.35	385658.50	23395209.78	12813.43	86442.87
AP4-3	284314.01	0.00	766.78	1241.07	301733.94	20173349.78	12934.39	66376.99
EVA2.5-1	0.00	0.00	189.14	73516.43	1258539.50	11543801.78	3100.10	30487.55
EVA2.5-2	0.00	0.00	0.00	65452.99	1317136.10	7919448.78	1856.13	20804.54
EVA2.5-3	0.00	0.00	0.00	68061.40	1076105.90	8723657.78	2054.49	21057.58
EVA2.5-4	0.00	0.00	133.50	58107.43	2032429.00	14577358.78	3851.94	33598.01
EVA2.5-5	0.00	0.00	336.62	69331.20	2078104.00	17716635.78	5118.07	41216.21
EVA2.5-6	0.00	0.00	274.34	73680.51	1739624.60	18681133.78	5371.63	42966.34
EVA2.5-7	0.00	0.00	0.00	20991.42	2182579.80	11811832.78	2661.42	20060.09
EVA2.5-8	0.00	0.00	1.02	23672.91	2631315.50	12832507.78	3035.34	22535.31
EVA2.5-9	0.00	0.00	30.42	25104.20	2442299.80	13559532.78	3362.30	22973.67
EVA2.5-10	0.00	0.00	0.00	17240.64	1737553.10	9461339.78	1968.97	15821.23
EVA2.5-11	0.00	0.00	0.00	21107.10	1850756.90	11120020.78	2518.89	20003.09
EVA2.5-12	0.00	0.00	0.00	23261.75	1737539.30	11891937.78	2754.06	21238.38
EVA2.5-13	0.00	0.00	0.00	21407.46	2903196.80	11632470.78	2599.97	18858.85
EVA2.5-14	0.00	0.00	67.06	23059.23	4116332.50	12947002.78	3083.86	20594.90
EVA2.5-15	0.00	0.00	0.00	23266.39	4146259.00	12702711.78	2892.22	20400.29
SRM614-4	7189501.13	7664472.89	2973.68	1266.47	2602828.50	2416194.58	7224.68	740.46
SRM612-4	6978551.63	7082218.39	2748.40	1338.23	2569829.00	2264201.08	3032.73	2551.87
SRM610-4	3330220.43	3220211.39	835.26	658.54	5110986.00	942312.34	136793.41	11297.24
AP1-4	37354.63	0.00	0.00	24.46	4320745.00	14378464.78	5031.15	18766.33
AP2-4	26564.53	0.00	34.18	0.54	4304417.50	14659910.78	4441.19	19121.85
AP3-4	162207.69	0.00	341.38	0.00	4943076.00	16628958.78	7689.80	39546.32
AP4-4	137922.47	0.00	0.00	26.06	427376.72	13301428.78	7170.52	23128.27

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-3	2.855960	2.629523	0.001380	0.000848	0.309161	1.000000	0.006523	0.000310
SRM612-3	3.036646	2.607871	0.001320	0.001097	0.411943	1.000000	0.014580	0.001115
SRM610-3	3.618810	3.055690	0.001472	0.002083	1.214870	1.000000	0.135910	0.011124
AP1-3	0.003326	0.000000	0.000029	0.000079	0.019860	1.000000	0.000420	0.002406
AP2-3	0.003356	0.000000	0.000027	0.000084	0.015015	1.000000	0.000387	0.002427
AP3-3	0.009305	0.000000	0.000038	0.000056	0.016485	1.000000	0.000548	0.003695
AP4-3	0.014094	0.000000	0.000038	0.000062	0.014957	1.000000	0.000641	0.003290
EVA2.5-1	0.000000	0.000000	0.000016	0.006368	0.109023	1.000000	0.000269	0.002641
EVA2.5-2	0.000000	0.000000	0.000000	0.008265	0.166317	1.000000	0.000234	0.002627
EVA2.5-3	0.000000	0.000000	0.000000	0.007802	0.123355	1.000000	0.000236	0.002414
EVA2.5-4	0.000000	0.000000	0.000009	0.003986	0.139424	1.000000	0.000264	0.002305
EVA2.5-5	0.000000	0.000000	0.000019	0.003913	0.117297	1.000000	0.000289	0.002326
EVA2.5-6	0.000000	0.000000	0.000015	0.003944	0.093122	1.000000	0.000288	0.002300
EVA2.5-7	0.000000	0.000000	0.000000	0.001777	0.184779	1.000000	0.000225	0.001698
EVA2.5-8	0.000000	0.000000	0.000000	0.001845	0.205051	1.000000	0.000237	0.001756
EVA2.5-9	0.000000	0.000000	0.000002	0.001851	0.180117	1.000000	0.000248	0.001694
EVA2.5-10	0.000000	0.000000	0.000000	0.001822	0.183648	1.000000	0.000208	0.001672
EVA2.5-11	0.000000	0.000000	0.000000	0.001898	0.166435	1.000000	0.000227	0.001799
EVA2.5-12	0.000000	0.000000	0.000000	0.001956	0.146111	1.000000	0.000232	0.001786
EVA2.5-13	0.000000	0.000000	0.000000	0.001840	0.249577	1.000000	0.000224	0.001621
EVA2.5-14	0.000000	0.000000	0.000005	0.001781	0.317937	1.000000	0.000238	0.001591

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000000	0.000000	0.000000	0.001832	0.326407	1.000000	0.000228	0.001606
SRM614-4	2.975547	3.172126	0.001231	0.000524	1.077243	1.000000	0.002990	0.000306
SRM612-4	3.082125	3.127911	0.001214	0.000591	1.134983	1.000000	0.013397	0.001127
SRM610-4	3.534094	3.417350	0.000886	0.000699	5.423877	1.000000	0.145168	0.011989
AP1-4	0.002598	0.000000	0.000000	0.000002	0.300501	1.000000	0.000350	0.001305
AP2-4	0.001812	0.000000	0.000002	0.000000	0.293618	1.000000	0.000303	0.001304
AP3-4	0.009755	0.000000	0.000021	0.000000	0.297257	1.000000	0.000462	0.002378
AP4-4	0.010369	0.000000	0.000000	0.000002	0.032130	1.000000	0.000539	0.001739
standardize signal averages AP								
AP1	0.002962	0.000000	0.000015	0.000040	0.160180	1.000000	0.000385	0.001855
AP2	0.002584	0.000000	0.000015	0.000042	0.154316	1.000000	0.000345	0.001866
AP3	0.009530	0.000000	0.000029	0.000028	0.156871	1.000000	0.000505	0.003037
AP4	0.012231	0.000000	0.000019	0.000032	0.023544	1.000000	0.000590	0.002515
linest from std sig ave								
	0.025381	0.000000	22044.999717	0.226989	0.000051	1.000000	0.008083	0.456975
standardize signal averages SRM								
srm614-2	2.915754	2.900824	0.001306	0.000686	0.693202	1.000000	0.004757	0.000308
srm612-2	3.059386	2.867891	0.001267	0.000844	0.773463	1.000000	0.013988	0.001121
srm610-2	3.576452	3.236520	0.001179	0.001391	3.319373	1.000000	0.140539	0.011556
linest from std sig ave								
	0.044127	1.303301	1.205483	2.444403	0.000999	1.000000	0.036538	0.438272
concentration data								
SRM614-3	6216.76	0.00	2609705.09	16.52	26.48	85763.00	4.52	12.15
SRM612-3	6610.07	0.00	2495718.93	21.36	35.29	85763.00	10.11	43.70
SRM610-3	7877.31	0.00	2783182.24	40.55	104.07	85763.00	94.22	435.95
AP1-3	33.68	0.00	257819.72	7.13	7.91	398936.00	1.35	438.57
AP2-3	33.98	0.00	236874.06	7.57	5.98	398936.00	1.25	442.39
AP3-3	94.21	0.00	335668.88	5.04	6.57	398936.00	1.77	673.59
AP4-3	142.70	0.00	334278.55	5.57	5.96	398936.00	2.07	599.84
EVA2.5-1	0.00	0.00	144095.40	576.69	43.44	398936.00	0.87	481.47
EVA2.5-2	0.00	0.00	0.00	748.41	66.28	398936.00	0.76	478.92
EVA2.5-3	0.00	0.00	0.00	706.50	49.16	398936.00	0.76	440.05
EVA2.5-4	0.00	0.00	80541.24	360.96	55.56	398936.00	0.85	420.18
EVA2.5-5	0.00	0.00	167099.22	354.37	46.74	398936.00	0.93	424.11
EVA2.5-6	0.00	0.00	129152.18	357.16	37.11	398936.00	0.93	419.30
EVA2.5-7	0.00	0.00	0.00	160.93	73.63	398936.00	0.73	309.61
EVA2.5-8	0.00	0.00	699.02	167.05	81.71	398936.00	0.76	320.15
EVA2.5-9	0.00	0.00	19730.15	167.65	71.77	398936.00	0.80	308.87
EVA2.5-10	0.00	0.00	0.00	165.01	73.18	398936.00	0.67	304.85
EVA2.5-11	0.00	0.00	0.00	171.88	66.32	398936.00	0.73	327.93
EVA2.5-12	0.00	0.00	0.00	177.13	58.22	398936.00	0.75	325.58
EVA2.5-13	0.00	0.00	0.00	166.65	99.45	398936.00	0.72	295.56
EVA2.5-14	0.00	0.00	45552.21	161.28	126.69	398936.00	0.77	289.99
EVA2.5-15	0.00	0.00	0.00	165.86	130.07	398936.00	0.73	292.78
SRM614-4	6477.07	0.00	2326868.84	10.20	92.28	85763.00	2.07	12.01
SRM612-4	6709.07	0.00	2294955.55	11.51	97.23	85763.00	9.29	44.17
SRM610-4	7692.90	0.00	1675866.05	13.60	464.65	85763.00	100.64	469.86
AP1-4	26.31	0.00	0.00	0.15	119.75	398936.00	1.13	237.94
AP2-4	18.35	0.00	20504.85	0.00	117.00	398936.00	0.98	237.79
AP3-4	98.77	0.00	180546.36	0.00	118.45	398936.00	1.49	433.55
AP4-4	104.99	0.00	0.00	0.18	12.80	398936.00	1.74	316.99
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	48282.07	123202.93	1179.61	3238.02	366532.59	17098.38	3168.26	627.20
SRM614-5	8704303.00	7515890.50	4521.91	5576.83	449184.56	2809787.30	19376.51	1658.73
SRM612-5	9221958.00	8063744.00	4737.83	6524.88	852223.13	2970336.80	43750.17	4051.22
SRM610-5	4417337.50	3689514.50	2424.21	5134.23	824880.31	1239829.00	164568.53	13958.32
AP1-5	99540.00	58125.21	1349.81	4117.50	299380.19	16975002.00	9151.65	43054.44
AP2-5	77609.56	47831.59	1278.97	4125.78	278281.38	16778808.00	8211.13	42042.60
AP3-5	184735.59	48722.95	1568.77	4062.66	282391.88	20420140.00	12376.71	64434.81
AP4-5	222317.30	47108.03	1359.25	3985.90	246168.78	17974250.00	12548.03	49902.52
EVA3-1	92478.64	40077.63	1294.09	23308.41	6831155.00	18505634.00	7760.44	59072.57
EVA3-2	44066.09	33808.23	1237.33	22007.36	5651090.50	16965628.00	7239.56	52850.86
EVA3-3	131870.42	40052.83	1135.41	19618.99	4946489.00	15131995.00	6406.96	46481.02
SRM614-6	5377014.50	4912740.00	2619.85	4173.06	379500.06	1655775.80	8009.77	1504.21
SRM612-6	7211456.00	6681700.50	3426.42	4980.03	549448.38	2283242.30	30756.81	3342.22
SRM610-6	3839112.80	3454652.50	1900.21	4371.34	640272.81	1104762.00	147557.67	12790.31
AP1-6	59602.30	20679.48	1011.49	3442.26	280553.84	14270549.00	6707.44	24268.42
AP2-6	68442.78	19291.47	1028.77	3492.62	244907.81	14910571.00	6921.24	28556.52
AP3-6	164099.00	25401.66	1327.13	3387.18	263112.38	18080396.00	10717.94	54775.31
AP4-6	232276.50	28554.76	1271.69	3396.66	234141.92	15466964.00	11538.35	42910.64
blank-6	10892.22	24487.38	365.44	2642.49	377377.56	63027.16	1159.09	1083.73
blank average	29587.15	73845.15	772.52	2940.26	371955.08	40062.77	2163.67	855.46
blank subtraction								
SRM614-5	8674715.85	7442045.35	3749.38	2636.58	77229.49	2769724.53	17212.84	803.26
SRM612-5	9192370.85	7989898.85	3965.30	3584.62	480268.06	2930274.03	41586.50	3195.76
SRM610-5	4387750.35	3615669.35	1651.69	2193.97	452925.24	1199766.23	162404.86	13102.85
AP1-5	69952.85	-15719.95	577.28	1177.25	-72574.89	16934939.23	6987.98	42198.98
AP2-5	48022.41	-26013.56	506.44	1185.53	-93673.70	16738745.23	6047.45	41187.13
AP3-5	155148.44	-25122.20	796.24	1122.41	-89563.20	20380077.23	10213.04	63579.34
AP4-5	192730.15	-26737.13	586.72	1045.65	-125786.30	17934187.23	10384.36	49047.06
EVA3-1	62891.50	-33767.53	521.56	20368.16	6459199.93	18465571.23	5596.77	58217.11
EVA3-2	14478.94	-40036.92	464.80	19067.11	5279135.43	16925565.23	5075.89	51995.39
EVA3-3	102283.27	-33792.33	362.88	16678.73	4574533.93	15091932.23	4243.28	45625.56
SRM614-6	5347427.35	4838894.85	1847.33	1232.81	7544.98	1615713.03	5846.09	648.74
SRM612-6	7181868.85	6607855.35	2653.89	2039.77	177493.31	2243179.53	28593.14	2486.75
SRM610-6	3809525.65	3380807.35	1127.69	1431.09	268317.74	1064699.23	145394.00	11934.85
AP1-6	30015.15	-53165.68	238.96	502.00	-91401.24	14230486.23	4543.77	23412.95
AP2-6	38855.64	-54553.68	256.24	552.36	-127047.27	14870508.23	4757.57	27701.06
AP3-6	134511.85	-48443.49	554.60	446.92	-108842.70	18040333.23	8554.27	53919.84
AP4-6	202689.35	-45290.39	499.16	456.40	-137813.16	15426901.23	9374.67	42055.18
zero correction								
SRM614-5	8674715.85	7442045.35	3749.38	2636.58	1259434.80	2769724.53	17212.84	803.26
SRM612-5	9192370.85	7989898.85	3965.30	3584.62	1467977.40	2930274.03	41586.50	3195.76
SRM610-5	4387750.35	3615669.35	1651.69	2193.97	1565305.60	1199766.23	162404.86	13102.85
AP1-5	69952.85	0.00	577.28	1177.25	397940.13	16934939.23	6987.98	42198.98
AP2-5	48022.41	0.00	506.44	1185.53	314931.06	16738745.23	6047.45	41187.13
AP3-5	155148.44	0.00	796.24	1122.41	385658.50	20380077.23	10213.04	63579.34
AP4-5	192730.15	0.00	586.72	1045.65	301733.94	17934187.23	10384.36	49047.06
EVA3-1	62891.50	0.00	521.56	20368.16	1258539.50	18465571.23	5596.77	58217.11
EVA3-2	14478.94	0.00	464.80	19067.11	1317136.10	16925565.23	5075.89	51995.39
EVA3-3	102283.27	0.00	362.88	16678.73	1076105.90	15091932.23	4243.28	45625.56
SRM614-6	5347427.35	4838894.85	1847.33	1232.81	2032429.00	1615713.03	5846.09	648.74
SRM612-6	7181868.85	6607855.35	2653.89	2039.77	2078104.00	2243179.53	28593.14	2486.75
SRM610-6	3809525.65	3380807.35	1127.69	1431.09	1739624.60	1064699.23	145394.00	11934.85
AP1-6	30015.15	0.00	238.96	502.00	2182579.80	14230486.23	4543.77	23412.95
AP2-6	38855.64	0.00	256.24	552.36	2631315.50	14870508.23	4757.57	27701.06
AP3-6	134511.85	0.00	554.60	446.92	2442299.80	18040333.23	8554.27	53919.84
AP4-6	202689.35	0.00	499.16	456.40	1737553.10	15426901.23	9374.67	42055.18
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	3.131978	2.686926	0.001354	0.000952	0.454715	1.000000	0.006215	0.000290
SRM612-5	3.137035	2.726673	0.001353	0.001223	0.500969	1.000000	0.014192	0.001091
SRM610-5	3.657171	3.013645	0.001377	0.001829	1.304675	1.000000	0.135364	0.010921
AP1-5	0.004131	0.000000	0.000034	0.000070	0.023498	1.000000	0.000413	0.002492
AP2-5	0.002869	0.000000	0.000030	0.000071	0.018814	1.000000	0.000361	0.002461
AP3-5	0.007613	0.000000	0.000039	0.000055	0.018923	1.000000	0.000501	0.003120
AP4-5	0.010747	0.000000	0.000033	0.000058	0.016825	1.000000	0.000579	0.002735
EVA3-1	0.003406	0.000000	0.000028	0.001103	0.068156	1.000000	0.000303	0.003153
EVA3-2	0.000855	0.000000	0.000027	0.001127	0.077819	1.000000	0.000300	0.003072
EVA3-3	0.006777	0.000000	0.000024	0.001105	0.071303	1.000000	0.000281	0.003023
SRM614-6	3.309639	2.994897	0.001143	0.000763	1.257915	1.000000	0.003618	0.000402
SRM612-6	3.201647	2.945754	0.001183	0.000909	0.926410	1.000000	0.012747	0.001109
SRM610-6	3.578030	3.175364	0.001059	0.001344	1.633912	1.000000	0.136559	0.011210
AP1-6	0.002109	0.000000	0.000017	0.000035	0.153374	1.000000	0.000319	0.001645
AP2-6	0.002613	0.000000	0.000017	0.000037	0.176949	1.000000	0.000320	0.001863
AP3-6	0.007456	0.000000	0.000031	0.000025	0.135380	1.000000	0.000474	0.002989
AP4-6	0.013139	0.000000	0.000032	0.000030	0.112631	1.000000	0.000608	0.002726

standardize signal averages AP

AP1	0.003120	0.000000	0.000025	0.000052	0.088436	1.000000	0.000366	0.002069
AP2	0.002741	0.000000	0.000024	0.000054	0.097882	1.000000	0.000341	0.002162
AP3	0.007534	0.000000	0.000035	0.000040	0.077152	1.000000	0.000488	0.003054
AP4	0.011943	0.000000	0.000033	0.000044	0.064728	1.000000	0.000593	0.002730

linest from std sig ave

	0.027781	0.000000	15625.708832	0.170149	0.000106	1.000000	0.008310	0.431435
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standardize signal averages SRM

srm614-2	3.220809	2.840912	0.001249	0.000857	0.856315	1.000000	0.004916	0.000346
srm612-2	3.169341	2.836214	0.001268	0.001066	0.713690	1.000000	0.013469	0.001100
srm610-2	3.617600	3.094504	0.001218	0.001586	1.469294	1.000000	0.135961	0.011065

linest from std sig ave

	0.042298	1.339848	1.250440	1.980847	0.001083	1.000000	0.037764	0.457518
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concentration data

SRM614-5	7462.12	0.00	1814106.08	13.89	42.22	85763.00	4.43	10.73
SRM612-5	7474.17	0.00	1813459.08	17.85	46.51	85763.00	10.12	40.35
SRM610-5	8713.43	0.00	1844893.89	26.68	121.13	85763.00	96.48	404.10
AP1-5	45.78	0.00	212494.77	4.72	10.15	398936.00	1.37	428.88
AP2-5	31.80	0.00	188603.82	4.81	8.13	398936.00	1.20	423.50
AP3-5	84.37	0.00	243547.42	3.74	8.17	398936.00	1.66	536.94
AP4-5	119.10	0.00	203936.30	3.96	7.27	398936.00	1.92	470.71
EVA3-1	37.75	0.00	176070.63	74.87	29.43	398936.00	1.00	542.63
EVA3-2	9.48	0.00	171186.00	76.47	33.61	398936.00	0.99	528.74
EVA3-3	75.11	0.00	149886.86	75.02	30.79	398936.00	0.93	520.33
SRM614-6	7885.41	0.00	1532216.10	11.13	116.79	85763.00	2.58	14.86
SRM612-6	7628.11	0.00	1585474.88	13.27	86.01	85763.00	9.08	41.02
SRM610-6	8524.87	0.00	1419387.79	19.61	151.69	85763.00	97.33	414.77
AP1-6	23.38	0.00	104676.90	2.39	66.24	398936.00	1.06	283.18
AP2-6	28.96	0.00	107415.43	2.52	76.42	398936.00	1.06	320.62
AP3-6	82.63	0.00	191637.56	1.68	58.47	398936.00	1.57	514.43
AP4-6	145.61	0.00	201700.23	2.01	48.64	398936.00	2.01	469.20

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-3	15041.48	1434.85	182.48	1251.77	46147.54	5680.71	1546.21	723.56
SRM614-3	4096172.80	4202898.50	2548.93	6800.96	310597.56	1213954.60	9967.02	1397.49
SRM612-3	3298890.80	3349019.30	2026.01	5632.63	238214.86	898990.00	8194.01	1150.33
SRM610-3	2016282.60	1863761.60	1199.61	4552.99	339112.25	538069.25	83819.71	8132.05
AP1-3	114103.44	30784.73	975.53	5942.71	626961.81	13156734.00	6451.12	38840.18
AP2-3	79843.73	29678.77	988.01	4931.47	322709.16	14561251.00	7278.96	43431.48
AP3-3	195882.94	37695.33	1571.45	4286.42	348957.72	14887001.00	10997.46	72352.85
AP4-3	328163.38	48187.79	1517.97	4379.02	315942.03	16356121.00	15200.73	77848.48
MZ5-1	100963.17	29286.89	932.89	27134.67	7386363.00	12733606.00	5813.51	28194.44
MZ5-2	72322.61	25032.22	1017.93	23384.29	5506353.00	13743860.00	6016.71	27817.56
MZ5-3	127711.00	27915.60	776.44	29396.13	7846704.50	11751865.00	5390.47	27719.76
MZ5-4	55888.92	23771.21	637.16	17618.98	2846573.30	8492061.00	4166.98	18074.22
MZ5-5	49150.96	21882.92	756.56	16492.25	2464640.30	9355647.00	4405.67	21054.24

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	58662.21	23376.17	823.48	25315.50	3583048.00	10008381.00	4735.19	23331.81
MZ5-7	54975.35	23387.53	931.89	34093.03	4401619.00	14670541.00	6419.00	28007.88
MZ5-8	64269.72	23554.65	1074.45	31996.62	3984916.80	15939271.00	6859.64	32301.82
MZ5-9	41230.63	20428.72	1052.41	33810.03	4326086.50	15060236.00	6455.96	29744.33
MZ5-10	338348.53	35765.04	1148.65	30553.69	4452058.00	16561421.00	7049.56	33285.55
MZ5-11	61285.55	20827.80	1341.17	35178.88	4864299.00	18513492.00	7639.20	38105.50
MZ5-12	36911.97	19441.95	1124.57	30532.41	4127545.00	16866092.00	7198.12	33325.19
MZ5-13	75617.59	24856.98	833.24	23785.77	5719342.00	12811232.00	5515.55	22555.93
MZ5-14	113384.96	27361.48	919.77	25743.47	5931401.00	13568873.00	5930.11	24343.74
MZ5-15	144937.94	30876.21	1040.85	26613.35	7233020.00	14290969.00	6360.56	26933.51
MZ5-16	51804.65	21390.44	1129.73	21396.56	2638425.80	14588087.00	6155.11	30343.65
MZ5-17	62816.19	22136.21	1000.37	22439.49	2701789.80	15293741.00	6600.44	31940.22
MZ5-18	39389.14	19581.23	1174.89	21589.24	2316520.80	15787145.00	6711.28	31687.30
SRM614-4	2321160.30	2486737.00	1461.53	4311.78	435517.81	703151.38	3668.94	1393.05
SRM612-4	2347298.30	2917073.80	1640.45	4226.14	488044.00	749444.19	11576.51	2349.85
SRM610-4	1581788.80	1784759.80	1149.37	3785.06	570225.44	490083.19	66717.73	7456.76
AP1-4	57000.56	16810.30	701.08	3852.02	471723.31	9414829.00	4536.99	16121.21
AP2-4	65480.13	15590.53	740.08	3909.82	334076.91	10118458.00	5085.95	15645.65
AP3-4	107887.61	21313.16	1018.05	3630.22	332789.00	10896657.00	7374.00	34287.35
AP4-4	180063.45	26578.67	1015.37	3654.38	301319.00	11236192.00	9300.89	35571.96
blank-4	7696.12	13436.68	184.48	2428.09	421598.53	73781.41	1121.33	1347.97
blank average	11368.80	7435.76	183.48	1839.93	233873.03	39731.06	1333.77	1035.77

blank subtraction								
SRM614-3	4084804.00	4195462.74	2365.45	4961.03	76724.53	1174223.54	8633.25	361.72
SRM612-3	3287522.00	3341583.54	1842.53	3792.70	4341.83	859258.94	6860.24	114.56
SRM610-3	2004913.80	1856325.84	1016.13	2713.06	105239.22	498338.19	82485.94	7096.28
AP1-3	102734.64	23348.97	792.04	4102.78	393088.78	13117002.94	5117.35	37804.41
AP2-3	68474.92	22243.01	804.52	3091.54	88836.13	14521519.94	5945.19	42395.72
AP3-3	184514.14	30259.57	1387.97	2446.49	115084.69	14847269.94	9663.69	71317.09
AP4-3	316794.58	40752.03	1334.49	2539.09	82069.00	16316389.94	13866.96	76812.71
MZ5-1	89594.37	21851.12	749.40	25294.74	7152489.97	12693874.94	4479.75	27158.67
MZ5-2	60953.81	17596.46	834.44	21544.36	5272479.97	13704128.94	4682.95	26781.79
MZ5-3	116342.20	20479.84	592.96	27556.19	7612831.47	11712133.94	4056.70	26683.99
MZ5-4	44520.11	16335.45	453.68	15779.05	2612700.27	8452329.94	2833.22	17038.46
MZ5-5	37782.15	14447.16	573.08	14652.32	2230767.27	9315915.94	3071.90	20018.47
MZ5-6	47293.41	15940.41	640.00	23475.57	3349174.97	9968649.94	3401.42	22296.05
MZ5-7	43606.55	15951.77	748.40	32253.10	4167745.97	14630809.94	5085.23	26972.11
MZ5-8	52900.92	16118.89	890.96	30156.69	3751043.77	15899539.94	5525.87	31266.06
MZ5-9	29861.83	12992.95	868.92	31970.10	4092213.47	15020504.94	5122.19	28708.56
MZ5-10	326979.73	28329.28	965.17	28713.76	4218184.97	16521689.94	5715.79	32249.78
MZ5-11	49916.74	13392.04	1157.69	33338.94	4630425.97	18473760.94	6305.44	37069.73
MZ5-12	25543.17	12006.19	941.09	28692.48	3893671.97	16826360.94	5864.35	32289.42
MZ5-13	64248.78	17421.22	649.76	21945.84	5485468.97	12771500.94	4181.78	21520.16
MZ5-14	102016.16	19925.71	736.28	23903.53	5697527.97	13529141.94	4596.35	23307.97
MZ5-15	133569.14	23440.45	857.36	24773.42	6999146.97	14251237.94	5026.79	25897.75
MZ5-16	40435.85	13954.68	946.25	19556.63	2404552.77	14548355.94	4821.35	29307.88
MZ5-17	51447.39	14700.44	816.88	20599.56	2467916.77	15254009.94	5266.67	30904.45
MZ5-18	28020.34	12145.47	991.41	19749.31	2082647.77	15747413.94	5377.51	30651.53
SRM614-4	2309791.50	2479301.24	1278.05	2471.85	201644.78	663420.32	2335.17	357.28
SRM612-4	2335929.50	2909638.04	1456.97	2386.21	254170.97	709713.13	10242.74	1314.09
SRM610-4	1570420.00	1777324.04	965.89	1945.13	336352.41	450352.13	65383.97	6421.00
AP1-4	45631.76	9374.53	517.60	2012.09	237850.28	9375097.94	3203.22	15085.45
AP2-4	54111.33	8154.77	556.60	2069.89	100203.88	10078726.94	3752.18	14609.88
AP3-4	96518.81	13877.40	834.56	1790.29	98915.97	10856925.94	6040.23	33251.59
AP4-4	168694.65	19142.91	831.88	1814.45	67445.97	11196460.94	7967.13	34536.20

zero correction								
SRM614-3	4084804.00	4195462.74	2365.45	4961.03	76724.53	1174223.54	8633.25	361.72
SRM612-3	3287522.00	3341583.54	1842.53	3792.70	4341.83	859258.94	6860.24	114.56
SRM610-3	2004913.80	1856325.84	1016.13	2713.06	105239.22	498338.19	82485.94	7096.28
AP1-3	102734.64	23348.97	792.04	4102.78	393088.78	13117002.94	5117.35	37804.41
AP2-3	68474.92	22243.01	804.52	3091.54	88836.13	14521519.94	5945.19	42395.72
AP3-3	184514.14	30259.57	1387.97	2446.49	115084.69	14847269.94	9663.69	71317.09
AP4-3	316794.58	40752.03	1334.49	2539.09	82069.00	16316389.94	13866.96	76812.71
MZ5-1	89594.37	21851.12	749.40	25294.74	7152489.97	12693874.94	4479.75	27158.67
MZ5-2	60953.81	17596.46	834.44	21544.36	5272479.97	13704128.94	4682.95	26781.79
MZ5-3	116342.20	20479.84	592.96	27556.19	7612831.47	11712133.94	4056.70	26683.99
MZ5-4	44520.11	16335.45	453.68	15779.05	2612700.27	8452329.94	2833.22	17038.46
MZ5-5	37782.15	14447.16	573.08	14652.32	2230767.27	9315915.94	3071.90	20018.47
MZ5-6	47293.41	15940.41	640.00	23475.57	3349174.97	9968649.94	3401.42	22296.05
MZ5-7	43606.55	15951.77	748.40	32253.10	4167745.97	14630809.94	5085.23	26972.11
MZ5-8	52900.92	16118.89	890.96	30156.69	3751043.77	15899539.94	5525.87	31266.06
MZ5-9	29861.83	12992.95	868.92	31970.10	4092213.47	15020504.94	5122.19	28708.56
MZ5-10	326979.73	28329.28	965.17	28713.76	4218184.97	16521689.94	5715.79	32249.78
MZ5-11	49916.74	13392.04	1157.69	33338.94	4630425.97	18473760.94	6305.44	37069.73
MZ5-12	25543.17	12006.19	941.09	28692.48	3893671.97	16826360.94	5864.35	32289.42
MZ5-13	64248.78	17421.22	649.76	21945.84	5485468.97	12771500.94	4181.78	21520.16

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	102016.16	19925.71	736.28	23903.53	5697527.97	13529141.94	4596.35	23307.97
MZ5-15	133569.14	23440.45	857.36	24773.42	6999146.97	14251237.94	5026.79	25897.75
MZ5-16	40435.85	13954.68	946.25	19556.63	2404552.77	14548355.94	4821.35	29307.88
MZ5-17	51447.39	14700.44	816.88	20599.56	2467916.77	15254009.94	5266.67	30904.45
MZ5-18	2820.34	12145.47	991.41	19749.31	2082647.77	15747413.94	5377.51	30651.53
SRM614-4	2309791.50	2479301.24	1278.05	2471.85	201644.78	663420.32	2335.17	357.28
SRM612-4	2335929.50	2909638.04	1456.97	2386.21	254170.97	709713.13	10242.74	1314.09
SRM610-4	1570420.00	1777324.04	965.89	1945.13	336352.41	450352.13	65383.97	6421.00
AP1-4	45631.76	9374.53	517.60	2012.09	237850.28	9375097.94	3203.22	15085.45
AP2-4	54111.33	8154.77	556.60	2069.89	100203.88	10078726.94	3752.18	14609.88
AP3-4	96518.81	13877.40	834.56	1790.29	98915.97	10856925.94	6040.23	33251.59
AP4-4	168694.65	19142.91	831.88	1814.45	67445.97	11196460.94	7967.13	34536.20
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-3	3.478728	3.572968	0.002014	0.004225	0.065341	1.000000	0.007352	0.000308
SRM612-3	3.825997	3.888913	0.002144	0.004414	0.005053	1.000000	0.007984	0.000133
SRM610-3	4.023199	3.725032	0.002039	0.005444	0.211180	1.000000	0.165522	0.014240
AP1-3	0.007832	0.001780	0.000060	0.000313	0.029968	1.000000	0.000390	0.002882
AP2-3	0.004715	0.001532	0.000055	0.000213	0.006118	1.000000	0.000409	0.002920
AP3-3	0.012427	0.002038	0.000093	0.000165	0.007751	1.000000	0.000651	0.004803
AP4-3	0.019416	0.002498	0.000082	0.000156	0.005030	1.000000	0.000850	0.004708
MZ5-1	0.007058	0.001721	0.000059	0.001993	0.563460	1.000000	0.000353	0.002140
MZ5-2	0.004448	0.001284	0.000061	0.001572	0.384737	1.000000	0.000342	0.001954
MZ5-3	0.009933	0.001749	0.000051	0.002353	0.649995	1.000000	0.000346	0.002278
MZ5-4	0.005267	0.001933	0.000054	0.001867	0.309110	1.000000	0.000335	0.002016
MZ5-5	0.004056	0.001551	0.000062	0.001573	0.239458	1.000000	0.000330	0.002149
MZ5-6	0.004744	0.001599	0.000064	0.002355	0.335971	1.000000	0.000341	0.002237
MZ5-7	0.002980	0.001090	0.000051	0.002204	0.284861	1.000000	0.000348	0.001844
MZ5-8	0.003327	0.001014	0.000056	0.001897	0.235922	1.000000	0.000348	0.001966
MZ5-9	0.001988	0.000865	0.000058	0.002128	0.272442	1.000000	0.000341	0.001911
MZ5-10	0.019791	0.001715	0.000058	0.001738	0.255312	1.000000	0.000346	0.001952
MZ5-11	0.002702	0.000725	0.000063	0.001805	0.250649	1.000000	0.000341	0.002007
MZ5-12	0.001518	0.000714	0.000056	0.001705	0.231403	1.000000	0.000349	0.001919
MZ5-13	0.005031	0.001364	0.000051	0.001718	0.429509	1.000000	0.000327	0.001685
MZ5-14	0.007540	0.001473	0.000054	0.001767	0.421130	1.000000	0.000340	0.001723
MZ5-15	0.009372	0.001645	0.000060	0.001738	0.491126	1.000000	0.000353	0.001817
MZ5-16	0.002779	0.000959	0.000065	0.001344	0.165280	1.000000	0.000331	0.002015
MZ5-17	0.003373	0.000964	0.000054	0.001350	0.161788	1.000000	0.000345	0.002026
MZ5-18	0.001779	0.000771	0.000063	0.001254	0.132253	1.000000	0.000341	0.001946
SRM614-4	3.481641	3.737150	0.001926	0.003726	0.303947	1.000000	0.003520	0.000539
SRM612-4	3.291371	4.099738	0.002053	0.003362	0.358132	1.000000	0.014432	0.001852
SRM610-4	3.487094	3.946521	0.002145	0.004319	0.746865	1.000000	0.145184	0.014258
AP1-4	0.004867	0.001000	0.000055	0.000215	0.025370	1.000000	0.000342	0.001609
AP2-4	0.005369	0.000809	0.000055	0.000205	0.009942	1.000000	0.000372	0.001450
AP3-4	0.008890	0.001278	0.000077	0.000165	0.009111	1.000000	0.000556	0.003063
AP4-4	0.015067	0.001710	0.000074	0.000162	0.006024	1.000000	0.000712	0.003085
standardize signal averages AP								
AP1	0.006350	0.001390	0.000058	0.000264	0.027669	1.000000	0.000366	0.002246
AP2	0.005042	0.001170	0.000055	0.000209	0.008030	1.000000	0.000391	0.002185
AP3	0.010659	0.001658	0.000085	0.000165	0.008431	1.000000	0.000604	0.003933
AP4	0.017241	0.002104	0.000078	0.000159	0.005527	1.000000	0.000781	0.003896
lineest from std sig ave								
	0.018653	0.159463	6546.764957	0.039669	0.000296	1.000000	0.007079	0.335001
standardize signal averages SRM								
srm614-2	3.480184	3.655059	0.001970	0.003975	0.184644	1.000000	0.005436	0.000423
srm612-2	3.558684	3.994326	0.002099	0.003888	0.181592	1.000000	0.011208	0.000992
srm610-2	3.755146	3.835777	0.002092	0.004882	0.479023	1.000000	0.155353	0.014249

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
	0.039318	1.023691	0.783213	0.488616	0.004255	1.000000	0.033122	0.355941
concentration data								
SRM614-3	5564.93	48863.85	1131072.14	14.37	23.84	85763.00	4.46	8.85
SRM612-3	6120.46	53184.72	1203974.56	15.02	1.84	85763.00	4.85	3.83
SRM610-3	6435.92	50943.48	1144853.64	18.52	77.06	85763.00	100.49	409.12
AP1-3	58.28	113.24	157704.81	4.95	50.86	398936.00	1.10	385.17
AP2-3	35.09	97.44	144696.22	3.37	10.38	398936.00	1.16	390.17
AP3-3	92.48	129.65	244153.41	2.61	13.16	398936.00	1.84	641.94
AP4-3	144.48	158.89	213609.42	2.46	8.54	398936.00	2.40	629.16
MZ5-1	52.52	109.51	154188.47	31.53	956.36	398936.00	1.00	285.93
MZ5-2	33.10	81.68	159028.91	24.88	653.01	398936.00	0.97	261.18
MZ5-3	73.92	111.24	132227.50	37.23	1103.23	398936.00	0.98	304.48
MZ5-4	39.19	122.95	140186.31	29.54	524.65	398936.00	0.95	269.40
MZ5-5	30.18	98.65	160665.31	24.89	406.43	398936.00	0.93	287.18
MZ5-6	35.30	101.72	167677.98	37.27	570.24	398936.00	0.96	298.91
MZ5-7	22.18	69.36	133597.35	34.89	483.49	398936.00	0.98	246.37
MZ5-8	24.76	64.49	146354.49	30.02	400.43	398936.00	0.98	262.81
MZ5-9	14.79	55.03	151087.20	33.68	462.41	398936.00	0.96	255.43
MZ5-10	147.27	109.08	152572.86	27.50	433.34	398936.00	0.98	260.87
MZ5-11	20.11	46.12	163668.71	28.56	425.42	398936.00	0.96	268.17
MZ5-12	11.30	45.39	146072.60	26.99	392.76	398936.00	0.98	256.46
MZ5-13	37.43	86.78	132875.06	27.19	729.00	398936.00	0.92	225.19
MZ5-14	56.11	93.69	142136.36	27.96	714.78	398936.00	0.96	230.24
MZ5-15	69.74	104.63	157124.18	27.51	833.58	398936.00	1.00	242.86
MZ5-16	20.68	61.02	169871.21	21.27	280.53	398936.00	0.94	269.23
MZ5-17	25.10	61.31	139864.23	21.37	274.60	398936.00	0.98	270.76
MZ5-18	13.24	49.06	164426.61	19.85	224.47	398936.00	0.96	260.13
SRM614-4	5569.59	51109.21	1081645.21	12.68	110.91	85763.00	2.14	15.47
SRM612-4	5265.21	56067.96	1152640.67	11.44	130.68	85763.00	8.76	53.20
SRM610-4	5578.31	53972.56	1204204.18	14.69	272.52	85763.00	88.15	409.63
AP1-4	36.22	63.61	144195.22	3.40	43.06	398936.00	0.96	215.05
AP2-4	39.95	51.47	144234.77	3.25	16.87	398936.00	1.05	193.73
AP3-4	66.15	81.31	200762.73	2.61	15.46	398936.00	1.57	409.31
AP4-4	112.11	108.76	194049.41	2.56	10.22	398936.00	2.01	412.23
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-1	10721.30	27933.92	323.76	3135.34	289147.66	19208.59	1202.69	744.16
SRM614-1	2742541.50	2978832.00	1934.65	5079.83	400231.97	831980.69	8349.37	2833.50
SRM612-1	4437900.00	5218329.50	2972.66	5884.59	515160.31	1423731.40	24209.02	4704.99
SRM610-1	1725818.90	1733096.40	1246.93	5211.39	655556.44	471154.50	69866.52	9008.33
AP1-1	75629.59	34890.64	694.08	4861.59	469511.84	8227520.50	4912.71	23120.89
AP2-1	125974.40	35231.36	618.08	3914.18	266548.81	6798325.50	4335.46	17415.86
AP3-1	61534.43	30919.25	630.84	4177.46	362720.34	6496316.00	4527.63	17234.58
AP4-1	93956.89	32737.39	801.88	3889.18	248956.25	8526024.00	6469.80	23922.49
MZ4-1	20885.04	27609.52	696.72	10468.46	697016.13	6348072.00	3470.38	13137.31
MZ4-2	29344.85	27526.72	629.92	10951.14	1196835.50	6597197.00	3584.06	15953.49
MZ4-3	96769.86	42417.00	641.92	11567.03	2026569.80	6536356.00	3566.66	17673.50
MZ4-4	81092.66	45468.50	587.60	8161.41	769215.50	6337616.00	3249.90	13102.47
MZ4-5	67572.38	36371.20	642.96	8707.85	705465.94	6189737.50	3408.78	13140.55
MZ4-6	63406.12	37524.81	542.44	8716.69	691687.63	6178612.50	3265.94	13026.39
MZ4-7	86283.73	40482.55	549.64	8860.89	813389.75	5053872.50	2885.78	10535.78
MZ4-8	68305.31	35757.68	505.08	8689.13	677363.88	4845312.00	2945.82	10238.74
MZ4-9	62779.99	35691.56	529.56	8708.65	665771.13	4992341.00	2863.18	10455.46
MZ4-10	75169.14	35133.48	507.44	6230.00	564883.06	4889409.00	2794.14	9826.94
MZ4-11	90025.47	36524.57	600.76	6415.28	618143.38	5990724.50	3249.78	11754.99
MZ4-12	106750.44	43486.97	649.16	6853.00	715321.81	6796344.50	3513.54	13180.15
SRM614-2	3305680.80	4125872.30	2377.01	4171.26	244454.02	1080646.50	6361.04	2361.21
SRM612-2	3252374.00	4230622.00	2329.41	4054.70	269015.03	1074593.50	16838.62	2417.29
SRM610-2	1619881.90	1780619.10	1104.29	3843.70	391682.72	480510.66	70021.11	7467.76
AP1-2	46920.47	19680.31	567.04	3447.54	222668.53	5753197.00	3815.46	10872.26
AP2-2	126363.71	18677.50	517.32	3109.26	184873.92	5995217.50	3962.22	12205.47
AP3-2	66153.17	20248.87	669.00	3756.58	283020.88	6452018.00	4738.43	15485.61
AP4-2	103305.10	22070.48	690.08	3273.38	184753.23	7971284.00	6387.36	17874.22
blank-2	10492.74	17744.10	248.36	2628.77	207068.28	49120.80	1139.45	939.97
blank average	10607.02	22839.01	286.06	2882.06	248107.97	34164.69	1171.07	842.06

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction								
SRM614-1	2731934.48	2955992.99	1648.59	2197.77	152124.00	797816.00	7178.30	1991.43
SRM612-1	4427292.98	5195490.49	2686.60	3002.54	267052.34	1389566.71	23037.95	3862.92
SRM610-1	1715211.88	1710257.39	960.87	2329.33	407448.47	436989.81	68695.45	8166.27
AP1-1	65022.57	12051.63	408.02	1979.53	221403.87	8193355.81	3741.64	22278.83
AP2-1	115367.38	12392.35	332.02	1032.13	18440.84	6764160.81	3164.40	16573.79
AP3-1	50927.41	8080.25	344.78	1295.41	114612.37	6462151.31	3356.56	16392.51
AP4-1	83349.87	9898.38	515.82	1007.13	848.28	8491859.31	5298.73	23080.43
MZ4-1	10278.02	4770.51	410.66	7586.40	448908.16	6313907.31	2299.31	12295.25
MZ4-2	18737.83	4687.71	343.86	8069.09	948727.53	6563032.31	2412.99	15111.43
MZ4-3	86162.84	19577.99	355.86	8684.97	1778461.83	6502191.31	2395.59	16831.44
MZ4-4	70485.64	22629.49	301.54	5279.35	521107.53	6303451.31	2078.83	12260.41
MZ4-5	56965.36	13532.19	356.90	5825.79	457357.97	6155572.81	2237.71	12298.49
MZ4-6	52799.10	14685.80	256.38	5834.63	443579.66	6144447.81	2094.87	12184.33
MZ4-7	75676.71	17643.54	263.58	5978.83	565281.78	5019707.81	1714.71	9693.71
MZ4-8	57698.29	12918.67	219.02	5807.07	429255.91	4811147.31	1774.75	9396.67
MZ4-9	52172.97	12852.55	243.50	5826.59	417663.16	4958176.31	1692.11	9613.39
MZ4-10	64562.12	12294.47	221.38	3347.94	316775.09	4855244.31	1623.07	8984.87
MZ4-11	79418.45	13685.56	314.70	3533.22	370035.41	5956559.81	2078.71	10912.92
MZ4-12	96143.42	20647.96	363.10	3970.94	467213.84	6762179.81	2342.47	12338.09
SRM614-2	3295073.78	4103033.29	2090.95	1289.21	-3653.95	1046481.81	5189.97	1519.15
SRM612-2	3241766.98	4207782.99	2043.35	1172.65	20907.06	1040428.81	15667.55	1575.23
SRM610-2	1609274.88	1757780.09	818.22	961.65	143574.75	446345.97	68850.04	6625.70
AP1-2	36313.45	-3158.70	280.98	565.48	-25439.44	5719032.31	2644.39	10030.20
AP2-2	115756.69	-4161.51	231.26	227.20	-63234.05	5961052.81	2791.16	11363.40
AP3-2	55546.15	-2590.14	382.94	874.53	34912.91	6417853.31	3567.36	14643.54
AP4-2	92698.08	-768.52	404.02	391.32	-63354.74	7937119.31	5216.29	17032.16
zero correction								
SRM614-1	2731934.48	2955992.99	1648.59	2197.77	152124.00	797816.00	7178.30	1991.43
SRM612-1	4427292.98	5195490.49	2686.60	3002.54	267052.34	1389566.71	23037.95	3862.92
SRM610-1	1715211.88	1710257.39	960.87	2329.33	407448.47	436989.81	68695.45	8166.27
AP1-1	65022.57	12051.63	408.02	1979.53	221403.87	8193355.81	3741.64	22278.83
AP2-1	115367.38	12392.35	332.02	1032.13	18440.84	6764160.81	3164.40	16573.79
AP3-1	50927.41	8080.25	344.78	1295.41	114612.37	6462151.31	3356.56	16392.51
AP4-1	83349.87	9898.38	515.82	1007.13	848.28	8491859.31	5298.73	23080.43
MZ4-1	10278.02	4770.51	410.66	7586.40	448908.16	6313907.31	2299.31	12295.25
MZ4-2	18737.83	4687.71	343.86	8069.09	948727.53	6563032.31	2412.99	15111.43
MZ4-3	86162.84	19577.99	355.86	8684.97	1778461.83	6502191.31	2395.59	16831.44
MZ4-4	70485.64	22629.49	301.54	5279.35	521107.53	6303451.31	2078.83	12260.41
MZ4-5	56965.36	13532.19	356.90	5825.79	457357.97	6155572.81	2237.71	12298.49
MZ4-6	52799.10	14685.80	256.38	5834.63	443579.66	6144447.81	2094.87	12184.33
MZ4-7	75676.71	17643.54	263.58	5978.83	565281.78	5019707.81	1714.71	9693.71
MZ4-8	57698.29	12918.67	219.02	5807.07	429255.91	4811147.31	1774.75	9396.67
MZ4-9	52172.97	12852.55	243.50	5826.59	417663.16	4958176.31	1692.11	9613.39
MZ4-10	64562.12	12294.47	221.38	3347.94	316775.09	4855244.31	1623.07	8984.87
MZ4-11	79418.45	13685.56	314.70	3533.22	370035.41	5956559.81	2078.71	10912.92
MZ4-12	96143.42	20647.96	363.10	3970.94	467213.84	6762179.81	2342.47	12338.09
SRM614-2	3295073.78	4103033.29	2090.95	1289.21	0.00	1046481.81	5189.97	1519.15
SRM612-2	3241766.98	4207782.99	2043.35	1172.65	20907.06	1040428.81	15667.55	1575.23
SRM610-2	1609274.88	1757780.09	818.22	961.65	143574.75	446345.97	68850.04	6625.70
AP1-2	36313.45	0.00	280.98	565.48	0.00	5719032.31	2644.39	10030.20
AP2-2	115756.69	0.00	231.26	227.20	0.00	5961052.81	2791.16	11363.40
AP3-2	55546.15	0.00	382.94	874.53	34912.91	6417853.31	3567.36	14643.54
AP4-2	92698.08	0.00	404.02	391.32	0.00	7937119.31	5216.29	17032.16
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	3.424266	3.705106	0.002066	0.002755	0.190676	1.000000	0.008997	0.002496
SRM612-1	3.186096	3.738928	0.001933	0.002161	0.192184	1.000000	0.016579	0.002780

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	3.925062	3.913724	0.002199	0.005330	0.932398	1.000000	0.157201	0.018688
AP1-1	0.007936	0.001471	0.000050	0.000242	0.027022	1.000000	0.000457	0.002719
AP2-1	0.017056	0.001832	0.000049	0.000153	0.002726	1.000000	0.000468	0.002450
AP3-1	0.007881	0.001250	0.000053	0.000200	0.017736	1.000000	0.000519	0.002537
AP4-1	0.009815	0.001166	0.000061	0.000119	0.000100	1.000000	0.000624	0.002718
MZ4-1	0.001628	0.000756	0.000065	0.001202	0.071098	1.000000	0.000364	0.001947
MZ4-2	0.002855	0.000714	0.000052	0.001229	0.144556	1.000000	0.000368	0.002303
MZ4-3	0.013251	0.003011	0.000055	0.001336	0.273517	1.000000	0.000368	0.002589
MZ4-4	0.011182	0.003590	0.000048	0.000838	0.082670	1.000000	0.000330	0.001945
MZ4-5	0.009254	0.002198	0.000058	0.000946	0.074300	1.000000	0.000364	0.001998
MZ4-6	0.008593	0.002390	0.000042	0.000950	0.072192	1.000000	0.000341	0.001983
MZ4-7	0.015076	0.003515	0.000053	0.001191	0.112612	1.000000	0.000342	0.001931
MZ4-8	0.011993	0.002685	0.000046	0.001207	0.089221	1.000000	0.000369	0.001953
MZ4-9	0.010523	0.002592	0.000049	0.001175	0.084237	1.000000	0.000341	0.001939
MZ4-10	0.013297	0.002532	0.000046	0.000690	0.065244	1.000000	0.000334	0.001851
MZ4-11	0.013333	0.002298	0.000053	0.000593	0.062122	1.000000	0.000349	0.001832
MZ4-12	0.014218	0.003053	0.000054	0.000587	0.069092	1.000000	0.000346	0.001825
SRM614-2	3.148716	3.920788	0.001998	0.001232	0.000000	1.000000	0.004959	0.001452
SRM612-2	3.115799	4.044278	0.001964	0.001127	0.020095	1.000000	0.015059	0.001514
SRM610-2	3.605443	3.938156	0.001833	0.002154	0.321667	1.000000	0.154253	0.014844
AP1-2	0.006350	0.000000	0.000049	0.000099	0.000000	1.000000	0.000462	0.001754
AP2-2	0.019419	0.000000	0.000039	0.000038	0.000000	1.000000	0.000468	0.001906
AP3-2	0.008655	0.000000	0.000060	0.000136	0.005440	1.000000	0.000556	0.002282
AP4-2	0.011679	0.000000	0.000051	0.000049	0.000000	1.000000	0.000657	0.002146
standardize signal averages AP								
AP1	0.007143	0.000735	0.000049	0.000170	0.013511	1.000000	0.000460	0.002236
AP2	0.018237	0.000916	0.000044	0.000095	0.001363	1.000000	0.000468	0.002178
AP3	0.008268	0.000625	0.000057	0.000168	0.011588	1.000000	0.000538	0.002409
AP4	0.010747	0.000583	0.000056	0.000084	0.000050	1.000000	0.000641	0.002432
linest from std sig ave								
	0.013600	0.287900	8972.219515	0.056825	0.000588	1.000000	0.006853	0.479977
standardize signal averages SRM								
srm614-2	3.286491	3.812947	0.002032	0.001993	0.095338	1.000000	0.006978	0.001974
srm612-2	3.150947	3.891603	0.001949	0.001644	0.106139	1.000000	0.015819	0.002147
srm610-2	3.765252	3.925940	0.002016	0.003742	0.627033	1.000000	0.155727	0.016766
linest from std sig ave								
	0.041391	1.012074	0.794306	0.991665	0.007279	1.000000	0.032941	0.297418
concentration data								
SRM614-1	3994.01	91483.25	1590045.64	13.43	119.03	85763.00	5.29	102.75
SRM612-1	3716.22	92318.36	1487725.04	10.53	119.98	85763.00	9.74	114.43
SRM610-1	4578.13	96634.26	1691963.93	25.98	582.07	85763.00	92.39	769.26
AP1-1	43.06	168.94	178248.23	5.48	78.47	398936.00	1.25	520.66
AP2-1	92.54	210.42	175693.59	3.46	7.92	398936.00	1.28	469.17
AP3-1	42.76	143.61	190972.37	4.54	51.50	398936.00	1.42	485.73
AP4-1	53.25	133.88	217420.74	2.69	0.29	398936.00	1.71	520.43
MZ4-1	8.83	86.78	232803.62	27.24	206.46	398936.00	1.00	372.87
MZ4-2	15.49	82.04	187535.17	27.87	419.77	398936.00	1.01	440.88
MZ4-3	71.90	345.82	195895.73	30.28	794.26	398936.00	1.01	495.66
MZ4-4	60.67	412.33	171226.95	18.99	240.06	398936.00	0.90	372.44
MZ4-5	50.21	252.49	207531.32	21.45	215.76	398936.00	0.99	382.57
MZ4-6	46.62	274.51	149350.56	21.53	209.64	398936.00	0.93	379.70
MZ4-7	81.80	403.69	187948.80	27.00	327.01	398936.00	0.93	369.77
MZ4-8	65.07	308.40	162944.85	27.36	259.09	398936.00	1.01	373.98
MZ4-9	57.09	297.72	175785.31	26.64	244.61	398936.00	0.93	371.26
MZ4-10	72.15	290.83	163204.79	15.63	189.46	398936.00	0.91	354.34
MZ4-11	72.34	263.88	189106.65	13.45	180.40	398936.00	0.95	350.81
MZ4-12	77.14	350.70	192196.33	13.31	200.64	398936.00	0.95	349.37
SRM614-2	3672.62	96808.68	1537489.62	6.00	0.00	85763.00	2.91	59.76
SRM612-2	3634.22	99857.78	1511230.00	5.49	12.54	85763.00	8.85	62.32
SRM610-2	4205.34	97237.52	1410590.07	10.50	200.81	85763.00	90.66	611.06
AP1-2	34.45	0.00	175856.51	2.24	0.00	398936.00	1.26	335.82
AP2-2	105.36	0.00	138861.92	0.86	0.00	398936.00	1.28	365.01
AP3-2	46.96	0.00	213573.09	3.09	15.80	398936.00	1.52	436.90
AP4-2	63.37	0.00	182198.79	1.12	0.00	398936.00	1.80	410.89
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-3	39503.38	558160.19	55789.56	382.48	209.72	31681.70	3185.42	381.52
SRM614-3	10039726.00	8384654.50	87416.06	322.56	205.40	3288055.80	42578.08	3084.90
SRM612-3	9740556.00	7480165.50	359197.22	271.24	287.44	3118295.80	54252.11	10911.70
SRM610-3	4608777.00	3631090.50	451620.72	236.16	253.96	1415282.90	151630.97	17478.90
AP1-3	148744.52	133074.31	27705324.00	619.04	379.08	18049126.00	8925.17	84070.59
AP2-3	122158.25	110285.62	27633762.00	617.48	365.08	17343546.00	8581.25	78117.52
AP3-3	270800.94	106330.16	33507428.00	797.04	476.52	22311652.00	13911.56	126557.95
AP4-3	373088.13	100213.16	32411886.00	793.32	431.24	19678406.00	15128.41	117623.06
TGP3-1	152596.78	79844.53	34336212.00	928.65	576.96	25631436.00	11951.71	147901.75
TGP3-2	92942.92	65929.85	33244078.00	796.16	471.56	23281270.00	10311.54	118535.30
TGP3-3	126190.63	64674.92	32154224.00	797.12	433.60	20966446.00	8701.53	99671.64
TGP3-4	209255.30	66571.66	34845136.00	902.97	541.52	25708234.00	11129.10	124093.41
TGP3-5	119916.55	51610.85	33789888.00	957.21	549.68	24267502.00	10453.10	108360.89
TGP3-6	117652.50	49038.72	33004116.00	772.12	511.92	22956936.00	9588.01	99329.16
TGP3-7	1549320.90	130425.05	31509662.00	822.16	568.60	21483584.00	9403.13	94024.73
TGP3-8	669900.63	72677.77	31272020.00	747.56	480.60	21143410.00	9204.89	87453.81
TGP3-9	180320.34	42355.44	32154564.00	830.56	481.44	24034668.00	10466.42	86775.97
TGP3-10	374647.19	60619.90	31447558.00	633.60	440.36	20041028.00	8239.05	73530.73
TGP3-11	246228.11	44417.21	32330918.00	780.80	475.20	20968706.00	8399.13	75939.19
TGP3-12	136578.20	39237.34	32628880.00	764.88	498.64	21630658.00	8536.41	75120.74
TGP3-13	242416.05	50555.36	21438598.00	472.40	348.96	11300471.00	5441.99	28788.48
TGP3-14	87055.97	26472.91	21827870.00	425.92	351.56	11527866.00	5168.47	27662.52
TGP3-15	262150.41	48581.84	26641594.00	542.20	442.76	14820806.00	7266.76	38390.14
SRM614-4	6546577.00	6768458.00	33846.51	155.04	109.12	2021678.30	8868.85	1690.45
SRM612-4	7395529.50	7031882.00	39768.18	153.84	148.20	2219487.30	29014.80	4244.70
SRM610-4	3590892.30	3196703.50	55853.31	157.32	138.12	999660.19	129838.45	12016.83
AP1-4	52110.53	17402.46	23413590.00	450.84	269.88	12793128.00	5855.11	21601.68
AP2-4	55808.83	16576.17	24720068.00	473.40	267.56	13332951.00	6074.43	24855.90
AP3-4	160872.58	22949.61	29608028.00	625.28	324.88	16453802.00	8997.05	43409.61
AP4-4	316326.97	32502.02	29448318.00	645.92	335.84	15457523.00	11757.11	49027.60
blank-4	13066.31	17531.78	12576.55	95.56	97.72	77629.12	1003.29	1039.09
blank average	26284.85	287845.98	34183.05	239.02	153.72	54655.41	2094.35	710.30
blank subtraction								
SRM614-3	10013441.15	8096808.52	53233.00	83.54	51.68	3233400.39	40483.73	2374.59
SRM612-3	9714271.15	7192319.52	325014.17	32.22	133.72	3063640.39	52157.75	10201.40
SRM610-3	4582492.15	3343244.52	417437.67	-2.86	100.24	1360627.49	149536.62	16768.59
AP1-3	122459.67	-154771.62	27671140.95	380.02	225.36	17994470.59	6830.82	83360.29
AP2-3	95873.40	-177560.36	27599578.95	378.46	211.36	17288890.59	6486.90	77407.21
AP3-3	244516.09	-181515.82	33473244.95	558.02	322.80	22256996.59	11817.21	125847.65
AP4-3	346803.28	-187632.82	32377702.95	554.30	277.52	19623750.59	13034.05	116912.76
TGP3-1	126311.93	-208001.45	34302028.95	689.62	423.24	25576780.59	9857.36	147191.45
TGP3-2	66658.07	-221916.13	33209894.95	557.14	317.84	23226614.59	8217.19	117825.00
TGP3-3	99905.78	-223171.06	32120040.95	558.10	279.88	20911790.59	6607.18	98961.34
TGP3-4	182970.45	-221274.33	34810952.95	663.94	387.80	25653578.59	9034.75	123383.11
TGP3-5	93631.70	-236235.13	33755704.95	718.18	395.96	24212846.59	8358.75	107650.59
TGP3-6	91367.65	-238807.27	32969932.95	533.10	358.20	22902280.59	7493.66	98618.86
TGP3-7	1523036.05	-157420.93	31475478.95	583.14	414.88	21428928.59	7308.78	93314.42
TGP3-8	643615.78	-215168.22	31237836.95	508.54	326.88	21088754.59	7110.54	86833.51
TGP3-9	154035.49	-245490.55	32120380.95	591.54	327.72	23980012.59	8372.07	86065.67
TGP3-10	348362.34	-227226.08	31413374.95	394.58	286.64	19986372.59	6144.70	72820.43
TGP3-11	219943.26	-243428.77	32296734.95	541.78	321.48	20914050.59	6304.78	75228.88
TGP3-12	110293.35	-248608.64	32594696.95	525.86	344.92	21576002.59	6442.06	74410.44
TGP3-13	216131.20	-237290.62	21404414.95	233.38	195.24	11245815.59	3347.64	28078.18
TGP3-14	60771.12	-261373.08	21793686.95	186.90	197.84	11473210.59	3074.12	26952.21
TGP3-15	235865.56	-239264.15	26607410.95	303.18	289.04	14766150.59	5172.41	37679.83
SRM614-4	6520292.15	6480612.02	-336.54	-83.98	-44.60	1967022.89	6774.50	980.15
SRM612-4	7369244.65	6744036.02	5585.13	-85.18	-5.52	2164831.89	26920.45	3534.40
SRM610-4	3564607.45	2908857.52	21670.26	-81.70	-15.60	945004.78	127744.10	11306.52
AP1-4	25825.68	-270443.53	23379406.95	211.82	116.16	12738472.59	3760.76	20891.38
AP2-4	29523.98	-271269.81	24685884.95	234.38	113.84	13278295.59	3980.08	24145.60
AP3-4	134587.73	-264896.38	29573844.95	386.26	171.16	16399146.59	6902.70	42699.30
AP4-4	290042.12	-255343.96	29414134.95	406.90	182.12	15402867.59	9662.75	48317.29
zero correction								
SRM614-3	10013441.15	8096808.52	53233.00	83.54	51.68	3233400.39	40483.73	2374.59
SRM612-3	9714271.15	7192319.52	325014.17	32.22	133.72	3063640.39	52157.75	10201.40
SRM610-3	4582492.15	3343244.52	417437.67	0.00	100.24	1360627.49	149536.62	16768.59
AP1-3	122459.67	0.00	27671140.95	380.02	225.36	17994470.59	6830.82	83360.29
AP2-3	95873.40	0.00	27599578.95	378.46	211.36	17288890.59	6486.90	77407.21
AP3-3	244516.09	0.00	33473244.95	558.02	322.80	22256996.59	11817.21	125847.65
AP4-3	346803.28	0.00	32377702.95	554.30	277.52	19623750.59	13034.05	116912.76
TGP3-1	126311.93	0.00	34302028.95	689.62	423.24	25576780.59	9857.36	147191.45
TGP3-2	66658.07	0.00	33209894.95	557.14	317.84	23226614.59	8217.19	117825.00
TGP3-3	99905.78	0.00	32120040.95	558.10	279.88	20911790.59	6607.18	98961.34

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	182970.45	0.00	34810952.95	663.94	387.80	25653578.59	9034.75	123383.11
TGP3-5	93631.70	0.00	33755704.95	718.18	395.96	24212846.59	8358.75	107650.59
TGP3-6	91367.65	0.00	32969932.95	533.10	358.20	22902280.59	7493.66	98618.86
TGP3-7	1523036.05	0.00	31475478.95	583.14	414.88	21428928.59	7308.78	93314.42
TGP3-8	643615.78	0.00	31237836.95	508.54	326.88	21088754.59	7110.54	86833.51
TGP3-9	154035.49	0.00	32120380.95	591.54	327.72	23980012.59	8372.07	86065.67
TGP3-10	348362.34	0.00	31413374.95	394.58	286.64	19986372.59	6144.70	72820.43
TGP3-11	219943.26	0.00	32296734.95	541.78	321.48	20914050.59	6304.78	75228.88
TGP3-12	110293.35	0.00	32594696.95	525.86	344.92	21576002.59	6442.06	74410.44
TGP3-13	216131.20	0.00	21404414.95	233.38	195.24	11245815.59	3347.64	28078.18
TGP3-14	60771.12	0.00	21793686.95	186.90	197.84	11473210.59	3074.12	26952.21
TGP3-15	235865.56	0.00	26607410.95	303.18	289.04	14766150.59	5172.41	37679.83
SRM614-4	6520292.15	6480612.02	0.00	0.00	0.00	1967022.89	6774.50	980.15
SRM612-4	7369244.65	6744036.02	5585.13	0.00	0.00	2164831.89	26920.45	3534.40
SRM610-4	3564607.45	2908857.52	21670.26	0.00	0.00	945004.78	127744.10	11306.52
AP1-4	25825.68	0.00	23379406.95	211.82	116.16	12738472.59	3760.76	20891.38
AP2-4	29523.98	0.00	24685884.95	234.38	113.84	13278295.59	3980.08	24145.60
AP3-4	134587.73	0.00	29573844.95	386.26	171.16	16399146.59	6902.70	42699.30
AP4-4	290042.12	0.00	29414134.95	406.90	182.12	15402867.59	9662.75	48317.29

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-3	3.096876	2.504116	0.016463	0.000026	0.000016	1.000000	0.012520	0.000734
SRM612-3	3.170826	2.347638	0.106088	0.000011	0.000044	1.000000	0.017025	0.003330
SRM610-3	3.367926	2.457134	0.306798	0.000000	0.000074	1.000000	0.019903	0.012324
AP1-3	0.006805	0.000000	1.537758	0.000021	0.000013	1.000000	0.000380	0.004633
AP2-3	0.005545	0.000000	1.596377	0.000022	0.000012	1.000000	0.000375	0.004477
AP3-3	0.010986	0.000000	1.503943	0.000025	0.000015	1.000000	0.000531	0.005654
AP4-3	0.017673	0.000000	1.649924	0.000028	0.000014	1.000000	0.000664	0.005958
TGP3-1	0.004939	0.000000	1.341139	0.000027	0.000017	1.000000	0.000385	0.005755
TGP3-2	0.002870	0.000000	1.429821	0.000024	0.000014	1.000000	0.000354	0.005073
TGP3-3	0.004777	0.000000	1.535978	0.000027	0.000013	1.000000	0.000316	0.004732
TGP3-4	0.007132	0.000000	1.356963	0.000026	0.000015	1.000000	0.000352	0.004810
TGP3-5	0.003867	0.000000	1.394124	0.000030	0.000016	1.000000	0.000345	0.004446
TGP3-6	0.003989	0.000000	1.439592	0.000023	0.000016	1.000000	0.000327	0.004306
TGP3-7	0.071074	0.000000	1.468831	0.000027	0.000019	1.000000	0.000341	0.004355
TGP3-8	0.030519	0.000000	1.481256	0.000024	0.000016	1.000000	0.000337	0.004118
TGP3-9	0.006423	0.000000	1.339465	0.000025	0.000014	1.000000	0.000349	0.003589
TGP3-10	0.017430	0.000000	1.571740	0.000020	0.000014	1.000000	0.000307	0.003644
TGP3-11	0.010517	0.000000	1.544260	0.000026	0.000015	1.000000	0.000301	0.003597
TGP3-12	0.005112	0.000000	1.510692	0.000024	0.000016	1.000000	0.000299	0.003449
TGP3-13	0.019219	0.000000	1.903323	0.000021	0.000017	1.000000	0.000298	0.002497
TGP3-14	0.005297	0.000000	1.899528	0.000016	0.000017	1.000000	0.000268	0.002349
TGP3-15	0.015973	0.000000	1.801919	0.000021	0.000020	1.000000	0.000350	0.002552
SRM614-4	3.314802	3.294630	0.000000	0.000000	0.000000	1.000000	0.003444	0.000498
SRM612-4	3.404072	3.115270	0.002580	0.000000	0.000000	1.000000	0.012435	0.001633
SRM610-4	3.772052	3.078141	0.022931	0.000000	0.000000	1.000000	0.013578	0.011965
AP1-4	0.002027	0.000000	1.835338	0.000017	0.000009	1.000000	0.000295	0.001640
AP2-4	0.002223	0.000000	1.859115	0.000018	0.000009	1.000000	0.000300	0.001818
AP3-4	0.008207	0.000000	1.803377	0.000024	0.000010	1.000000	0.000421	0.002604
AP4-4	0.018830	0.000000	1.909653	0.000026	0.000012	1.000000	0.000627	0.003137

standardize signal averages AP								
AP1	0.004416	0.000000	1.686548	0.000019	0.000011	1.000000	0.000337	0.003136
AP2	0.003884	0.000000	1.727746	0.000020	0.000010	1.000000	0.000337	0.003148
AP3	0.009597	0.000000	1.653660	0.000024	0.000012	1.000000	0.000476	0.004129
AP4	0.018252	0.000000	1.779789	0.000027	0.000013	1.000000	0.000646	0.004547

lineat from std sig ave								
	0.019026	0.000000	0.271174	0.346367	0.880564	1.000000	0.008387	0.288858

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	3.205839	2.899373	0.008232	0.000013	0.000008	1.000000	0.007982	0.000616
srM612-2	3.287449	2.731454	0.054334	0.000005	0.000022	1.000000	0.014730	0.002481
srM610-2	3.569989	2.767637	0.164865	0.000000	0.000037	1.000000	0.122540	0.012144

linest from std sig ave								
	0.042125	1.400833	0.022988	0.000000	35.401401	1.000000	0.041676	0.408219

concentration data								
SRM614-3	5053.26	0.00	382.89	0.77	48.53	85763.00	9.01	18.19
SRM612-3	5173.93	0.00	2467.25	0.31	132.52	85763.00	12.25	82.49
SRM610-3	5495.54	0.00	7135.12	0.00	223.68	85763.00	79.05	305.31
AP1-3	51.65	0.00	166356.55	2.92	176.87	398936.00	1.27	533.84
AP2-3	42.09	0.00	172697.98	3.02	172.66	398936.00	1.26	515.94
AP3-3	83.39	0.00	162698.36	3.46	204.83	398936.00	1.78	651.58
AP4-3	134.14	0.00	178490.84	3.90	199.73	398936.00	2.22	686.54
TGP3-1	37.48	0.00	145086.11	3.73	233.70	398936.00	1.29	663.17
TGP3-2	21.78	0.00	154679.77	3.31	193.26	398936.00	1.18	584.57
TGP3-3	36.26	0.00	166163.94	3.69	189.02	398936.00	1.06	545.33
TGP3-4	54.14	0.00	146797.91	3.58	213.49	398936.00	1.18	554.24
TGP3-5	29.35	0.00	150818.02	4.10	230.96	398936.00	1.16	512.34
TGP3-6	30.28	0.00	155736.80	3.22	220.89	398936.00	1.09	496.21
TGP3-7	539.46	0.00	158899.97	3.76	273.43	398936.00	1.14	501.81
TGP3-8	231.65	0.00	160244.06	3.33	218.91	398936.00	1.13	474.49
TGP3-9	48.76	0.00	144904.94	3.41	193.01	398936.00	1.17	413.59
TGP3-10	132.30	0.00	170032.73	2.73	202.55	398936.00	1.03	419.86
TGP3-11	79.82	0.00	167059.96	3.58	217.09	398936.00	1.01	414.51
TGP3-12	38.80	0.00	163428.53	3.37	225.77	398936.00	1.00	397.42
TGP3-13	145.87	0.00	205903.78	2.87	245.19	398936.00	1.00	287.72
TGP3-14	40.20	0.00	205493.30	2.25	243.53	398936.00	0.90	270.71
TGP3-15	121.24	0.00	194933.84	2.84	276.45	398936.00	1.17	294.06
SRM614-4	5408.86	0.00	0.00	0.00	0.00	85763.00	2.48	12.34
SRM612-4	5554.52	0.00	60.00	0.00	0.00	85763.00	8.94	40.45
SRM610-4	6154.97	0.00	533.31	0.00	0.00	85763.00	97.23	296.40
AP1-4	15.39	0.00	198549.16	2.30	128.79	398936.00	0.99	188.99
AP2-4	16.88	0.00	201121.40	2.44	121.08	398936.00	1.00	209.55
AP3-4	62.29	0.00	195091.55	3.25	147.40	398936.00	1.41	300.05
AP4-4	142.93	0.00	206588.63	3.65	166.99	398936.00	2.10	361.48

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-1	44192.37	549599.38	57168.56	395.68	199.20	31926.42	3963.62	477.64
SRM614-1	12041498.00	10159247.00	52682.34	354.84	200.92	3961550.50	50381.04	2475.61
SRM612-1	10807125.00	8576924.00	154568.47	355.48	214.64	3433830.80	63011.79	6634.04
SRM610-1	4349429.00	3260191.00	64602.00	251.92	207.36	1161933.40	148145.00	13064.31
AP1-1	111802.31	152783.50	30320146.00	703.68	415.96	21515126.00	10529.98	112304.83
AP2-1	129176.88	138900.66	26638766.00	618.12	364.68	16456195.00	8793.57	86435.37
AP3-1	301996.19	122608.73	33688528.00	893.05	450.32	21078540.00	15048.48	176647.88
AP4-1	345994.72	119012.07	32446334.00	804.20	414.88	19835066.00	15715.37	133899.11
TGP2-1	410587.00	128147.20	34547184.00	881.72	561.00	25674440.00	11664.31	152086.81
TGP2-2	291678.28	92807.04	33747304.00	811.56	571.68	24021294.00	10595.46	129382.24
TGP2-3	960202.06	127559.40	34234232.00	848.80	569.60	24030012.00	10394.30	121874.52
TGP2-4	158400.56	73793.85	19735880.00	453.72	321.68	11041238.00	5073.39	35911.60
TGP2-5	55583.67	51533.13	21212086.00	414.44	326.84	11702538.00	5239.07	35705.88
TGP2-6	57877.97	48305.27	18141768.00	383.92	271.48	9912041.00	4488.54	29831.53
TGP2-7	152883.42	60741.98	17160778.00	376.96	261.04	9191527.00	4228.38	27730.36
TGP2-8	41759.52	37063.53	18244250.00	373.44	258.72	9841404.00	4424.59	26738.95
TGP2-9	35541.80	36063.68	18551030.00	382.12	288.00	9983903.00	4294.70	26624.87
TGP2-10	19772.55	29013.00	23233572.00	477.56	328.72	12844396.00	5315.95	30631.17
TGP2-11	29410.53	28560.52	24958932.00	518.32	342.16	14162650.00	5765.19	37149.65
TGP2-12	43609.89	28527.36	23269342.00	399.36	296.76	12741124.00	5159.35	30583.85
TGP2-13	116509.93	40777.75	21881040.00	460.36	308.48	11900268.00	4956.79	32054.14
TGP2-14	82690.19	32142.10	24191308.00	563.12	332.48	13467392.00	5610.31	38243.61
TGP2-15	90523.52	31293.78	26650284.00	577.04	323.64	15715993.00	6238.44	44735.49
TGP2-16	97200.59	32830.47	33086812.00	781.12	569.12	21707590.00	8595.49	77428.03
TGP2-17	56381.44	27088.23	32828578.00	865.00	457.20	21743284.00	8573.45	75175.18
TGP2-18	147944.95	32765.34	32948132.00	757.28	520.84	21880738.00	8643.29	75964.98
SRM614-2	7379282.00	7378987.00	13734.16	199.32	130.08	2271176.00	10433.46	1477.77
SRM612-2	7220725.50	6934543.50	17956.14	161.12	123.16	2175524.80	28758.92	3609.74

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	3320523.30	2942539.80	40903.91	142.36	119.08	907843.06	120091.08	11186.14
AP1-2	54815.27	17379.82	26127390.00	492.28	279.60	14932379.00	6077.07	27200.99
AP2-2	61465.71	18102.50	23290780.00	482.20	287.80	11950933.00	5518.91	25432.06
AP3-2	271536.50	31811.22	32514724.00	851.92	454.20	18307274.00	11666.99	76052.83
AP4-2	245244.30	30154.41	28482356.00	605.88	366.44	15003364.00	10616.54	44557.17
blank-2	7333.16	18210.18	4949.31	115.44	97.08	73472.77	894.57	885.20
blank average	25762.76	283904.78	31058.94	255.56	148.14	52699.60	2429.09	681.42
blank subtraction								
SRM614-1	12015735.24	9875342.22	21623.40	99.28	52.78	3908850.90	47951.95	1794.19
SRM612-1	10781362.24	8293019.22	123509.53	99.92	66.50	3381131.20	60582.70	5952.61
SRM610-1	4323666.24	2976286.22	33543.07	-3.64	59.22	1109233.80	145715.91	12382.89
AP1-1	86039.55	-131121.28	30289087.06	448.12	267.82	21462426.40	8100.89	111623.41
AP2-1	103414.12	-145004.12	26607707.06	362.56	216.54	16403495.40	6364.48	85753.94
AP3-1	276233.43	-161296.05	33657469.06	637.48	302.18	21025840.40	12619.39	175966.46
AP4-1	320231.96	-164892.71	32415275.06	548.64	266.74	19782366.40	13286.27	133217.69
TGP2-1	384824.24	-155757.58	34516125.06	626.16	412.86	25621740.40	9235.21	151405.39
TGP2-2	265915.52	-191097.74	33716245.06	556.00	423.54	23968594.40	8166.37	128700.82
TGP2-3	934439.30	-156345.38	34203173.06	593.24	421.46	23977312.40	7965.21	121193.10
TGP2-4	132637.80	-210110.93	19704821.06	198.16	173.54	10988538.40	2644.30	35230.18
TGP2-5	29820.91	-232371.65	21181027.06	158.88	178.70	11649838.40	2809.98	35024.46
TGP2-6	32115.20	-235599.51	18110709.06	128.36	123.34	9859341.40	2059.45	29150.10
TGP2-7	127120.66	-223162.80	17129719.06	121.40	112.90	9138827.40	1799.29	27048.93
TGP2-8	15996.75	-246841.25	18213191.06	117.88	110.58	9788704.40	1995.49	26057.53
TGP2-9	9779.04	-247841.10	18519971.06	126.56	139.86	9931203.40	1865.61	25943.45
TGP2-10	-5990.21	-254891.78	23202513.06	222.00	180.58	12791696.40	2886.86	29949.75
TGP2-11	3647.76	-255344.26	24927873.06	262.76	194.02	14109950.40	3336.10	36468.22
TGP2-12	17847.12	-255377.42	23238283.06	143.80	148.62	12688424.40	2730.26	29902.43
TGP2-13	90747.17	-243127.03	21849981.06	204.80	160.34	11847568.40	2527.69	31372.72
TGP2-14	56927.42	-251762.68	24160249.06	307.56	184.34	13414692.40	3181.22	37562.19
TGP2-15	64760.75	-252611.01	26619225.06	321.48	175.50	15663293.40	3809.34	44054.07
TGP2-16	71437.82	-251074.32	33055753.06	525.56	420.98	21654890.40	6166.39	76746.61
TGP2-17	30618.67	-256816.55	32797519.06	609.44	309.06	21690584.40	6144.35	74493.76
TGP2-18	122182.19	-251139.44	32917073.06	501.72	372.70	21828038.40	6214.19	75283.56
SRM614-2	7353519.24	7095082.22	-17324.78	-56.24	-18.06	2218476.40	8004.37	796.34
SRM612-2	7194962.74	6650638.72	-13102.79	-94.44	-24.98	2122825.20	26329.83	2928.32
SRM610-2	3294760.54	2658635.02	9844.97	-113.20	-29.06	855143.46	117661.99	10504.72
AP1-2	29052.51	-266524.96	26096331.06	236.72	131.46	14879679.40	3647.98	26519.57
AP2-2	35702.94	-265802.28	23259721.06	226.64	139.66	11898233.40	3089.82	24750.64
AP3-2	245773.74	-252093.56	32483665.06	596.36	306.06	18254574.40	9237.89	75371.40
AP4-2	219481.54	-253750.37	28451297.06	350.32	218.30	14950664.40	8187.45	43875.75
zero correction								
SRM614-1	12015735.24	9875342.22	21623.40	99.28	52.78	3908850.90	47951.95	1794.19
SRM612-1	10781362.24	8293019.22	123509.53	99.92	66.50	3381131.20	60582.70	5952.61
SRM610-1	4323666.24	2976286.22	33543.07	0.00	59.22	1109233.80	145715.91	12382.89
AP1-1	86039.55	0.00	30289087.06	448.12	267.82	21462426.40	8100.89	111623.41
AP2-1	103414.12	0.00	26607707.06	362.56	216.54	16403495.40	6364.48	85753.94
AP3-1	276233.43	0.00	33657469.06	637.48	302.18	21025840.40	12619.39	175966.46
AP4-1	320231.96	0.00	32415275.06	548.64	266.74	19782366.40	13286.27	133217.69
TGP2-1	384824.24	0.00	34516125.06	626.16	412.86	25621740.40	9235.21	151405.39
TGP2-2	265915.52	0.00	33716245.06	556.00	423.54	23968594.40	8166.37	128700.82
TGP2-3	934439.30	0.00	34203173.06	593.24	421.46	23977312.40	7965.21	121193.10
TGP2-4	132637.80	0.00	19704821.06	198.16	173.54	10988538.40	2644.30	35230.18
TGP2-5	29820.91	0.00	21181027.06	158.88	178.70	11649838.40	2809.98	35024.46
TGP2-6	32115.20	0.00	18110709.06	128.36	123.34	9859341.40	2059.45	29150.10
TGP2-7	127120.66	0.00	17129719.06	121.40	112.90	9138827.40	1799.29	27048.93
TGP2-8	15996.75	0.00	18213191.06	117.88	110.58	9788704.40	1995.49	26057.53
TGP2-9	9779.04	0.00	18519971.06	126.56	139.86	9931203.40	1865.61	25943.45
TGP2-10	0.00	0.00	23202513.06	222.00	180.58	12791696.40	2886.86	29949.75
TGP2-11	3647.76	0.00	24927873.06	262.76	194.02	14109950.40	3336.10	36468.22
TGP2-12	17847.12	0.00	23238283.06	143.80	148.62	12688424.40	2730.26	29902.43
TGP2-13	90747.17	0.00	21849981.06	204.80	160.34	11847568.40	2527.69	31372.72
TGP2-14	56927.42	0.00	24160249.06	307.56	184.34	13414692.40	3181.22	37562.19
TGP2-15	64760.75	0.00	26619225.06	321.48	175.50	15663293.40	3809.34	44054.07
TGP2-16	71437.82	0.00	33055753.06	525.56	420.98	21654890.40	6166.39	76746.61
TGP2-17	30618.67	0.00	32797519.06	609.44	309.06	21690584.40	6144.35	74493.76
TGP2-18	122182.19	0.00	32917073.06	501.72	372.70	21828038.40	6214.19	75283.56
SRM614-2	7353519.24	7095082.22	0.00	0.00	0.00	2218476.40	8004.37	796.34
SRM612-2	7194962.74	6650638.72	0.00	0.00	0.00	2122825.20	26329.83	2928.32
SRM610-2	3294760.54	2658635.02	9844.97	0.00	0.00	855143.46	117661.99	10504.72
AP1-2	29052.51	0.00	26096331.06	236.72	131.46	14879679.40	3647.98	26519.57
AP2-2	35702.94	0.00	23259721.06	226.64	139.66	11898233.40	3089.82	24750.64
AP3-2	245773.74	0.00	32483665.06	596.36	306.06	18254574.40	9237.89	75371.40
AP4-2	219481.54	0.00	28451297.06	350.32	218.30	14950664.40	8187.45	43875.75
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	3.073981	2.526405	0.005532	0.000025	0.000014	1.000000	0.012268	0.000459
SRM612-1	3.188685	2.452735	0.036529	0.000030	0.000020	1.000000	0.017918	0.001761
SRM610-1	3.897885	2.683191	0.030240	0.000000	0.000053	1.000000	0.131366	0.011163
AP1-1	0.004009	0.000000	1.411261	0.000021	0.000012	1.000000	0.000377	0.005201
AP2-1	0.006304	0.000000	1.622075	0.000022	0.000013	1.000000	0.000388	0.005228
AP3-1	0.013138	0.000000	1.600767	0.000030	0.000014	1.000000	0.000600	0.008369
AP4-1	0.016188	0.000000	1.638594	0.000028	0.000013	1.000000	0.000672	0.006734
TGP2-1	0.015019	0.000000	1.347142	0.000024	0.000016	1.000000	0.000360	0.005909
TGP2-2	0.011094	0.000000	1.406684	0.000023	0.000018	1.000000	0.000341	0.005370
TGP2-3	0.038972	0.000000	1.426481	0.000025	0.000018	1.000000	0.000332	0.005054
TGP2-4	0.012071	0.000000	1.793216	0.000018	0.000016	1.000000	0.000241	0.003206
TGP2-5	0.002560	0.000000	1.818139	0.000014	0.000015	1.000000	0.000241	0.003006
TGP2-6	0.003257	0.000000	1.836909	0.000013	0.000013	1.000000	0.000209	0.002957
TGP2-7	0.013910	0.000000	1.874389	0.000013	0.000012	1.000000	0.000197	0.002960
TGP2-8	0.001634	0.000000	1.860633	0.000012	0.000011	1.000000	0.000204	0.002662
TGP2-9	0.000985	0.000000	1.864826	0.000013	0.000014	1.000000	0.000188	0.002612
TGP2-10	0.000000	0.000000	1.813873	0.000017	0.000014	1.000000	0.000226	0.002341
TGP2-11	0.000259	0.000000	1.766688	0.000019	0.000014	1.000000	0.000236	0.002585
TGP2-12	0.001407	0.000000	1.831455	0.000011	0.000012	1.000000	0.000215	0.002357
TGP2-13	0.007660	0.000000	1.844259	0.000017	0.000014	1.000000	0.000213	0.002648
TGP2-14	0.004244	0.000000	1.801029	0.000023	0.000014	1.000000	0.000237	0.002800
TGP2-15	0.004135	0.000000	1.699465	0.000021	0.000011	1.000000	0.000243	0.002813
TGP2-16	0.003299	0.000000	1.526480	0.000024	0.000019	1.000000	0.000285	0.003544
TGP2-17	0.001412	0.000000	1.512062	0.000028	0.000014	1.000000	0.000283	0.003434
TGP2-18	0.005597	0.000000	1.508018	0.000023	0.000017	1.000000	0.000285	0.003449
SRM614-2	3.314671	3.198178	0.000000	0.000000	0.000000	1.000000	0.003608	0.000359
SRM612-2	3.389334	3.132919	0.000000	0.000000	0.000000	1.000000	0.012403	0.001379
SRM610-2	3.852875	3.108993	0.011513	0.000000	0.000000	1.000000	0.137593	0.012284
AP1-2	0.001952	0.000000	1.753823	0.000016	0.000009	1.000000	0.000245	0.001782
AP2-2	0.003001	0.000000	1.954889	0.000019	0.000012	1.000000	0.000260	0.002080
AP3-2	0.013464	0.000000	1.779481	0.000033	0.000017	1.000000	0.000506	0.004129
AP4-2	0.014680	0.000000	1.903012	0.000023	0.000015	1.000000	0.000548	0.002935
standardize signal averages AP								
AP1	0.002981	0.000000	1.582542	0.000018	0.000011	1.000000	0.000311	0.003492
AP2	0.004653	0.000000	1.788482	0.000021	0.000012	1.000000	0.000324	0.003654
AP3	0.013301	0.000000	1.690124	0.000031	0.000016	1.000000	0.000553	0.006249
AP4	0.015434	0.000000	1.770803	0.000026	0.000014	1.000000	0.000610	0.004834
linest from std sig ave								
	0.019190	0.000000	0.271573	0.316616	0.794099	1.000000	0.008352	0.229221
standardize signal averages SRM								
srm614-2	3.194326	2.862292	0.002766	0.000013	0.000007	1.000000	0.007938	0.000409
srm612-2	3.289009	2.792827	0.018265	0.000015	0.000010	1.000000	0.015161	0.001570
srm610-2	3.875380	2.896092	0.020876	0.000000	0.000027	1.000000	0.134480	0.011724
linest from std sig ave								
	0.040702	1.376412	0.122793	0.000000	78.563255	1.000000	0.038042	0.429942
concentration data								
SRM614-1	5059.06	0.00	128.84	0.69	90.98	85763.00	8.79	9.02
SRM612-1	5247.84	0.00	850.80	0.80	132.52	85763.00	12.84	34.61
SRM610-1	6415.01	0.00	704.31	0.00	359.72	85763.00	94.10	219.46
AP1-1	30.69	0.00	152896.47	2.64	391.10	398936.00	1.26	475.59
AP2-1	48.26	0.00	175736.17	2.79	413.74	398936.00	1.29	478.05
AP3-1	100.58	0.00	173427.59	3.83	450.44	398936.00	2.00	765.31
AP4-1	123.92	0.00	177525.84	3.50	422.61	398936.00	2.24	615.80
TGP2-1	114.98	0.00	145949.80	3.09	505.03	398936.00	1.20	540.37
TGP2-2	84.93	0.00	152400.62	2.93	553.83	398936.00	1.14	491.02
TGP2-3	298.35	0.00	154545.37	3.13	550.91	398936.00	1.11	462.21

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	92.41	0.00	194277.57	2.28	494.98	398936.00	0.80	293.18
TGP2-5	19.60	0.00	196977.77	1.72	480.76	398936.00	0.80	274.92
TGP2-6	24.94	0.00	199011.26	1.64	392.09	398936.00	0.70	270.37
TGP2-7	106.49	0.00	203071.91	1.68	387.19	398936.00	0.66	270.66
TGP2-8	12.51	0.00	201581.62	1.52	354.06	398936.00	0.68	243.43
TGP2-9	7.54	0.00	202035.89	1.61	441.38	398936.00	0.63	238.88
TGP2-10	0.00	0.00	196515.58	2.19	442.45	398936.00	0.75	214.10
TGP2-11	1.98	0.00	191403.48	2.35	430.97	398936.00	0.79	236.35
TGP2-12	10.77	0.00	198420.45	1.43	367.11	398936.00	0.72	215.50
TGP2-13	58.64	0.00	199807.57	2.18	424.17	398936.00	0.71	242.15
TGP2-14	32.49	0.00	195124.04	2.90	430.69	398936.00	0.79	256.05
TGP2-15	31.65	0.00	184120.62	2.59	351.17	398936.00	0.81	257.19
TGP2-16	25.25	0.00	165379.31	3.07	609.30	398936.00	0.95	324.09
TGP2-17	10.81	0.00	163817.33	3.55	446.58	398936.00	0.94	314.06
TGP2-18	42.85	0.00	163379.14	2.90	535.14	398936.00	0.95	315.39
SRM614-2	5455.18	0.00	0.00	0.00	0.00	85763.00	2.58	7.06
SRM612-2	5578.06	0.00	0.00	0.00	0.00	85763.00	8.88	27.12
SRM610-2	6340.94	0.00	268.14	0.00	0.00	85763.00	98.56	241.49
AP1-2	14.95	0.00	190009.79	2.01	276.90	398936.00	0.82	162.98
AP2-2	22.97	0.00	211793.25	2.41	367.89	398936.00	0.87	190.22
AP3-2	103.07	0.00	192789.51	4.13	525.48	398936.00	1.69	377.57
AP4-2	112.39	0.00	206172.95	2.96	457.63	398936.00	1.82	268.36

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-11	49699.20	320050.28	2972.86	4263.66	514234.00	27233.83	4215.62	698.32
SRM614-11	10740372.00	9563722.00	6912.40	7585.84	739597.06	3643080.30	33698.71	2638.25
SRM612-11	9477371.00	8247764.00	5781.15	8564.33	3063235.50	3179368.50	50622.09	9521.21
SRM610-11	4963405.50	4322383.00	3655.22	7178.04	2008157.80	1646076.00	184379.23	19808.43
AP1-11	116661.17	114889.29	1935.05	6309.28	767045.13	20166750.00	10697.54	83054.95
AP2-11	85466.40	91845.08	1771.05	6563.64	854213.69	18507054.00	9718.01	78336.16
AP3-11	265323.97	85111.16	2014.93	5784.27	523760.78	21527022.00	14568.48	116280.38
AP4-11	485074.22	95527.26	2110.61	5135.79	456042.56	22264810.00	21355.52	168773.75
GCK4-1	62288.95	48414.87	1578.77	20013.51	3009746.00	17991960.00	7837.24	70606.04
GCK4-2	15741.21	40475.95	1404.93	20563.32	2013202.80	18159394.00	7776.36	65586.37
GCK4-3	21334.68	39762.74	1512.97	22821.81	2160664.00	19720522.00	8239.17	71819.92
GCK4-4	15599.41	36577.69	2061.45	47202.63	3439796.80	27220234.00	12040.99	103839.19
GCK4-5	11351.22	30587.01	1980.93	47671.67	3643463.80	27090452.00	11587.75	97157.47
GCK4-6	11251.70	27977.68	2090.57	47596.47	3940029.80	27185140.00	11583.23	96949.78
GCK4-7	11317.78	26066.03	715.48	11882.87	794364.38	9562845.00	4392.42	22800.93
GCK4-8	12173.07	22136.68	685.60	10350.30	613680.88	7798960.00	3899.46	18698.95
GCK4-9	12393.35	21517.28	899.73	11797.26	1178937.50	11411540.00	5005.87	28567.24
GCK4-10	11303.66	22287.53	812.60	11201.14	678434.13	10752996.00	4715.23	21268.40
GCK4-11	8965.93	17719.10	557.80	7842.56	397964.38	5466244.50	2968.34	12881.59
GCK4-12	9164.45	18603.58	563.12	8048.21	420005.09	6051879.50	3135.18	13227.84
GCK4-13	11401.10	20308.80	880.88	14131.76	685132.06	12865375.00	5294.11	24530.14
GCK4-14	8983.97	16225.77	853.84	14098.48	700871.81	12818755.00	5412.67	25444.82
GCK4-15	9571.09	16433.73	906.25	14205.88	718204.88	12704205.00	5319.35	25549.74
GCK4-16	8098.49	13353.44	1212.77	20151.03	692405.06	16389593.00	6559.32	27927.04
GCK4-17	8024.81	13010.99	1119.93	17108.42	704301.88	16230272.00	6572.72	26793.15
GCK4-18	8377.49	12530.71	1012.45	17052.38	700157.88	15741927.00	6227.96	25627.58
SRM614-11	3541371.50	3443065.80	9517.09	127.92	117.92	977040.94	7290.76	763.84
SRM612-11	4584444.50	4343181.00	9384.93	130.64	128.60	1274463.80	20454.76	2332.41
SRM610-11	2462052.50	2428958.80	27858.72	124.48	118.72	638395.06	90975.79	8434.77
AP1-11	85621.92	17931.50	22781072.00	457.00	264.12	12167592.00	5918.55	22729.73
AP2-11	54732.55	17635.26	22736592.00	431.12	282.40	11725008.00	5680.87	22829.37
AP3-11	132557.58	22514.65	27339598.00	625.52	338.36	13305882.00	8099.37	42880.08
AP4-11	220701.89	33459.67	28631566.00	657.60	323.84	13076368.00	10424.22	54014.38
blank-11	30668.69	17252.06	4954.47	130.12	105.92	10494.62	2514.85	444.68
blank average	40183.95	168651.17	3963.66	2196.89	257169.96	18864.23	3365.24	571.50

blank subtraction								
SRM614-11	10700188.05	9395070.83	2948.74	5388.95	482427.10	3624216.07	30333.47	2066.75
SRM612-11	9437187.05	8079112.83	1817.49	6367.44	2806065.54	3160504.27	47256.85	8949.71
SRM610-11	4923221.55	4153731.83	-308.44	4981.15	1750987.84	1627211.77	181013.99	19236.93
AP1-11	76477.22	-53761.88	-2028.61	4112.38	509875.17	20147885.77	7332.30	82483.44
AP2-11	45282.45	-76806.09	-2192.61	4366.74	597043.73	18488189.77	6352.78	77764.66
AP3-11	225140.02	-83540.01	-1948.73	3587.38	266590.82	21508157.77	11203.24	115708.88
AP4-11	444890.27	-73123.91	-1853.05	2938.90	198872.60	22245945.77	17990.28	168202.25

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	22105.00	-120236.30	-2384.89	17816.62	2752576.04	17973095.77	4472.01	70034.54
GCK4-2	-24442.74	-128175.22	-2558.73	18366.42	1756032.84	18140529.77	4411.12	65014.86
GCK4-3	-18849.27	-128888.43	-2450.69	20624.92	1903494.04	19701657.77	4873.93	71248.42
GCK4-4	-24584.54	-132073.48	-1902.21	45005.73	3182626.84	27201369.77	8675.75	103267.69
GCK4-5	-28832.72	-138064.16	-1982.73	45474.78	3386293.84	27071587.77	8222.51	96585.97
GCK4-6	-28932.24	-140673.49	-1873.09	45399.58	3682859.84	27166275.77	8217.99	96378.28
GCK4-7	-28866.16	-142585.14	-3248.18	9685.97	537194.42	9543980.77	1027.19	22229.42
GCK4-8	-28010.88	-146514.48	-3278.06	8153.41	356510.92	7780095.77	534.22	18127.44
GCK4-9	-27790.60	-147133.89	-3063.94	15600.37	921767.54	11392675.77	1640.63	27995.74
GCK4-10	-28880.28	-146363.64	-3151.06	9004.25	421264.17	10734131.77	1349.99	20696.90
GCK4-11	-31218.02	-150932.07	-3405.86	5645.67	140794.42	5447380.27	-396.90	12310.09
GCK4-12	-31019.49	-150047.58	-3400.54	5851.31	162835.13	6033015.27	-230.06	12656.33
GCK4-13	-28782.84	-148342.37	-3082.78	11934.87	427962.10	12846510.77	1928.87	23958.64
GCK4-14	-31199.98	-152425.40	-3109.82	11901.59	443701.85	12799890.77	2047.43	24873.32
GCK4-15	-30612.85	-152217.44	-3057.42	12008.99	461034.92	12685340.77	1954.11	24978.24
GCK4-16	-32085.46	-155297.73	-2750.90	17954.14	435235.10	16370728.77	3194.08	27355.53
GCK4-17	-32159.14	-155640.18	-2843.74	14911.52	447131.92	16211407.77	3207.48	26221.65
GCK4-18	-31806.46	-156120.46	-2951.22	14855.48	442987.92	15723062.77	2862.72	25056.08
SRM614-11	3501187.55	3274414.63	5553.43	-2068.97	-257052.04	958176.71	3925.52	192.34
SRM612-11	4544260.55	4174529.83	5421.27	-2066.25	-257041.36	1255599.57	17089.52	1760.91
SRM610-11	2421868.55	2260307.63	23895.05	-2072.41	-257051.24	619530.83	87610.55	7863.26
AP1-11	45437.98	-150719.67	22777108.34	-1739.89	-256905.84	12148727.77	2553.31	22158.23
AP2-11	14548.60	-151015.91	22732628.34	-1765.77	-256887.56	11706143.77	2315.63	22257.87
AP3-11	92373.63	-146136.52	27335634.34	-1571.37	-256831.60	13287017.77	4734.13	42308.58
AP4-11	180517.94	-135191.50	28627602.34	-1539.29	-256846.12	13057503.77	7058.98	53442.88
zero correction								
SRM614-11	10700188.05	9395070.83	2948.74	5388.95	482427.10	3624216.07	30333.47	2066.75
SRM612-11	9437187.05	8079112.83	1817.49	6367.44	2806065.54	3160504.27	47256.85	8949.71
SRM610-11	4923221.55	4153731.83	0.00	4981.15	1750987.84	1627211.77	181013.99	19236.93
AP1-11	76477.22	0.00	0.00	4112.38	509875.17	20147885.77	7332.30	82483.44
AP2-11	45282.45	0.00	0.00	4366.74	597043.73	18488189.77	6352.78	77764.66
AP3-11	225140.02	0.00	0.00	3587.38	266590.82	21508157.77	11203.24	115708.88
AP4-11	444890.27	0.00	0.00	2938.90	198872.60	22245945.77	17990.28	168202.25
GCK4-1	22105.00	0.00	0.00	17816.62	2752576.04	17973095.77	4472.01	70034.54
GCK4-2	0.00	0.00	0.00	18366.42	1756032.84	18140529.77	4411.12	65014.86
GCK4-3	0.00	0.00	0.00	20624.92	1903494.04	19701657.77	4873.93	71248.42
GCK4-4	0.00	0.00	0.00	45005.73	3182626.84	27201369.77	8675.75	103267.69
GCK4-5	0.00	0.00	0.00	45474.78	3386293.84	27071587.77	8222.51	96585.97
GCK4-6	0.00	0.00	0.00	45399.58	3682859.84	27166275.77	8217.99	96378.28
GCK4-7	0.00	0.00	0.00	9685.97	537194.42	9543980.77	1027.19	22229.42
GCK4-8	0.00	0.00	0.00	8153.41	356510.92	7780095.77	534.22	18127.44
GCK4-9	0.00	0.00	0.00	15600.37	921767.54	11392675.77	1640.63	27995.74
GCK4-10	0.00	0.00	0.00	9004.25	421264.17	10734131.77	1349.99	20696.90
GCK4-11	0.00	0.00	0.00	5645.67	140794.42	5447380.27	0.00	12310.09
GCK4-12	0.00	0.00	0.00	5851.31	162835.13	6033015.27	0.00	12656.33
GCK4-13	0.00	0.00	0.00	11934.87	427962.10	12846510.77	1928.87	23958.64
GCK4-14	0.00	0.00	0.00	11901.59	443701.85	12799890.77	2047.43	24873.32
GCK4-15	0.00	0.00	0.00	12008.99	461034.92	12685340.77	1954.11	24978.24
GCK4-16	0.00	0.00	0.00	17954.14	435235.10	16370728.77	3194.08	27355.53
GCK4-17	0.00	0.00	0.00	14911.52	447131.92	16211407.77	3207.48	26221.65
GCK4-18	0.00	0.00	0.00	14855.48	442987.92	15723062.77	2862.72	25056.08
SRM614-11	3501187.55	3274414.63	5553.43	0.00	0.00	958176.71	3925.52	192.34
SRM612-11	4544260.55	4174529.83	5421.27	0.00	0.00	1255599.57	17089.52	1760.91
SRM610-11	2421868.55	2260307.63	23895.05	0.00	0.00	619530.83	87610.55	7863.26
AP1-11	45437.98	0.00	22777108.34	0.00	0.00	12148727.77	2553.31	22158.23
AP2-11	14548.60	0.00	22732628.34	0.00	0.00	11706143.77	2315.63	22257.87
AP3-11	92373.63	0.00	27335634.34	0.00	0.00	13287017.77	4734.13	42308.58
AP4-11	180517.94	0.00	28627602.34	0.00	0.00	13057503.77	7058.98	53442.88
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	2.952414	2.592304	0.000814	0.001487	0.133112	1.000000	0.008370	0.000570
SRM612-11	2.985975	2.556273	0.000575	0.002015	0.887854	1.000000	0.014952	0.002832
SRM610-11	3.025557	2.552668	0.000000	0.003061	1.076066	1.000000	0.111242	0.011822
AP1-11	0.003796	0.000000	0.000000	0.000204	0.025307	1.000000	0.000364	0.004094
AP2-11	0.002449	0.000000	0.000000	0.000236	0.032293	1.000000	0.000344	0.004206
AP3-11	0.010468	0.000000	0.000000	0.000167	0.012395	1.000000	0.000521	0.005380
AP4-11	0.019999	0.000000	0.000000	0.000132	0.008940	1.000000	0.000809	0.007561
GCK4-1	0.001230	0.000000	0.000000	0.000091	0.153150	1.000000	0.000249	0.003897
GCK4-2	0.000000	0.000000	0.000000	0.001012	0.096802	1.000000	0.000243	0.003584
GCK4-3	0.000000	0.000000	0.000000	0.001047	0.096616	1.000000	0.000247	0.003616
GCK4-4	0.000000	0.000000	0.000000	0.001655	0.117002	1.000000	0.000319	0.003796
GCK4-5	0.000000	0.000000	0.000000	0.001680	0.125087	1.000000	0.000304	0.003568
GCK4-6	0.000000	0.000000	0.000000	0.001671	0.135567	1.000000	0.000303	0.003548
GCK4-7	0.000000	0.000000	0.000000	0.001015	0.056286	1.000000	0.000108	0.002329
GCK4-8	0.000000	0.000000	0.000000	0.001048	0.045823	1.000000	0.000069	0.002330
GCK4-9	0.000000	0.000000	0.000000	0.001369	0.080909	1.000000	0.000144	0.002457
GCK4-10	0.000000	0.000000	0.000000	0.000839	0.039245	1.000000	0.000126	0.001928
GCK4-11	0.000000	0.000000	0.000000	0.001036	0.025846	1.000000	0.000000	0.002260
GCK4-12	0.000000	0.000000	0.000000	0.000970	0.026991	1.000000	0.000000	0.002098
GCK4-13	0.000000	0.000000	0.000000	0.000929	0.033313	1.000000	0.000150	0.001865
GCK4-14	0.000000	0.000000	0.000000	0.000930	0.034665	1.000000	0.000160	0.001943
GCK4-15	0.000000	0.000000	0.000000	0.000947	0.036344	1.000000	0.000154	0.001969
GCK4-16	0.000000	0.000000	0.000000	0.001097	0.026586	1.000000	0.000195	0.001671
GCK4-17	0.000000	0.000000	0.000000	0.000920	0.027581	1.000000	0.000198	0.001617
GCK4-18	0.000000	0.000000	0.000000	0.000945	0.028174	1.000000	0.000182	0.001594
SRM614-11	3.654010	3.417339	0.005796	0.000000	0.000000	1.000000	0.004097	0.000201
SRM612-11	3.619196	3.324730	0.004318	0.000000	0.000000	1.000000	0.013611	0.001402
SRM610-11	3.909198	3.648418	0.038570	0.000000	0.000000	1.000000	0.141414	0.012692
AP1-11	0.003740	0.000000	1.874855	0.000000	0.000000	1.000000	0.000210	0.001824
AP2-11	0.001243	0.000000	1.941940	0.000000	0.000000	1.000000	0.000198	0.001901
AP3-11	0.006952	0.000000	2.057319	0.000000	0.000000	1.000000	0.000356	0.003184
AP4-11	0.013825	0.000000	2.192425	0.000000	0.000000	1.000000	0.000541	0.004093
standardize signal averages AP								
AP1	0.003768	0.000000	0.937428	0.000102	0.012653	1.000000	0.000287	0.002959
AP2	0.001846	0.000000	0.970970	0.000118	0.016147	1.000000	0.000271	0.003054
AP3	0.008710	0.000000	1.028660	0.000083	0.006197	1.000000	0.000439	0.004282
AP4	0.016912	0.000000	1.096213	0.000066	0.004470	1.000000	0.000675	0.005827
linest from std sig ave								
	0.020707	0.000000	0.460070	0.085586	0.000571	1.000000	0.009033	0.253738
standardize signal averages SRM								
srm614-2	3.303212	3.004822	0.003305	0.000743	0.066556	1.000000	0.006233	0.000385
srm612-2	3.302585	2.940502	0.002446	0.001007	0.443927	1.000000	0.014281	0.002117
srm610-2	3.467377	3.100543	0.019285	0.001531	0.538033	1.000000	0.126328	0.012257
linest from std sig ave								
	0.042152	1.300823	0.203049	2.145160	0.001740	1.000000	0.040535	0.408289
concentration data								
SRM614-11	5243.19	0.00	32.10	10.91	19.87	85763.00	6.48	12.41
SRM612-11	5302.79	0.00	22.69	14.79	132.52	85763.00	11.58	61.62
SRM610-11	5373.08	0.00	0.00	22.47	160.61	85763.00	86.18	257.26
AP1-11	31.36	0.00	0.00	6.97	17.57	398936.00	1.31	414.41
AP2-11	20.23	0.00	0.00	8.06	22.42	398936.00	1.24	425.77
AP3-11	86.47	0.00	0.00	5.69	8.61	398936.00	1.88	544.57
AP4-11	165.21	0.00	0.00	4.51	6.21	398936.00	2.91	765.37
GCK4-1	10.16	0.00	0.00	33.85	106.33	398936.00	0.90	394.44
GCK4-2	0.00	0.00	0.00	34.57	67.21	398936.00	0.88	362.79
GCK4-3	0.00	0.00	0.00	35.74	67.08	398936.00	0.89	366.07
GCK4-4	0.00	0.00	0.00	56.49	81.23	398936.00	1.15	384.29
GCK4-5	0.00	0.00	0.00	57.35	86.85	398936.00	1.09	361.15
GCK4-6	0.00	0.00	0.00	57.06	94.12	398936.00	1.09	359.12
GCK4-7	0.00	0.00	0.00	34.65	39.08	398936.00	0.39	235.77
GCK4-8	0.00	0.00	0.00	35.78	31.81	398936.00	0.25	235.85
GCK4-9	0.00	0.00	0.00	46.75	56.17	398936.00	0.52	248.75
GCK4-10	0.00	0.00	0.00	28.64	27.25	398936.00	0.45	195.18
GCK4-11	0.00	0.00	0.00	35.39	17.94	398936.00	0.00	228.75
GCK4-12	0.00	0.00	0.00	33.12	18.74	398936.00	0.00	212.36
GCK4-13	0.00	0.00	0.00	31.72	23.13	398936.00	0.54	188.78
GCK4-14	0.00	0.00	0.00	31.75	24.07	398936.00	0.58	196.71
GCK4-15	0.00	0.00	0.00	32.32	25.23	398936.00	0.56	199.32
GCK4-16	0.00	0.00	0.00	37.45	18.46	398936.00	0.70	169.15
GCK4-17	0.00	0.00	0.00	31.41	19.15	398936.00	0.71	163.73
GCK4-18	0.00	0.00	0.00	32.26	19.56	398936.00	0.66	161.31
SRM614-11	6489.16	0.00	228.69	0.00	0.00	85763.00	3.17	4.37

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	6427.33	0.00	170.36	0.00	0.00	85763.00	10.54	30.52
SRM610-11	6942.34	0.00	1521.84	0.00	0.00	85763.00	109.55	276.20
AP1-11	30.90	0.00	344108.42	0.00	0.00	398936.00	0.76	184.63
AP2-11	10.27	0.00	356421.03	0.00	0.00	398936.00	0.71	192.47
AP3-11	57.43	0.00	377597.54	0.00	0.00	398936.00	1.28	322.32
AP4-11	114.20	0.00	402394.78	0.00	0.00	398936.00	1.95	414.30

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-9	37772.25	793685.75	7077.32	6504.88	805816.69	53932.42	4672.55	776.72
SRM614-9	10172633.00	8143538.50	9543.93	9137.01	853865.56	3488991.30	51006.45	2524.61
SRM612-9	11017339.00	8689973.00	8459.49	9592.49	1410287.10	3782679.00	74285.18	5625.03
SRM610-9	5667554.00	4758112.00	5402.11	8271.69	1664359.60	1865216.90	205712.08	19009.63
AP1-9	105721.99	212596.36	3063.86	6523.48	556564.63	23690228.00	11989.23	137905.50
AP2-9	102505.77	177610.80	2706.78	6455.44	572712.63	19817894.00	10443.98	112736.03
AP3-9	268379.94	150030.56	3021.62	6188.63	509964.94	26779372.00	17661.58	202525.86
AP4-9	344064.69	138345.09	2580.45	5971.15	489531.28	22368172.00	17468.62	161049.34
GCK3-1	37368.61	84797.00	2140.05	37640.49	965554.00	22477190.00	9939.74	105087.67
GCK3-2	81157.82	82417.87	2167.97	32707.14	2008709.50	25295040.00	11372.62	146638.11
GCK3-3	96172.54	74005.30	2029.49	29244.45	1789223.00	23022450.00	10199.50	126816.71
GCK3-4	30756.57	69079.87	1195.33	19930.75	675655.44	8961574.00	4715.71	36812.89
GCK3-5	20783.20	56176.88	1154.01	22201.09	584293.69	9503604.00	4765.75	36638.09
GCK3-6	25200.94	51623.05	1164.93	22735.17	604716.00	9322880.00	4705.39	34990.76
GCK3-7	31980.90	53736.31	1409.37	33590.15	925691.63	16051812.00	7219.48	56685.84
GCK3-8	18803.87	41078.83	1370.65	33675.35	851940.81	15837822.00	6860.36	52717.10
GCK3-9	20745.84	41172.75	1411.05	33416.47	724807.13	15763438.00	6761.68	50533.32
GCK3-10	25177.54	43186.20	1151.69	26840.39	591889.19	13080583.00	5792.91	42376.84
GCK3-11	19206.51	34230.83	1201.89	29010.16	561423.31	13736966.00	6061.99	43702.53
GCK3-12	16345.05	33030.34	1167.09	27195.55	520001.41	13077804.00	5941.51	40492.39
GCK3-13	27127.99	39986.11	1126.49	27363.96	661543.25	14706851.00	6528.56	46183.74
GCK3-14	59627.77	29624.85	1187.81	28617.12	649790.56	15000564.00	6498.76	43850.97
GCK3-15	13416.84	28496.56	1227.41	28907.56	649947.50	15430085.00	6588.40	47157.70
GCK3-16	141265.36	34409.56	1314.05	30175.81	1001753.60	18439598.00	7579.08	57058.64
GCK3-17	30820.33	25453.34	1471.45	31886.50	925223.88	18416730.00	7645.28	56091.48
GCK3-18	18864.11	23498.45	1443.33	33356.07	780681.94	20412746.00	8165.73	58522.13
SRM614-10	6288962.00	6037962.50	3306.58	5787.07	281180.06	1964672.80	11363.82	1766.85
SRM612-10	7021500.50	6662105.00	3647.90	5913.67	353232.16	2188170.50	31767.58	3433.98
SRM610-10	3865441.50	3571112.50	1982.61	5158.27	549692.44	1145400.90	147703.19	13417.36
AP1-10	101799.77	18932.87	1091.01	4257.58	212848.52	17116788.00	7331.16	36990.21
AP2-10	47136.15	18376.62	892.48	4096.62	213201.64	12280079.00	6185.03	27952.84
AP3-10	170467.03	25923.75	1513.73	4405.34	220396.44	20022354.00	11798.99	171372.04
AP4-10	244248.58	31604.78	1395.53	4152.50	217211.19	17103604.00	12606.55	63685.76
blank-10	7230.52	20880.20	342.60	2932.94	258307.42	76746.23	1352.09	1178.09
blank average	22501.39	407282.97	3709.96	4718.91	532062.06	65339.33	3012.32	977.41

blank subtraction								
SRM614-9	10150131.61	7736255.53	5833.97	4418.11	321803.51	3423651.97	47994.13	1547.21
SRM612-9	10994837.61	8282690.03	4749.53	4873.59	878225.05	3717339.67	71272.86	4647.63
SRM610-9	5645052.61	4350829.03	1692.15	3552.78	1132297.55	1799877.57	202699.76	18032.22
AP1-9	83220.60	-194686.61	-646.10	1804.57	24502.58	23624888.67	8976.91	136928.09
AP2-9	80004.38	-229672.17	-1003.19	1736.53	40650.58	19752554.67	7431.66	111758.62
AP3-9	245878.55	-257252.41	-688.34	1469.73	-22097.11	26714032.67	14649.26	201548.45
AP4-9	321563.30	-268937.88	-1129.51	1252.25	-42530.77	22302832.67	14456.30	160071.93
GCK3-1	14867.22	-322485.97	-1569.91	32921.59	433491.95	22411850.67	6927.42	104110.26
GCK3-2	58656.43	-324865.11	-1541.99	27988.24	1476647.45	25229700.67	8360.31	145660.70
GCK3-3	73671.15	-333277.68	-1680.47	24525.54	1257160.95	22957110.67	7187.18	125839.30
GCK3-4	8255.18	-338203.11	-2514.63	15211.85	143593.39	8896234.67	1703.39	35835.48
GCK3-5	-1718.19	-351106.10	-2555.95	17482.18	52231.64	9438264.67	1753.43	35660.68
GCK3-6	2699.55	-355659.92	-2545.03	18016.26	72653.95	9257540.67	1693.07	34013.35
GCK3-7	9479.51	-353546.67	-2300.59	28871.24	393629.58	15986472.67	4207.16	55708.43
GCK3-8	-3697.52	-366204.14	-2339.31	28956.44	319878.76	15772482.67	3848.04	51739.69
GCK3-9	-1755.55	-366110.22	-2298.91	28697.56	192745.08	15698098.67	3749.36	49555.92
GCK3-10	2676.15	-364096.77	-2558.27	22121.48	59827.14	13015243.67	2780.60	41399.43
GCK3-11	-3294.88	-373052.14	-2508.07	24291.26	29361.26	13671626.67	3049.68	42725.12
GCK3-12	-6156.34	-374252.63	-2542.87	22476.65	-12060.65	13012464.67	2929.20	39514.98
GCK3-13	4626.60	-367296.87	-2583.47	22645.05	129481.20	14641511.67	3516.24	45206.34
GCK3-14	37126.39	-377658.13	-2522.15	23898.21	117728.51	14935224.67	3486.44	42873.56
GCK3-15	-9084.55	-378786.41	-2482.55	24188.66	117885.45	15364745.67	3576.08	46180.30
GCK3-16	118763.97	-372873.42	-2395.91	25456.90	469691.55	18374258.67	4566.77	56081.24

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	8318.95	-381829.63	-2238.51	27167.59	393161.83	18351390.67	4632.97	55114.07
GCK3-18	-3637.28	-383784.52	-2266.63	28637.16	248619.89	20347406.67	5153.41	57544.72
SRM614-10	6266460.61	5630679.53	-403.38	1068.17	-250882.00	1899333.47	8351.51	789.44
SRM612-10	6998999.11	6254822.03	-62.06	1194.77	-178829.90	2122831.17	28755.26	2456.57
SRM610-10	3842940.11	3163829.53	-1727.35	439.36	17630.39	1080061.57	144690.87	12439.95
AP1-10	79298.38	-388350.11	-2618.95	-461.32	-319213.54	17051448.67	4318.84	36012.80
AP2-10	24634.76	-388906.35	-2817.48	-622.28	-318860.42	12214739.67	3172.72	26975.43
AP3-10	147965.64	-381359.23	-2196.23	-313.56	-311665.62	19957014.67	8786.67	70394.63
AP4-10	221747.19	-375678.20	-2314.43	-566.40	-314850.87	17038264.67	9594.23	62708.35

zero correction

SRM614-9	10150131.61	7736255.53	5833.97	4418.11	321803.51	3423651.97	47994.13	1547.21
SRM612-9	10994837.61	8282690.03	4749.53	4873.59	878225.05	3717339.67	71272.86	4647.63
SRM610-9	5645052.61	4350829.03	1692.15	3552.78	1132297.55	1799877.57	202699.76	18032.22
AP1-9	83220.60	0.00	0.00	1804.57	24502.58	23624888.67	8976.91	136928.09
AP2-9	80004.38	0.00	0.00	1736.53	40650.58	19752554.67	7431.66	111758.62
AP3-9	245878.55	0.00	0.00	1469.73	0.00	26714032.67	14649.26	201548.45
AP4-9	321563.30	0.00	0.00	1252.25	0.00	22302832.67	14456.30	160071.93
GCK3-1	14867.22	0.00	0.00	32921.59	433491.95	22411850.67	6927.42	104110.26
GCK3-2	58656.43	0.00	0.00	27988.24	1476647.45	25229700.67	8360.31	145660.70
GCK3-3	73671.15	0.00	0.00	24525.54	1257160.95	22957110.67	7187.18	125839.30
GCK3-4	8255.18	0.00	0.00	15211.85	143593.39	8896234.67	1703.39	35835.48
GCK3-5	0.00	0.00	0.00	17482.18	52231.64	9438264.67	1753.43	35660.68
GCK3-6	2699.55	0.00	0.00	18016.26	72653.95	9257540.67	1693.07	34013.35
GCK3-7	9479.51	0.00	0.00	28871.24	393629.58	15986472.67	4207.16	55708.43
GCK3-8	0.00	0.00	0.00	28956.44	319878.76	15772482.67	3848.04	51739.69
GCK3-9	0.00	0.00	0.00	28697.56	192745.08	15698098.67	3749.36	49555.92
GCK3-10	2676.15	0.00	0.00	22121.48	59827.14	13015243.67	2780.60	41399.43
GCK3-11	0.00	0.00	0.00	24291.26	29361.26	13671626.67	3049.68	42725.12
GCK3-12	0.00	0.00	0.00	22476.65	0.00	13012464.67	2929.20	39514.98
GCK3-13	4626.60	0.00	0.00	22645.05	129481.20	14641511.67	3516.24	45206.34
GCK3-14	37126.39	0.00	0.00	23898.21	117728.51	14935224.67	3486.44	42873.56
GCK3-15	0.00	0.00	0.00	24188.66	117885.45	15364745.67	3576.08	46180.30
GCK3-16	118763.97	0.00	0.00	25456.90	469691.55	18374258.67	4566.77	56081.24
GCK3-17	8318.95	0.00	0.00	27167.59	393161.83	18351390.67	4632.97	55114.07
GCK3-18	0.00	0.00	0.00	28637.16	248619.89	20347406.67	5153.41	57544.72
SRM614-10	6266460.61	5630679.53	0.00	1068.17	0.00	1899333.47	8351.51	789.44
SRM612-10	6998999.11	6254822.03	0.00	1194.77	0.00	2122831.17	28755.26	2456.57
SRM610-10	3842940.11	3163829.53	0.00	439.36	17630.39	1080061.57	144690.87	12439.95
AP1-10	79298.38	0.00	0.00	0.00	0.00	17051448.67	4318.84	36012.80
AP2-10	24634.76	0.00	0.00	0.00	0.00	12214739.67	3172.72	26975.43
AP3-10	147965.64	0.00	0.00	0.00	0.00	19957014.67	8786.67	70394.63
AP4-10	221747.19	0.00	0.00	0.00	0.00	17038264.67	9594.23	62708.35

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration

SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal

SRM614-9	2.964709	2.259650	0.001704	0.001290	0.093994	1.000000	0.014018	0.000452
SRM612-9	2.957717	2.228123	0.001278	0.001311	0.236251	1.000000	0.019173	0.001250
SRM610-9	3.136354	2.417292	0.000940	0.001974	0.629097	1.000000	0.112619	0.010019
AP1-9	0.003523	0.000000	0.000000	0.000076	0.001037	1.000000	0.000380	0.005796
AP2-9	0.004050	0.000000	0.000000	0.000088	0.002058	1.000000	0.000376	0.005658
AP3-9	0.009204	0.000000	0.000000	0.000055	0.000000	1.000000	0.000548	0.007545
AP4-9	0.014418	0.000000	0.000000	0.000056	0.000000	1.000000	0.000648	0.007177
GCK3-1	0.000663	0.000000	0.000000	0.001469	0.019342	1.000000	0.000309	0.004645
GCK3-2	0.002325	0.000000	0.000000	0.001109	0.058528	1.000000	0.000331	0.005773
GCK3-3	0.003209	0.000000	0.000000	0.001068	0.054761	1.000000	0.000313	0.005481
GCK3-4	0.000928	0.000000	0.000000	0.001710	0.016141	1.000000	0.000191	0.004028
GCK3-5	0.000000	0.000000	0.000000	0.001852	0.005534	1.000000	0.000186	0.003778
GCK3-6	0.000292	0.000000	0.000000	0.001946	0.007848	1.000000	0.000183	0.003674
GCK3-7	0.000593	0.000000	0.000000	0.001806	0.024623	1.000000	0.000263	0.003485
GCK3-8	0.000000	0.000000	0.000000	0.001836	0.020281	1.000000	0.000244	0.003280

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000000	0.000000	0.000000	0.001828	0.012278	1.000000	0.000239	0.003157
GCK3-10	0.000206	0.000000	0.000000	0.001700	0.004597	1.000000	0.000214	0.003181
GCK3-11	0.000000	0.000000	0.000000	0.001777	0.002148	1.000000	0.000223	0.003125
GCK3-12	0.000000	0.000000	0.000000	0.001727	0.000000	1.000000	0.000225	0.003037
GCK3-13	0.000316	0.000000	0.000000	0.001547	0.008843	1.000000	0.000240	0.003088
GCK3-14	0.002486	0.000000	0.000000	0.001600	0.007883	1.000000	0.000233	0.002871
GCK3-15	0.000000	0.000000	0.000000	0.001574	0.007672	1.000000	0.000233	0.003006
GCK3-16	0.006464	0.000000	0.000000	0.001385	0.025562	1.000000	0.000249	0.003052
GCK3-17	0.000453	0.000000	0.000000	0.001480	0.021424	1.000000	0.000252	0.003003
GCK3-18	0.000000	0.000000	0.000000	0.001407	0.012219	1.000000	0.000253	0.002828
SRM614-10	3.299295	2.964556	0.000000	0.000562	0.000000	1.000000	0.004397	0.000416
SRM612-10	3.297012	2.946453	0.000000	0.000563	0.000000	1.000000	0.013546	0.001157
SRM610-10	3.558075	2.929305	0.000000	0.000407	0.016323	1.000000	0.133965	0.011518
AP1-10	0.004651	0.000000	0.000000	0.000000	0.000000	1.000000	0.000253	0.002112
AP2-10	0.002017	0.000000	0.000000	0.000000	0.000000	1.000000	0.000260	0.002208
AP3-10	0.007414	0.000000	0.000000	0.000000	0.000000	1.000000	0.000440	0.003527
AP4-10	0.013015	0.000000	0.000000	0.000000	0.000000	1.000000	0.000563	0.003680
standardize signal averages AP								
AP1	0.004087	0.000000	0.000000	0.000038	0.000519	1.000000	0.000317	0.003954
AP2	0.003034	0.000000	0.000000	0.000044	0.001029	1.000000	0.000318	0.003933
AP3	0.008309	0.000000	0.000000	0.000028	0.000000	1.000000	0.000494	0.005536
AP4	0.013716	0.000000	0.000000	0.000028	0.000000	1.000000	0.000606	0.005429
linest from std sig ave								
	0.024251	0.000000	0.000000	0.230981	0.004807	1.000000	0.008687	0.229212
standardize signal averages SRM								
srm614-2	3.132002	2.612103	0.000852	0.000926	0.046997	1.000000	0.009208	0.000434
srm612-2	3.127364	2.587288	0.000639	0.000937	0.118125	1.000000	0.016359	0.001204
srm610-2	3.347214	2.673298	0.000470	0.001190	0.322710	1.000000	0.123292	0.010768
linest from std sig ave								
	0.044178	1.495097	1.756928	2.068917	0.006540	1.000000	0.041289	0.469303
concentration data								
SRM614-9	6166.03	0.00	0.00	25.56	52.72	85763.00	10.44	8.88
SRM612-9	6151.49	0.00	0.00	25.97	132.52	85763.00	14.28	24.58
SRM610-9	6523.02	0.00	0.00	39.10	352.88	85763.00	83.90	196.94
AP1-9	34.08	0.00	0.00	7.04	2.71	398936.00	1.32	529.99
AP2-9	39.18	0.00	0.00	8.10	5.37	398936.00	1.30	517.37
AP3-9	89.04	0.00	0.00	5.07	0.00	398936.00	1.90	689.89
AP4-9	139.49	0.00	0.00	5.17	0.00	398936.00	2.25	656.29
GCK3-1	6.42	0.00	0.00	135.36	50.47	398936.00	1.07	424.77
GCK3-2	22.49	0.00	0.00	102.22	152.71	398936.00	1.15	527.92
GCK3-3	31.05	0.00	0.00	98.44	142.88	398936.00	1.08	501.23
GCK3-4	8.98	0.00	0.00	157.56	42.12	398936.00	0.66	368.34
GCK3-5	0.00	0.00	0.00	170.68	14.44	398936.00	0.64	345.49
GCK3-6	2.82	0.00	0.00	179.33	20.48	398936.00	0.63	335.97
GCK3-7	5.74	0.00	0.00	166.41	64.25	398936.00	0.91	318.65
GCK3-8	0.00	0.00	0.00	169.17	52.92	398936.00	0.85	299.96
GCK3-9	0.00	0.00	0.00	168.45	32.04	398936.00	0.83	288.66
GCK3-10	1.99	0.00	0.00	156.62	11.99	398936.00	0.74	290.86
GCK3-11	0.00	0.00	0.00	163.72	5.60	398936.00	0.77	285.76
GCK3-12	0.00	0.00	0.00	159.17	0.00	398936.00	0.78	277.68
GCK3-13	3.06	0.00	0.00	142.52	23.07	398936.00	0.83	282.33
GCK3-14	24.05	0.00	0.00	147.45	20.57	398936.00	0.81	262.49
GCK3-15	0.00	0.00	0.00	145.07	20.02	398936.00	0.81	274.84
GCK3-16	62.53	0.00	0.00	127.67	66.70	398936.00	0.86	279.09
GCK3-17	4.39	0.00	0.00	136.41	55.90	398936.00	0.87	274.62
GCK3-18	0.00	0.00	0.00	129.69	31.88	398936.00	0.88	258.61
SRM614-10	6861.91	0.00	0.00	11.14	0.00	85763.00	3.28	8.17
SRM612-10	6857.16	0.00	0.00	11.15	0.00	85763.00	10.09	22.75
SRM610-10	7400.12	0.00	0.00	8.06	9.16	85763.00	99.81	226.42
AP1-10	44.99	0.00	0.00	0.00	0.00	398936.00	0.88	193.12
AP2-10	19.51	0.00	0.00	0.00	0.00	398936.00	0.90	201.94
AP3-10	71.73	0.00	0.00	0.00	0.00	398936.00	1.53	322.54
AP4-10	125.91	0.00	0.00	0.00	0.00	398936.00	1.95	336.54
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-7	45769.02	64931.13	622.40	2991.46	185837.38	14822.52	3559.38	682.68
SRM614-7	7674501.00	7993672.50	4572.19	5318.47	268900.00	2539231.80	14575.72	1551.33
SRM612-7	7493042.50	7257569.50	4192.38	5372.19	398325.84	2422486.30	34944.36	4062.62
SRM610-7	3331941.00	3330515.50	2035.01	4437.79	588737.56	1010543.10	135701.13	12888.47
AP1-7	116961.94	39315.90	1208.21	3778.42	308620.97	18448594.00	9276.17	33344.67
AP2-7	68941.43	34036.11	1009.93	3896.38	369432.88	15018210.00	7772.16	28502.16
AP3-7	199438.33	33856.07	1466.05	3385.66	160988.78	20407010.00	13211.11	57059.44
AP4-7	230036.30	36195.81	1486.45	3281.58	146204.83	17199066.00	13534.00	47136.15
GCK2-1	22801.33	20698.36	585.40	8893.57	409207.31	5698273.00	3167.42	11328.50
GCK2-2	13607.64	14798.20	508.76	9027.85	263791.63	5195361.50	2997.02	9720.97
GCK2-3	14617.68	15394.85	524.40	9409.73	270303.56	5126492.00	2971.18	10170.38
GCK2-4	27211.23	21482.84	580.64	10152.38	344018.09	5847426.00	3139.46	10519.82
GCK2-5	13573.16	13302.48	599.52	11264.54	242280.38	6125893.00	3165.50	9860.02
GCK2-6	14664.52	14255.80	565.16	12274.71	292225.50	6944901.00	3400.42	11095.78
GCK2-7	28839.16	19117.83	590.76	10222.98	277779.50	6197889.50	3164.02	9405.41
GCK2-8	17178.86	13360.92	607.28	12172.91	232296.58	6938026.50	3500.98	10450.94
GCK2-9	38860.06	14057.52	629.44	11363.34	230094.25	6512039.50	3261.10	10115.06
GCK2-10	20909.56	14415.48	1030.77	6990.36	992022.69	13653285.00	5799.15	29102.68
GCK2-11	14937.32	11600.51	979.41	6745.12	972369.63	13233390.00	5705.47	27621.08
GCK2-12	16261.01	12207.27	1023.57	6760.04	970098.88	13042639.00	5647.71	26815.03
GCK2-13	19621.71	12590.95	1064.29	7267.28	910589.81	13537130.00	5828.15	26665.15
GCK2-14	14233.44	9998.98	884.76	7659.84	787257.44	12662064.00	5476.95	23102.77
GCK2-15	13315.12	10832.70	1044.09	6913.52	876759.00	13703892.00	5753.51	26399.11
GCK2-16	17840.98	10775.90	879.00	7650.72	646380.06	11275223.00	4977.71	20954.52
GCK2-17	13114.27	9464.81	825.24	9098.53	582133.44	10892130.00	4821.59	20215.15
GCK2-18	11839.23	9189.93	675.76	9964.14	413724.38	8568220.00	3892.66	14713.40
SRM614-8	4121883.30	4832959.00	2642.97	3318.66	172886.53	1400741.90	5349.91	1442.93
SRM612-8	4695742.00	5127093.00	2680.34	3598.22	211702.52	1547563.50	21299.28	2885.54
SRM610-8	2387433.80	2652443.30	1429.85	3157.94	360401.31	754642.19	105354.07	10077.58
AP1-8	55726.04	10630.58	894.13	2742.46	155561.11	13169996.00	6008.75	14883.64
AP2-8	57657.73	10063.54	875.08	2723.82	163108.80	11068281.00	5504.91	14644.32
AP3-8	173706.69	17191.10	1434.21	2743.58	124048.26	16521858.00	10239.10	37002.17
AP4-8	147251.67	18197.34	986.69	2567.21	104937.95	12416681.00	9200.93	22765.53
blank-8	7682.88	7539.72	175.72	1733.17	132366.98	76025.23	1063.77	1243.41
blank average	26725.95	36235.42	399.06	2362.31	159102.18	45423.88	2311.57	963.05
blank subtraction								
SRM614-7	7647775.05	7957437.08	4173.12	2956.16	109797.82	2493807.93	12264.15	588.28
SRM612-7	7466316.55	7221334.08	3793.32	3009.88	239223.66	2377062.43	32632.78	3099.58
SRM610-7	3305215.05	3294280.08	1635.95	2075.47	429635.38	965119.23	133389.56	11925.43
AP1-7	90235.99	3080.48	809.14	1416.11	149518.79	18403170.13	6964.60	32381.62
AP2-7	42215.48	-2199.31	610.86	1534.07	210330.70	14972786.13	5460.59	27539.11
AP3-7	172712.38	-2379.35	1066.99	1023.35	1886.60	20361586.13	10899.54	56096.40
AP4-7	203310.35	-39.62	1087.39	919.27	-12897.35	17153642.13	11222.42	46173.10
GCK2-1	-3924.62	-15537.07	186.34	6531.26	250105.13	5652849.13	855.85	10365.46
GCK2-2	-13118.31	-21437.22	109.70	6665.54	104689.45	5149937.63	685.44	8757.93
GCK2-3	-12108.27	-20840.58	125.34	7047.42	111201.38	5081068.13	659.60	9207.33
GCK2-4	485.28	-14752.58	181.58	7790.06	184915.91	5802002.13	827.88	9556.77
GCK2-5	-13152.79	-22932.95	200.46	8902.23	83178.20	6080469.13	853.92	8896.97
GCK2-6	-12061.43	-21979.62	166.10	9912.40	133123.32	6899477.13	1088.85	10132.74
GCK2-7	2113.21	-17117.60	191.70	7860.66	118677.32	6152465.63	852.44	8442.37
GCK2-8	-9547.09	-22874.51	208.22	9810.59	73194.40	6892602.63	1189.41	9487.89
GCK2-9	12134.11	-22177.90	230.38	9001.03	70992.07	6466615.63	949.53	9152.01
GCK2-10	-5816.39	-21819.94	631.70	4628.05	832920.51	13607861.13	3487.58	28139.64
GCK2-11	-11788.63	-24634.92	580.34	4382.80	813267.45	13187966.13	3393.90	26658.03
GCK2-12	-10464.94	-24028.15	624.50	4397.72	810996.70	12997215.13	3336.14	25851.99
GCK2-13	-7104.24	-23644.47	665.22	4904.97	751487.63	13491706.13	3516.58	25702.10
GCK2-14	-12492.51	-26236.45	485.70	5297.53	628155.26	12616640.13	3165.38	22139.72
GCK2-15	-13410.83	-25402.72	645.02	4551.21	717656.82	13658468.13	3441.94	25436.06
GCK2-16	-8884.97	-25459.52	479.94	5288.41	487277.88	11229799.13	2666.14	19991.47
GCK2-17	-13611.68	-26770.61	426.18	6736.22	423031.26	10846706.13	2510.01	19252.11
GCK2-18	-14886.72	-27045.49	276.70	7601.82	254622.20	8522796.13	1581.09	13750.36
SRM614-8	4095157.35	4796723.58	2243.91	956.35	13784.35	1355318.03	3038.34	479.88
SRM612-8	4669016.05	5090857.58	2281.27	1235.91	52600.34	1502139.63	18987.71	1922.49
SRM610-8	2360707.85	2616207.88	1030.79	795.62	201299.13	709218.32	103042.50	9114.53
AP1-8	29000.09	-25604.84	495.06	380.14	-3541.07	13124572.13	3697.18	13920.60
AP2-8	30931.78	-26171.89	476.02	361.50	4006.62	11022857.13	3193.34	13681.28
AP3-8	146980.74	-19044.33	1035.15	381.26	-35053.92	16476434.13	7927.53	36039.12
AP4-8	120525.72	-18038.08	587.62	204.90	-54164.23	12371257.13	6889.36	21802.48
zero correction								
SRM614-7	7647775.05	7957437.08	4173.12	2956.16	109797.82	2493807.93	12264.15	588.28
SRM612-7	7466316.55	7221334.08	3793.32	3009.88	239223.66	2377062.43	32632.78	3099.58
SRM610-7	3305215.05	3294280.08	1635.95	2075.47	429635.38	965119.23	133389.56	11925.43
AP1-7	90235.99	3080.48	809.14	1416.11	149518.79	18403170.13	6964.60	32381.62
AP2-7	42215.48	0.00	610.86	1534.07	210330.70	14972786.13	5460.59	27539.11

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	172712.38	0.00	1066.99	1023.35	1886.60	20361586.13	10899.54	56096.40
AP4-7	203310.35	0.00	1087.39	919.27	0.00	17153642.13	11222.42	46173.10
GCK2-1	0.00	0.00	186.34	6531.26	250105.13	5652849.13	855.85	10365.46
GCK2-2	0.00	0.00	109.70	6665.54	104689.45	5149937.63	685.44	8757.93
GCK2-3	0.00	0.00	125.34	7047.42	111201.38	5081068.13	659.60	9207.33
GCK2-4	485.28	0.00	181.58	7790.06	184915.91	5802002.13	827.88	9556.77
GCK2-5	0.00	0.00	200.46	8902.23	83178.20	6080469.13	853.92	8896.97
GCK2-6	0.00	0.00	166.10	9912.40	133123.32	6899477.13	1088.85	10132.74
GCK2-7	2113.21	0.00	191.70	7860.66	118677.32	6152465.63	852.44	8442.37
GCK2-8	0.00	0.00	208.22	9810.59	73194.40	6892602.63	1189.41	9487.89
GCK2-9	12134.11	0.00	230.38	9001.03	70992.07	6466615.63	949.53	9152.01
GCK2-10	0.00	0.00	631.70	4628.05	832920.51	13607861.13	3487.58	28139.64
GCK2-11	0.00	0.00	580.34	4382.80	813267.45	13187966.13	3393.90	26658.03
GCK2-12	0.00	0.00	624.50	4397.72	810996.70	12997215.13	3336.14	25851.99
GCK2-13	0.00	0.00	665.22	4904.97	751487.63	13491706.13	3516.58	25702.10
GCK2-14	0.00	0.00	485.70	5297.53	628155.26	12616640.13	3165.38	22139.72
GCK2-15	0.00	0.00	645.02	4551.21	717656.82	13658468.13	3441.94	25436.06
GCK2-16	0.00	0.00	479.94	5288.41	487277.88	11229799.13	2666.14	19991.47
GCK2-17	0.00	0.00	426.18	6736.22	423031.26	10846706.13	2510.01	19252.11
GCK2-18	0.00	0.00	276.70	7601.82	254622.20	8522796.13	1581.09	13750.36
SRM614-8	4095157.35	4796723.58	2243.91	956.35	13784.35	1355318.03	3038.34	479.88
SRM612-8	4669016.05	5090857.58	2281.27	1235.91	52600.34	1502139.63	18987.71	1922.49
SRM610-8	2360707.85	2616207.88	1030.79	795.62	201299.13	709218.32	103042.50	9114.53
AP1-8	29000.09	0.00	495.06	380.14	0.00	13124572.13	3697.18	13920.60
AP2-8	30931.78	0.00	476.02	361.50	4006.62	11022857.13	3193.34	13681.28
AP3-8	146980.74	0.00	1035.15	381.26	0.00	16476434.13	7927.53	36039.12
AP4-8	120525.72	0.00	587.62	204.90	0.00	12371257.13	6889.36	21802.48

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-7	3.066706	3.190878	0.001673	0.001185	0.044028	1.000000	0.004918	0.000236
SRM612-7	3.140985	3.037924	0.001596	0.001266	0.100638	1.000000	0.013728	0.001304
SRM610-7	3.424670	3.413340	0.001695	0.002150	0.445163	1.000000	0.138210	0.012356
AP1-7	0.004903	0.000167	0.000044	0.000077	0.008125	1.000000	0.000378	0.001760
AP2-7	0.002819	0.000000	0.000041	0.000102	0.014048	1.000000	0.000365	0.001839
AP3-7	0.008482	0.000000	0.000052	0.000050	0.000093	1.000000	0.000535	0.002755
AP4-7	0.011852	0.000000	0.000063	0.000054	0.000000	1.000000	0.000654	0.002692
GCK2-1	0.000000	0.000000	0.000033	0.001155	0.044244	1.000000	0.000151	0.001834
GCK2-2	0.000000	0.000000	0.000021	0.001294	0.020328	1.000000	0.000133	0.001701
GCK2-3	0.000000	0.000000	0.000025	0.001387	0.021885	1.000000	0.000130	0.001812
GCK2-4	0.000084	0.000000	0.000031	0.001343	0.031871	1.000000	0.000143	0.001647
GCK2-5	0.000000	0.000000	0.000033	0.001464	0.013680	1.000000	0.000140	0.001463
GCK2-6	0.000000	0.000000	0.000024	0.001437	0.019295	1.000000	0.000158	0.001469
GCK2-7	0.000343	0.000000	0.000031	0.001278	0.019289	1.000000	0.000139	0.001372
GCK2-8	0.000000	0.000000	0.000030	0.001423	0.010619	1.000000	0.000173	0.001377
GCK2-9	0.001876	0.000000	0.000036	0.001392	0.010978	1.000000	0.000147	0.001415
GCK2-10	0.000000	0.000000	0.000046	0.000340	0.061209	1.000000	0.000256	0.002068
GCK2-11	0.000000	0.000000	0.000044	0.000332	0.061667	1.000000	0.000257	0.002021
GCK2-12	0.000000	0.000000	0.000048	0.000338	0.062398	1.000000	0.000257	0.001989
GCK2-13	0.000000	0.000000	0.000049	0.000364	0.055700	1.000000	0.000261	0.001905
GCK2-14	0.000000	0.000000	0.000038	0.000420	0.049788	1.000000	0.000251	0.001755
GCK2-15	0.000000	0.000000	0.000047	0.000333	0.052543	1.000000	0.000252	0.001862
GCK2-16	0.000000	0.000000	0.000043	0.000471	0.043392	1.000000	0.000237	0.001780
GCK2-17	0.000000	0.000000	0.000039	0.000621	0.039001	1.000000	0.000231	0.001775
GCK2-18	0.000000	0.000000	0.000032	0.000892	0.029875	1.000000	0.000186	0.001613
SRM614-8	3.021547	3.539187	0.001656	0.000706	0.010171	1.000000	0.002242	0.000354
SRM612-8	3.108244	3.389071	0.001519	0.000823	0.035017	1.000000	0.012640	0.001280
SRM610-8	3.328605	3.688861	0.001453	0.001122	0.283832	1.000000	0.145290	0.012852
AP1-8	0.002210	0.000000	0.000038	0.000029	0.000000	1.000000	0.000282	0.001061
AP2-8	0.002806	0.000000	0.000043	0.000033	0.000363	1.000000	0.000290	0.001241
AP3-8	0.008921	0.000000	0.000063	0.000023	0.000000	1.000000	0.000481	0.002187

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.009742	0.000000	0.000047	0.000017	0.000000	1.000000	0.000557	0.001762
standardize signal averages AP								
AP1	0.003556	0.000084	0.000041	0.000053	0.004062	1.000000	0.000330	0.001410
AP2	0.002813	0.000000	0.000042	0.000068	0.007206	1.000000	0.000327	0.001540
AP3	0.008701	0.000000	0.000058	0.000037	0.000046	1.000000	0.000508	0.002471
AP4	0.010797	0.000000	0.000055	0.000035	0.000000	1.000000	0.000606	0.002227
linest from std sig ave								
	0.027789	0.173351	9319.245765	0.160967	0.000664	1.000000	0.008480	0.548404
standardize signal averages SRM								
srm614-2	3.044126	3.365032	0.001665	0.000946	0.027099	1.000000	0.003580	0.000295
srm612-2	3.124614	3.213497	0.001557	0.001044	0.067828	1.000000	0.013184	0.001292
srm610-2	3.376638	3.551101	0.001574	0.001636	0.364498	1.000000	0.141750	0.012604
linest from std sig ave								
	0.044419	1.160261	0.973318	1.923331	0.011391	1.000000	0.036266	0.401699
concentration data								
SRM614-7	7308.86	47439.23	1337454.27	16.36	43.01	85763.00	3.58	11.09
SRM612-7	7485.89	45165.24	1275439.32	17.48	98.31	85763.00	9.98	61.33
SRM610-7	8162.00	50746.60	1354782.54	29.69	434.87	85763.00	100.52	581.16
AP1-7	54.36	11.58	163462.25	4.94	36.92	398936.00	1.28	384.96
AP2-7	31.26	0.00	151679.02	6.58	63.83	398936.00	1.23	402.39
AP3-7	94.04	0.00	194818.90	3.23	0.42	398936.00	1.81	602.74
AP4-7	131.40	0.00	235673.88	3.44	0.00	398936.00	2.21	588.89
GCK2-1	0.00	0.00	122553.35	74.19	201.05	398936.00	0.51	401.17
GCK2-2	0.00	0.00	79193.80	83.11	92.37	398936.00	0.45	372.05
GCK2-3	0.00	0.00	91710.93	89.07	99.45	398936.00	0.44	396.45
GCK2-4	0.93	0.00	116352.75	86.22	144.83	398936.00	0.48	360.36
GCK2-5	0.00	0.00	122568.00	94.02	62.16	398936.00	0.48	320.12
GCK2-6	0.00	0.00	89503.46	92.26	87.68	398936.00	0.53	321.30
GCK2-7	3.81	0.00	115840.21	82.04	87.65	398936.00	0.47	300.21
GCK2-8	0.00	0.00	112311.88	91.40	48.26	398936.00	0.58	301.16
GCK2-9	20.80	0.00	132450.67	89.38	49.89	398936.00	0.50	309.63
GCK2-10	0.00	0.00	172586.72	21.84	278.14	398936.00	0.87	452.41
GCK2-11	0.00	0.00	163602.95	21.34	280.22	398936.00	0.87	442.24
GCK2-12	0.00	0.00	178635.81	21.73	283.54	398936.00	0.87	435.16
GCK2-13	0.00	0.00	183309.46	23.35	253.11	398936.00	0.88	416.78
GCK2-14	0.00	0.00	143123.45	26.96	226.24	398936.00	0.85	383.91
GCK2-15	0.00	0.00	175572.96	21.40	238.76	398936.00	0.85	407.43
GCK2-16	0.00	0.00	158891.77	30.24	197.18	398936.00	0.80	389.47
GCK2-17	0.00	0.00	146076.92	39.88	177.22	398936.00	0.78	388.32
GCK2-18	0.00	0.00	120701.73	57.28	135.76	398936.00	0.63	352.97
SRM614-8	7201.24	52617.58	1323260.85	9.74	9.94	85763.00	1.63	16.65
SRM612-8	7407.86	50385.79	1213801.42	11.36	34.21	85763.00	9.19	60.19
SRM610-8	7933.04	54842.81	1161633.68	15.49	277.27	85763.00	105.67	604.44
AP1-8	24.50	0.00	140235.88	1.86	0.00	398936.00	0.95	232.05
AP2-8	31.11	0.00	160552.64	2.11	1.65	398936.00	0.98	271.54
AP3-8	98.90	0.00	233572.80	1.49	0.00	398936.00	1.63	478.54
AP4-8	108.01	0.00	176591.25	1.06	0.00	398936.00	1.88	385.56
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-5	6715.36	31026.90	409.96	3168.50	161886.95	9850.82	1212.65	858.36
SRM614-5	7012711.50	8042555.50	4351.90	5949.79	1099335.30	2510522.00	12815.79	4576.63
SRM612-5	6756443.00	7184985.00	3905.50	5809.47	1154686.60	2275424.00	31992.54	6625.00
SRM610-5	3336209.50	3642625.50	2076.25	4844.07	1411465.40	1120908.40	144114.17	15557.05
AP1-5	87373.61	26936.07	1201.97	3888.74	471866.34	17302040.00	8498.97	30142.41
AP2-5	64080.48	23900.65	1061.37	3481.46	432851.75	14215724.00	7448.88	28475.84
AP3-5	361908.34	37365.97	1817.53	3491.50	298742.84	20335406.00	15301.25	79442.84
AP4-5	338846.75	46047.18	1893.85	3153.66	236669.25	18375056.00	17165.46	77298.12
GCK1-1	22459.89	14521.88	1295.93	14192.32	656249.88	17938718.00	7438.32	34795.88
GCK1-2	17017.34	11695.23	1473.85	13270.60	894432.25	19921526.00	8474.45	38045.22
GCK1-3	15636.13	12009.67	1146.85	11327.58	581326.31	15101673.00	6504.20	28466.16
GCK1-4	63387.52	18606.66	1377.21	11809.99	1220118.50	18709586.00	7623.04	38764.54
GCK1-5	33612.67	13454.24	1493.05	12901.55	1302493.50	19071290.00	7929.76	40689.11
GCK1-6	26559.47	11872.63	1194.13	14404.96	779729.88	15742378.00	6580.44	25977.71

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	24359.10	16370.73	692.84	10816.86	331751.13	8350114.50	3817.46	12705.75
GCK1-8	13732.84	9810.78	665.56	10917.18	255149.83	8061583.00	3822.02	11303.70
GCK1-9	15084.29	11261.14	663.36	11570.51	243511.78	8370780.00	4007.82	11689.31
GCK1-10	25147.70	12252.99	1405.93	10711.70	698530.31	19534270.00	8265.33	39023.98
GCK1-11	23233.89	10813.70	1216.93	9201.21	601174.00	16207663.00	6818.20	31452.14
GCK1-12	23638.33	11303.66	1211.37	8739.33	601095.25	16773312.00	6893.76	31645.02
GCK1-13	19701.87	12318.23	864.28	14500.28	421411.41	11203303.00	4834.31	14305.20
GCK1-14	14547.68	9754.50	883.80	15075.37	472807.09	11401496.00	4935.23	13926.48
GCK1-15	14477.96	9616.13	786.52	14841.32	430292.94	10677734.00	4593.19	13364.84
GCK1-16	18395.54	13606.28	673.76	13833.44	776022.44	8186428.50	3891.58	11684.35
GCK1-17	21285.40	9475.05	758.28	15422.49	776464.88	9494351.00	4397.34	11315.98
GCK1-18	18396.14	9840.94	683.28	13723.20	797763.13	7941890.00	3768.54	10312.02
SRM614-6	3926118.80	4823971.00	2590.85	3430.66	222749.22	1393976.40	5184.51	1739.49
SRM612-6	4363097.50	4803964.50	2584.37	3537.86	254399.52	1464640.00	19767.79	3152.14
SRM610-6	2408271.80	2692059.50	1444.25	3031.66	399713.94	779331.00	109625.09	10764.98
AP1-6	65279.81	10060.34	902.69	2645.41	170003.67	11973548.00	5567.91	12317.59
AP2-6	40833.87	9689.85	839.76	2691.58	171706.61	10283711.00	5431.55	12681.63
AP3-6	154145.94	19280.91	1428.61	2456.29	138120.33	15308856.00	10184.18	39722.86
AP4-6	154377.75	19534.59	1064.57	2335.25	115610.29	11103584.00	9199.97	28491.36
blank-6	7490.64	7709.60	171.88	1608.89	158142.53	81008.98	1051.93	1407.29
blank average	7103.00	19368.25	290.92	2388.69	160014.74	45429.90	1132.29	1132.83
blank subtraction								
SRM614-5	7005608.50	8023187.25	4060.98	3561.10	939320.56	2465092.10	11683.51	3443.80
SRM612-5	6749340.00	7165616.75	3614.58	3420.78	994671.86	2229994.10	30860.25	5492.17
SRM610-5	3329106.50	3623257.25	1785.33	2455.37	1251450.66	1075478.50	142981.88	14424.22
AP1-5	80270.61	7567.82	911.05	1500.05	311851.60	17256610.10	7366.68	29009.58
AP2-5	56977.48	4532.40	770.44	1092.77	272837.01	14170294.10	6316.60	27343.01
AP3-5	354805.34	17997.72	1526.61	1102.81	138728.10	20289976.10	14168.96	78310.02
AP4-5	331743.75	26678.93	1602.93	764.96	76654.51	18329626.10	16033.17	76165.29
GCK1-1	15356.89	-4846.37	1005.01	11803.63	496235.14	17893288.10	6306.04	33663.05
GCK1-2	9914.34	-7673.02	1182.93	10881.90	734417.51	19876096.10	7342.16	36912.39
GCK1-3	8533.13	-7358.58	855.92	8938.89	421311.57	15056243.10	5371.91	27333.33
GCK1-4	56284.52	-761.59	1086.29	9421.29	1060103.76	18664156.10	6490.76	37631.71
GCK1-5	26509.67	-5914.01	1202.13	10512.86	1142478.76	19025860.10	6797.48	39556.28
GCK1-6	19456.47	-7495.62	903.21	12016.27	619715.14	15696948.10	5448.15	24844.88
GCK1-7	17256.10	-2997.52	401.92	8428.17	171736.39	8304684.60	2685.18	11572.92
GCK1-8	6629.84	-9557.47	374.64	8528.49	95135.09	8016153.10	2689.74	10170.88
GCK1-9	7981.29	-8107.11	372.44	9181.81	83497.04	8325350.10	2875.54	10556.48
GCK1-10	18044.70	-7115.26	1115.01	8323.01	538515.57	19488840.10	7133.04	37891.15
GCK1-11	16130.89	-8554.55	926.01	6812.52	441159.26	16162233.10	5685.91	30319.31
GCK1-12	16535.33	-8064.59	920.45	6350.64	441080.51	16727882.10	5761.47	30512.19
GCK1-13	12598.87	-7050.02	573.36	12111.59	261396.67	11157873.10	3702.02	13172.37
GCK1-14	7444.68	-9613.75	592.88	12686.67	312792.35	11356066.10	3802.94	12793.65
GCK1-15	7374.96	-9752.12	495.60	12452.63	270278.20	10632304.10	3460.90	12232.01
GCK1-16	11292.54	-5761.97	382.84	11444.74	616007.70	8140998.60	2759.30	10551.52
GCK1-17	14182.40	-9893.20	467.36	13033.79	616450.14	9448921.10	3265.06	10183.16
GCK1-18	11293.14	-9527.31	392.36	11334.50	637748.39	7896460.10	2636.25	9179.19
SRM614-6	3919015.80	4804602.75	2299.93	1041.97	62734.48	1348546.50	4052.22	606.66
SRM612-6	4355994.50	4784596.25	2293.45	1149.17	94384.78	1419210.10	18635.50	2019.31
SRM610-6	2401168.80	2672691.25	1153.33	642.96	239699.20	733901.10	108492.80	9632.15
AP1-6	58176.81	-9307.91	611.76	256.72	9988.93	11928118.10	4435.62	11184.76
AP2-6	33730.87	-9678.39	548.84	302.88	11691.87	10238281.10	4299.26	11548.81
AP3-6	147042.94	-87.34	1137.69	67.60	-21894.41	15263426.10	9051.89	38590.04
AP4-6	147274.75	166.34	773.64	-53.44	-44404.45	11058154.10	8067.69	27358.53
zero correction								
SRM614-5	7005608.50	8023187.25	4060.98	3561.10	939320.56	2465092.10	11683.51	3443.80
SRM612-5	6749340.00	7165616.75	3614.58	3420.78	994671.86	2229994.10	30860.25	5492.17
SRM610-5	3329106.50	3623257.25	1785.33	2455.37	1251450.66	1075478.50	142981.88	14424.22
AP1-5	80270.61	7567.82	911.05	1500.05	311851.60	17256610.10	7366.68	29009.58
AP2-5	56977.48	4532.40	770.44	1092.77	272837.01	14170294.10	6316.60	27343.01
AP3-5	354805.34	17997.72	1526.61	1102.81	138728.10	20289976.10	14168.96	78310.02
AP4-5	331743.75	26678.93	1602.93	764.96	76654.51	18329626.10	16033.17	76165.29
GCK1-1	15356.89	0.00	1005.01	11803.63	496235.14	17893288.10	6306.04	33663.05
GCK1-2	9914.34	0.00	1182.93	10881.90	734417.51	19876096.10	7342.16	36912.39
GCK1-3	8533.13	0.00	855.92	8938.89	421311.57	15056243.10	5371.91	27333.33
GCK1-4	56284.52	0.00	1086.29	9421.29	1060103.76	18664156.10	6490.76	37631.71
GCK1-5	26509.67	0.00	1202.13	10512.86	1142478.76	19025860.10	6797.48	39556.28
GCK1-6	19456.47	0.00	903.21	12016.27	619715.14	15696948.10	5448.15	24844.88
GCK1-7	17256.10	0.00	401.92	8428.17	171736.39	8304684.60	2685.18	11572.92
GCK1-8	6629.84	0.00	374.64	8528.49	95135.09	8016153.10	2689.74	10170.88
GCK1-9	7981.29	0.00	372.44	9181.81	83497.04	8325350.10	2875.54	10556.48
GCK1-10	18044.70	0.00	1115.01	8323.01	538515.57	19488840.10	7133.04	37891.15
GCK1-11	16130.89	0.00	926.01	6812.52	441159.26	16162233.10	5685.91	30319.31
GCK1-12	16535.33	0.00	920.45	6350.64	441080.51	16727882.10	5761.47	30512.19
GCK1-13	12598.87	0.00	573.36	12111.59	261396.67	11157873.10	3702.02	13172.37
GCK1-14	7444.68	0.00	592.88	12686.67	312792.35	11356066.10	3802.94	12793.65

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	7374.96	0.00	495.60	12452.63	270278.20	10632304.10	3460.90	12232.01
GCK1-16	11292.54	0.00	382.84	11444.74	616007.70	8140998.60	2759.30	10551.52
GCK1-17	14182.40	0.00	467.36	13033.79	616450.14	9448921.10	3265.06	10183.16
GCK1-18	11293.14	0.00	392.36	11334.50	637748.39	7896460.10	2636.25	9179.19
SRM614-6	3919015.80	4804602.75	2299.93	1041.97	62734.48	1348546.50	4052.22	606.66
SRM612-6	4355994.50	4784596.25	2293.45	1149.17	94384.78	1419210.10	18635.50	2019.31
SRM610-6	2401168.80	2672691.25	1153.33	642.96	239699.20	733901.10	108492.80	9632.15
AP1-6	58176.81	0.00	611.76	256.72	9988.93	11928118.10	4435.62	11184.76
AP2-6	33730.87	0.00	548.84	302.88	11691.87	10238281.10	4299.26	11548.81
AP3-6	147042.94	0.00	1137.69	67.60	0.00	15263426.10	9051.89	38590.04
AP4-6	147274.75	166.34	773.64	0.00	0.00	11058154.10	8067.69	27358.53

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-5	2.841926	3.254721	0.001647	0.001445	0.381049	1.000000	0.004740	0.001397
SRM612-5	3.026618	3.213290	0.001621	0.001534	0.446042	1.000000	0.013839	0.002463
SRM610-5	3.095465	3.368972	0.001660	0.002283	1.163622	1.000000	0.132947	0.013412
AP1-5	0.004652	0.000439	0.000053	0.000087	0.018071	1.000000	0.000427	0.001681
AP2-5	0.004021	0.000320	0.000054	0.000077	0.019254	1.000000	0.000446	0.001930
AP3-5	0.017487	0.000887	0.000075	0.000054	0.006837	1.000000	0.000698	0.003860
AP4-5	0.018099	0.001456	0.000087	0.000042	0.004182	1.000000	0.000875	0.004155
GCK1-1	0.000858	0.000000	0.000056	0.000660	0.027733	1.000000	0.000352	0.001881
GCK1-2	0.000499	0.000000	0.000060	0.000547	0.036950	1.000000	0.000369	0.001857
GCK1-3	0.000567	0.000000	0.000057	0.000594	0.027983	1.000000	0.000357	0.001815
GCK1-4	0.003016	0.000000	0.000058	0.000505	0.056799	1.000000	0.000348	0.002016
GCK1-5	0.001393	0.000000	0.000063	0.000553	0.060049	1.000000	0.000357	0.002079
GCK1-6	0.001240	0.000000	0.000058	0.000766	0.039480	1.000000	0.000347	0.001583
GCK1-7	0.002078	0.000000	0.000048	0.001015	0.020679	1.000000	0.000323	0.001394
GCK1-8	0.000827	0.000000	0.000047	0.001064	0.011868	1.000000	0.000336	0.001269
GCK1-9	0.000959	0.000000	0.000045	0.001103	0.010029	1.000000	0.000345	0.001268
GCK1-10	0.000926	0.000000	0.000057	0.000427	0.027632	1.000000	0.000366	0.001944
GCK1-11	0.000998	0.000000	0.000057	0.000422	0.027296	1.000000	0.000352	0.001876
GCK1-12	0.000988	0.000000	0.000055	0.000380	0.026368	1.000000	0.000344	0.001824
GCK1-13	0.001129	0.000000	0.000051	0.001085	0.023427	1.000000	0.000332	0.001181
GCK1-14	0.000656	0.000000	0.000052	0.001117	0.027544	1.000000	0.000335	0.001127
GCK1-15	0.000694	0.000000	0.000047	0.001171	0.025420	1.000000	0.000326	0.001150
GCK1-16	0.001387	0.000000	0.000047	0.001406	0.075667	1.000000	0.000339	0.001296
GCK1-17	0.001501	0.000000	0.000049	0.001379	0.065240	1.000000	0.000346	0.001078
GCK1-18	0.001430	0.000000	0.000050	0.001435	0.080764	1.000000	0.000334	0.001162
SRM614-6	2.906104	3.562801	0.001705	0.000773	0.046520	1.000000	0.003005	0.000450
SRM612-6	3.069309	3.371309	0.001616	0.000810	0.066505	1.000000	0.013131	0.001423
SRM610-6	3.271788	3.641759	0.001572	0.000876	0.326610	1.000000	0.147830	0.013125
AP1-6	0.004877	0.000000	0.000051	0.000022	0.000837	1.000000	0.000372	0.000938
AP2-6	0.003295	0.000000	0.000054	0.000030	0.001142	1.000000	0.000420	0.001128
AP3-6	0.009634	0.000000	0.000075	0.000004	0.000000	1.000000	0.000593	0.002528
AP4-6	0.013318	0.000015	0.000070	0.000000	0.000000	1.000000	0.000730	0.002474

standardize signal averages AP								
AP1	0.004764	0.000219	0.000052	0.000054	0.009454	1.000000	0.000399	0.001309
AP2	0.003658	0.000160	0.000054	0.000053	0.010198	1.000000	0.000433	0.001529
AP3	0.013560	0.000444	0.000075	0.000029	0.003419	1.000000	0.000646	0.003194
AP4	0.015708	0.000735	0.000079	0.000021	0.002091	1.000000	0.000802	0.003315

linest from std sig ave								
	0.018672	0.614589	6972.652506	0.187004	0.000728	1.000000	0.006627	0.407875

standardize signal averages SRM								
srm614-2	2.874015	3.408761	0.001676	0.001109	0.213784	1.000000	0.003872	0.000923
srm612-2	3.047963	3.292299	0.001618	0.001172	0.256274	1.000000	0.013485	0.001943
srm610-2	3.183627	3.505366	0.001616	0.001580	0.745116	1.000000	0.140389	0.013268

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.046575	1.152700	0.954611	1.698212	0.003015	1.000000	0.036603	0.377880
concentration data								
SRM614-5	4550.96	171553.00	985135.50	23.17	98.52	85763.00	2.69	48.87
SRM612-5	4846.71	169369.18	969286.48	24.60	115.32	85763.00	7.87	86.15
SRM610-5	4956.96	177575.06	992692.57	36.62	300.86	85763.00	75.57	469.16
AP1-5	34.65	107.52	146853.96	6.48	21.73	398936.00	1.13	273.54
AP2-5	29.95	78.42	151238.95	5.75	23.16	398936.00	1.18	313.98
AP3-5	130.26	217.48	209289.50	4.05	8.22	398936.00	1.85	628.01
AP4-5	134.82	356.86	243255.10	3.11	5.03	398936.00	2.31	676.14
GCK1-1	6.39	0.00	156235.44	49.21	33.35	398936.00	0.93	306.12
GCK1-2	3.72	0.00	165549.54	40.84	44.44	398936.00	0.98	302.18
GCK1-3	4.22	0.00	158132.17	44.29	33.65	398936.00	0.94	295.40
GCK1-4	22.46	0.00	161896.38	37.66	68.31	398936.00	0.92	328.08
GCK1-5	10.38	0.00	175754.82	41.22	72.22	398936.00	0.94	338.30
GCK1-6	9.23	0.00	160056.16	57.11	47.48	398936.00	0.92	257.54
GCK1-7	15.48	0.00	134623.27	75.71	24.87	398936.00	0.85	226.75
GCK1-8	6.16	0.00	130002.53	79.37	14.27	398936.00	0.89	206.45
GCK1-9	7.14	0.00	124439.28	82.28	12.06	398936.00	0.91	206.32
GCK1-10	6.90	0.00	159144.84	31.86	33.23	398936.00	0.97	316.36
GCK1-11	7.43	0.00	159372.48	31.45	32.83	398936.00	0.93	305.24
GCK1-12	7.36	0.00	153058.77	28.32	31.71	398936.00	0.91	296.80
GCK1-13	8.41	0.00	142938.64	80.98	28.18	398936.00	0.88	192.09
GCK1-14	4.88	0.00	145225.40	83.34	33.13	398936.00	0.89	183.31
GCK1-15	5.17	0.00	129660.47	87.37	30.57	398936.00	0.86	187.20
GCK1-16	10.33	0.00	130810.71	104.88	91.00	398936.00	0.90	210.90
GCK1-17	11.18	0.00	137585.60	102.91	78.46	398936.00	0.91	175.36
GCK1-18	10.65	0.00	138215.24	107.08	97.13	398936.00	0.88	189.15
SRM614-6	4653.73	187791.57	1019875.64	12.39	12.03	85763.00	1.71	15.74
SRM612-6	4915.08	177698.24	966364.82	12.99	17.20	85763.00	7.46	49.77
SRM610-6	5239.32	191953.39	939750.71	14.05	84.45	85763.00	84.03	459.11
AP1-6	36.33	0.00	142663.48	1.61	1.01	398936.00	0.98	152.58
AP2-6	24.54	0.00	149115.36	2.21	1.37	398936.00	1.11	183.54
AP3-6	71.76	0.00	207334.60	0.33	0.00	398936.00	1.57	411.39
AP4-6	99.21	3.69	194607.68	0.00	0.00	398936.00	1.93	402.57
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-1	11065.54	1483.21	187.44	1370.33	74258.18	7884.20	1276.97	799.68
SRM614-1	7395405.00	7870402.50	4426.94	8319.93	973412.06	2548594.50	16163.21	8190.01
SRM612-1	7127134.50	6861638.50	3937.14	7977.00	977834.88	2275997.50	34590.07	8395.05
SRM610-1	3487664.50	3606442.30	2258.85	7782.52	1539902.80	1085793.90	146437.66	19311.51
AP1-1	112989.16	30562.25	1199.21	5406.59	566986.63	17055340.00	8533.89	39713.58
AP2-1	70171.95	28854.56	1136.49	4867.71	413405.13	17297570.00	8672.61	43358.13
AP3-1	299409.13	41336.83	2016.81	4556.91	452769.66	21050006.00	16245.25	89970.87
AP4-1	439299.44	42989.04	1726.17	5097.95	492984.19	20115686.00	17284.66	77303.36
V2-1	20818.72	17166.94	729.12	20268.91	608234.94	9067110.00	4493.11	17222.18
V2-2	14831.08	14494.20	622.24	18115.10	496863.75	8006058.00	4027.70	14572.40
V2-3	13578.68	13835.32	662.12	15420.53	415104.09	6642649.00	3719.58	12361.19
V2-4	111746.67	33404.43	753.76	15766.17	650576.31	8411485.00	4116.70	19500.79
V2-5	51137.65	20442.28	794.00	16074.29	667196.88	9057629.00	4412.11	20799.36
V2-6	69563.48	24398.26	787.92	15673.77	712644.50	9016272.00	4364.38	21755.64
V2-7	244880.81	63010.04	608.12	12861.51	899250.38	6210648.50	3377.34	15245.45
V2-8	61754.59	22534.61	617.48	14132.76	533273.81	6019113.50	3166.46	14552.24
V2-9	78938.48	25443.62	566.96	13427.80	518703.38	5335995.00	3027.86	14068.80
V2-10	126771.16	33124.75	569.56	13106.07	823656.81	5148070.50	3045.98	14739.48
V2-11	47363.99	18465.58	499.68	12560.15	563529.63	4687229.50	2811.34	11343.02
V2-12	81965.30	27548.96	494.24	11717.47	553255.94	4511968.00	2860.34	11011.38
V2-13	170557.39	40762.23	1327.45	7787.56	2000560.30	17909550.00	7618.32	43627.48
V2-14	54649.03	19227.71	1370.25	8507.33	1877244.30	18408106.00	7811.16	42664.72
V2-15	61159.50	22896.41	1449.73	9397.13	2110719.00	19966842.00	8457.21	46627.54
SRM614-2	4476700.50	5351254.00	2880.70	4800.47	339774.94	1553326.10	6907.68	2179.57
SRM612-2	5329218.00	5717057.00	3206.02	5383.47	410496.47	1757375.30	24655.02	4109.34
SRM610-2	2916437.00	3263390.50	1926.49	4748.71	686673.19	935811.38	125156.79	13065.99
AP1-2	66896.66	15009.81	890.73	3637.74	261495.23	12271654.00	5885.11	16932.57
AP2-2	44680.25	14535.64	902.53	3592.14	221295.13	12515096.00	6287.04	19638.39
AP3-2	121625.09	17877.50	1159.41	3358.18	170973.13	12941516.00	8658.73	32451.10
AP4-2	200709.81	24758.78	1234.93	3604.26	200237.77	14877039.00	11765.59	37278.97

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	8164.93	10219.38	210.60	2478.65	248347.56	74222.50	1175.33	1346.81
blank average	9615.23	5851.29	199.02	1924.49	161302.87	41053.35	1226.15	1073.25
blank subtraction								
SRM614-1	7385789.77	7864551.21	4227.92	6395.44	812109.19	2507541.15	14937.06	7116.76
SRM612-1	7117519.27	6855787.21	3738.12	6052.51	816532.01	2234944.15	33363.93	7321.80
SRM610-1	3478049.27	3600591.01	2059.83	5858.03	1378599.93	1044740.55	145211.51	18238.26
AP1-1	103373.93	24710.96	1000.19	3482.10	405683.76	17014286.65	7307.74	38640.34
AP2-1	60556.72	23003.27	937.47	2943.22	252102.26	17256516.65	7446.46	42284.88
AP3-1	289793.90	35485.54	1817.79	2632.41	291466.79	21008952.65	15019.10	88897.62
AP4-1	429684.21	37137.75	1527.15	3173.46	331681.32	20074632.65	16058.51	76230.11
V2-1	11203.48	11315.65	530.10	18344.42	446932.07	9026056.65	3266.96	16148.93
V2-2	5215.85	8642.91	423.22	16190.61	335560.88	7965004.65	2801.56	13499.16
V2-3	3963.44	7984.02	463.10	13496.04	253801.22	6601595.65	2493.43	11287.94
V2-4	102131.44	27553.14	554.74	13841.68	489273.44	8370431.65	2890.56	18427.54
V2-5	41522.41	14590.98	594.98	14149.80	505894.01	9016575.65	3185.96	19726.11
V2-6	59948.24	18546.97	588.90	13749.28	551341.63	8975218.65	3138.24	20682.40
V2-7	235265.58	57158.74	409.10	10937.02	737947.51	6169595.15	2151.19	14172.20
V2-8	52139.36	16683.31	418.46	12208.27	371970.94	5978060.15	1940.31	13479.00
V2-9	69323.25	19592.33	367.94	11503.31	357400.51	5294941.65	1801.71	12995.55
V2-10	117155.93	27273.45	370.54	11181.58	662353.94	5107017.15	1819.83	13666.24
V2-11	37748.75	12614.29	300.66	10635.66	402226.76	4646176.15	1585.19	10269.78
V2-12	72350.06	21697.66	295.22	9792.98	391953.07	4470914.65	1634.19	9938.14
V2-13	160942.16	34910.94	1128.43	5863.07	1839257.43	17868496.65	6392.18	42554.24
V2-14	45033.79	13376.42	1171.23	6582.84	1715941.43	18367052.65	6585.02	41591.47
V2-15	51544.27	17045.12	1250.71	7472.64	1949416.13	19925788.65	7231.06	45554.30
SRM614-2	4467085.27	5345402.71	2681.68	2875.98	178472.07	1512272.75	5681.53	1106.33
SRM612-2	5319602.77	5711205.71	3007.00	3458.98	249193.60	1716321.95	23428.87	3036.10
SRM610-2	2906821.77	3257539.21	1727.47	2824.22	525370.32	894758.03	123930.64	11992.75
AP1-2	57281.42	9158.51	691.70	1713.25	100192.36	12230600.65	4658.97	15859.33
AP2-2	35065.02	8684.35	703.50	1667.65	59992.26	12474042.65	5060.89	18565.14
AP3-2	112009.86	12026.21	960.39	1433.69	9670.26	12900462.65	7432.58	31377.86
AP4-2	191094.58	18907.49	1035.91	1679.77	38934.90	14835985.65	10539.44	36205.72
zero correction								
SRM614-1	7385789.77	7864551.21	4227.92	6395.44	812109.19	2507541.15	14937.06	7116.76
SRM612-1	7117519.27	6855787.21	3738.12	6052.51	816532.01	2234944.15	33363.93	7321.80
SRM610-1	3478049.27	3600591.01	2059.83	5858.03	1378599.93	1044740.55	145211.51	18238.26
AP1-1	103373.93	24710.96	1000.19	3482.10	405683.76	17014286.65	7307.74	38640.34
AP2-1	60556.72	23003.27	937.47	2943.22	252102.26	17256516.65	7446.46	42284.88
AP3-1	289793.90	35485.54	1817.79	2632.41	291466.79	21008952.65	15019.10	88897.62
AP4-1	429684.21	37137.75	1527.15	3173.46	331681.32	20074632.65	16058.51	76230.11
V2-1	11203.48	11315.65	530.10	18344.42	446932.07	9026056.65	3266.96	16148.93
V2-2	5215.85	8642.91	423.22	16190.61	335560.88	7965004.65	2801.56	13499.16
V2-3	3963.44	7984.02	463.10	13496.04	253801.22	6601595.65	2493.43	11287.94
V2-4	102131.44	27553.14	554.74	13841.68	489273.44	8370431.65	2890.56	18427.54
V2-5	41522.41	14590.98	594.98	14149.80	505894.01	9016575.65	3185.96	19726.11
V2-6	59948.24	18546.97	588.90	13749.28	551341.63	8975218.65	3138.24	20682.40
V2-7	235265.58	57158.74	409.10	10937.02	737947.51	6169595.15	2151.19	14172.20
V2-8	52139.36	16683.31	418.46	12208.27	371970.94	5978060.15	1940.31	13479.00
V2-9	69323.25	19592.33	367.94	11503.31	357400.51	5294941.65	1801.71	12995.55
V2-10	117155.93	27273.45	370.54	11181.58	662353.94	5107017.15	1819.83	13666.24
V2-11	37748.75	12614.29	300.66	10635.66	402226.76	4646176.15	1585.19	10269.78
V2-12	72350.06	21697.66	295.22	9792.98	391953.07	4470914.65	1634.19	9938.14
V2-13	160942.16	34910.94	1128.43	5863.07	1839257.43	17868496.65	6392.18	42554.24
V2-14	45033.79	13376.42	1171.23	6582.84	1715941.43	18367052.65	6585.02	41591.47
V2-15	51544.27	17045.12	1250.71	7472.64	1949416.13	19925788.65	7231.06	45554.30
SRM614-2	4467085.27	5345402.71	2681.68	2875.98	178472.07	1512272.75	5681.53	1106.33
SRM612-2	5319602.77	5711205.71	3007.00	3458.98	249193.60	1716321.95	23428.87	3036.10
SRM610-2	2906821.77	3257539.21	1727.47	2824.22	525370.32	894758.03	123930.64	11992.75
AP1-2	57281.42	9158.51	691.70	1713.25	100192.36	12230600.65	4658.97	15859.33
AP2-2	35065.02	8684.35	703.50	1667.65	59992.26	12474042.65	5060.89	18565.14
AP3-2	112009.86	12026.21	960.39	1433.69	9670.26	12900462.65	7432.58	31377.86
AP4-2	191094.58	18907.49	1035.91	1679.77	38934.90	14835985.65	10539.44	36205.72
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	2.945431	3.136360	0.001686	0.002550	0.323867	1.000000	0.005957	0.002838
SRM612-1	3.184652	3.067543	0.001673	0.002708	0.365348	1.000000	0.014928	0.003276
SRM610-1	3.329103	3.446397	0.001972	0.005607	1.319562	1.000000	0.138993	0.017457
AP1-1	0.006076	0.001452	0.000059	0.000205	0.023844	1.000000	0.000430	0.002271
AP2-1	0.003509	0.001333	0.000054	0.000171	0.014609	1.000000	0.000432	0.002450
AP3-1	0.013794	0.001689	0.000087	0.000125	0.013873	1.000000	0.000715	0.004231
AP4-1	0.021404	0.001850	0.000076	0.000158	0.016522	1.000000	0.000800	0.003797
V2-1	0.001241	0.001254	0.000059	0.002032	0.049516	1.000000	0.000362	0.001789
V2-2	0.000655	0.001085	0.000053	0.002033	0.042129	1.000000	0.000352	0.001695
V2-3	0.000600	0.001209	0.000070	0.002044	0.038445	1.000000	0.000378	0.001710
V2-4	0.012201	0.003292	0.000066	0.001654	0.058453	1.000000	0.000345	0.002202
V2-5	0.004605	0.001618	0.000066	0.001569	0.056107	1.000000	0.000353	0.002188
V2-6	0.006679	0.002066	0.000066	0.001532	0.061429	1.000000	0.000350	0.002304
V2-7	0.038133	0.009265	0.000066	0.001773	0.119610	1.000000	0.000349	0.002297
V2-8	0.008722	0.002791	0.000070	0.002042	0.062223	1.000000	0.000325	0.002255
V2-9	0.013092	0.003700	0.000069	0.002173	0.067498	1.000000	0.000340	0.002454
V2-10	0.022940	0.005340	0.000073	0.002189	0.129695	1.000000	0.000356	0.002676
V2-11	0.008125	0.002715	0.000065	0.002289	0.086572	1.000000	0.000341	0.002210
V2-12	0.016182	0.004853	0.000066	0.002190	0.087667	1.000000	0.000366	0.002223
V2-13	0.009007	0.001954	0.000063	0.000328	0.102933	1.000000	0.000358	0.002382
V2-14	0.002452	0.000728	0.000064	0.000358	0.093425	1.000000	0.000359	0.002264
V2-15	0.002587	0.000855	0.000063	0.000375	0.097834	1.000000	0.000363	0.002286
SRM614-2	2.953889	3.534682	0.001773	0.001902	0.118016	1.000000	0.003757	0.000732
SRM612-2	3.099420	3.327584	0.001752	0.002015	0.145190	1.000000	0.013651	0.001769
SRM610-2	3.248724	3.640693	0.001931	0.003156	0.587165	1.000000	0.138507	0.013403
AP1-2	0.004683	0.000749	0.000057	0.000140	0.008192	1.000000	0.000381	0.001297
AP2-2	0.002811	0.000696	0.000056	0.000134	0.004809	1.000000	0.000406	0.001488
AP3-2	0.008683	0.000932	0.000074	0.000111	0.000750	1.000000	0.000576	0.002432
AP4-2	0.012880	0.001274	0.000070	0.000113	0.002624	1.000000	0.000710	0.002440
standardize signal averages AP								
AP1	0.005380	0.001101	0.000058	0.000172	0.016018	1.000000	0.000405	0.001784
AP2	0.003160	0.001015	0.000055	0.000152	0.009709	1.000000	0.000419	0.001969
AP3	0.011238	0.001311	0.000080	0.000118	0.007312	1.000000	0.000646	0.003332
AP4	0.017142	0.001562	0.000073	0.000136	0.009573	1.000000	0.000755	0.003119
linest from std sig ave								
	0.018963	0.201477	6844.711640	0.055732	0.000686	1.000000	0.006754	0.404339
standardize signal averages SRM								
srm614-2	2.949660	3.335521	0.001730	0.002226	0.220941	1.000000	0.004857	0.001785
srm612-2	3.142036	3.197564	0.001712	0.002362	0.255269	1.000000	0.014289	0.002523
srm610-2	3.288914	3.543545	0.001951	0.004382	0.953363	1.000000	0.138750	0.015430
linest from std sig ave								
	0.045199	1.166223	0.933240	0.807614	0.003027	1.000000	0.036992	0.321336
concentration data								
SRM614-1	4790.17	54193.97	989769.78	12.19	84.07	85763.00	3.45	98.42
SRM612-1	5179.21	53004.87	981842.44	12.94	94.83	85763.00	8.65	113.60
SRM610-1	5414.13	59551.19	1157386.48	26.80	342.52	85763.00	80.52	605.37
AP1-1	45.96	116.74	160518.57	4.55	28.79	398936.00	1.16	366.33
AP2-1	26.55	107.14	148340.76	3.79	17.64	398936.00	1.16	395.26
AP3-1	104.35	135.76	236264.11	2.79	16.75	398936.00	1.93	682.55
AP4-1	161.92	148.70	207726.58	3.51	19.95	398936.00	2.16	612.53
V2-1	9.39	100.76	160369.07	45.19	59.79	398936.00	0.98	288.60
V2-2	4.95	87.22	145091.16	45.19	50.87	398936.00	0.95	273.38
V2-3	4.54	97.21	191552.00	45.45	46.42	398936.00	1.02	275.81
V2-4	92.30	264.58	180968.27	36.77	70.58	398936.00	0.93	355.11
V2-5	34.84	130.07	180186.21	34.89	67.74	398936.00	0.95	352.90
V2-6	50.53	166.09	179166.72	34.06	74.17	398936.00	0.94	371.71
V2-7	288.47	744.65	181064.63	39.41	144.42	398936.00	0.94	370.53
V2-8	65.98	224.31	191141.28	45.40	75.13	398936.00	0.87	363.70
V2-9	99.04	297.41	189747.76	48.30	81.50	398936.00	0.92	395.90
V2-10	173.54	429.24	198120.15	48.68	156.60	398936.00	0.96	431.65
V2-11	61.46	218.22	176701.73	50.90	104.53	398936.00	0.92	356.54
V2-12	122.42	390.07	180306.01	48.70	105.85	398936.00	0.98	358.56
V2-13	68.14	157.04	172442.22	7.30	124.28	398936.00	0.96	384.15
V2-14	18.55	58.54	174124.48	7.97	112.80	398936.00	0.97	365.27
V2-15	19.57	68.76	171395.11	8.34	118.13	398936.00	0.98	368.78
SRM614-2	4803.92	61076.68	1040953.11	9.09	30.63	85763.00	2.18	25.37
SRM612-2	5040.60	57498.19	1028464.62	9.63	37.69	85763.00	7.91	61.34

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	5283.41	62908.48	1133339.31	15.09	152.41	85763.00	80.23	464.79
AP1-2	35.43	60.19	154429.70	3.11	9.89	398936.00	1.03	209.16
AP2-2	21.27	55.96	153998.93	2.97	5.81	398936.00	1.09	240.07
AP3-2	65.68	74.93	203281.87	2.47	0.91	398936.00	1.55	392.34
AP4-2	97.44	102.43	190661.18	2.52	3.17	398936.00	1.91	393.65

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-23	46864.50	405032.53	2839.54	3644.26	461836.13	200741.77	10389.94	612.24
SRM614-23	6509767.50	5196420.00	4733.63	5373.15	456749.00	2226265.00	31415.26	1736.09
SRM612-23	6397895.50	4803332.00	3927.66	5886.99	688420.94	2094732.00	41025.19	3292.98
SRM610-23	2789564.80	2003822.60	2477.45	4705.19	662441.44	872569.00	94111.61	8088.21
AP1-23	109269.38	138971.27	1516.05	4082.74	411069.56	10247401.00	9468.09	49988.24
AP2-23	89040.10	110243.74	1689.53	4113.50	473908.81	13713321.00	9653.73	77062.88
AP3-23	150948.89	92442.32	1707.05	3868.18	339238.94	15218993.00	11233.26	94805.00
AP4-23	209041.94	82635.06	1708.89	3944.54	329386.78	15100140.00	11954.59	7286.09
34HP45-494-1	614859.44	106139.88	1518.01	96033.58	12726117.00	15333661.00	9259.89	66149.70
34HP45-494-2	268850.22	71442.68	1360.13	58193.17	6592625.00	13428802.00	7520.72	54010.63
34HP45-494-3	2169416.00	222094.17	1290.05	41757.47	5580928.00	12694073.00	8365.37	56334.12
34HP45-494-4	5755103.50	638811.50	1002.85	13602.40	5871697.00	14204087.00	9205.93	30107.93
34HP45-494-5	2855869.80	208826.05	850.88	12969.95	2469567.50	14195054.00	7988.69	22771.05
34HP45-494-6	3520618.50	250787.38	859.80	11680.51	2585573.80	12648452.00	7404.00	21478.68
34HP45-494-7	2793707.30	228639.94	695.08	17023.06	3870578.80	11460748.00	6907.32	23984.94
34HP45-494-8	5650711.00	539640.06	811.24	14479.04	5223511.50	10336281.00	7201.32	25176.34
34HP45-494-9	4815301.00	369094.31	741.80	13161.75	4159758.80	9949146.00	6689.44	23222.37
34HP45-494-10	4415368.50	319194.94	1190.73	15495.09	4601814.00	12783974.00	9566.37	43958.33
34HP45-494-11	2032878.80	161061.06	1085.41	15712.37	3229579.50	13811493.00	8897.45	41696.07
34HP45-494-12	2576115.50	243780.97	1145.49	15678.33	4510115.00	14037729.00	9281.45	42457.52
34HP45-494-13	4711890.50	326745.56	1030.33	13693.64	3215048.50	12445020.00	7545.48	34600.72
34HP45-494-14	5097421.00	369838.31	1071.09	14558.84	3352530.50	13074034.00	7811.92	38208.73
34HP45-494-15	3553523.00	247556.19	1048.21	16052.25	2447987.30	13522569.00	7485.00	39999.38
34HP45-494-16	1435521.80	95724.30	782.72	5626.39	1382948.30	11217662.00	5738.91	22292.21
34HP45-494-17	2656714.50	147769.36	817.36	6692.40	2145634.00	12197961.00	6189.92	23219.17
34HP45-494-18	1695246.10	105924.76	875.20	7280.20	1577462.40	13514780.00	6356.12	24001.33
SRM614-24	4726044.00	4520662.50	2352.17	3796.66	363766.13	1481190.90	6566.52	1336.25
SRM612-24	4708685.50	4353873.50	2226.25	3809.14	421099.00	1443731.00	18991.11	2317.93
SRM610-24	2341524.50	2047350.00	1225.01	3287.18	557100.00	673450.00	86902.45	7990.81
AP1-24	57949.89	13692.64	615.64	2906.66	361336.78	8840295.00	4828.79	14735.28
AP2-24	57615.05	13466.16	818.96	2756.14	329512.81	11695710.00	5740.63	205027.21
AP3-24	120205.84	17930.02	998.29	2790.02	293478.25	13125982.00	7886.40	39505.94
AP4-24	185772.53	19881.47	1031.17	2790.98	251718.73	13003295.00	9004.25	30343.65
blank-24	30397.73	14958.12	249.04	1975.09	347776.56	95027.09	1610.93	936.77
blank average	38631.12	209995.33	1544.29	2809.68	404806.35	147884.43	6000.43	774.50

blank subtraction

SRM614-23	6471136.38	4986424.67	3189.34	2563.47	51942.66	2078380.57	25414.82	961.59
SRM612-23	6359264.38	4593336.67	2383.37	3077.32	283614.60	1946847.57	35024.76	2518.47
SRM610-23	2750933.68	1793827.27	933.17	1895.51	257635.10	724684.57	88111.18	7313.70
AP1-23	70638.26	-71024.06	-28.24	1273.07	6263.22	10099516.57	3467.66	49213.74
AP2-23	50408.99	-99751.59	145.24	1303.83	69102.47	13565436.57	3653.30	76288.37
AP3-23	112317.77	-117553.01	162.76	1058.51	-65567.41	15071108.57	5232.83	95031.00
AP4-23	170410.82	-127360.26	164.60	1134.87	-75419.56	14952255.57	5954.15	73511.59
34HP45-494-1	576228.32	-103855.45	-26.28	93223.90	12321310.66	15185776.57	3259.46	65375.19
34HP45-494-2	230219.10	-138552.65	-184.16	55383.50	6187818.66	13280917.57	1520.29	53236.12
34HP45-494-3	2130784.88	12098.84	-254.24	38947.80	5176121.66	12546188.57	2364.93	55559.61
34HP45-494-4	5716472.38	428816.17	-541.44	10792.72	5466890.66	14056202.57	3205.50	29333.43
34HP45-494-5	2817238.68	-1169.28	-693.40	10160.28	2064761.16	14047169.57	1988.25	21996.54
34HP45-494-6	3481987.38	40792.05	-684.48	8870.83	2180767.46	12500567.57	1403.57	20704.18
34HP45-494-7	2755076.18	18644.61	-849.20	14213.38	3465772.46	11312863.57	906.89	23210.43
34HP45-494-8	5612079.88	329644.73	-733.04	11669.37	4818705.16	10188396.57	1200.89	24401.84
34HP45-494-9	4776669.88	159098.98	-802.48	10352.08	3754952.46	9801261.57	689.00	22447.87
34HP45-494-10	4376737.38	109199.61	-353.56	12685.41	4197007.66	12636089.57	3565.94	43183.82
34HP45-494-11	1994247.68	-48934.27	-458.88	12902.69	2824773.16	13663608.57	2897.02	40921.57
34HP45-494-12	2537484.38	33785.64	-398.80	12868.65	4105308.66	13889844.57	3281.02	41683.02
34HP45-494-13	4673259.38	116750.23	-513.96	10883.96	2810242.16	12297135.57	1545.05	33826.21
34HP45-494-14	5058789.88	159842.98	-473.20	11749.17	2947724.16	12926149.57	1811.49	37434.23
34HP45-494-15	3514891.88	37560.86	-496.08	13242.57	2043180.96	13374684.57	1484.57	39224.88
34HP45-494-16	1396890.68	-114271.03	-761.56	2816.72	978141.96	11069777.57	-261.52	21517.70
34HP45-494-17	2618083.38	-62225.97	-726.92	3882.72	1740827.66	12050076.57	189.48	22444.67

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	1656614.98	-104070.57	-669.08	4470.53	1172656.06	13366895.57	355.68	23226.83
SRM614-24	4687412.88	4310667.17	807.88	986.99	-41040.22	1333306.47	566.08	561.74
SRM612-24	4670054.38	4143878.17	681.96	999.47	16292.66	1295846.57	12990.67	1543.43
SRM610-24	2302893.38	1837354.67	-319.28	477.50	152293.66	525565.57	80902.02	7216.30
AP1-24	19318.77	-196302.69	-928.65	96.98	-43469.56	8692410.57	-1171.65	13960.78
AP2-24	18983.93	-196529.17	-725.32	-53.54	-75293.54	11547825.57	-259.80	22252.70
AP3-24	81574.72	-192065.31	-546.00	-19.66	-111328.10	12978097.57	1885.97	38731.44
AP4-24	147141.41	-190113.85	-513.12	-18.70	-153087.62	12855410.57	3003.82	29569.15
zero correction								
SRM614-23	6471136.38	4986424.67	3189.34	2563.47	51942.66	2078380.57	25414.82	961.59
SRM612-23	6359264.38	4593336.67	2383.37	3077.32	283614.60	1946847.57	35024.76	2518.47
SRM610-23	2750933.68	1793827.27	933.17	1895.51	257635.10	724684.57	88111.18	7313.70
AP1-23	70638.26	0.00	0.00	1273.07	6263.22	10099516.57	3467.66	49213.74
AP2-23	50408.99	0.00	145.24	1303.83	69102.47	13565436.57	3653.30	76288.37
AP3-23	112317.77	0.00	162.76	1058.51	0.00	15071108.57	5232.83	95031.00
AP4-23	170410.82	0.00	164.60	1134.87	0.00	14952255.57	5954.15	73511.59
34HP45-494-1	576228.32	0.00	0.00	93223.90	12321310.66	15185776.57	3259.46	65375.19
34HP45-494-2	230219.10	0.00	0.00	55383.50	6187818.66	13280917.57	1520.29	53236.12
34HP45-494-3	2130784.88	12098.84	0.00	38947.80	5176121.66	12546188.57	2364.93	55559.61
34HP45-494-4	5716472.38	428816.17	0.00	10792.72	5466890.66	14056202.57	3205.50	29333.43
34HP45-494-5	2817238.68	0.00	0.00	10160.28	2064761.16	14047169.57	1988.25	21996.54
34HP45-494-6	3481987.38	40792.05	0.00	8870.83	2180767.46	12500567.57	1403.57	20704.18
34HP45-494-7	2755076.18	18644.61	0.00	14213.38	3465772.46	11312863.57	906.89	23210.43
34HP45-494-8	5612079.88	329644.73	0.00	11669.37	4818705.16	10188396.57	1200.89	24401.84
34HP45-494-9	4776669.88	159098.98	0.00	10352.08	3754952.46	9801261.57	689.00	22447.87
34HP45-494-10	4376737.38	109199.61	0.00	12685.41	4197007.66	12636089.57	3565.94	43183.82
34HP45-494-11	1994247.68	0.00	0.00	12902.69	2824773.16	13663608.57	2897.02	40921.57
34HP45-494-12	2537484.38	33785.64	0.00	12868.65	4105308.66	13889844.57	3281.02	41683.02
34HP45-494-13	4673259.38	116750.23	0.00	10883.96	2810242.16	12297135.57	1545.05	33826.21
34HP45-494-14	5058789.88	159842.98	0.00	11749.17	2947724.16	12926149.57	1811.49	37434.23
34HP45-494-15	3514891.88	37560.86	0.00	13242.57	2043180.96	13374684.57	1484.57	39224.88
34HP45-494-16	1396890.68	0.00	0.00	2816.72	978141.96	11069777.57	0.00	21517.70
34HP45-494-17	2618083.38	0.00	0.00	3882.72	1740827.66	12050076.57	189.48	22444.67
34HP45-494-18	1656614.98	0.00	0.00	4470.53	1172656.06	13366895.57	355.68	23226.83
SRM614-24	4687412.88	4310667.17	807.88	986.99	0.00	1333306.47	566.08	561.74
SRM612-24	4670054.38	4143878.17	681.96	999.47	16292.66	1295846.57	12990.67	1543.43
SRM610-24	2302893.38	1837354.67	0.00	477.50	152293.66	525565.57	80902.02	7216.30
AP1-24	19318.77	0.00	0.00	96.98	0.00	8692410.57	0.00	13960.78
AP2-24	18983.93	0.00	0.00	0.00	0.00	11547825.57	0.00	22252.70
AP3-24	81574.72	0.00	0.00	0.00	0.00	12978097.57	1885.97	38731.44
AP4-24	147141.41	0.00	0.00	0.00	0.00	12855410.57	3003.82	29569.15
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-23	3.113547	2.399187	0.001535	0.001233	0.024992	1.000000	0.012228	0.000463
SRM612-23	3.266442	2.359372	0.001224	0.001581	0.145679	1.000000	0.017990	0.001294
SRM610-23	3.796043	2.475321	0.001288	0.002616	0.355513	1.000000	0.121586	0.010092
AP1-23	0.006994	0.000000	0.000000	0.000126	0.000620	1.000000	0.000343	0.004873
AP2-23	0.003716	0.000000	0.000011	0.000096	0.005094	1.000000	0.000269	0.005624
AP3-23	0.007453	0.000000	0.000011	0.000070	0.000000	1.000000	0.000347	0.006306
AP4-23	0.011397	0.000000	0.000011	0.000076	0.000000	1.000000	0.000398	0.004916
34HP45-494-1	0.037945	0.000000	0.000000	0.006139	0.811372	1.000000	0.000215	0.004305
34HP45-494-2	0.017335	0.000000	0.000000	0.004170	0.465918	1.000000	0.000114	0.004008
34HP45-494-3	0.169835	0.000964	0.000000	0.003104	0.412565	1.000000	0.000188	0.004428
34HP45-494-4	0.406687	0.030507	0.000000	0.000768	0.388931	1.000000	0.000228	0.002087
34HP45-494-5	0.200556	0.000000	0.000000	0.000723	0.146988	1.000000	0.000142	0.001566
34HP45-494-6	0.278546	0.003263	0.000000	0.000710	0.174453	1.000000	0.000112	0.001656
34HP45-494-7	0.243535	0.001648	0.000000	0.001255	0.306357	1.000000	0.000080	0.002052
34HP45-494-8	0.550831	0.032355	0.000000	0.001145	0.472960	1.000000	0.000118	0.002395
34HP45-494-9	0.487353	0.016233	0.000000	0.001056	0.383109	1.000000	0.000070	0.002290

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.346368	0.008642	0.000000	0.001004	0.332145	1.000000	0.000282	0.003417
34HP45-494-11	0.145953	0.000000	0.000000	0.000944	0.206737	1.000000	0.000212	0.002995
34HP45-494-12	0.182686	0.002432	0.000000	0.000926	0.295562	1.000000	0.000236	0.003001
34HP45-494-13	0.380028	0.009494	0.000000	0.000885	0.228528	1.000000	0.000126	0.002751
34HP45-494-14	0.391361	0.012366	0.000000	0.000909	0.228043	1.000000	0.000140	0.002896
34HP45-494-15	0.262802	0.002808	0.000000	0.000990	0.152765	1.000000	0.000111	0.002933
34HP45-494-16	0.126190	0.000000	0.000000	0.000254	0.088361	1.000000	0.000000	0.001944
34HP45-494-17	0.217267	0.000000	0.000000	0.000322	0.144466	1.000000	0.000016	0.001863
34HP45-494-18	0.123934	0.000000	0.000000	0.000334	0.087728	1.000000	0.000027	0.001738
SRM614-24	3.515630	3.233066	0.000606	0.000740	0.000000	1.000000	0.000425	0.000421
SRM612-24	3.603864	3.197815	0.000526	0.000771	0.012573	1.000000	0.010025	0.001191
SRM610-24	4.381743	3.495957	0.000000	0.000909	0.289771	1.000000	0.153933	0.013731
AP1-24	0.002222	0.000000	0.000000	0.000011	0.000000	1.000000	0.000000	0.001606
AP2-24	0.001644	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.001927
AP3-24	0.006286	0.000000	0.000000	0.000000	0.000000	1.000000	0.000145	0.002984
AP4-24	0.011446	0.000000	0.000000	0.000000	0.000000	1.000000	0.000234	0.002300

standardize signal averages AP

AP1	0.004608	0.000000	0.000000	0.000069	0.000310	1.000000	0.000172	0.003239
AP2	0.002680	0.000000	0.000005	0.000048	0.002547	1.000000	0.000135	0.003775
AP3	0.006869	0.000000	0.000005	0.000035	0.000000	1.000000	0.000246	0.004645
AP4	0.011421	0.000000	0.000006	0.000038	0.000000	1.000000	0.000316	0.003608

linest from std sig ave

0.028184	0.000000	87209.082891	0.162252	0.002400	1.000000	0.017236	0.285501
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standardize signal averages SRM

srM614-2	3.314589	2.816127	0.001070	0.000987	0.012496	1.000000	0.006326	0.000442
srM612-2	3.435153	2.778593	0.000875	0.001176	0.079126	1.000000	0.014008	0.001242
srM610-2	4.088893	2.985639	0.000644	0.001762	0.322642	1.000000	0.137759	0.011911

linest from std sig ave

0.038852	1.370689	1.397407	1.768062	0.009764	1.000000	0.037233	0.424683
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concentration data

SRM614-23	7525.83	0.00	11477231.39	17.16	20.93	85763.00	18.08	11.33
SRM612-23	7895.39	0.00	9156338.33	22.00	121.99	85763.00	26.59	31.67
SRM610-23	9175.50	0.00	9630996.57	36.40	297.71	85763.00	179.73	247.11
AP1-23	78.64	0.00	0.00	8.16	2.42	398936.00	2.36	555.00
AP2-23	41.78	0.00	372494.58	6.22	19.84	398936.00	1.85	640.52
AP3-23	83.79	0.00	375724.89	4.55	0.00	398936.00	2.39	718.18
AP4-23	128.14	0.00	382992.77	4.91	0.00	398936.00	2.74	559.96
34HP45-494-1	426.64	0.00	0.00	397.36	3160.50	398936.00	1.48	490.33
34HP45-494-2	194.90	0.00	0.00	269.93	1814.87	398936.00	0.79	456.55
34HP45-494-3	1909.54	0.00	0.00	200.94	1607.05	398936.00	1.30	504.38
34HP45-494-4	4572.59	0.00	0.00	49.70	1514.98	398936.00	1.57	237.69
34HP45-494-5	2254.95	0.00	0.00	46.82	572.55	398936.00	0.97	178.35
34HP45-494-6	3131.84	0.00	0.00	45.93	679.54	398936.00	0.77	188.64
34HP45-494-7	2738.19	0.00	0.00	81.32	1193.34	398936.00	0.55	233.68
34HP45-494-8	6193.27	0.00	0.00	74.14	1842.30	398936.00	0.81	272.79
34HP45-494-9	5479.56	0.00	0.00	68.37	1492.31	398936.00	0.48	260.86
34HP45-494-10	3894.39	0.00	0.00	64.98	1293.79	398936.00	1.94	389.24
34HP45-494-11	1641.03	0.00	0.00	61.12	805.29	398936.00	1.46	341.11
34HP45-494-12	2054.04	0.00	0.00	59.97	1151.29	398936.00	1.62	341.80
34HP45-494-13	4272.85	0.00	0.00	57.29	890.18	398936.00	0.86	313.30
34HP45-494-14	4400.27	0.00	0.00	58.83	888.29	398936.00	0.96	329.85
34HP45-494-15	2954.82	0.00	0.00	64.09	595.06	398936.00	0.76	334.03
34HP45-494-16	1418.81	0.00	0.00	16.47	344.19	398936.00	0.00	221.39
34HP45-494-17	2442.84	0.00	0.00	20.86	562.73	398936.00	0.11	212.15
34HP45-494-18	1393.46	0.00	0.00	21.65	341.72	398936.00	0.18	197.91
SRM614-24	8497.71	0.00	4531907.68	10.30	0.00	85763.00	0.63	10.32
SRM612-24	8710.98	0.00	3936129.61	10.73	10.53	85763.00	14.82	29.16
SRM610-24	10591.21	0.00	0.00	12.64	242.65	85763.00	227.54	336.20
AP1-24	24.99	0.00	0.00	0.72	0.00	398936.00	0.00	182.93
AP2-24	18.48	0.00	0.00	0.00	0.00	398936.00	0.00	219.48
AP3-24	70.67	0.00	0.00	0.00	0.00	398936.00	1.00	339.91
AP4-24	128.69	0.00	0.00	0.00	0.00	398936.00	1.61	261.98

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Al Si P Cl K Ca Sc Ti

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
blank-21	32740.42	761837.38	5347.79	4587.35	482894.59	266967.09	13177.35	870.20
SRM614-21	4318962.00	3486076.50	5589.31	6297.48	718927.31	1531226.40	30994.85	1893.61
SRM612-21	5687880.50	4630374.00	5457.83	9738.85	2269591.50	2163128.50	44575.89	6928.36
SRM610-21	3310114.00	2534711.50	3786.46	6785.36	1133095.10	1216746.10	114178.92	11750.99
AP1-21	176717.98	266717.44	2440.85	5206.87	624950.56	10582758.00	11461.90	73083.97
AP2-21	83673.95	194899.27	2240.45	4647.51	491734.28	13384268.00	10822.98	85844.28
AP3-21	54721.83	149688.53	1843.29	4280.22	372616.72	12408135.00	9435.05	65965.69
AP4-21	267737.63	141287.95	2229.45	4494.87	373226.66	17196984.00	15559.81	137886.14
34HP45-671-1	907829.44	178171.41	1919.49	30488.09	1665883.50	19424862.00	11488.15	89705.02
34HP45-671-2	541000.19	140139.63	1747.09	30514.01	1552456.00	17686094.00	10448.06	83209.63
34HP45-671-3	379707.03	118167.23	1677.49	28494.96	1348205.90	16833468.00	9302.53	75624.87
34HP45-671-4	1256052.10	195293.30	1843.05	39033.58	2820335.80	18697742.00	9854.14	105054.39
34HP45-671-5	236204.84	83489.03	1608.57	32704.98	1469100.40	16849808.00	8828.77	81917.30
34HP45-671-6	1323884.40	177185.86	1455.25	26091.75	1990847.30	14296605.00	8066.89	61499.55
34HP45-671-7	577654.50	161000.06	1618.09	39127.86	2351153.00	18516696.00	9576.45	89823.19
34HP45-671-8	162237.75	61967.59	1533.65	35310.44	1166771.10	17825614.00	8962.21	73907.94
34HP45-671-9	302639.63	97828.35	1626.97	32999.03	1289544.80	18309968.00	9018.89	74217.09
34HP45-671-10	966591.56	227570.80	1469.09	32309.14	2634467.00	15484212.00	11285.66	67470.18
34HP45-671-11	340972.38	79941.29	1235.05	29057.80	1164267.00	14615340.00	8311.37	52720.94
34HP45-671-12	629471.31	101649.45	1244.25	30111.69	1526156.50	14163120.00	8204.53	51851.37
34HP45-671-13	311780.22	113172.23	708.32	13622.40	1242336.00	6600080.00	4580.03	24813.50
34HP45-671-14	61618.15	46910.38	707.00	11338.86	580732.63	5447751.00	4000.38	16718.93
34HP45-671-15	47872.95	39476.70	594.92	11538.98	588687.19	5260354.50	3925.86	16913.34
34HP45-671-16	87023.65	45953.86	607.76	10193.30	677077.88	4970540.00	3813.54	14900.52
34HP45-671-17	30041.33	32106.58	637.48	12454.75	485393.06	6156280.50	4046.66	17360.66
34HP45-671-18	42922.00	34395.56	728.32	13436.68	613474.25	6513596.00	4137.38	19046.59
SRM614-22	3948359.00	3489952.30	1898.29	4279.50	333254.16	1222218.90	7116.72	1570.77
SRM612-22	4534016.50	3993676.00	2164.33	4997.23	486295.09	1396210.10	19257.91	2707.34
SRM610-22	2905108.80	2434056.50	1477.73	4327.30	548984.88	861708.50	104158.67	9351.61
AP1-22	44242.25	24187.06	748.84	3562.54	299722.13	10072773.00	5418.15	23559.81
AP2-22	47424.27	22614.25	840.64	3316.82	237393.81	10504596.00	5767.07	25339.50
AP3-22	172990.45	30755.29	1117.25	3505.82	290787.06	13317276.00	8560.21	50203.92
AP4-22	156500.56	29510.21	1113.05	3282.98	215579.61	13305352.00	9651.05	46524.86
blank-22	11569.75	26712.15	296.92	2305.25	252750.98	112795.64	1985.73	1099.00
blank average	22155.08	394274.77	2822.36	3446.30	367822.79	189881.37	7581.54	984.65
blank subtraction								
SRM614-21	4296806.92	3091801.74	2766.96	2851.18	351104.53	1341345.04	23413.31	908.97
SRM612-21	5665725.42	4236099.24	2635.47	6292.56	1901768.72	1973247.14	36994.35	5943.71
SRM610-21	3287958.92	2140436.74	964.11	3339.06	765272.32	1026864.74	106597.38	10766.34
AP1-21	154562.90	-127557.33	-381.50	1760.57	257127.78	10392876.64	3880.36	72099.32
AP2-21	61518.87	-199375.50	-581.90	1201.21	123911.50	13194386.64	3241.44	84859.64
AP3-21	32566.74	-244586.24	-979.07	833.92	4793.93	12218253.64	1853.51	64981.04
AP4-21	245582.55	-252986.82	-592.90	1048.57	5403.87	17007102.64	7978.27	136901.49
34HP45-671-1	885674.36	-216103.36	-902.87	27041.79	1298060.72	19234980.64	3906.60	88720.38
34HP45-671-2	518845.11	-254135.14	-1075.27	27067.71	1184633.22	17496212.64	2866.52	82224.98
34HP45-671-3	357551.95	-276107.54	-1144.87	25048.66	980383.12	16643586.64	1720.99	74640.22
34HP45-671-4	1233897.02	-198981.47	-979.31	35587.28	2452513.02	18507860.64	2272.59	104069.74
34HP45-671-5	214049.76	-310785.73	-1213.79	29258.68	1101277.62	16659926.64	1247.23	80932.65
34HP45-671-6	1301729.32	-217088.91	-1367.11	22645.45	1623024.52	14106723.64	485.34	60514.90
34HP45-671-7	555499.42	-233274.71	-1204.27	35681.56	1983330.22	18326814.64	1994.91	88838.54
34HP45-671-8	140082.67	-332307.18	-1288.71	31864.14	798948.32	17635732.64	1380.67	72923.29
34HP45-671-9	280484.55	-296446.41	-1195.39	29552.73	921722.02	18120086.64	1437.35	73232.45
34HP45-671-10	944436.48	-166703.97	-1353.27	28862.84	2266644.22	15894330.64	3704.12	66485.53
34HP45-671-11	318817.30	-314333.48	-1587.31	25611.50	796444.22	14425458.64	729.82	51736.29
34HP45-671-12	607316.23	-292625.32	-1578.11	26665.39	1158333.72	13973238.64	622.98	50866.73
34HP45-671-13	289625.14	-281102.54	-2114.03	10176.10	874513.22	6410198.64	-3001.52	23928.85
34HP45-671-14	39463.06	-347364.38	-2115.35	7892.56	212909.85	5257869.64	-3581.16	15734.29
34HP45-671-15	25717.86	-354798.06	-2227.43	8092.68	220864.41	5070473.14	-3655.68	15929.69
34HP45-671-16	64868.56	-348320.91	-2214.59	6747.00	309255.10	4780658.64	-3768.00	1915.88
34HP45-671-17	7886.25	-362168.18	-2184.87	9008.45	117570.28	5966399.14	-3534.88	16376.01
34HP45-671-18	20766.92	-359879.21	-2094.03	9990.38	245651.47	6323714.64	-3444.16	18061.94
SRM614-22	3922603.92	3095677.54	-924.07	833.20	-34568.63	1032337.54	-464.82	586.12
SRM612-22	4511861.42	3599401.24	-658.02	1550.93	118472.31	1206328.74	11676.37	1722.69
SRM610-22	2882953.72	2039781.74	-1344.63	881.00	181162.10	671827.14	96577.13	8366.97
AP1-22	22087.17	-370087.71	-2073.51	116.24	-68100.66	9882891.64	-2163.39	22575.17
AP2-22	25269.18	-371660.52	-1981.71	-129.48	-130428.98	10314714.64	-1814.47	24354.86
AP3-22	150835.37	-363519.47	-1705.11	59.52	-77035.73	13127394.64	978.67	49219.28
AP4-22	134345.48	-364764.56	-1709.31	-163.32	-152243.18	13115470.64	2069.51	45540.22
zero correction								
SRM614-21	4296806.92	3091801.74	2766.96	2851.18	351104.53	1341345.04	23413.31	908.97
SRM612-21	5665725.42	4236099.24	2635.47	6292.56	1901768.72	1973247.14	36994.35	5943.71
SRM610-21	3287958.92	2140436.74	964.11	3339.06	765272.32	1026864.74	106597.38	10766.34
AP1-21	154562.90	0.00	0.00	1760.57	257127.78	10392876.64	3880.36	72099.32
AP2-21	61518.87	0.00	0.00	1201.21	123911.50	13194386.64	3241.44	84859.64
AP3-21	32566.74	0.00	0.00	833.92	4793.93	12218253.64	1853.51	64981.04

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	245582.55	0.00	0.00	1048.57	5403.87	17007102.64	7978.27	136901.49
34HP45-671-1	885674.36	0.00	0.00	27041.79	1298060.72	19234980.64	3906.60	88720.38
34HP45-671-2	518845.11	0.00	0.00	27067.71	1184633.22	17496212.64	2866.52	82224.98
34HP45-671-3	357551.95	0.00	0.00	25048.66	980383.12	16643586.64	1720.99	74640.22
34HP45-671-4	1233897.02	0.00	0.00	35587.28	2452513.02	18507860.64	2272.59	104069.74
34HP45-671-5	214049.76	0.00	0.00	29258.68	1101277.62	16659926.64	1247.23	80932.65
34HP45-671-6	1301729.32	0.00	0.00	22645.45	1623024.52	14106723.64	485.34	60514.90
34HP45-671-7	555499.42	0.00	0.00	35681.56	1983330.22	18326814.64	1994.91	88838.54
34HP45-671-8	140082.67	0.00	0.00	31864.14	798948.32	17635732.64	1380.67	72923.29
34HP45-671-9	280484.55	0.00	0.00	29552.73	921722.02	18120086.64	1437.35	73232.45
34HP45-671-10	944436.48	0.00	0.00	28862.84	2266644.22	15294330.64	3704.12	66485.53
34HP45-671-11	318817.30	0.00	0.00	25611.50	796444.22	14425458.64	729.82	51736.29
34HP45-671-12	607316.23	0.00	0.00	26665.39	1158333.72	13973238.64	622.98	50866.73
34HP45-671-13	289625.14	0.00	0.00	10176.10	874513.22	6410198.64	0.00	23928.85
34HP45-671-14	39463.06	0.00	0.00	7892.56	212909.85	5257869.64	0.00	15734.29
34HP45-671-15	25717.86	0.00	0.00	8092.68	220864.41	5070473.14	0.00	15928.69
34HP45-671-16	64868.56	0.00	0.00	6747.00	309255.10	4780658.64	0.00	13915.88
34HP45-671-17	7886.25	0.00	0.00	9008.45	117570.28	5966399.14	0.00	16376.01
34HP45-671-18	20766.92	0.00	0.00	9990.38	245651.47	6323714.64	0.00	18061.94
SRM614-22	3926203.92	3095677.54	0.00	833.20	0.00	1032337.54	0.00	586.12
SRM612-22	4511861.42	3599401.24	0.00	1550.93	118472.31	1206328.74	11676.37	1722.69
SRM610-22	2882953.72	2039781.74	0.00	881.00	181162.10	671827.14	96577.13	8366.97
AP1-22	22087.17	0.00	0.00	116.24	0.00	9882891.64	0.00	22575.17
AP2-22	25269.18	0.00	0.00	0.00	0.00	10314714.64	0.00	24354.86
AP3-22	150835.37	0.00	0.00	59.52	0.00	13127394.64	978.67	49219.28
AP4-22	134345.48	0.00	0.00	0.00	0.00	13115470.64	2069.51	45540.22

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration

SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal

SRM614-21	3.203357	2.305001	0.002063	0.002126	0.261756	1.000000	0.017455	0.000678
SRM612-21	2.871270	2.146766	0.001336	0.003189	0.963776	1.000000	0.018748	0.003012
SRM610-21	3.201940	2.084439	0.000939	0.003252	0.745251	1.000000	0.103809	0.010485
AP1-21	0.014872	0.000000	0.000000	0.000169	0.024741	1.000000	0.000373	0.006937
AP2-21	0.004663	0.000000	0.000000	0.000091	0.009391	1.000000	0.000246	0.006431
AP3-21	0.002665	0.000000	0.000000	0.000068	0.000392	1.000000	0.000152	0.005318
AP4-21	0.014440	0.000000	0.000000	0.000062	0.000318	1.000000	0.000469	0.008050
34HP45-671-1	0.046045	0.000000	0.000000	0.001406	0.067484	1.000000	0.000203	0.004612
34HP45-671-2	0.029655	0.000000	0.000000	0.001547	0.067708	1.000000	0.000164	0.004700
34HP45-671-3	0.021483	0.000000	0.000000	0.001505	0.058905	1.000000	0.000103	0.004485
34HP45-671-4	0.066669	0.000000	0.000000	0.001923	0.132512	1.000000	0.000123	0.005623
34HP45-671-5	0.012848	0.000000	0.000000	0.001756	0.066103	1.000000	0.000075	0.004858
34HP45-671-6	0.092277	0.000000	0.000000	0.001605	0.115053	1.000000	0.000034	0.004290
34HP45-671-7	0.030311	0.000000	0.000000	0.001947	0.108220	1.000000	0.000109	0.004847
34HP45-671-8	0.007943	0.000000	0.000000	0.001807	0.045303	1.000000	0.000078	0.004135
34HP45-671-9	0.015479	0.000000	0.000000	0.001631	0.050867	1.000000	0.000079	0.004042
34HP45-671-10	0.061751	0.000000	0.000000	0.001887	0.148202	1.000000	0.000242	0.004347
34HP45-671-11	0.022101	0.000000	0.000000	0.001775	0.055211	1.000000	0.000051	0.003586
34HP45-671-12	0.043463	0.000000	0.000000	0.001908	0.082897	1.000000	0.000045	0.003640
34HP45-671-13	0.045182	0.000000	0.000000	0.001587	0.136425	1.000000	0.000000	0.003733
34HP45-671-14	0.007506	0.000000	0.000000	0.001501	0.040494	1.000000	0.000000	0.002993
34HP45-671-15	0.005072	0.000000	0.000000	0.001596	0.043559	1.000000	0.000000	0.003141
34HP45-671-16	0.013569	0.000000	0.000000	0.001411	0.064689	1.000000	0.000000	0.002911
34HP45-671-17	0.001322	0.000000	0.000000	0.001510	0.019705	1.000000	0.000000	0.002745
34HP45-671-18	0.003284	0.000000	0.000000	0.001580	0.038846	1.000000	0.000000	0.002856
SRM614-22	3.803217	2.998707	0.000000	0.000807	0.000000	1.000000	0.000000	0.000568
SRM612-22	3.740159	2.983765	0.000000	0.001286	0.098209	1.000000	0.009679	0.001428
SRM610-22	4.291214	3.036171	0.000000	0.001311	0.269656	1.000000	0.143753	0.012454
AP1-22	0.002235	0.000000	0.000000	0.000012	0.000000	1.000000	0.000000	0.002284
AP2-22	0.002450	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.002361
AP3-22	0.011490	0.000000	0.000000	0.000005	0.000000	1.000000	0.000075	0.003749
AP4-22	0.010243	0.000000	0.000000	0.000000	0.000000	1.000000	0.000158	0.003472

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP								
AP1	0.008553	0.000000	0.000000	0.000091	0.012370	1.000000	0.000187	0.004611
AP2	0.003556	0.000000	0.000000	0.000046	0.004696	1.000000	0.000123	0.004396
AP3	0.007078	0.000000	0.000000	0.000036	0.000196	1.000000	0.000113	0.004534
AP4	0.012342	0.000000	0.000000	0.000031	0.000159	1.000000	0.000313	0.005761
linest from std sig ave								
	0.022644	0.000000	0.000000	0.135203	0.000199	1.000000	0.018561	0.227843
standardize signal averages SRM								
srm614-2	3.503287	2.651854	0.001031	0.001466	0.130878	1.000000	0.008728	0.000623
srm612-2	3.305715	2.565265	0.000668	0.002237	0.530993	1.000000	0.014214	0.002220
srm610-2	3.746577	2.560305	0.000469	0.002282	0.507454	1.000000	0.123781	0.011469
linest from std sig ave								
	0.040142	1.513299	1.396542	1.011504	0.001455	1.000000	0.041261	0.433372
concentration data								
SRM614-21	6221.06	0.00	0.00	24.65	32.66	85763.00	27.79	13.24
SRM612-21	5576.14	0.00	0.00	36.98	120.26	85763.00	29.84	58.86
SRM610-21	6218.31	0.00	0.00	37.70	93.00	85763.00	165.25	204.88
AP1-21	134.35	0.00	0.00	9.14	14.36	398936.00	2.76	630.57
AP2-21	42.12	0.00	0.00	4.91	5.45	398936.00	1.82	584.59
AP3-21	24.08	0.00	0.00	3.68	0.23	398936.00	1.12	483.41
AP4-21	130.45	0.00	0.00	3.33	0.18	398936.00	3.47	731.67
34HP45-671-1	415.95	0.00	0.00	75.83	39.17	398936.00	1.50	419.25
34HP45-671-2	267.89	0.00	0.00	83.44	39.30	398936.00	1.21	427.17
34HP45-671-3	194.07	0.00	0.00	81.18	34.19	398936.00	0.77	407.63
34HP45-671-4	602.26	0.00	0.00	103.71	76.92	398936.00	0.91	511.10
34HP45-671-5	116.07	0.00	0.00	94.73	38.37	398936.00	0.55	441.56
34HP45-671-6	833.60	0.00	0.00	86.59	66.78	398936.00	0.25	389.92
34HP45-671-7	273.82	0.00	0.00	105.01	62.82	398936.00	0.81	440.61
34HP45-671-8	71.76	0.00	0.00	97.45	26.30	398936.00	0.58	375.85
34HP45-671-9	139.83	0.00	0.00	87.97	29.53	398936.00	0.59	367.35
34HP45-671-10	557.83	0.00	0.00	101.79	86.02	398936.00	1.79	395.13
34HP45-671-11	199.65	0.00	0.00	95.76	32.05	398936.00	0.37	325.99
34HP45-671-12	392.63	0.00	0.00	102.93	48.12	398936.00	0.33	330.88
34HP45-671-13	408.16	0.00	0.00	85.62	79.19	398936.00	0.00	339.30
34HP45-671-14	67.80	0.00	0.00	80.96	23.50	398936.00	0.00	272.00
34HP45-671-15	45.82	0.00	0.00	86.09	25.28	398936.00	0.00	285.54
34HP45-671-16	122.58	0.00	0.00	76.12	37.55	398936.00	0.00	264.58
34HP45-671-17	11.94	0.00	0.00	81.44	11.44	398936.00	0.00	249.48
34HP45-671-18	29.67	0.00	0.00	85.21	22.55	398936.00	0.00	259.62
SRM614-22	7386.02	0.00	0.00	9.36	0.00	85763.00	0.00	11.09
SRM612-22	7263.56	0.00	0.00	14.91	12.26	85763.00	15.41	27.90
SRM610-22	8333.73	0.00	0.00	15.21	33.65	85763.00	228.84	243.36
AP1-22	20.19	0.00	0.00	0.63	0.00	398936.00	0.00	207.63
AP2-22	22.13	0.00	0.00	0.00	0.00	398936.00	0.00	214.62
AP3-22	103.80	0.00	0.00	0.24	0.00	398936.00	0.55	340.80
AP4-22	92.53	0.00	0.00	0.00	0.00	398936.00	1.17	315.61
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-19	29614.61	197102.31	1590.49	3986.34	531131.94	130621.73	6988.36	550.28
SRM614-19	7273275.00	5822986.50	4160.42	7346.92	679871.00	2489838.30	33327.03	3971.30
SRM612-19	6084278.50	4527462.50	3396.70	9845.50	1703297.80	2002551.00	38935.94	13881.52
SRM610-19	3411062.50	2462092.50	2454.93	6117.31	853293.31	1081304.40	115396.73	10550.26
AP1-19	90168.35	113598.28	1535.17	4932.87	466150.09	11703312.00	9459.05	70412.00
AP2-19	214155.56	127051.84	1727.01	10754.42	2299140.30	16354821.00	10761.86	283611.34
AP3-19	428494.50	131076.86	2353.33	7110.04	1304200.30	20821698.00	15825.17	281373.09
AP4-19	349569.09	103111.94	2185.85	5308.23	605608.69	20606488.00	17791.10	208228.73
34HP60-102-1	112613.23	100118.41	1278.81	19017.51	1388453.00	12115513.00	9282.09	65597.37
34HP60-102-2	76055.83	85198.88	1058.05	14532.28	753429.25	8146655.00	6968.80	46941.58
34HP60-102-3	136811.17	83101.59	911.69	11885.67	662232.88	5887368.50	5557.55	31802.30
34HP60-102-4	26452.35	74930.31	783.24	9486.89	523384.63	3927489.80	4954.67	21684.24
34HP60-102-5	56483.68	72252.16	858.60	12670.19	660585.00	5743704.00	5376.63	29887.13
34HP60-102-6	321412.59	92090.44	1229.05	21803.40	998335.38	11912539.00	8159.05	68809.23
34HP60-102-7	30696.17	65003.00	739.88	8537.29	508252.81	4302226.50	4769.19	19943.91

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	67705.34	61774.47	821.00	10982.14	1067513.60	5904168.50	5612.59	30646.49
34HP60-102-9	285266.94	70122.31	899.17	9953.94	944653.19	6770452.00	6404.88	33515.23
34HP60-102-10	114832.81	64060.72	1039.97	8383.53	821172.50	11697154.00	7740.60	46669.30
34HP60-102-11	158719.84	62668.67	1021.21	9792.97	731524.00	10716232.00	7187.84	41031.35
34HP60-102-12	251725.45	66066.13	1030.09	7582.60	899323.38	11580700.00	7826.36	45857.46
34HP60-102-13	84699.23	50534.36	967.65	8354.97	1267102.90	12715328.00	8087.09	45235.57
34HP60-102-14	65358.85	44744.17	1073.25	9683.05	1265383.80	12937757.00	7964.56	44169.45
34HP60-102-15	49625.64	42776.12	1095.97	10466.94	1319106.80	12031854.00	7311.12	40355.27
34HP60-102-16	133397.59	54535.87	803.08	9853.22	988074.50	8467263.00	5828.19	31956.62
34HP60-102-17	65711.89	41746.72	813.40	10171.82	797424.00	8911770.00	5774.43	30191.45
34HP60-102-18	39253.86	39865.50	772.24	11199.42	520683.84	6755579.00	4609.15	22823.77
SRM614-20	5027572.00	4483997.00	2546.77	5177.51	310453.03	1562529.40	10627.62	1780.53
SRM612-20	5315029.00	4520691.00	2438.21	5689.95	458294.34	1611461.30	23496.45	2982.70
SRM610-20	3129034.80	2554920.80	1629.09	4825.91	514249.13	909262.06	109098.53	9877.62
AP1-20	67582.94	29723.85	778.52	3907.82	247967.75	10331724.00	5548.63	27751.12
AP2-20	46096.18	28400.68	896.53	3903.78	352929.00	10996098.00	5946.75	37165.85
AP3-20	141225.36	32054.10	1256.53	3767.58	258125.05	14135997.00	9003.57	60879.38
AP4-20	214265.92	38460.34	1461.41	3785.06	253869.98	15750350.00	11679.67	74202.50
blank-20	9842.14	34028.55	360.16	2716.62	270183.84	109502.38	2068.97	1019.57
blank average	19728.37	115565.43	975.33	3351.48	400657.89	120062.06	4528.67	784.92
blank subtraction								
SRM614-19	7253546.63	5707421.07	3185.10	3995.44	279213.11	2369776.25	28798.36	3186.38
SRM612-19	6064550.13	4411897.07	2421.37	6494.02	1302639.91	1882488.95	34407.27	13096.59
SRM610-19	3391334.13	2346527.07	1479.61	2765.84	452635.42	961242.35	110868.06	9765.34
AP1-19	70439.98	-1967.15	559.84	1581.39	65492.20	11583249.95	4930.39	69627.08
AP2-19	194427.19	11486.41	751.68	7402.94	1898482.41	16234758.95	6233.19	282826.42
AP3-19	408766.13	15511.43	1378.01	3758.56	903542.41	20701635.95	11296.50	280588.17
AP4-19	329840.72	-12453.49	1210.53	1956.75	204950.80	20486425.95	13262.43	207443.81
34HP60-102-1	92884.86	-15447.02	303.48	15666.03	987795.11	11995450.95	4753.43	64812.44
34HP60-102-2	56327.46	-30366.56	82.72	11180.80	352771.36	8026592.95	2440.13	46156.66
34HP60-102-3	117082.80	-32463.84	-63.64	8534.19	261574.99	5767306.45	1028.89	31017.37
34HP60-102-4	6723.98	-40635.13	-192.08	6135.41	122726.74	3807427.75	426.00	20899.32
34HP60-102-5	36755.30	-43313.27	-116.72	9318.71	259927.11	5623641.95	847.96	29102.20
34HP60-102-6	301684.22	-23474.99	253.72	18451.92	597677.49	11792476.95	3630.38	68024.30
34HP60-102-7	10967.80	-50562.43	-235.44	5185.81	107594.92	4182164.45	240.52	19158.99
34HP60-102-8	47976.97	-53790.96	-154.32	7630.66	666855.71	5784106.45	1083.93	29861.57
34HP60-102-9	265538.57	-45443.12	-76.16	6602.46	543995.30	6650389.95	1876.21	32730.31
34HP60-102-10	95104.44	-51504.71	64.64	5032.05	420514.61	11577091.95	3211.94	45884.38
34HP60-102-11	138991.47	-52896.76	45.88	6441.50	330866.11	10596169.95	2659.17	40246.43
34HP60-102-12	231997.08	-49499.30	54.76	4231.12	498665.49	11460637.95	3297.70	45072.53
34HP60-102-13	64970.86	-65031.07	-7.68	5003.49	866445.01	12595265.95	3558.42	44450.65
34HP60-102-14	45630.48	-70821.26	97.92	6331.58	864725.91	12817694.95	3435.90	43384.52
34HP60-102-15	29897.27	-72789.31	120.64	7115.46	918448.91	11911791.95	2782.46	39570.34
SRM614-20	5007843.63	4368431.57	1571.45	1826.03	-90204.86	1442467.35	6098.95	995.61
SRM612-20	5295300.63	4405125.57	1462.89	2338.47	57636.45	1491399.25	18967.79	2197.77
SRM610-20	3109306.43	2439355.37	653.76	1474.43	113591.24	789200.01	104569.86	9092.69
AP1-20	47854.57	-85841.58	-196.80	556.34	-152690.14	10211661.95	1019.97	26966.19
AP2-20	26367.81	-87164.75	-78.80	552.30	-47728.89	10876035.95	1418.09	36380.92
AP3-20	121496.99	-83511.33	281.20	416.10	-142532.84	14015934.95	4474.90	60094.46
AP4-20	194537.55	-77105.09	486.08	433.58	-146787.91	15630287.95	7151.00	73417.58
zero correction								
SRM614-19	7253546.63	5707421.07	3185.10	3995.44	279213.11	2369776.25	28798.36	3186.38
SRM612-19	6064550.13	4411897.07	2421.37	6494.02	1302639.91	1882488.95	34407.27	13096.59
SRM610-19	3391334.13	2346527.07	1479.61	2765.84	452635.42	961242.35	110868.06	9765.34
AP1-19	70439.98	0.00	559.84	1581.39	65492.20	11583249.95	4930.39	69627.08
AP2-19	194427.19	11486.41	751.68	7402.94	1898482.41	16234758.95	6233.19	282826.42
AP3-19	408766.13	15511.43	1378.01	3758.56	903542.41	20701635.95	11296.50	280588.17
AP4-19	329840.72	0.00	1210.53	1956.75	204950.80	20486425.95	13262.43	207443.81
34HP60-102-1	92884.86	0.00	303.48	15666.03	987795.11	11995450.95	4753.43	64812.44
34HP60-102-2	56327.46	0.00	82.72	11180.80	352771.36	8026592.95	2440.13	46156.66
34HP60-102-3	117082.80	0.00	0.00	8534.19	261574.99	5767306.45	1028.89	31017.37
34HP60-102-4	6723.98	0.00	0.00	6135.41	122726.74	3807427.75	426.00	20899.32
34HP60-102-5	36755.30	0.00	0.00	9318.71	259927.11	5623641.95	847.96	29102.20
34HP60-102-6	301684.22	0.00	253.72	18451.92	597677.49	11792476.95	3630.38	68024.30
34HP60-102-7	10967.80	0.00	0.00	5185.81	107594.92	4182164.45	240.52	19158.99
34HP60-102-8	47976.97	0.00	0.00	7630.66	666855.71	5784106.45	1083.93	29861.57
34HP60-102-9	265538.57	0.00	0.00	6602.46	543995.30	6650389.95	1876.21	32730.31
34HP60-102-10	95104.44	0.00	64.64	5032.05	420514.61	11577091.95	3211.94	45884.38
34HP60-102-11	138991.47	0.00	45.88	6441.50	330866.11	10596169.95	2659.17	40246.43
34HP60-102-12	231997.08	0.00	54.76	4231.12	498665.49	11460637.95	3297.70	45072.53
34HP60-102-13	64970.86	0.00	0.00	5003.49	866445.01	12595265.95	3558.42	44450.65
34HP60-102-14	45630.48	0.00	97.92	6331.58	864725.91	12817694.95	3435.90	43384.52
34HP60-102-15	29897.27	0.00	120.64	7115.46	918448.91	11911791.95	2782.46	39570.34

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	113669.22	0.00	0.00	6501.74	587416.61	8347200.95	1299.53	31171.69
34HP60-102-17	45983.52	0.00	0.00	6820.34	396766.11	8791707.95	1245.77	29406.53
34HP60-102-18	19525.49	0.00	0.00	7847.94	120025.95	6635516.95	80.48	22038.84
SRM614-20	5007843.63	4368431.57	1571.45	1826.03	0.00	1442467.35	6098.95	995.61
SRM612-20	5295300.63	4405125.57	1462.89	2338.47	57636.45	1491399.25	18967.79	2197.77
SRM610-20	3109306.43	2439355.37	653.76	1474.43	113591.24	789200.01	104569.86	9092.69
AP1-20	47854.57	0.00	0.00	556.34	0.00	10211661.95	1019.97	26966.19
AP2-20	26367.81	0.00	0.00	552.30	0.00	10876035.95	1418.09	36380.92
AP3-20	121496.99	0.00	281.20	416.10	0.00	14015934.95	4474.90	60094.46
AP4-20	194537.55	0.00	486.08	433.58	0.00	15630287.95	7151.00	73417.58

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-19	3.060857	2.408422	0.001344	0.001686	0.117823	1.000000	0.012152	0.001345
SRM612-19	3.221559	2.343651	0.001286	0.003450	0.691977	1.000000	0.018278	0.006957
SRM610-19	3.528074	2.441140	0.001539	0.002877	0.470886	1.000000	0.115338	0.010159
AP1-19	0.006081	0.000000	0.000048	0.000137	0.005654	1.000000	0.000426	0.006011
AP2-19	0.011976	0.000708	0.000046	0.000456	0.116939	1.000000	0.000384	0.017421
AP3-19	0.019746	0.000749	0.000067	0.000182	0.043646	1.000000	0.000546	0.013554
AP4-19	0.016100	0.000000	0.000059	0.000096	0.010004	1.000000	0.000647	0.010126
34HP60-102-1	0.007743	0.000000	0.000025	0.001306	0.082347	1.000000	0.000396	0.005403
34HP60-102-2	0.007018	0.000000	0.000010	0.001393	0.043950	1.000000	0.000304	0.005750
34HP60-102-3	0.020301	0.000000	0.000000	0.001480	0.045355	1.000000	0.000178	0.005378
34HP60-102-4	0.001766	0.000000	0.000000	0.001611	0.032234	1.000000	0.000112	0.005489
34HP60-102-5	0.006536	0.000000	0.000000	0.001657	0.046220	1.000000	0.000151	0.005175
34HP60-102-6	0.025583	0.000000	0.000022	0.001565	0.050683	1.000000	0.000308	0.005768
34HP60-102-7	0.002623	0.000000	0.000000	0.001240	0.025727	1.000000	0.000058	0.004581
34HP60-102-8	0.008295	0.000000	0.000000	0.001319	0.115291	1.000000	0.000187	0.005163
34HP60-102-9	0.039928	0.000000	0.000000	0.000993	0.081799	1.000000	0.000282	0.004922
34HP60-102-10	0.008215	0.000000	0.000006	0.000435	0.036323	1.000000	0.000277	0.003963
34HP60-102-11	0.013117	0.000000	0.000004	0.000608	0.031225	1.000000	0.000251	0.003798
34HP60-102-12	0.020243	0.000000	0.000005	0.000369	0.043511	1.000000	0.000288	0.003933
34HP60-102-13	0.005158	0.000000	0.000000	0.000397	0.068791	1.000000	0.000283	0.003529
34HP60-102-14	0.003560	0.000000	0.000008	0.000494	0.067463	1.000000	0.000268	0.003385
34HP60-102-15	0.002510	0.000000	0.000010	0.000597	0.077104	1.000000	0.000234	0.003322
34HP60-102-16	0.013618	0.000000	0.000000	0.000779	0.070373	1.000000	0.000156	0.003734
34HP60-102-17	0.005230	0.000000	0.000000	0.000776	0.045130	1.000000	0.000142	0.003345
34HP60-102-18	0.002943	0.000000	0.000000	0.001183	0.018088	1.000000	0.000012	0.003321
SRM614-20	3.471721	3.028444	0.001089	0.001266	0.000000	1.000000	0.004228	0.000690
SRM612-20	3.550559	2.953686	0.000981	0.001568	0.038646	1.000000	0.012718	0.001474
SRM610-20	3.939821	3.090922	0.000828	0.001868	0.143932	1.000000	0.132501	0.011521
AP1-20	0.004686	0.000000	0.000000	0.000054	0.000000	1.000000	0.000100	0.002641
AP2-20	0.002424	0.000000	0.000000	0.000051	0.000000	1.000000	0.000130	0.003345
AP3-20	0.008668	0.000000	0.000020	0.000030	0.000000	1.000000	0.000319	0.004288
AP4-20	0.012446	0.000000	0.000031	0.000028	0.000000	1.000000	0.000458	0.004697

standardize signal averages AP								
AP1	0.005384	0.000000	0.000024	0.000096	0.002827	1.000000	0.000263	0.004326
AP2	0.007200	0.000354	0.000023	0.000253	0.058470	1.000000	0.000257	0.010383
AP3	0.014207	0.000375	0.000043	0.000106	0.021823	1.000000	0.000432	0.008921
AP4	0.014273	0.000000	0.000045	0.000062	0.005002	1.000000	0.000552	0.007412

linest from std sig ave								
	0.018080	0.672113	12688.235772	0.049281	0.000200	1.000000	0.010054	0.131495

standardize signal averages SRM								
srm614-2	3.266289	2.718433	0.001217	0.001476	0.058911	1.000000	0.008190	0.001017
srm612-2	3.386059	2.648669	0.001134	0.002509	0.365312	1.000000	0.015498	0.004215
srm610-2	3.733947	2.766031	0.001184	0.002373	0.307409	1.000000	0.123920	0.010840

linest from std sig ave								
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Appendix A. Raw trace element datasheets from laser ablation.

	0.040769	1.447037	1.341257	0.922044	0.002115	1.000000	0.041177	0.420094
concentration data								
SRM614-19	4746.19	138827.38	1462569.93	7.13	21.37	85763.00	10.48	15.16
SRM612-19	4995.38	135093.82	1399685.93	14.58	125.51	85763.00	15.76	78.46
SRM610-19	5470.66	140713.33	1675001.04	12.16	85.41	85763.00	99.45	114.57
AP1-19	43.86	0.00	244647.29	2.68	4.77	398936.00	1.71	315.33
AP2-19	86.38	189.71	234365.74	8.96	98.66	398936.00	1.54	913.88
AP3-19	142.42	200.91	336939.16	3.57	36.82	398936.00	2.19	711.01
AP4-19	116.13	0.00	299097.44	1.88	8.44	398936.00	2.60	531.19
34HP60-102-1	55.85	0.00	128062.09	25.68	69.48	398936.00	1.59	283.44
34HP60-102-2	50.62	0.00	52165.82	27.39	37.08	398936.00	1.22	301.66
34HP60-102-3	146.43	0.00	0.00	29.09	38.27	398936.00	0.72	282.13
34HP60-102-4	12.74	0.00	0.00	31.68	27.20	398936.00	0.45	287.95
34HP60-102-5	47.14	0.00	0.00	32.58	39.00	398936.00	0.60	271.47
34HP60-102-6	184.52	0.00	108907.20	30.76	42.76	398936.00	1.23	302.60
34HP60-102-7	18.92	0.00	0.00	24.38	21.71	398936.00	0.23	240.32
34HP60-102-8	59.83	0.00	0.00	25.94	97.27	398936.00	0.75	270.83
34HP60-102-9	288.00	0.00	0.00	19.52	69.01	398936.00	1.13	258.18
34HP60-102-10	59.25	0.00	28262.37	8.55	30.65	398936.00	1.11	207.91
34HP60-102-11	94.61	0.00	21917.01	11.95	26.34	398936.00	1.01	199.25
34HP60-102-12	146.01	0.00	24185.88	7.26	36.71	398936.00	1.15	206.31
34HP60-102-13	37.21	0.00	0.00	7.81	58.04	398936.00	1.13	185.13
34HP60-102-14	25.68	0.00	38669.52	9.71	56.92	398936.00	1.08	177.56
34HP60-102-15	18.10	0.00	51265.05	11.74	65.05	398936.00	0.94	174.26
34HP60-102-16	98.22	0.00	0.00	15.31	59.37	398936.00	0.62	195.90
34HP60-102-17	37.73	0.00	0.00	15.25	38.08	398936.00	0.57	175.46
34HP60-102-18	21.22	0.00	0.00	23.25	15.26	398936.00	0.05	174.23
SRM614-20	5383.28	174566.98	1185483.43	5.35	0.00	85763.00	3.65	7.78
SRM612-20	5505.52	170257.77	1067378.39	6.63	7.01	85763.00	10.97	16.62
SRM610-20	6109.12	178168.35	901436.12	7.90	26.11	85763.00	114.25	129.93
AP1-20	33.80	0.00	0.00	1.07	0.00	398936.00	0.40	138.53
AP2-20	17.49	0.00	0.00	1.00	0.00	398936.00	0.52	175.48
AP3-20	62.52	0.00	101554.75	0.58	0.00	398936.00	1.28	224.92
AP4-20	89.77	0.00	157415.57	0.55	0.00	398936.00	1.83	246.40
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-17	23448.01	1444205.10	11137.98	8219.81	735218.31	136528.38	9776.13	671.24
SRM614-17	6291328.50	5197194.50	10488.82	9517.21	828279.75	2264059.50	65194.25	5258.23
SRM612-17	5602859.50	4527455.00	8630.93	18557.74	5348428.00	2072101.90	58895.81	23817.38
SRM610-17	3961737.00	3207149.30	6653.40	12556.59	3407519.30	1404218.30	131879.19	18887.11
AP1-17	128024.77	388352.75	4273.82	7967.61	1912494.60	16063632.00	11349.06	239790.63
AP2-17	213451.36	280449.91	3335.38	9050.41	1910409.10	15461033.00	10379.82	300056.50
AP3-17	244621.22	225626.39	3180.26	8950.65	2419109.30	16712044.00	12820.51	221036.56
AP4-17	412603.72	198894.44	3297.70	6438.20	1177359.40	20527838.00	18163.30	285970.22
34HP60-24-1	42108.20	149274.77	1868.37	10454.06	854080.44	4911951.00	4790.31	32703.66
34HP60-24-2	31421.90	127108.23	1669.81	12307.59	860141.75	5304435.00	4868.31	33660.71
34HP60-24-3	52519.54	111246.79	1435.45	12503.95	908352.38	5745896.50	4825.75	32516.66
34HP60-24-4	64527.92	97927.63	1291.45	10391.26	817384.38	8267365.00	5878.91	42134.44
34HP60-24-5	30939.09	79463.37	1427.05	8274.97	792359.56	11387395.00	7963.52	54144.47
34HP60-24-6	36681.97	70902.52	1304.53	8441.93	905050.38	11726080.00	8091.93	52648.10
34HP60-24-7	67937.31	67662.58	1252.97	8510.37	581728.25	9850099.00	6161.95	44047.57
34HP60-24-8	51485.89	58784.81	1157.45	9240.61	542419.31	10301927.00	5956.59	47517.79
34HP60-24-9	63388.88	54749.63	1194.29	7765.20	701923.25	11447821.00	6207.52	52176.02
34HP60-24-10	40753.67	49860.92	1079.65	5521.23	488904.63	10740960.00	7468.12	41883.12
34HP60-24-11	31982.58	43511.97	1048.53	5530.19	462152.69	11866408.00	7702.76	45167.09
34HP60-24-12	39547.06	40693.75	988.61	5798.59	486310.13	13024607.00	8564.17	46200.26
SRM614-18	4376161.50	3872015.80	2262.69	5140.67	342210.13	1341109.10	9698.81	1726.65
SRM612-18	5257291.00	4699831.00	2579.57	7001.56	829815.19	1628718.10	23343.05	4886.95
SRM610-18	3201185.30	2565788.00	1646.29	5652.95	775303.06	925927.06	111616.34	10699.98
AP1-18	57915.16	27591.44	862.68	4255.82	435236.97	11430353.00	5687.11	36352.00
AP2-18	60482.62	27279.35	961.65	4054.78	339540.03	12768259.00	6285.04	46614.78
AP3-18	136188.16	30127.77	1127.41	4309.74	380628.25	14055487.00	8825.57	55144.67
AP4-18	243003.53	37395.25	1338.09	3951.18	252821.98	16335796.00	12176.51	78729.48
blank-18	8853.69	34445.56	498.00	3012.62	285299.69	90126.38	1717.77	992.29
blank average	16150.85	739325.33	5817.99	5616.21	510259.00	113327.38	5746.95	831.76
blank subtraction								

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	6275177.65	4457869.17	4670.83	3901.00	318020.75	2150732.12	59447.30	4426.46
SRM612-17	5586708.65	3788129.67	2812.94	12941.53	4838169.00	1958774.52	53148.86	22985.61
SRM610-17	3945586.15	2467823.97	835.41	6940.38	2897260.30	1290890.92	126132.24	18055.34
AP1-17	111873.92	-350972.58	-1544.17	2351.39	1402235.60	15950304.62	5602.11	238958.87
AP2-17	197300.51	-458875.42	-2482.61	3434.20	1400150.10	15347705.62	4632.87	299224.74
AP3-17	228470.37	-513698.94	-2637.73	3334.44	1908850.30	16598716.62	7073.56	220204.80
AP4-17	396452.87	-540430.89	-2520.29	821.98	667100.40	20414510.62	12416.35	285138.46
34HP60-24-1	25957.34	-590050.56	-3949.62	4837.85	343821.44	4798623.62	-956.65	31871.90
34HP60-24-2	15271.05	-612217.10	-4148.18	6691.38	349882.75	5191107.62	-878.64	32828.94
34HP60-24-3	36368.68	-628078.54	-4382.54	6887.74	398093.38	5632569.12	-921.21	31684.90
34HP60-24-4	48377.07	-641397.69	-4526.55	4775.05	307125.38	8154037.62	131.96	41302.67
34HP60-24-5	14788.24	-659861.96	-4390.94	2658.76	282100.56	11274067.62	2216.57	53312.70
34HP60-24-6	20531.11	-668422.81	-4513.47	2825.72	394791.38	11612752.62	2344.97	51816.33
34HP60-24-7	51786.45	-671662.75	-4565.03	2894.16	71469.25	9736771.62	415.00	43215.80
34HP60-24-8	35335.04	-680540.51	-4660.55	3624.40	32160.31	10188599.62	209.64	46686.02
34HP60-24-9	47238.02	-684575.70	-4623.71	2148.99	191664.25	11334493.62	460.56	51344.25
34HP60-24-10	24602.82	-689464.41	-4738.35	-94.98	-21354.37	10627632.62	1721.17	41051.35
34HP60-24-11	15831.73	-695813.36	-4769.47	-86.02	-48106.31	11753080.62	1955.81	44335.33
34HP60-24-12	23396.21	-698631.58	-4829.39	182.38	-23948.87	12911279.62	2817.22	45368.50
SRM614-18	4360010.65	3132690.47	-3555.30	-475.54	-168048.87	1227781.72	3951.86	894.89
SRM612-18	5241140.15	3960505.67	-3238.42	1385.35	319556.19	1515390.72	17596.10	4055.18
SRM610-18	3185034.45	1826462.67	-4171.70	36.74	265044.06	812599.68	105869.39	9868.22
AP1-18	41764.31	-711733.89	-4955.31	-1360.39	-75022.03	11317025.62	-59.84	35520.24
AP2-18	44331.77	-712045.97	-4856.35	-1561.43	-170718.97	12654931.62	538.08	45783.02
AP3-18	120037.31	-709197.56	-4690.59	-1306.47	-129630.75	13942159.62	3078.62	54312.90
AP4-18	226852.68	-701930.08	-4479.90	-1665.03	-257437.02	16222468.62	6429.56	77897.72

zero correction

SRM614-17	6275177.65	4457869.17	4670.83	3901.00	318020.75	2150732.12	59447.30	4426.46
SRM612-17	5586708.65	3788129.67	2812.94	12941.53	4838169.00	1958774.52	53148.86	22985.61
SRM610-17	3945586.15	2467823.97	835.41	6940.38	2897260.30	1290890.92	126132.24	18055.34
AP1-17	111873.92	0.00	0.00	2351.39	1402235.60	15950304.62	5602.11	238958.87
AP2-17	197300.51	0.00	0.00	3434.20	1400150.10	15347705.62	4632.87	299224.74
AP3-17	228470.37	0.00	0.00	3334.44	1908850.30	16598716.62	7073.56	220204.80
AP4-17	396452.87	0.00	0.00	821.98	667100.40	20414510.62	12416.35	285138.46
34HP60-24-1	25957.34	0.00	0.00	4837.85	343821.44	4798623.62	0.00	31871.90
34HP60-24-2	15271.05	0.00	0.00	6691.38	349882.75	5191107.62	0.00	32828.94
34HP60-24-3	36368.68	0.00	0.00	6887.74	398093.38	5632569.12	0.00	31684.90
34HP60-24-4	48377.07	0.00	0.00	4775.05	307125.38	8154037.62	131.96	41302.67
34HP60-24-5	14788.24	0.00	0.00	2658.76	282100.56	11274067.62	2216.57	53312.70
34HP60-24-6	20531.11	0.00	0.00	2825.72	394791.38	11612752.62	2344.97	51816.33
34HP60-24-7	51786.45	0.00	0.00	2894.16	71469.25	9736771.62	415.00	43215.80
34HP60-24-8	35335.04	0.00	0.00	3624.40	32160.31	10188599.62	209.64	46686.02
34HP60-24-9	47238.02	0.00	0.00	2148.99	191664.25	11334493.62	460.56	51344.25
34HP60-24-10	24602.82	0.00	0.00	0.00	0.00	10627632.62	1721.17	41051.35
34HP60-24-11	15831.73	0.00	0.00	0.00	0.00	11753080.62	1955.81	44335.33
34HP60-24-12	23396.21	0.00	0.00	182.38	0.00	12911279.62	2817.22	45368.50
SRM614-18	4360010.65	3132690.47	0.00	0.00	0.00	1227781.72	3951.86	894.89
SRM612-18	5241140.15	3960505.67	0.00	1385.35	319556.19	1515390.72	17596.10	4055.18
SRM610-18	3185034.45	1826462.67	0.00	36.74	265044.06	812599.68	105869.39	9868.22
AP1-18	41764.31	0.00	0.00	0.00	0.00	11317025.62	0.00	35520.24
AP2-18	44331.77	0.00	0.00	0.00	0.00	12654931.62	538.08	45783.02
AP3-18	120037.31	0.00	0.00	0.00	0.00	13942159.62	3078.62	54312.90
AP4-18	226852.68	0.00	0.00	0.00	0.00	16222468.62	6429.56	77897.72

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration

SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal

SRM614-17	2.917694	2.072722	0.002172	0.001814	0.147866	1.000000	0.027640	0.002058
SRM612-17	2.852145	1.933928	0.001436	0.006607	2.469998	1.000000	0.027134	0.011735
SRM610-17	3.056483	1.911722	0.000647	0.005376	2.244388	1.000000	0.097709	0.013987
AP1-17	0.007014	0.000000	0.000000	0.000147	0.087913	1.000000	0.000351	0.014981

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.012855	0.000000	0.000000	0.000224	0.091229	1.000000	0.000302	0.019496
AP3-17	0.013764	0.000000	0.000000	0.000201	0.115000	1.000000	0.000426	0.013266
AP4-17	0.019420	0.000000	0.000000	0.000040	0.032678	1.000000	0.000608	0.013967
34HP60-24-1	0.005409	0.000000	0.000000	0.001008	0.071650	1.000000	0.000000	0.006642
34HP60-24-2	0.002942	0.000000	0.000000	0.001289	0.067400	1.000000	0.000000	0.006324
34HP60-24-3	0.006457	0.000000	0.000000	0.001223	0.070677	1.000000	0.000000	0.005625
34HP60-24-4	0.005933	0.000000	0.000000	0.000586	0.037665	1.000000	0.000016	0.005065
34HP60-24-5	0.001312	0.000000	0.000000	0.000236	0.025022	1.000000	0.000197	0.004729
34HP60-24-6	0.001768	0.000000	0.000000	0.000243	0.033996	1.000000	0.000202	0.004462
34HP60-24-7	0.005319	0.000000	0.000000	0.000297	0.007340	1.000000	0.000043	0.004438
34HP60-24-8	0.003468	0.000000	0.000000	0.000356	0.003156	1.000000	0.000021	0.004582
34HP60-24-9	0.004168	0.000000	0.000000	0.000190	0.016910	1.000000	0.000041	0.004530
34HP60-24-10	0.002315	0.000000	0.000000	0.000000	0.000000	1.000000	0.000162	0.003863
34HP60-24-11	0.001347	0.000000	0.000000	0.000000	0.000000	1.000000	0.000166	0.003772
34HP60-24-12	0.001812	0.000000	0.000000	0.000014	0.000000	1.000000	0.000218	0.003514
SRM614-18	3.551128	2.551504	0.000000	0.000000	0.000000	1.000000	0.003219	0.000729
SRM612-18	3.458606	2.613521	0.000000	0.000914	0.210874	1.000000	0.011612	0.002676
SRM610-18	3.919562	2.247678	0.000000	0.000045	0.326168	1.000000	0.130285	0.012144
AP1-18	0.003690	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003139
AP2-18	0.003503	0.000000	0.000000	0.000000	0.000000	1.000000	0.000043	0.003618
AP3-18	0.008610	0.000000	0.000000	0.000000	0.000000	1.000000	0.000221	0.003896
AP4-18	0.013984	0.000000	0.000000	0.000000	0.000000	1.000000	0.000396	0.004802

standardize signal averages AP

AP1	0.005352	0.000000	0.000000	0.000074	0.043956	1.000000	0.000176	0.009060
AP2	0.008179	0.000000	0.000000	0.000112	0.045614	1.000000	0.000172	0.011557
AP3	0.011187	0.000000	0.000000	0.000100	0.057500	1.000000	0.000323	0.008581
AP4	0.016702	0.000000	0.000000	0.000020	0.016339	1.000000	0.000502	0.009385

linest from std sig ave

	0.018184	0.000000	0.000000	0.088624	0.000192	1.000000	0.012793	0.113976
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standardize signal averages SRM

srM614-2	3.234411	2.312113	0.001086	0.000907	0.073933	1.000000	0.015430	0.001393
srM612-2	3.155376	2.273725	0.000718	0.003761	1.340436	1.000000	0.019373	0.007205
srM610-2	3.488022	2.079700	0.000324	0.002711	1.285278	1.000000	0.113997	0.013065

linest from std sig ave

	0.042929	1.762504	1.040309	0.665798	0.000576	1.000000	0.043794	0.312691
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concentration data

SRM614-17	4550.27	0.00	0.00	13.79	7.31	85763.00	30.33	20.12
SRM612-17	4448.04	0.00	0.00	50.22	122.10	85763.00	29.77	114.71
SRM610-17	4766.72	0.00	0.00	40.86	110.94	85763.00	107.20	136.72
AP1-17	50.88	0.00	0.00	5.21	20.21	398936.00	1.79	681.19
AP2-17	93.26	0.00	0.00	7.91	20.98	398936.00	1.54	886.48
AP3-17	99.85	0.00	0.00	7.10	26.44	398936.00	2.17	603.21
AP4-17	140.88	0.00	0.00	1.42	7.51	398936.00	3.10	635.09
34HP60-24-1	39.24	0.00	0.00	35.64	16.47	398936.00	0.00	302.00
34HP60-24-2	21.34	0.00	0.00	45.57	15.50	398936.00	0.00	287.55
34HP60-24-3	46.84	0.00	0.00	43.23	16.25	398936.00	0.00	255.78
34HP60-24-4	43.04	0.00	0.00	20.70	8.66	398936.00	0.08	230.31
34HP60-24-5	9.52	0.00	0.00	8.34	5.75	398936.00	1.00	215.01
34HP60-24-6	12.83	0.00	0.00	8.60	7.82	398936.00	1.03	202.88
34HP60-24-7	38.58	0.00	0.00	10.51	1.69	398936.00	0.22	201.81
34HP60-24-8	25.16	0.00	0.00	12.58	0.73	398936.00	0.11	208.35
34HP60-24-9	30.23	0.00	0.00	6.70	3.89	398936.00	0.21	205.97
34HP60-24-10	16.79	0.00	0.00	0.00	0.00	398936.00	0.83	175.63
34HP60-24-11	9.77	0.00	0.00	0.00	0.00	398936.00	0.85	171.52
34HP60-24-12	13.15	0.00	0.00	0.50	0.00	398936.00	1.11	159.77
SRM614-18	5538.14	0.00	0.00	0.00	0.00	85763.00	3.53	7.12
SRM612-18	5393.84	0.00	0.00	6.95	10.42	85763.00	12.74	26.16
SRM610-18	6112.72	0.00	0.00	0.34	16.12	85763.00	142.95	118.71
AP1-18	26.77	0.00	0.00	0.00	0.00	398936.00	0.00	142.71
AP2-18	25.41	0.00	0.00	0.00	0.00	398936.00	0.22	164.50
AP3-18	62.46	0.00	0.00	0.00	0.00	398936.00	1.13	177.13
AP4-18	101.44	0.00	0.00	0.00	0.00	398936.00	2.02	218.33

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Al Si P Cl K Ca Sc Ti

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
blank-15	39571.02	336116.06	3354.46	4108.94	558514.25	47883.55	4135.74	608.92
SRM614-15	8398365.00	6651761.50	6028.23	6297.28	689107.06	2901943.80	42956.52	3872.46
SRM612-15	8666128.00	6928025.50	5730.07	11760.31	4222777.50	3105365.50	59638.14	37968.90
SRM610-15	5518456.50	4453998.00	4088.10	9926.74	3456231.00	1915836.60	189064.63	27591.00
AP1-15	79129.05	134472.11	2190.25	4554.99	504057.16	13476582.00	8918.85	87958.38
AP2-15	79149.05	103849.91	2021.97	4556.55	445694.53	14227476.00	7956.24	78468.64
AP3-15	223392.70	90229.19	2252.65	4362.94	439242.88	18730184.00	11932.55	130729.30
AP4-15	236565.66	80087.61	1963.73	4278.78	390910.44	17026024.00	12335.15	101355.89
34BV166-1	20146.15	64995.09	1062.97	8944.89	452791.88	4212744.50	3241.06	20438.40
34BV166-2	18517.10	57127.28	982.81	9121.53	417117.78	3600628.00	2955.86	17585.46
34BV166-3	17524.50	50629.13	900.57	8532.69	380376.38	3302117.80	2811.26	14251.44
34BV166-4	21532.80	47086.43	772.20	7173.48	401182.13	2965878.30	2632.17	12745.99
34BV166-5	25538.90	45024.61	741.40	7624.20	406578.97	3128813.00	2653.53	13593.84
34BV166-6	30849.41	41562.88	690.16	8297.01	408425.78	4296273.00	2901.10	15589.73
SRM614-16	5902069.50	5027227.50	2753.74	4957.47	321270.09	1775883.00	12152.31	1516.89
SRM612-16	7637216.00	6541210.50	3566.66	5900.75	540272.50	2370289.00	34474.43	6684.52
SRM610-16	4163531.00	3226760.30	1937.97	5114.75	726793.44	1168769.60	148541.36	13323.96
AP1-16	70545.52	27675.80	973.41	3676.66	259837.06	12034806.00	6774.92	32607.54
AP2-16	66250.41	23076.05	975.45	3768.26	232052.42	12035128.00	6055.91	31699.90
AP3-16	151926.53	27161.55	1278.41	3769.34	248669.72	16350386.00	9605.09	61273.15
AP4-16	176949.03	28300.20	1102.45	3734.98	225798.03	14581835.00	9832.98	46030.34
blank-16	17999.10	34788.56	503.00	2699.30	299000.53	60277.22	1583.29	816.04
blank average	28785.06	185452.31	1928.73	3404.12	428757.39	54080.39	2859.52	712.48
blank subtraction								
SRM614-15	8369579.94	6466309.19	4099.50	2893.16	260349.67	2847863.42	40097.00	3159.98
SRM612-15	8637342.94	6742573.19	3801.34	8356.19	3794020.11	3051285.12	56778.62	37256.41
SRM610-15	5489671.44	4268545.69	2159.37	6522.62	3027473.61	1861756.22	186205.11	26878.51
AP1-15	50343.98	-50980.20	261.52	1150.87	75299.77	13422501.62	6059.33	87245.89
AP2-15	50363.98	-81602.40	93.24	1152.43	16937.14	14173395.62	5096.73	77756.16
AP3-15	194607.64	-95223.12	323.92	958.83	10485.49	18676103.62	9073.03	130016.82
AP4-15	207780.60	-105364.70	35.00	874.67	-37846.95	16971943.62	9475.63	100643.41
34BV166-1	-8638.91	-120457.22	-865.76	5540.77	24034.49	4158664.12	381.54	19725.91
34BV166-2	-10267.96	-128325.03	-945.93	5717.41	-11639.61	3546547.62	96.34	16872.97
34BV166-3	-11260.56	-134823.18	-1028.17	5128.57	-48381.01	3248037.42	-48.26	13538.96
34BV166-4	-7252.26	-138365.88	-1156.53	3769.36	-27575.26	2911797.92	-227.34	12033.51
34BV166-5	-3246.16	-140427.69	-1187.33	4220.08	-22178.42	3074732.62	-205.98	12881.35
34BV166-6	2064.35	-143889.43	-1238.57	4892.89	-20331.61	4242192.62	41.58	14877.24
SRM614-16	5873284.44	4841775.19	825.00	1553.35	-107487.30	1721802.62	9292.79	804.40
SRM612-16	7608430.94	6355758.19	1637.93	2496.63	111515.11	2316208.62	31614.92	5972.03
SRM610-16	4134745.94	3041307.99	9.24	1710.63	298036.05	1114689.22	145681.84	12611.47
AP1-16	41760.45	-157776.51	-955.33	272.54	-168920.33	11980725.62	3915.40	31895.06
AP2-16	37465.35	-162376.26	-953.29	364.14	-196704.97	11981047.62	3196.40	30987.41
AP3-16	123141.47	-158290.75	-650.32	365.22	-180087.67	16296305.62	6745.58	60560.66
AP4-16	148163.97	-157152.11	-826.28	330.86	-202959.36	14527754.62	6973.46	45317.86
zero correction								
SRM614-15	8369579.94	6466309.19	4099.50	2893.16	260349.67	2847863.42	40097.00	3159.98
SRM612-15	8637342.94	6742573.19	3801.34	8356.19	3794020.11	3051285.12	56778.62	37256.41
SRM610-15	5489671.44	4268545.69	2159.37	6522.62	3027473.61	1861756.22	186205.11	26878.51
AP1-15	50343.98	0.00	261.52	1150.87	75299.77	13422501.62	6059.33	87245.89
AP2-15	50363.98	0.00	93.24	1152.43	16937.14	14173395.62	5096.73	77756.16
AP3-15	194607.64	0.00	323.92	958.83	10485.49	18676103.62	9073.03	130016.82
AP4-15	207780.60	0.00	35.00	874.67	0.00	16971943.62	9475.63	100643.41
34BV166-1	0.00	0.00	0.00	5540.77	24034.49	4158664.12	381.54	19725.91
34BV166-2	0.00	0.00	0.00	5717.41	0.00	3546547.62	96.34	16872.97
34BV166-3	0.00	0.00	0.00	5128.57	0.00	3248037.42	0.00	13538.96
34BV166-4	0.00	0.00	0.00	3769.36	0.00	2911797.92	0.00	12033.51
34BV166-5	0.00	0.00	0.00	4220.08	0.00	3074732.62	0.00	12881.35
34BV166-6	2064.35	0.00	0.00	4892.89	0.00	4242192.62	41.58	14877.24
SRM614-16	5873284.44	4841775.19	825.00	1553.35	0.00	1721802.62	9292.79	804.40
SRM612-16	7608430.94	6355758.19	1637.93	2496.63	111515.11	2316208.62	31614.92	5972.03
SRM610-16	4134745.94	3041307.99	9.24	1710.63	298036.05	1114689.22	145681.84	12611.47
AP1-16	41760.45	0.00	0.00	272.54	0.00	11980725.62	3915.40	31895.06
AP2-16	37465.35	0.00	0.00	364.14	0.00	11981047.62	3196.40	30987.41
AP3-16	123141.47	0.00	0.00	365.22	0.00	16296305.62	6745.58	60560.66
AP4-16	148163.97	0.00	0.00	330.86	0.00	14527754.62	6973.46	45317.86
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-15	2.938898	2.270583	0.001440	0.001016	0.091419	1.000000	0.014080	0.001110
SRM612-15	2.830723	2.209749	0.001246	0.002739	1.243417	1.000000	0.018608	0.012210
SRM610-15	2.948652	2.292752	0.001160	0.003503	1.626139	1.000000	0.100016	0.014437
AP1-15	0.003751	0.000000	0.000019	0.000086	0.005610	1.000000	0.000451	0.006500
AP2-15	0.003553	0.000000	0.000007	0.000081	0.001195	1.000000	0.000360	0.005486
AP3-15	0.010420	0.000000	0.000017	0.000051	0.000561	1.000000	0.000486	0.006962
AP4-15	0.012243	0.000000	0.000002	0.000052	0.000000	1.000000	0.000558	0.005930
34BV166-1	0.000000	0.000000	0.000000	0.001332	0.005779	1.000000	0.000092	0.004743
34BV166-2	0.000000	0.000000	0.000000	0.001612	0.000000	1.000000	0.000027	0.004758
34BV166-3	0.000000	0.000000	0.000000	0.001579	0.000000	1.000000	0.000000	0.004168
34BV166-4	0.000000	0.000000	0.000000	0.001295	0.000000	1.000000	0.000000	0.004133
34BV166-5	0.000000	0.000000	0.000000	0.001373	0.000000	1.000000	0.000000	0.004189
34BV166-6	0.000487	0.000000	0.000000	0.001153	0.000000	1.000000	0.000010	0.003507
SRM614-16	3.411125	2.812038	0.000479	0.000902	0.000000	1.000000	0.005397	0.000467
SRM612-16	3.284864	2.744035	0.000707	0.001078	0.048146	1.000000	0.013649	0.002578
SRM610-16	3.709326	2.728391	0.000008	0.001535	0.267371	1.000000	0.130693	0.011314
AP1-16	0.003486	0.000000	0.000000	0.000023	0.000000	1.000000	0.000327	0.002662
AP2-16	0.003127	0.000000	0.000000	0.000030	0.000000	1.000000	0.000267	0.002586
AP3-16	0.007556	0.000000	0.000000	0.000022	0.000000	1.000000	0.000414	0.003716
AP4-16	0.010199	0.000000	0.000000	0.000023	0.000000	1.000000	0.000480	0.003119
standardize signal averages AP								
AP1	0.003618	0.000000	0.000010	0.000054	0.002805	1.000000	0.000389	0.004581
AP2	0.003340	0.000000	0.000003	0.000056	0.000597	1.000000	0.000313	0.004036
AP3	0.008988	0.000000	0.000009	0.000037	0.000281	1.000000	0.000450	0.005339
AP4	0.011221	0.000000	0.000001	0.000037	0.000000	1.000000	0.000519	0.004525
linest from std sig ave								
	0.026740	0.000000	57421.940641	0.173071	0.000966	1.000000	0.008642	0.238363
standardize signal averages SRM								
srm614-2	3.175012	2.541311	0.000959	0.000959	0.045710	1.000000	0.009738	0.000788
srm612-2	3.057794	2.476892	0.000976	0.001908	0.645781	1.000000	0.016129	0.007394
srm610-2	3.328989	2.510572	0.000584	0.002519	0.946755	1.000000	0.115354	0.012876
linest from std sig ave								
	0.044376	1.563518	1.383634	1.265727	0.001196	1.000000	0.044011	0.313640
concentration data								
SRM614-15	6739.75	0.00	7089080.33	15.08	9.38	85763.00	10.44	22.68
SRM612-15	6491.68	0.00	6135245.31	40.65	127.58	85763.00	13.79	249.61
SRM610-15	6762.12	0.00	5711925.48	52.00	166.85	85763.00	74.13	295.14
AP1-15	40.01	0.00	446329.17	5.92	2.68	398936.00	1.56	618.09
AP2-15	37.91	0.00	150699.72	5.61	0.57	398936.00	1.24	521.68
AP3-15	111.16	0.00	397315.09	3.54	0.27	398936.00	1.67	662.00
AP4-15	130.60	0.00	47241.30	3.56	0.00	398936.00	1.92	563.89
34BV166-1	0.00	0.00	0.00	91.99	2.76	398936.00	0.32	451.05
34BV166-2	0.00	0.00	0.00	111.31	0.00	398936.00	0.09	452.41
34BV166-3	0.00	0.00	0.00	109.02	0.00	398936.00	0.00	396.37
34BV166-4	0.00	0.00	0.00	89.38	0.00	398936.00	0.00	392.98
34BV166-5	0.00	0.00	0.00	94.76	0.00	398936.00	0.00	398.38
34BV166-6	5.19	0.00	0.00	79.63	0.00	398936.00	0.03	333.48
SRM614-16	7822.71	0.00	2359668.34	13.39	0.00	85763.00	4.00	9.55
SRM612-16	7533.16	0.00	3482533.86	16.00	4.94	85763.00	10.12	52.71
SRM610-16	8506.57	0.00	40822.80	22.78	27.43	85763.00	96.87	231.29
AP1-16	37.18	0.00	0.00	1.57	0.00	398936.00	1.13	253.15
AP2-16	33.36	0.00	0.00	2.10	0.00	398936.00	0.92	245.94
AP3-16	80.61	0.00	0.00	1.55	0.00	398936.00	1.43	353.38
AP4-16	108.79	0.00	0.00	1.57	0.00	398936.00	1.65	296.63
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-13	43280.97	404030.97	3866.06	4063.50	563427.31	19597.27	2964.66	573.88
SRM614-13	8573780.00	7081690.00	6291.12	5938.23	535460.13	2956675.30	37748.13	2008.17
SRM612-13	8837710.00	6789047.50	5656.79	6153.35	574546.25	2954614.30	53678.46	3708.22
SRM610-13	4168510.80	3119490.00	3197.38	5266.91	797367.81	1225834.60	145192.06	11808.55
AP1-13	131992.06	133570.95	2029.37	4472.47	405123.50	15680471.00	9203.61	82257.91
AP2-13	78236.96	104813.19	2109.25	4305.02	376605.84	16416799.00	8213.73	83610.03
AP3-13	186495.89	94928.06	2068.73	4156.94	381728.78	17338978.00	10482.94	99138.64
AP4-13	212862.95	85058.52	1901.61	4102.34	354609.88	17528088.00	11914.19	94052.61
W3-1	61714.31	84563.80	1196.13	15235.33	860456.19	6069624.50	3517.38	27743.04
W3-2	24941.38	60671.26	1037.25	16916.26	712939.19	6503828.00	3590.10	25816.59
W3-3	25864.87	56596.80	977.05	16246.73	686839.44	6314495.50	3441.26	24769.42
W3-4	22781.81	49539.32	920.37	14273.24	787776.50	5819962.00	3320.98	21466.40
W3-5	19137.75	42561.52	865.92	16295.37	881921.63	6343344.00	3491.66	24303.42
W3-6	19742.23	39773.15	847.08	16140.25	882656.13	6459587.00	3460.50	23753.53
W3-7	35240.00	40970.15	707.04	13445.36	955421.94	5307393.50	3121.14	18278.42
W3-8	22665.77	34540.52	796.08	16307.81	964646.44	6052110.00	3310.38	21790.08
W3-9	18730.51	32409.54	726.64	16543.57	857675.13	6268970.00	3486.90	21388.48
W3-10	151999.14	42430.08	864.80	19303.07	1105723.90	8790730.00	4228.94	26651.15
W3-11	252110.89	42367.84	864.44	20822.04	1305893.60	8821323.00	4126.22	27119.75
W3-12	32720.66	27511.20	884.04	20838.12	1002602.80	8970217.00	4108.58	27405.67
SRM614-14	7403237.50	7215781.50	3662.86	4949.39	284880.59	2402589.00	12859.91	1571.41
SRM612-14	7980393.50	7478430.00	3665.62	5243.55	345323.25	2550439.00	34255.04	3410.78
SRM610-14	3493240.00	3041062.50	1742.09	4226.42	492739.63	975497.13	126896.08	11410.54
AP1-14	61204.27	19737.71	912.25	3402.38	218831.31	12867038.00	6312.24	28105.28
AP2-14	55490.67	17954.02	997.49	3493.54	200720.09	13428451.00	6244.68	30756.89
AP3-14	136861.05	22741.25	1135.61	3419.06	218697.59	14597171.00	8532.21	46001.14
AP4-14	167247.94	24039.94	1200.85	3428.70	196806.31	14740074.00	9810.78	42797.20
blank-14	11476.82	21651.48	321.16	2539.17	265364.78	64891.81	1136.05	945.17
blank average	27378.89	212841.23	2093.61	3301.34	414396.05	42244.54	2050.35	759.52
blank subtraction								
SRM614-13	8546401.11	6868848.77	4197.50	2636.89	121064.09	2914430.76	35697.78	1248.65
SRM612-13	8810331.11	6576206.27	3563.18	2852.02	160150.21	2912369.76	51628.11	2948.70
SRM610-13	4141131.91	2906648.77	1103.77	1965.57	382971.77	1183590.06	143141.71	11049.02
AP1-13	104613.17	-79270.28	-64.24	1171.13	-9272.55	15638226.46	7153.26	81498.38
AP2-13	50858.07	-108028.04	15.64	1003.69	-37790.21	16374554.46	6163.38	82850.51
AP3-13	159117.00	-117913.17	-24.88	855.60	-32667.27	17296733.46	8432.59	98379.12
AP4-13	185484.06	-127782.71	-192.00	801.00	-59786.17	17485843.46	9863.84	93293.08
W3-1	34335.41	-128277.43	-897.49	11933.99	446060.15	6027379.96	1467.03	26983.51
W3-2	-2437.51	-152169.96	-1056.37	13614.92	298543.15	6461583.46	1539.75	25057.06
W3-3	-1514.03	-156244.43	-1116.57	12945.39	272443.40	6272250.96	1390.91	24009.90
W3-4	-4597.09	-163301.91	-1173.25	10971.90	373380.46	5777717.46	1270.63	20706.88
W3-5	-8241.15	-170279.71	-1227.69	12994.03	467525.59	6301099.46	1441.31	23543.89
W3-6	-7636.66	-173068.08	-1246.53	12838.91	468260.09	6417342.46	1410.15	22994.01
W3-7	7861.11	-171871.07	-1386.57	10144.02	541025.90	5265148.96	1070.79	17518.90
W3-8	-4713.13	-178300.71	-1297.53	13006.47	550250.40	6009865.46	1260.03	21030.56
W3-9	-8648.39	-180431.69	-1366.97	13242.24	443279.09	6226725.46	1436.55	20628.96
W3-10	124620.25	-170411.15	-1228.81	16001.73	691327.86	8748485.46	2178.59	25891.63
W3-11	224732.00	-170473.39	-1229.17	17520.70	891497.56	8779078.46	2075.87	26360.23
W3-12	5341.77	-185330.03	-1209.57	17536.78	588206.76	8927972.46	2058.23	26646.15
SRM614-14	7375858.61	7002940.27	1569.25	1648.05	-129515.46	2360344.46	10809.56	811.88
SRM612-14	7953014.61	7265588.77	1572.01	1942.21	-69072.80	2508194.46	32204.68	2651.25
SRM610-14	3465861.11	2828221.27	-351.52	925.09	78343.59	933252.59	124845.73	10651.02
AP1-14	33825.37	-193103.52	-1181.37	101.04	-195564.74	12824793.46	4261.88	27345.75
AP2-14	28111.78	-194887.21	-1096.13	192.20	-213675.96	13386206.46	4194.32	29997.37
AP3-14	109482.16	-190099.98	-958.01	117.72	-195698.46	14554926.46	6481.86	45241.62
AP4-14	139869.05	-188801.29	-892.77	127.36	-217589.74	14697829.46	7760.42	42037.67
zero correction								
SRM614-13	8546401.11	6868848.77	4197.50	2636.89	121064.09	2914430.76	35697.78	1248.65
SRM612-13	8810331.11	6576206.27	3563.18	2852.02	160150.21	2912369.76	51628.11	2948.70
SRM610-13	4141131.91	2906648.77	1103.77	1965.57	382971.77	1183590.06	143141.71	11049.02
AP1-13	104613.17	0.00	0.00	1171.13	0.00	15638226.46	7153.26	81498.38
AP2-13	50858.07	0.00	15.64	1003.69	0.00	16374554.46	6163.38	82850.51
AP3-13	159117.00	0.00	0.00	855.60	0.00	17296733.46	8432.59	98379.12
AP4-13	185484.06	0.00	0.00	801.00	0.00	17485843.46	9863.84	93293.08
W3-1	34335.41	0.00	0.00	11933.99	446060.15	6027379.96	1467.03	26983.51
W3-2	0.00	0.00	0.00	13614.92	298543.15	6461583.46	1539.75	25057.06
W3-3	0.00	0.00	0.00	12945.39	272443.40	6272250.96	1390.91	24009.90
W3-4	0.00	0.00	0.00	10971.90	373380.46	5777717.46	1270.63	20706.88
W3-5	0.00	0.00	0.00	12994.03	467525.59	6301099.46	1441.31	23543.89
W3-6	0.00	0.00	0.00	12838.91	468260.09	6417342.46	1410.15	22994.01
W3-7	7861.11	0.00	0.00	10144.02	541025.90	5265148.96	1070.79	17518.90
W3-8	0.00	0.00	0.00	13006.47	550250.40	6009865.46	1260.03	21030.56
W3-9	0.00	0.00	0.00	13242.24	443279.09	6226725.46	1436.55	20628.96

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	124620.25	0.00	0.00	16001.73	691327.86	8748485.46	2178.59	25891.63
W3-11	224732.00	0.00	0.00	17520.70	891497.56	8779078.46	2075.87	26360.23
W3-12	5341.77	0.00	0.00	17536.78	588206.76	8927972.46	2058.23	26646.15
SRM614-14	7375858.61	7002940.27	1569.25	1648.05	0.00	2360344.46	10809.56	811.88
SRM612-14	7953014.61	7265588.77	1572.01	1942.21	0.00	2508194.46	32204.68	2651.25
SRM610-14	3465861.11	2828221.27	0.00	925.09	78343.59	933252.59	124845.73	10651.02
AP1-14	33825.37	0.00	0.00	101.04	0.00	12824793.46	4261.88	27345.75
AP2-14	28111.78	0.00	0.00	192.20	0.00	13386206.46	4194.32	29997.37
AP3-14	109482.16	0.00	0.00	117.72	0.00	14554926.46	6481.86	45241.62
AP4-14	139869.05	0.00	0.00	127.36	0.00	14697829.46	7760.42	42037.67
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-13	2.932443	2.356841	0.001440	0.000905	0.041540	1.000000	0.012249	0.000428
SRM612-13	3.025142	2.258026	0.001223	0.000979	0.054990	1.000000	0.017727	0.001012
SRM610-13	3.498789	2.455790	0.000933	0.001661	0.323568	1.000000	0.120939	0.009335
AP1-13	0.006690	0.000000	0.000000	0.000075	0.000000	1.000000	0.000457	0.005211
AP2-13	0.003106	0.000000	0.000001	0.000061	0.000000	1.000000	0.000376	0.005060
AP3-13	0.009199	0.000000	0.000000	0.000049	0.000000	1.000000	0.000488	0.005688
AP4-13	0.010608	0.000000	0.000000	0.000046	0.000000	1.000000	0.000564	0.005335
W3-1	0.005697	0.000000	0.000000	0.001980	0.074006	1.000000	0.000243	0.004477
W3-2	0.000000	0.000000	0.000000	0.002107	0.046203	1.000000	0.000238	0.003878
W3-3	0.000000	0.000000	0.000000	0.002064	0.043436	1.000000	0.000222	0.003828
W3-4	0.000000	0.000000	0.000000	0.001899	0.064624	1.000000	0.000220	0.003584
W3-5	0.000000	0.000000	0.000000	0.002062	0.074197	1.000000	0.000229	0.003736
W3-6	0.000000	0.000000	0.000000	0.002001	0.072968	1.000000	0.000220	0.003583
W3-7	0.001493	0.000000	0.000000	0.001927	0.102756	1.000000	0.000203	0.003327
W3-8	0.000000	0.000000	0.000000	0.002164	0.091558	1.000000	0.000210	0.003499
W3-9	0.000000	0.000000	0.000000	0.002127	0.071190	1.000000	0.000231	0.003313
W3-10	0.014245	0.000000	0.000000	0.001829	0.079023	1.000000	0.000249	0.002960
W3-11	0.025599	0.000000	0.000000	0.001996	0.101548	1.000000	0.000236	0.003003
W3-12	0.000598	0.000000	0.000000	0.001964	0.065884	1.000000	0.000231	0.002985
SRM614-14	3.124908	2.966915	0.000665	0.000698	0.000000	1.000000	0.004580	0.000344
SRM612-14	3.170813	2.896741	0.000627	0.000774	0.000000	1.000000	0.012840	0.001057
SRM610-14	3.713744	3.030499	0.000000	0.000991	0.083947	1.000000	0.133775	0.011413
AP1-14	0.002637	0.000000	0.000000	0.000008	0.000000	1.000000	0.000332	0.002132
AP2-14	0.002100	0.000000	0.000000	0.000014	0.000000	1.000000	0.000313	0.002241
AP3-14	0.007522	0.000000	0.000000	0.000008	0.000000	1.000000	0.000445	0.003108
AP4-14	0.009516	0.000000	0.000000	0.000009	0.000000	1.000000	0.000528	0.002860
standardize signal averages AP								
AP1	0.004664	0.000000	0.000000	0.000041	0.000000	1.000000	0.000395	0.003672
AP2	0.002603	0.000000	0.000000	0.000038	0.000000	1.000000	0.000345	0.003650
AP3	0.008361	0.000000	0.000000	0.000029	0.000000	1.000000	0.000466	0.004398
AP4	0.010062	0.000000	0.000000	0.000027	0.000000	1.000000	0.000546	0.004098
linest from std sig ave								
	0.028330	0.000000	0.000000	0.236513	0.000000	1.000000	0.008286	0.279397
standardize signal averages SRM								
srm614-2	3.028675	2.661878	0.001053	0.000801	0.020770	1.000000	0.008414	0.000386
srm612-2	3.097977	2.577383	0.000925	0.000877	0.027495	1.000000	0.015283	0.001035
srm610-2	3.606266	2.743145	0.000466	0.001326	0.203757	1.000000	0.127357	0.010374
linest from std sig ave								
	0.043376	1.473873	1.178941	2.292744	0.028100	1.000000	0.040096	0.487822
concentration data								
SRM614-13	7124.84	0.00	0.00	18.35	100.11	85763.00	8.70	10.27
SRM612-13	7350.06	0.00	0.00	19.86	132.52	85763.00	12.60	24.26
SRM610-13	8500.86	0.00	0.00	33.69	779.77	85763.00	85.95	223.69

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	75.60	0.00	0.00	7.07	0.00	398936.00	1.51	580.88
AP2-13	35.10	0.00	0.00	5.78	0.00	398936.00	1.24	563.96
AP3-13	103.97	0.00	0.00	4.67	0.00	398936.00	1.61	633.96
AP4-13	119.89	0.00	0.00	4.32	0.00	398936.00	1.86	594.69
W3-1	64.38	0.00	0.00	186.82	829.60	398936.00	0.80	498.99
W3-2	0.00	0.00	0.00	198.81	517.93	398936.00	0.79	432.23
W3-3	0.00	0.00	0.00	194.74	486.92	398936.00	0.73	426.67
W3-4	0.00	0.00	0.00	179.18	724.43	398936.00	0.73	399.47
W3-5	0.00	0.00	0.00	194.57	831.75	398936.00	0.76	416.47
W3-6	0.00	0.00	0.00	188.77	817.97	398936.00	0.73	399.38
W3-7	16.87	0.00	0.00	181.78	1151.89	398936.00	0.67	370.87
W3-8	0.00	0.00	0.00	204.20	1026.36	398936.00	0.69	390.04
W3-9	0.00	0.00	0.00	200.66	798.03	398936.00	0.76	369.27
W3-10	160.99	0.00	0.00	172.58	885.84	398936.00	0.82	329.88
W3-11	289.31	0.00	0.00	188.30	1138.35	398936.00	0.78	334.68
W3-12	6.76	0.00	0.00	185.33	738.55	398936.00	0.76	332.66
SRM614-14	7592.46	0.00	0.00	14.16	0.00	85763.00	3.25	8.24
SRM612-14	7703.99	0.00	0.00	15.71	0.00	85763.00	9.12	25.33
SRM610-14	9023.13	0.00	0.00	20.11	202.30	85763.00	95.07	273.47
AP1-14	29.81	0.00	0.00	0.74	0.00	398936.00	1.10	237.66
AP2-14	23.73	0.00	0.00	1.35	0.00	398936.00	1.04	249.78
AP3-14	85.01	0.00	0.00	0.76	0.00	398936.00	1.47	346.46
AP4-14	107.55	0.00	0.00	0.82	0.00	398936.00	1.75	318.79

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-11	53579.98	184221.28	1731.25	3185.22	454996.00	31774.82	3500.22	938.13
SRM614-11	10465478.00	9076117.00	5457.35	5743.99	447724.03	3546235.50	26890.11	1975.53
SRM612-11	9240956.00	7247835.00	4536.91	5991.39	592776.56	3121483.30	44785.77	6133.55
SRM610-11	4500406.00	3506578.00	2633.01	5034.07	761397.25	1381488.30	162457.36	14716.32
AP1-11	120331.16	73995.38	1555.33	4902.11	505074.16	18419676.00	9553.53	63722.72
AP2-11	88561.26	63875.56	1528.37	4903.47	487260.41	17622866.00	8847.69	59483.73
AP3-11	249351.48	59971.86	1671.61	4724.27	485471.91	18522134.00	12364.23	93497.93
AP4-11	396802.19	52197.86	1362.05	4007.94	334964.97	16282770.00	11512.10	56539.04
W1-1	20931.16	38914.38	1156.49	28494.64	2385491.30	13008815.00	5888.03	45531.70
W1-2	15443.21	32572.86	969.73	21916.68	1666209.80	10315418.00	4859.91	35017.12
W1-3	14914.64	29248.81	853.84	18173.58	1294500.10	8520498.00	4115.18	29245.76
W1-4	29843.53	30953.54	1396.41	25224.66	1810772.50	18310368.00	7540.12	60837.82
W1-5	17530.94	24871.82	1186.17	22145.48	1569665.60	16656115.00	6930.76	52250.90
W1-6	14493.92	23101.05	1196.33	22164.73	1483072.10	16909964.00	6819.04	50234.32
W1-7	96427.34	38085.41	1362.45	26663.71	1668851.60	18546556.00	7428.32	57129.08
W1-8	35196.20	22962.81	1306.61	25119.06	1419355.00	17266710.00	7034.80	49496.68
W1-9	60981.18	27857.08	1275.29	25114.34	1581842.60	17512558.00	7150.56	50794.32
W1-10	76963.43	29270.84	1470.09	31128.62	1634136.40	20674832.00	8172.13	57701.88
W1-11	30158.05	20061.87	1498.93	31992.78	1526568.80	20918928.00	8137.45	57657.56
W1-12	45256.02	21177.48	1467.49	29645.81	1615846.40	19482740.00	7789.52	51776.13
W1-13	54714.99	21880.36	1356.77	22328.25	1484282.60	18818776.00	7467.52	51728.21
W1-14	28733.48	17022.54	1463.65	22895.13	1476620.00	19528240.00	7672.08	53098.98
W1-15	27631.31	17066.02	1399.97	21913.12	1462179.90	18919018.00	7342.76	51455.53
W1-16	37728.65	18031.10	1039.81	14777.64	1372907.60	13869679.00	5599.95	36209.65
W1-17	15703.01	13702.60	1059.17	14582.40	1232651.40	13866742.00	5558.47	35695.08
W1-18	17347.58	14384.40	1006.89	14857.40	1120123.00	13493614.00	5619.75	34562.52
SRM614-12	6969529.00	7345920.50	3614.82	4195.78	252490.63	2355711.30	9009.85	1773.81
SRM612-12	6953585.00	6723916.00	3303.86	4226.10	303880.00	2255510.80	28299.44	3257.06
SRM610-12	3472291.80	3133316.00	1655.89	3678.22	484854.88	1034202.30	138432.66	11724.35
AP1-12	57451.40	12465.11	890.21	2903.66	216536.78	13112137.00	6156.63	20338.56
AP2-12	45100.29	10867.82	781.88	2751.86	193758.66	12269351.00	5706.91	20517.44
AP3-12	120694.36	15786.53	1087.21	2830.94	199571.80	13108372.00	7885.48	32509.02
AP4-12	173541.42	19485.11	1022.01	2664.25	183823.80	13696814.00	9586.61	33636.19
blank-12	6872.68	10036.86	198.80	1986.57	229585.02	72764.89	1074.85	1127.13
blank average	30226.33	97129.07	965.03	2585.89	342290.51	52269.85	2287.53	1032.63

blank subtraction								
SRM614-11	10435251.67	8978987.93	4492.33	3158.10	105433.52	3493965.65	24602.58	942.91
SRM612-11	9210729.67	7150705.93	3571.88	3405.50	250486.05	3069213.45	42498.24	5100.93
SRM610-11	4470179.67	3409448.93	1667.99	2448.17	419106.74	1329218.45	160169.83	13683.70
AP1-11	90104.83	-23133.69	590.30	2316.21	162783.65	18367406.15	7266.00	62690.09
AP2-11	58334.93	-33253.51	563.34	2317.57	144969.90	17570596.15	6560.16	58451.11
AP3-11	219125.15	-37157.21	706.58	2138.37	143181.40	18469864.15	10076.70	92465.30

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	366575.86	-44931.21	397.02	1422.05	-7325.54	16230500.15	9224.57	55506.41
W1-1	-9295.17	-58214.69	191.46	25908.75	2043200.79	12956545.15	3600.50	44499.07
W1-2	-14783.12	-64556.21	4.70	19330.79	1323919.29	10263148.15	2572.37	33984.49
W1-3	-15311.69	-67880.26	-111.18	15587.69	952209.59	8468228.15	1827.65	28213.14
W1-4	-382.80	-66175.53	431.38	22638.77	1468481.99	18258098.15	5252.59	59805.19
W1-5	-12695.39	-72257.25	221.14	19559.59	1227375.09	16603845.15	4643.23	51218.27
W1-6	-15732.41	-74028.02	231.30	19578.83	1140781.59	16857694.15	4531.51	49201.70
W1-7	66201.01	-59043.65	397.42	24077.82	1326561.09	18494286.15	5140.79	56186.46
W1-8	4969.87	-74166.26	341.58	22533.17	1077064.49	17214440.15	4747.27	48464.05
W1-9	30754.85	-69271.99	310.26	22528.45	1239552.09	17460288.15	4863.03	49761.70
W1-10	46737.10	-67858.22	505.06	28542.72	1291845.89	20622562.15	5884.59	56669.26
W1-11	-68.28	-77067.20	533.90	29406.89	1184278.29	20866658.15	5849.91	56624.94
W1-12	15029.69	-75951.59	502.46	27059.91	1273555.89	19430470.15	5501.99	50743.50
W1-13	24488.66	-75248.71	391.74	19742.35	1141992.09	18766506.15	5179.99	50695.59
W1-14	-1492.85	-80106.53	498.62	20309.23	1134329.49	19475970.15	5384.55	52066.35
W1-15	-2595.02	-80063.05	434.94	19327.23	1119889.39	18866748.15	5055.23	50422.91
W1-16	7502.32	-79097.97	74.78	12191.75	1030617.09	13817409.15	3312.42	35177.02
W1-17	-14523.32	-83426.47	94.14	11996.51	890360.89	13814472.15	3270.94	34662.46
W1-18	-12878.75	-82744.67	41.86	12271.51	777832.49	13441344.15	3332.22	33529.89
SRM614-12	6939302.67	7248791.43	2649.79	1609.89	-89799.88	2303441.45	6722.32	741.18
SRM612-12	6923358.67	6626786.93	2338.83	1640.21	-38410.51	2203240.95	26011.91	2224.43
SRM610-12	3442065.47	3036186.93	690.86	1092.33	142564.37	981932.45	136145.13	10691.72
AP1-12	27225.07	-84663.96	-74.82	317.76	-125753.73	13059867.15	3869.10	19305.93
AP2-12	14873.96	-86261.25	-183.14	165.96	-148531.85	12217081.15	3419.38	19484.81
AP3-12	90468.03	-81342.54	122.18	245.04	-142718.71	13056102.15	5597.95	31476.40
AP4-12	143315.09	-77643.96	56.98	78.36	-158466.71	13644544.15	7299.08	32603.56
zero correction								
SRM614-11	10435251.67	8978987.93	4492.33	3158.10	105433.52	3493965.65	24602.58	942.91
SRM612-11	9210729.67	7150705.93	3571.88	3405.50	-250486.05	3069213.45	42498.24	5100.93
SRM610-11	4470179.67	3409448.93	1667.99	2448.17	419106.74	1329218.45	160169.83	13683.70
AP1-11	90104.83	0.00	590.30	2316.21	162783.65	18367406.15	7266.00	62690.09
AP2-11	58334.93	0.00	563.34	2317.57	144969.90	17570596.15	6560.16	58451.11
AP3-11	219125.15	0.00	706.58	2138.37	143181.40	18469864.15	10076.70	92465.30
AP4-11	366575.86	0.00	397.02	1422.05	0.00	16230500.15	9224.57	55506.41
W1-1	0.00	0.00	191.46	25908.75	2043200.79	12956545.15	3600.50	44499.07
W1-2	0.00	0.00	4.70	19330.79	1323919.29	10263148.15	2572.37	33984.49
W1-3	0.00	0.00	0.00	15587.69	952209.59	8468228.15	1827.65	28213.14
W1-4	0.00	0.00	431.38	22638.77	1468481.99	18258098.15	5252.59	59805.19
W1-5	0.00	0.00	221.14	19559.59	1227375.09	16603845.15	4643.23	51218.27
W1-6	0.00	0.00	231.30	19578.83	1140781.59	16857694.15	4531.51	49201.70
W1-7	66201.01	0.00	397.42	24077.82	1326561.09	18494286.15	5140.79	56186.46
W1-8	4969.87	0.00	341.58	22533.17	1077064.49	17214440.15	4747.27	48464.05
W1-9	30754.85	0.00	310.26	22528.45	1239552.09	17460288.15	4863.03	49761.70
W1-10	46737.10	0.00	505.06	28542.72	1291845.89	20622562.15	5884.59	56669.26
W1-11	0.00	0.00	533.90	29406.89	1184278.29	20866658.15	5849.91	56624.94
W1-12	15029.69	0.00	502.46	27059.91	1273555.89	19430470.15	5501.99	50743.50
W1-13	24488.66	0.00	391.74	19742.35	1141992.09	18766506.15	5179.99	50695.59
W1-14	0.00	0.00	498.62	20309.23	1134329.49	19475970.15	5384.55	52066.35
W1-15	0.00	0.00	434.94	19327.23	1119889.39	18866748.15	5055.23	50422.91
W1-16	7502.32	0.00	74.78	12191.75	1030617.09	13817409.15	3312.42	35177.02
W1-17	0.00	0.00	94.14	11996.51	890360.89	13814472.15	3270.94	34662.46
W1-18	0.00	0.00	41.86	12271.51	777832.49	13441344.15	3332.22	33529.89
SRM614-12	6939302.67	7248791.43	2649.79	1609.89	0.00	2303441.45	6722.32	741.18
SRM612-12	6923358.67	6626786.93	2338.83	1640.21	0.00	2203240.95	26011.91	2224.43
SRM610-12	3442065.47	3036186.93	690.86	1092.33	142564.37	981932.45	136145.13	10691.72
AP1-12	27225.07	0.00	0.00	317.76	0.00	13059867.15	3869.10	19305.93
AP2-12	14873.96	0.00	0.00	165.96	0.00	12217081.15	3419.38	19484.81
AP3-12	90468.03	0.00	122.18	245.04	0.00	13056102.15	5597.95	31476.40
AP4-12	143315.09	0.00	56.98	78.36	0.00	13644544.15	7299.08	32603.56
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	2.986650	2.569856	0.001286	0.000904	0.030176	1.000000	0.007041	0.000270
SRM612-11	3.001007	2.329817	0.001164	0.001110	0.081612	1.000000	0.013847	0.001662
SRM610-11	3.363014	2.565003	0.001255	0.001842	0.315303	1.000000	0.120499	0.010295
AP1-11	0.004906	0.000000	0.000032	0.000126	0.008863	1.000000	0.000396	0.003413
AP2-11	0.003320	0.000000	0.000032	0.000132	0.008251	1.000000	0.000373	0.003327
AP3-11	0.011864	0.000000	0.000038	0.000116	0.007752	1.000000	0.000546	0.005006
AP4-11	0.022586	0.000000	0.000024	0.000088	0.000000	1.000000	0.000568	0.003420
W1-1	0.000000	0.000000	0.000015	0.002000	0.157696	1.000000	0.000278	0.003434
W1-2	0.000000	0.000000	0.000000	0.001884	0.128997	1.000000	0.000251	0.003311
W1-3	0.000000	0.000000	0.000000	0.001841	0.112445	1.000000	0.000216	0.003332
W1-4	0.000000	0.000000	0.000024	0.001240	0.080429	1.000000	0.000288	0.003276
W1-5	0.000000	0.000000	0.000013	0.001178	0.073921	1.000000	0.000280	0.003085
W1-6	0.000000	0.000000	0.000014	0.001161	0.067671	1.000000	0.000269	0.002919
W1-7	0.003580	0.000000	0.000021	0.001302	0.071728	1.000000	0.000278	0.003038
W1-8	0.000289	0.000000	0.000020	0.001309	0.062568	1.000000	0.000276	0.002815
W1-9	0.001761	0.000000	0.000018	0.001290	0.070993	1.000000	0.000279	0.002850
W1-10	0.002266	0.000000	0.000024	0.001384	0.062642	1.000000	0.000285	0.002748
W1-11	0.000000	0.000000	0.000026	0.001409	0.056755	1.000000	0.000280	0.002714
W1-12	0.000774	0.000000	0.000026	0.001393	0.065544	1.000000	0.000283	0.002612
W1-13	0.001305	0.000000	0.000021	0.001052	0.060853	1.000000	0.000276	0.002701
W1-14	0.000000	0.000000	0.000026	0.001043	0.058243	1.000000	0.000276	0.002673
W1-15	0.000000	0.000000	0.000023	0.001024	0.059358	1.000000	0.000268	0.002673
W1-16	0.000543	0.000000	0.000005	0.000882	0.074588	1.000000	0.000240	0.002546
W1-17	0.000000	0.000000	0.000007	0.000868	0.064451	1.000000	0.000237	0.002509
W1-18	0.000000	0.000000	0.000003	0.000913	0.057869	1.000000	0.000248	0.002495
SRM614-12	3.012580	3.146940	0.001150	0.000699	0.000000	1.000000	0.002918	0.000322
SRM612-12	3.142352	3.007745	0.001062	0.000744	0.000000	1.000000	0.011806	0.001010
SRM610-12	3.505399	3.092053	0.000704	0.001112	0.145188	1.000000	0.138650	0.010888
AP1-12	0.002085	0.000000	0.000000	0.000024	0.000000	1.000000	0.000296	0.001478
AP2-12	0.001217	0.000000	0.000000	0.000014	0.000000	1.000000	0.000280	0.001595
AP3-12	0.006929	0.000000	0.000009	0.000019	0.000000	1.000000	0.000429	0.002411
AP4-12	0.010503	0.000000	0.000004	0.000006	0.000000	1.000000	0.000535	0.002389
standardize signal averages AP								
AP1	0.003495	0.000000	0.000016	0.000075	0.004431	1.000000	0.000346	0.002446
AP2	0.002269	0.000000	0.000016	0.000073	0.004125	1.000000	0.000327	0.002461
AP3	0.009397	0.000000	0.000024	0.000067	0.003876	1.000000	0.000487	0.003709
AP4	0.016545	0.000000	0.000014	0.000047	0.000000	1.000000	0.000552	0.002905
linest from std sig ave								
	0.020830	0.000000	25420.282471	0.121559	0.001647	1.000000	0.008655	0.373114
standardize signal averages SRM								
srm614-2	2.999615	2.858398	0.001218	0.000801	0.015088	1.000000	0.004980	0.000296
srm612-2	3.071679	2.668781	0.001113	0.000927	0.040806	1.000000	0.012826	0.001336
srm610-2	3.434207	2.828528	0.000979	0.001477	0.230245	1.000000	0.129575	0.010591
linest from std sig ave								
	0.044533	1.407680	1.292865	2.197649	0.018933	1.000000	0.039620	0.476625
concentration data								
SRM614-11	5335.51	0.00	2803063.19	9.42	49.00	85763.00	5.23	8.64
SRM612-11	5361.16	0.00	2537173.02	11.57	132.52	85763.00	10.28	53.18
SRM610-11	6007.87	0.00	2735755.46	19.20	511.98	85763.00	89.45	329.42
AP1-11	40.77	0.00	325919.95	6.12	66.94	398936.00	1.37	508.04
AP2-11	27.59	0.00	325139.84	6.40	62.32	398936.00	1.29	495.17
AP3-11	98.59	0.00	387957.06	5.61	58.55	398936.00	1.88	745.18
AP4-11	187.68	0.00	248065.53	4.25	0.00	398936.00	1.96	509.05
W1-1	0.00	0.00	149856.23	96.97	1191.11	398936.00	0.96	511.22
W1-2	0.00	0.00	4644.09	91.34	974.34	398936.00	0.87	492.88
W1-3	0.00	0.00	0.00	89.26	849.31	398936.00	0.75	495.91
W1-4	0.00	0.00	239601.99	60.13	607.49	398936.00	0.99	487.56
W1-5	0.00	0.00	135065.57	57.13	558.34	398936.00	0.97	459.16
W1-6	0.00	0.00	139143.65	56.32	511.13	398936.00	0.93	434.44
W1-7	29.75	0.00	217920.50	63.13	541.77	398936.00	0.96	452.21
W1-8	2.40	0.00	201226.70	63.48	472.58	398936.00	0.95	419.06
W1-9	14.64	0.00	180202.28	62.57	536.22	398936.00	0.96	424.22
W1-10	18.83	0.00	248362.71	67.12	473.15	398936.00	0.99	409.03
W1-11	0.00	0.00	259473.55	68.34	428.68	398936.00	0.97	403.92
W1-12	6.43	0.00	262243.20	67.54	495.07	398936.00	0.98	388.72
W1-13	10.84	0.00	211690.06	51.02	459.63	398936.00	0.95	402.10
W1-14	0.00	0.00	259631.02	50.57	439.91	398936.00	0.95	397.93
W1-15	0.00	0.00	233785.91	49.68	448.34	398936.00	0.93	397.81
W1-16	4.51	0.00	54883.90	42.79	563.38	398936.00	0.83	378.95
W1-17	0.00	0.00	69107.63	42.11	486.81	398936.00	0.82	373.48
W1-18	0.00	0.00	31582.22	44.27	437.09	398936.00	0.86	371.31

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	5381.83	0.00	2507930.00	7.29	0.00	85763.00	2.17	10.30
SRM612-12	5613.66	0.00	2314288.95	7.76	0.00	85763.00	8.76	32.31
SRM610-12	6262.23	0.00	1533879.31	11.60	235.75	85763.00	102.92	348.42
AP1-12	17.32	0.00	0.00	1.18	0.00	398936.00	1.02	220.04
AP2-12	10.12	0.00	0.00	0.66	0.00	398936.00	0.97	237.40
AP3-12	57.58	0.00	94901.36	0.91	0.00	398936.00	1.48	358.85
AP4-12	87.28	0.00	42349.63	0.28	0.00	398936.00	1.85	355.67

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-9	45342.38	266876.56	2378.57	3571.10	478953.13	25102.10	3236.90	671.60
SRM614-9	8482477.00	6570842.50	4998.75	5425.99	549382.19	2733801.00	23364.65	1628.53
SRM612-9	9342783.00	7308358.50	4833.35	5963.79	703955.75	3074821.30	47388.11	4605.03
SRM610-9	4677657.50	3396520.80	2783.90	5195.39	814024.50	1376828.40	167942.19	14259.96
AP1-9	105908.80	99516.20	1750.45	4939.71	514607.72	18377824.00	9488.13	64511.36
AP2-9	89760.34	82115.06	1657.41	4632.91	445118.66	18627260.00	9234.29	67755.54
AP3-9	213145.56	75563.95	1780.13	4236.02	388717.19	18498260.00	12169.43	84611.64
AP4-9	262776.59	70183.59	1695.37	4018.58	340053.72	18598768.00	13455.24	73944.17
T2-1	76225.63	52055.25	1743.09	60526.90	7377221.50	22149774.00	9482.29	92336.16
T2-2	15148.09	44974.73	1575.29	55365.51	6892216.50	19493312.00	8171.29	76271.51
T2-3	18776.79	42061.16	1403.81	48570.23	6157979.00	16338824.00	6868.48	58803.77
T2-4	19431.31	42615.64	1385.41	79334.05	17245552.00	17787782.00	7977.81	76331.87
T2-5	10221.42	37357.61	1370.77	79960.01	16661030.00	15934555.00	7189.40	65847.34
T2-6	9438.41	32572.98	1219.93	79401.37	15685229.00	14134664.00	6328.12	54183.18
T2-7	15088.01	29186.16	1283.85	42234.20	5459851.50	16459962.00	6901.56	48457.35
T2-8	14915.68	26024.67	1256.81	44246.05	5999299.50	16881286.00	6907.88	48810.20
T2-9	11069.38	24329.46	1303.17	39073.62	4832104.50	16288531.00	6810.44	44715.33
T2-10	26424.23	25043.62	742.68	17732.78	1730638.40	7575447.50	3708.38	17290.86
T2-11	21152.56	21403.60	730.52	20563.48	1721222.60	8636980.00	3986.38	19495.31
T2-12	10928.46	19646.39	721.24	19809.71	1067199.50	9264178.00	4190.74	19655.39
T2-13	24047.38	24004.62	777.36	25070.90	1907661.30	9982077.00	4445.67	22856.09
T2-14	19344.95	18646.63	839.76	26248.51	1560997.30	10789320.00	4567.59	24423.82
T2-15	17283.30	18124.42	858.32	28367.44	1929219.50	11511155.00	4854.67	25939.71
T2-16	20720.64	22373.01	1008.57	32690.02	1933469.80	14318454.00	5765.99	31377.54
T2-17	12719.43	17317.66	1121.37	35808.92	1899778.30	15778770.00	6374.68	34815.44
T2-18	12856.67	16308.53	1230.77	39249.14	1980260.80	17079906.00	6749.72	35880.80
SRM614-10	6034432.50	5776568.50	2944.94	3892.22	464350.41	1915284.30	8143.21	1486.77
SRM612-10	6785181.00	6551757.50	3333.70	4104.98	551504.63	2175093.50	28323.68	3205.98
SRM610-10	3629165.80	3235743.80	1753.61	3771.38	749185.19	1081107.00	141542.03	12386.87
AP1-10	59989.10	14548.96	880.20	3153.50	440616.56	13842643.00	6194.84	22281.01
AP2-10	51435.53	14052.76	971.25	3159.58	382760.00	14311807.00	6705.20	26397.75
AP3-10	136326.38	19208.07	1086.01	2966.34	360928.88	14018981.00	8517.21	37015.13
AP4-10	175909.98	23006.69	1105.05	2899.78	325105.06	14126812.00	9761.38	37826.61
blank-10	7165.12	13172.91	253.36	2226.97	428662.50	73136.41	1065.61	1182.81
blank average	26253.75	140024.74	1315.97	2899.04	453807.82	49119.26	2151.25	927.21

blank subtraction								
SRM614-9	8456223.25	6430817.76	3682.78	2526.95	95574.37	2684681.74	21213.40	701.32
SRM612-9	9316529.25	7168333.76	3517.38	3064.76	250147.94	3025702.04	45236.85	3677.82
SRM610-9	4651403.75	3256496.06	1467.93	2296.35	360216.69	1327709.14	165790.94	13332.75
AP1-9	79655.05	-40508.54	434.48	2040.67	60799.91	18328704.74	7336.88	63584.16
AP2-9	63506.60	-57909.67	341.44	1733.87	-8689.16	18578140.74	7083.04	66828.33
AP3-9	186891.81	-64460.79	464.16	1336.99	-65090.63	18449140.74	10018.18	83684.44
AP4-9	236522.84	-69841.14	379.40	1119.55	-113754.10	18549648.74	11303.98	73016.97
T2-1	49971.89	-87969.48	427.12	57627.86	6923413.69	22100654.74	7331.04	91408.96
T2-2	-11105.66	-95050.00	259.32	52466.48	6438408.69	19444192.74	6020.03	75344.30
T2-3	-7476.96	-97963.58	87.84	45671.20	5704171.19	16289704.74	4717.23	57876.56
T2-4	-6822.44	-97409.10	69.44	76435.01	16791744.19	17738662.74	5826.55	75404.66
T2-5	-16032.33	-102667.13	54.80	77060.97	16207222.19	15885435.74	5038.15	64920.13
T2-6	-16815.33	-107451.75	-96.04	76502.33	15231421.19	14085544.74	4176.86	53255.98
T2-7	-11165.74	-110838.57	-32.12	39335.16	5006043.69	16410842.74	4750.31	47530.15
T2-8	-11338.06	-114000.07	-59.16	41347.01	5545491.69	16832166.74	4756.63	47882.99
T2-9	-15184.37	-115695.28	-12.80	36174.58	4378296.69	16239411.74	4659.19	43788.13
T2-10	170.48	-114981.12	-573.28	14833.74	1276830.59	7526328.24	1557.13	16363.65
T2-11	-5101.19	-118621.14	-585.44	17664.44	1267414.79	8587860.74	1835.13	18568.11
T2-12	-15325.29	-120378.35	-594.72	16910.67	613391.69	9215058.74	2039.49	18728.19
T2-13	-2206.37	-116020.12	-538.60	22171.86	1453853.49	9932957.74	2294.41	21928.88
T2-14	-6908.80	-121378.11	-476.20	23349.47	1107189.49	10740200.74	2146.33	23496.61
T2-15	-8970.45	-121900.32	-457.64	25468.40	1475411.69	11462035.74	2703.42	25012.50

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	-5533.11	-117651.73	-307.40	29790.99	1479661.99	14269334.74	3614.74	30450.33
T2-17	-13534.32	-122707.08	-194.60	32909.89	1445970.49	15729650.74	4223.42	33888.23
T2-18	-13397.08	-123716.21	-85.20	36350.10	1526452.99	17030786.74	4598.47	34953.60
SRM614-10	6008178.75	5636543.76	1628.97	993.19	10542.59	1866165.04	5991.95	559.56
SRM612-10	6758927.25	6411732.76	2017.73	1205.95	97696.82	2125974.24	26172.43	2278.77
SRM610-10	3602912.05	3095719.06	437.64	872.34	295377.38	1031987.74	139390.78	11459.66
AP1-10	33735.35	-125475.78	-435.76	254.46	-13191.26	13793523.74	4043.58	21353.80
AP2-10	25181.78	-125971.98	-344.72	260.54	-71047.82	14262687.74	4553.95	25470.54
AP3-10	110072.63	-120816.67	-229.96	67.30	-92878.94	13969861.74	6365.96	36087.92
AP4-10	149656.23	-117018.05	-210.92	0.74	-128702.76	14077692.74	7610.12	36899.41
zero correction								
SRM614-9	8456223.25	6430817.76	3682.78	2526.95	95574.37	2684681.74	21213.40	701.32
SRM612-9	9316529.25	7168333.76	3517.38	3064.76	250147.94	3025702.04	45236.85	3677.82
SRM610-9	4651403.75	3256496.06	1467.93	2296.35	360216.69	1327709.14	165790.94	13332.75
AP1-9	79655.05	0.00	434.48	2040.67	60799.91	18328704.74	7336.88	63584.16
AP2-9	63506.60	0.00	341.44	1733.87	0.00	18578140.74	7083.04	68828.33
AP3-9	186891.81	0.00	464.16	1336.99	0.00	18449140.74	10018.18	83684.44
AP4-9	236522.84	0.00	379.40	1119.55	0.00	18549648.74	11303.98	73016.97
T2-1	49971.89	0.00	427.12	57627.86	6923413.69	22100654.74	7331.04	91408.96
T2-2	0.00	0.00	259.32	52466.48	6438408.69	19444192.74	6020.03	75344.30
T2-3	0.00	0.00	87.84	45671.20	5704171.19	16289704.74	4717.23	57876.56
T2-4	0.00	0.00	69.44	76435.01	16791744.19	17738662.74	5826.55	75404.66
T2-5	0.00	0.00	54.80	77060.97	16207222.19	15885435.74	5038.15	64920.13
T2-6	0.00	0.00	0.00	76502.33	15231421.19	14085544.74	4176.86	53255.98
T2-7	0.00	0.00	0.00	39335.16	5006043.69	16410842.74	4750.31	47530.15
T2-8	0.00	0.00	0.00	41347.01	5545491.69	16832166.74	4756.63	47882.99
T2-9	0.00	0.00	0.00	36174.58	4378296.69	16239411.74	4659.19	43788.13
T2-10	170.48	0.00	0.00	14833.74	1276830.59	7526328.24	1557.13	16363.65
T2-11	0.00	0.00	0.00	17664.44	1267414.79	8587860.74	1835.13	18568.11
T2-12	0.00	0.00	0.00	16910.67	613391.69	9215058.74	2039.49	18728.19
T2-13	0.00	0.00	0.00	22171.86	1453853.49	9932957.74	2294.41	21928.88
T2-14	0.00	0.00	0.00	23349.47	1107189.49	10740200.74	2416.33	23496.61
T2-15	0.00	0.00	0.00	25468.40	1475411.69	11462035.74	2703.42	25012.50
T2-16	0.00	0.00	0.00	29790.99	1479661.99	14269334.74	3614.74	30450.33
T2-17	0.00	0.00	0.00	32909.89	1445970.49	15729650.74	4223.42	33888.23
T2-18	0.00	0.00	0.00	36350.10	1526452.99	17030786.74	4598.47	34953.60
SRM614-10	6008178.75	5636543.76	1628.97	993.19	10542.59	1866165.04	5991.95	559.56
SRM612-10	6758927.25	6411732.76	2017.73	1205.95	97696.82	2125974.24	26172.43	2278.77
SRM610-10	3602912.05	3095719.06	437.64	872.34	295377.38	1031987.74	139390.78	11459.66
AP1-10	33735.35	0.00	0.00	254.46	0.00	13793523.74	4043.58	21353.80
AP2-10	25181.78	0.00	0.00	260.54	0.00	14262687.74	4553.95	25470.54
AP3-10	110072.63	0.00	0.00	67.30	0.00	13969861.74	6365.96	36087.92
AP4-10	149656.23	0.00	0.00	0.74	0.00	14077692.74	7610.12	36899.41
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-9	3.149805	2.395374	0.001372	0.000941	0.035600	1.000000	0.007902	0.000261
SRM612-9	3.079130	2.369147	0.001163	0.001013	0.082674	1.000000	0.014951	0.001216
SRM610-9	3.503330	2.452718	0.001106	0.001730	0.271307	1.000000	0.012487	0.010042
AP1-9	0.004346	0.000000	0.000024	0.000111	0.003317	1.000000	0.000400	0.003469
AP2-9	0.003418	0.000000	0.000018	0.000093	0.000000	1.000000	0.000381	0.003597
AP3-9	0.010130	0.000000	0.000025	0.000072	0.000000	1.000000	0.000543	0.004536
AP4-9	0.012751	0.000000	0.000020	0.000060	0.000000	1.000000	0.000609	0.003936
T2-1	0.002261	0.000000	0.000019	0.002608	0.313267	1.000000	0.000332	0.004136
T2-2	0.000000	0.000000	0.000013	0.002698	0.331122	1.000000	0.000310	0.003875
T2-3	0.000000	0.000000	0.000005	0.002804	0.350170	1.000000	0.000290	0.003553
T2-4	0.000000	0.000000	0.000004	0.004309	0.946618	1.000000	0.000328	0.004251
T2-5	0.000000	0.000000	0.000003	0.004851	1.020257	1.000000	0.000317	0.004087
T2-6	0.000000	0.000000	0.000000	0.005431	1.081351	1.000000	0.000297	0.003781
T2-7	0.000000	0.000000	0.000000	0.002397	0.305045	1.000000	0.000289	0.002896

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000000	0.000000	0.000000	0.002456	0.329458	1.000000	0.000283	0.002845
T2-9	0.000000	0.000000	0.000000	0.002228	0.269609	1.000000	0.000287	0.002696
T2-10	0.000023	0.000000	0.000000	0.001971	0.169649	1.000000	0.000207	0.002174
T2-11	0.000000	0.000000	0.000000	0.002057	0.147582	1.000000	0.000214	0.002162
T2-12	0.000000	0.000000	0.000000	0.001835	0.066564	1.000000	0.000221	0.002032
T2-13	0.000000	0.000000	0.000000	0.002232	0.146367	1.000000	0.000231	0.002208
T2-14	0.000000	0.000000	0.000000	0.002174	0.103088	1.000000	0.000225	0.002188
T2-15	0.000000	0.000000	0.000000	0.002222	0.128722	1.000000	0.000236	0.002182
T2-16	0.000000	0.000000	0.000000	0.002088	0.103695	1.000000	0.000253	0.002134
T2-17	0.000000	0.000000	0.000000	0.002092	0.091926	1.000000	0.000269	0.002154
T2-18	0.000000	0.000000	0.000000	0.002134	0.089629	1.000000	0.000270	0.002052
SRM614-10	3.219532	3.020389	0.000873	0.000532	0.005649	1.000000	0.003211	0.000300
SRM612-10	3.179214	3.015903	0.000949	0.000567	0.045954	1.000000	0.012311	0.001072
SRM610-10	3.491235	2.999763	0.000424	0.000845	0.286222	1.000000	0.135070	0.011104
AP1-10	0.002446	0.000000	0.000000	0.000018	0.000000	1.000000	0.000293	0.001548
AP2-10	0.001766	0.000000	0.000000	0.000018	0.000000	1.000000	0.000319	0.001786
AP3-10	0.007879	0.000000	0.000000	0.000005	0.000000	1.000000	0.000456	0.002583
AP4-10	0.010631	0.000000	0.000000	0.000000	0.000000	1.000000	0.000541	0.002621
standardize signal averages AP								
AP1	0.003396	0.000000	0.000012	0.000065	0.001659	1.000000	0.000347	0.002509
AP2	0.002592	0.000000	0.000009	0.000056	0.000000	1.000000	0.000350	0.002691
AP3	0.009005	0.000000	0.000013	0.000039	0.000000	1.000000	0.000499	0.003560
AP4	0.011691	0.000000	0.000010	0.000030	0.000000	1.000000	0.000575	0.003279
linest from std sig ave								
	0.026435	0.000000	41787.025559	0.161998	0.000000	1.000000	0.008393	0.361309
standardize signal averages SRM								
srm614-2	3.184669	2.707882	0.001122	0.000737	0.020625	1.000000	0.005556	0.000281
srm612-2	3.129172	2.692525	0.001056	0.000790	0.064314	1.000000	0.013631	0.001144
srm610-2	3.497283	2.726241	0.000765	0.001287	0.278764	1.000000	0.129970	0.010573
linest from std sig ave								
	0.043195	1.448612	1.302777	2.497959	0.012013	1.000000	0.039461	0.478523
concentration data								
SRM614-9	7140.96	0.00	4916142.39	13.08	36.68	85763.00	5.69	8.09
SRM612-9	6980.73	0.00	4166146.35	14.07	85.18	85763.00	10.76	37.67
SRM610-9	7942.44	0.00	3962263.31	24.03	279.52	85763.00	89.88	311.17
AP1-9	45.83	0.00	395170.98	7.20	15.90	398936.00	1.34	500.03
AP2-9	36.05	0.00	306379.13	6.03	0.00	398936.00	1.28	518.49
AP3-9	106.83	0.00	419409.86	4.68	0.00	398936.00	1.82	653.81
AP4-9	134.47	0.00	340964.10	3.90	0.00	398936.00	2.04	567.37
T2-1	23.84	0.00	322175.00	168.52	1501.29	398936.00	1.11	596.16
T2-2	0.00	0.00	222327.42	174.38	1586.85	398936.00	1.04	558.52
T2-3	0.00	0.00	89893.02	181.19	1678.14	398936.00	0.97	512.12
T2-4	0.00	0.00	65258.28	278.47	4536.52	398936.00	1.10	612.72
T2-5	0.00	0.00	57507.97	313.51	4889.43	398936.00	1.06	589.06
T2-6	0.00	0.00	0.00	351.00	5182.21	398936.00	0.99	544.97
T2-7	0.00	0.00	0.00	154.90	1461.88	398936.00	0.97	417.46
T2-8	0.00	0.00	0.00	158.75	1578.88	398936.00	0.95	410.04
T2-9	0.00	0.00	0.00	143.96	1292.06	398936.00	0.96	388.66
T2-10	0.24	0.00	0.00	127.37	813.01	398936.00	0.69	313.39
T2-11	0.00	0.00	0.00	132.93	707.26	398936.00	0.72	311.65
T2-12	0.00	0.00	0.00	118.60	319.00	398936.00	0.74	292.94
T2-13	0.00	0.00	0.00	144.26	701.44	398936.00	0.77	318.21
T2-14	0.00	0.00	0.00	140.50	494.04	398936.00	0.75	315.34
T2-15	0.00	0.00	0.00	143.60	616.88	398936.00	0.79	314.54
T2-16	0.00	0.00	0.00	134.93	496.94	398936.00	0.85	307.59
T2-17	0.00	0.00	0.00	135.21	440.54	398936.00	0.90	310.54
T2-18	0.00	0.00	0.00	137.94	429.53	398936.00	0.90	295.83
SRM614-10	7299.04	0.00	3128269.81	7.39	5.82	85763.00	2.31	9.29
SRM612-10	7207.63	0.00	3401314.13	7.88	47.34	85763.00	8.86	33.21
SRM610-10	7915.02	0.00	1519799.56	11.74	294.88	85763.00	97.23	344.09
AP1-10	25.79	0.00	0.00	1.19	0.00	398936.00	0.98	223.14
AP2-10	18.62	0.00	0.00	1.18	0.00	398936.00	1.07	257.41
AP3-10	83.09	0.00	0.00	0.31	0.00	398936.00	1.53	372.35
AP4-10	112.11	0.00	0.00	0.00	0.00	398936.00	1.81	377.81
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-1	22242.24	1583723.50	11875.59	9426.09	1254422.00	94245.57	8450.61	530.68
SRM614-1	8865947.00	6543932.50	12487.39	9618.21	1234241.90	3305448.00	127618.68	4637.43
SRM612-1	8529562.00	5948348.00	11612.59	12821.51	3529111.30	3060354.30	122398.97	12171.87
SRM610-1	4766181.00	3407450.80	9383.25	9965.66	1967445.80	1531599.80	154956.27	14155.04
AP1-1	92585.68	785253.00	6921.76	8406.33	1463659.10	9195622.00	10969.86	242939.66
AP2-1	97271.67	628210.44	5920.19	8085.93	1360514.40	15300785.00	12427.95	395937.69
AP3-1	382629.16	490987.94	5359.39	7240.04	1097782.80	22017486.00	19013.59	830006.56
AP4-1	285483.59	448360.13	4719.95	6513.28	937816.81	15044968.00	13966.36	349699.53
41LU1-REDO-1	104001.14	411345.19	3973.46	12422.91	1092328.50	5703713.00	6634.56	92673.13
41LU1-REDO-2	69489.88	366159.19	3808.66	13672.00	1026392.30	6889255.00	6662.84	108251.17
41LU1-REDO-3	64098.20	320595.81	3457.82	14804.04	995677.75	8054161.00	6842.28	117006.94
41LU1-REDO-4	37223.69	307384.53	3214.34	11208.26	998303.56	5031972.00	5976.31	72657.93
41LU1-REDO-5	25095.86	279877.25	3086.34	12204.67	994737.44	5988020.00	6261.56	84059.63
41LU1-REDO-6	18663.06	259669.11	2669.66	12031.27	953590.31	5458206.50	6016.39	76299.83
41LU1-REDO-7	32305.86	245398.98	2538.97	10004.54	991302.88	4177552.50	5538.79	52993.58
41LU1-REDO-8	16429.41	222226.94	2515.57	10584.86	958708.31	4475175.50	5474.31	56980.00
41LU1-REDO-9	27650.60	212278.56	2340.77	10423.98	993937.88	4329880.00	5353.59	54420.87
41LU1-REDO-10	39093.62	205062.23	2224.93	10681.86	994076.25	4829368.00	5409.03	57495.16
41LU1-REDO-11	34246.43	188521.78	2063.41	11110.14	984015.94	4703153.00	5405.31	55811.15
41LU1-REDO-12	25929.95	177685.41	1930.57	10849.82	954590.63	4308901.50	5104.07	50342.08
41LU1-REDO-13	24766.30	171926.64	1919.09	10326.74	975604.31	4400768.00	5137.25	48446.27
41LU1-REDO-14	19269.71	163783.16	1898.33	11610.71	913806.94	4889777.50	5178.15	52190.45
41LU1-REDO-15	14275.72	154562.16	1888.81	13034.99	899708.00	6098471.00	5802.27	61710.79
SRM614-2	8506639.00	6408575.50	4584.31	6474.28	877004.50	2998165.30	47104.82	2335.01
SRM612-2	8445556.00	6122448.00	4414.15	6326.96	938689.69	2920872.80	61795.71	3974.26
SRM610-2	4611382.00	3005541.80	2846.02	5879.15	1248691.40	1444715.10	152386.42	11941.91
AP1-2	55893.27	111118.30	1576.89	4680.43	859731.44	10090987.00	6757.04	90476.63
AP2-2	54439.66	101984.02	1702.17	5029.39	806641.50	16027590.00	8806.73	150579.64
AP3-2	220738.56	100814.45	2012.33	4695.43	684181.88	21775462.00	13484.92	284818.06
AP4-2	331090.81	99658.32	1792.69	4519.43	687222.88	16470556.00	11766.67	158056.02
blank-2	8713.25	144290.94	1551.69	4193.74	852135.19	93592.77	3436.50	680.76
blank average	15477.75	864007.22	6713.64	6809.92	1053278.60	93919.17	5943.55	605.72
blank subtraction								
SRM614-1	8850469.25	5679925.28	5773.75	2808.30	180963.31	3211528.83	121675.13	4031.70
SRM612-1	8514084.25	5084340.78	4898.95	6011.59	2475832.71	2966435.13	116455.42	11566.14
SRM610-1	4750703.25	2543443.58	2669.62	3155.74	914167.21	1437680.63	149012.72	13549.32
AP1-1	77107.93	-78754.22	208.12	1596.41	410380.51	9101702.83	5026.31	242333.94
AP2-1	81793.93	-235796.78	-793.44	1276.01	307235.81	15206865.83	6484.40	395331.97
AP3-1	367151.41	-373019.28	-1354.25	430.12	44504.21	21923566.83	13070.03	829400.84
AP4-1	270005.84	-415647.09	-1993.69	-296.64	-115461.79	14951048.83	8022.80	349093.81
41LU1-REDO-1	88523.39	-452662.03	-2740.18	5612.99	39049.91	5609793.83	691.00	92067.40
41LU1-REDO-2	54012.13	-497848.03	-2904.98	6862.08	-26886.29	6795335.83	719.28	107645.45
41LU1-REDO-3	48620.45	-543411.41	-3255.82	7994.12	-57600.84	7960241.83	898.72	116401.22
41LU1-REDO-4	21745.94	-556622.69	-3499.30	4398.34	-54975.03	4938052.83	32.76	72052.21
41LU1-REDO-5	9618.11	-584129.97	-3627.30	5394.75	-58541.16	5894100.83	318.00	83453.91
41LU1-REDO-6	3185.32	-604338.11	-4043.98	5221.35	-99688.28	5364287.33	72.84	75694.10
41LU1-REDO-7	16828.11	-618608.24	-4174.66	3194.62	-61975.72	4083633.33	-404.76	52387.85
41LU1-REDO-8	951.67	-641780.28	-4198.06	3774.94	-94570.28	4381256.33	-469.24	56374.28
41LU1-REDO-9	12172.85	-651728.66	-4372.86	3614.06	-59340.72	4235960.83	-589.96	53815.14
41LU1-REDO-10	23615.87	-658944.99	-4488.71	3871.94	-59202.34	4735448.83	-534.52	56889.44
41LU1-REDO-11	18768.69	-675485.44	-4650.23	4300.22	-69262.66	4609233.83	-538.24	55205.43
41LU1-REDO-12	10452.20	-686321.81	-4783.07	4039.90	-98687.97	4214982.33	-839.48	49736.36
41LU1-REDO-13	9288.55	-692080.58	-4794.55	3516.82	-77674.28	4306848.83	-810.80	47840.55
41LU1-REDO-14	3791.96	-700224.06	-4815.31	4800.79	-139471.66	4795858.33	-765.40	51584.73
41LU1-REDO-15	-1202.03	-709445.06	-4824.83	6225.07	-153570.60	6004551.83	-141.28	61105.06
SRM614-2	8491161.25	5544568.28	-2129.33	-335.64	-176274.10	2904246.13	41161.27	1729.29
SRM612-2	8430078.25	5258440.78	-2299.49	-482.96	-114588.91	2826953.63	55852.15	3368.54
SRM610-2	4595904.25	2141534.58	-3867.62	-930.77	195412.81	1350795.93	146442.87	11336.18
AP1-2	40415.53	-752888.92	-5136.75	-2129.49	-193547.16	9997067.83	813.48	89870.90
AP2-2	38961.92	-762023.20	-5011.47	-1780.53	-246637.10	15933670.83	2863.18	149973.92
AP3-2	205260.81	-763192.77	-4701.31	-2114.49	-369096.72	21681542.83	7541.36	284212.34
AP4-2	315613.06	-764348.90	-4920.95	-2290.49	-366055.72	16376636.83	5823.11	157450.30
zero correction								
SRM614-1	8850469.25	5679925.28	5773.75	2808.30	1259434.80	3211528.83	121675.13	4031.70
SRM612-1	8514084.25	5084340.78	4898.95	6011.59	1467977.40	2966435.13	116455.42	11566.14
SRM610-1	4750703.25	2543443.58	2669.62	3155.74	1565305.60	1437680.63	149012.72	13549.32
AP1-1	77107.93	0.00	208.12	1596.41	397940.13	9101702.83	5026.31	242333.94
AP2-1	81793.93	0.00	0.00	1276.01	314931.06	15206865.83	6484.40	395331.97
AP3-1	367151.41	0.00	0.00	430.12	385658.50	21923566.83	13070.03	829400.84
AP4-1	270005.84	0.00	0.00	0.00	301733.94	14951048.83	8022.80	349093.81
41LU1-REDO-1	88523.39	0.00	0.00	5612.99	1258539.50	5609793.83	691.00	92067.40
41LU1-REDO-2	54012.13	0.00	0.00	6862.08	1317136.10	6795335.83	719.28	107645.45
41LU1-REDO-3	48620.45	0.00	0.00	7994.12	1076105.90	7960241.83	898.72	116401.22

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	21745.94	0.00	0.00	4398.34	2032429.00	4938052.83	32.76	72052.21
41LU1-REDO-5	9618.11	0.00	0.00	5394.75	2078104.00	5894100.83	318.00	83453.91
41LU1-REDO-6	3185.32	0.00	0.00	5221.35	1739624.60	5364287.33	72.84	75694.10
41LU1-REDO-7	16828.11	0.00	0.00	3194.62	2182579.80	4083633.33	0.00	52387.85
41LU1REDO-8	951.67	0.00	0.00	3774.94	2631315.50	4381256.33	0.00	56374.28
41LU1-REDO-9	12172.85	0.00	0.00	3614.06	2442299.80	4235960.83	0.00	53815.14
41LU1REDO-10	23615.87	0.00	0.00	3871.94	1737553.10	4735448.83	0.00	56889.44
41LU1-REDO-11	18768.69	0.00	0.00	4300.22	1850756.90	4609233.83	0.00	55205.43
41LU1REDO-12	10452.20	0.00	0.00	4039.90	1737539.30	4214982.33	0.00	49736.36
41LU1-REDO-13	9288.55	0.00	0.00	3516.82	2903196.80	4306848.83	0.00	47840.55
41LU1-REDO-14	3791.96	0.00	0.00	4800.79	4116332.50	4795858.33	0.00	51584.73
41LU1-REDO-15	0.00	0.00	0.00	6225.07	4146259.00	6004551.83	0.00	61105.06
SRM614-2	8491161.25	5544568.28	0.00	0.00	2602828.50	2904246.13	41161.27	1729.29
SRM612-2	8430078.25	5258440.78	0.00	0.00	2569829.00	2826953.63	55852.15	3368.54
SRM610-2	4595904.25	2141534.58	0.00	0.00	5110986.00	1350795.93	146442.87	11336.18
AP1-2	40415.53	0.00	0.00	0.00	4320745.00	9997067.83	813.48	89870.90
AP2-2	38961.92	0.00	0.00	0.00	4304417.50	15933670.83	2863.18	149973.92
AP3-2	205260.81	0.00	0.00	0.00	4943076.00	21681542.83	7541.36	284212.34
AP4-2	315613.06	0.00	0.00	0.00	427376.72	16376636.83	5823.11	157450.30
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	2.755843	1.768605	0.001798	0.000874	0.392161	1.000000	0.037887	0.001255
SRM612-1	2.870140	1.713957	0.001651	0.002027	0.494862	1.000000	0.039258	0.003899
SRM610-1	3.304422	1.769130	0.001857	0.002195	1.088771	1.000000	0.103648	0.009424
AP1-1	0.008472	0.000000	0.000023	0.000175	0.043722	1.000000	0.000552	0.026625
AP2-1	0.005379	0.000000	0.000000	0.000084	0.020710	1.000000	0.000426	0.025997
AP3-1	0.016747	0.000000	0.000000	0.000020	0.017591	1.000000	0.000596	0.037831
AP4-1	0.018059	0.000000	0.000000	0.000000	0.020181	1.000000	0.000537	0.023349
41LU1-REDO-1	0.015780	0.000000	0.000000	0.001001	0.224347	1.000000	0.000123	0.016412
41LU1-REDO-2	0.007948	0.000000	0.000000	0.001010	0.193829	1.000000	0.000106	0.015841
41LU1-REDO-3	0.006108	0.000000	0.000000	0.001004	0.135185	1.000000	0.000113	0.014623
41LU1-REDO-4	0.004404	0.000000	0.000000	0.000891	0.411585	1.000000	0.000007	0.014591
41LU1-REDO-5	0.001632	0.000000	0.000000	0.000915	0.352574	1.000000	0.000054	0.014159
41LU1-REDO-6	0.000594	0.000000	0.000000	0.000973	0.324297	1.000000	0.000014	0.014111
41LU1-REDO-7	0.004121	0.000000	0.000000	0.000782	0.534470	1.000000	0.000000	0.012829
41LU1REDO-8	0.000217	0.000000	0.000000	0.000862	0.600585	1.000000	0.000000	0.012867
41LU1-REDO-9	0.002874	0.000000	0.000000	0.000853	0.576563	1.000000	0.000000	0.012704
41LU1REDO-10	0.004987	0.000000	0.000000	0.000818	0.366925	1.000000	0.000000	0.012014
41LU1-REDO-11	0.004072	0.000000	0.000000	0.000933	0.401532	1.000000	0.000000	0.011977
41LU1REDO-12	0.002480	0.000000	0.000000	0.000958	0.412229	1.000000	0.000000	0.011800
41LU1-REDO-13	0.002157	0.000000	0.000000	0.000817	0.674088	1.000000	0.000000	0.011108
41LU1-REDO-14	0.000791	0.000000	0.000000	0.001001	0.858310	1.000000	0.000000	0.010756
41LU1-REDO-15	0.000000	0.000000	0.000000	0.001037	0.690519	1.000000	0.000000	0.010176
SRM614-2	2.923706	1.909125	0.000000	0.000000	0.896215	1.000000	0.014173	0.000595
SRM612-2	2.982036	1.860109	0.000000	0.000000	0.909045	1.000000	0.019757	0.001192
SRM610-2	3.402368	1.585387	0.000000	0.000000	3.783685	1.000000	0.108412	0.008392
AP1-2	0.004043	0.000000	0.000000	0.000000	0.432201	1.000000	0.000081	0.008990
AP2-2	0.002445	0.000000	0.000000	0.000000	0.270146	1.000000	0.000180	0.009412
AP3-2	0.009467	0.000000	0.000000	0.000000	0.227985	1.000000	0.000348	0.013108
AP4-2	0.019272	0.000000	0.000000	0.000000	0.026097	1.000000	0.000356	0.009614
standardize signal averages AP								
AP1	0.006257	0.000000	0.000011	0.000088	0.237961	1.000000	0.000317	0.017807
AP2	0.003912	0.000000	0.000000	0.000042	0.145428	1.000000	0.000303	0.017705
AP3	0.013107	0.000000	0.000000	0.000010	0.122788	1.000000	0.000472	0.025470
AP4	0.018666	0.000000	0.000000	0.000000	0.023139	1.000000	0.000446	0.016482
linest from std sig ave								
	0.016942	0.000000	38513.940242	0.127829	0.000034	1.000000	0.009395	0.055444

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	2.839774	1.838865	0.000899	0.000437	0.644188	1.000000	0.026030	0.000925
srM612-2	2.926088	1.787033	0.000826	0.001013	0.701954	1.000000	0.029507	0.002545
srM610-2	3.353395	1.677258	0.000928	0.001098	2.436228	1.000000	0.106030	0.008908

linest from std sig ave								
	0.046334	2.216715	1.843831	2.482903	0.001101	1.000000	0.043792	0.536927

concentration data								
SRM614-1	4004.14	0.00	5938328.63	9.59	37.02	85763.00	30.53	5.97
SRM612-1	4170.21	0.00	5454887.71	22.22	46.71	85763.00	31.63	18.54
SRM610-1	4801.20	0.00	6133440.22	24.06	102.77	85763.00	83.52	44.81
AP1-1	57.26	0.00	351329.27	8.94	19.20	398936.00	2.07	588.91
AP2-1	36.35	0.00	0.00	4.28	9.09	398936.00	1.60	575.01
AP3-1	113.19	0.00	0.00	1.00	7.72	398936.00	2.23	836.77
AP4-1	122.06	0.00	0.00	0.00	8.86	398936.00	2.01	516.45
41LU1-REDO-1	106.65	0.00	0.00	51.02	98.51	398936.00	0.46	363.01
41LU1-REDO-2	53.72	0.00	0.00	51.50	85.11	398936.00	0.40	350.38
41LU1-REDO-3	41.28	0.00	0.00	51.21	59.36	398936.00	0.42	323.43
41LU1-REDO-4	29.76	0.00	0.00	45.42	180.72	398936.00	0.02	322.73
41LU1-REDO-5	11.03	0.00	0.00	46.68	154.81	398936.00	0.20	313.17
41LU1-REDO-6	4.01	0.00	0.00	49.64	142.39	398936.00	0.05	312.11
41LU1-REDO-7	27.85	0.00	0.00	39.89	234.68	398936.00	0.00	283.75
41LU1REDO-8	1.47	0.00	0.00	43.94	263.71	398936.00	0.00	284.60
41LU1-REDO-9	19.42	0.00	0.00	43.51	253.16	398936.00	0.00	281.00
41LU1REDO-10	33.71	0.00	0.00	41.70	161.11	398936.00	0.00	265.72
41LU1-REDO-11	27.52	0.00	0.00	47.58	176.31	398936.00	0.00	264.92
41LU1REDO-12	16.76	0.00	0.00	48.88	181.00	398936.00	0.00	261.00
41LU1-REDO-13	14.58	0.00	0.00	41.64	295.98	398936.00	0.00	245.69
41LU1-REDO-14	5.34	0.00	0.00	51.05	376.87	398936.00	0.00	237.91
41LU1-REDO-15	0.00	0.00	0.00	52.87	303.19	398936.00	0.00	225.09
SRM614-2	4248.04	0.00	0.00	0.00	84.60	85763.00	11.42	2.83
SRM612-2	4332.79	0.00	0.00	0.00	85.81	85763.00	15.92	5.67
SRM610-2	4943.52	0.00	0.00	0.00	357.16	85763.00	87.35	39.91
AP1-2	27.32	0.00	0.00	0.00	189.77	398936.00	0.30	198.84
AP2-2	16.53	0.00	0.00	0.00	118.62	398936.00	0.67	208.19
AP3-2	63.98	0.00	0.00	0.00	100.10	398936.00	1.30	289.94
AP4-2	130.25	0.00	0.00	0.00	11.46	398936.00	1.33	212.65

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-17	37113.09	1243118.90	8901.25	7202.04	645310.81	150600.89	12780.31	862.72
SRM614-17	5420240.50	4399134.00	8551.73	6987.68	615712.44	2010234.40	79236.61	2712.34
SRM612-17	6795230.00	5373310.50	7951.65	6811.12	653660.63	2541048.80	99312.76	4627.27
SRM610-17	4052571.00	2734091.50	5760.63	6315.20	888450.31	1300120.40	136887.45	9926.74
AP1-17	106588.52	400862.16	4040.50	5102.71	605089.19	13424439.00	11942.47	268883.00
AP2-17	71278.81	332305.16	3467.58	4911.47	726485.81	12702381.00	10725.82	236079.45
AP3-17	176207.52	300931.97	3327.06	5361.83	841034.00	11675401.00	11035.30	233414.19
AP4-17	142604.38	245224.94	2815.62	4305.38	511200.28	10994124.00	10775.50	185176.00
41LU1-1	166049.81	237140.78	2345.81	13656.64	885108.88	6784646.00	7254.64	91436.76
41LU1-2	293970.44	249632.00	2119.49	12799.43	1299189.50	6493772.00	7317.32	82892.95
41LU1-3	100954.65	188842.09	1912.37	11526.59	758908.94	5483311.00	6149.59	65152.57
41LU1-4	41918.59	160010.66	1769.73	9647.05	691448.13	5637474.50	6077.31	61410.35
41LU1-5	41536.59	144934.94	1655.29	8772.89	631485.75	4427392.00	5505.11	44893.85
41LU1-6	45910.78	134466.67	1565.01	8008.17	667804.19	4055560.50	5271.07	39494.14
41LU1-7	77455.00	119962.20	1695.33	7417.76	663678.44	14768121.00	10141.34	138481.58
41LU1-8	40095.11	86812.29	1359.45	9903.82	481004.25	10532729.00	6649.40	83710.15
41LU1-9	41483.40	71977.77	1207.61	9451.97	469062.22	10574573.00	6499.28	75145.46
41LU1-10	65239.61	66302.02	1231.77	6695.56	529102.63	14792319.00	8273.89	102650.46
41LU1-11	88114.77	63211.96	1370.81	6006.35	845433.69	20242966.00	11851.31	137568.02
41LU1-12	77739.32	59144.73	1259.93	6023.67	644992.94	19072928.00	10877.38	125269.55
SRM614-18	5283951.50	4588767.50	2897.18	4102.46	388448.00	1819258.40	21372.36	1553.65
SRM612-18	6568960.00	6001132.50	3590.90	4439.54	421171.25	2327072.00	40141.82	3085.86
SRM610-18	4661427.00	3259769.80	2285.37	4490.11	691299.50	1436979.60	154440.95	12510.27
AP1-18	60124.70	43404.36	1044.61	3385.70	334823.78	15052000.00	7193.96	86736.93
AP2-18	43555.29	41423.88	1103.97	3530.82	389647.88	13771328.00	6740.36	78524.16
AP3-18	107043.28	43448.81	1147.85	3467.10	334756.47	13481562.00	8134.73	92181.20
AP4-18	138249.09	42271.84	995.85	3071.38	294254.38	12486236.00	8450.49	68101.42
blank-18	5870.19	56853.48	675.80	2528.85	396274.28	87503.73	2460.77	811.64

Appendix A. Raw trace element datasheets from laser ablation.

blank average	21491.64	649986.19	4788.53	4865.45	520792.55	119052.31	7620.54	837.18
blank subtraction								
SRM614-17	5398748.86	3749147.81	3763.20	2122.23	94919.89	1891182.09	71616.07	1875.15
SRM612-17	6773738.36	4723324.31	3163.12	1945.67	132868.09	2421996.49	91692.22	3790.08
SRM610-17	4031079.36	2084105.31	972.11	1449.75	367657.77	1181068.09	129266.91	9089.55
AP1-17	85096.88	-249124.03	-748.02	237.26	84296.64	13305386.69	4321.92	268045.82
AP2-17	49787.16	-317681.03	-1320.95	46.02	205693.27	12583328.69	3105.28	235242.27
AP3-17	154715.88	-349054.22	-1461.47	496.38	320241.46	11556348.69	3414.76	232577.01
AP4-17	121112.74	-404761.25	-1972.91	-560.06	-9592.27	10875071.69	3154.96	184338.82
41LU1-1	144558.17	-412845.41	-2442.71	8791.19	364316.34	6665593.69	-365.90	90599.57
41LU1-2	272478.80	-400354.19	-2669.03	7933.98	778396.96	6374719.69	-303.22	82055.76
41LU1-3	79463.01	-461144.10	-2876.16	6661.14	238116.40	5364258.69	-1470.95	64315.38
41LU1-4	20426.95	-489975.53	-3018.80	4781.61	170655.59	5518422.19	-1543.23	60573.16
41LU1-5	20044.95	-505051.25	-3133.24	3907.44	110693.21	4308339.69	-2115.43	44056.67
41LU1-6	24419.14	-515519.52	-3223.52	3142.72	147011.65	3936508.19	-2349.47	38656.96
41LU1-7	55963.36	-530023.99	-3093.20	2552.31	142885.90	14649068.69	2520.79	137644.40
41LU1-8	18603.46	-563173.90	-3429.08	5038.37	-39788.30	10413676.69	-971.15	82872.96
41LU1-9	19991.75	-578008.42	-3580.92	4586.53	-51730.33	10455520.69	-1121.27	74308.28
41LU1-10	43747.97	-583684.17	-3556.76	1830.11	8310.08	14673266.69	653.34	101813.28
41LU1-11	66623.13	-586774.23	-3417.72	1140.91	324641.15	20123913.69	4230.76	136730.84
41LU1-12	56247.68	-590841.46	-3528.60	1158.23	124200.40	18953875.69	3256.84	124432.37
SRM614-18	5262459.86	3938781.31	-1891.35	-762.98	-132344.55	1700206.09	13751.82	716.46
SRM612-18	6547468.36	5351146.31	-1197.63	-425.90	-99621.30	2208019.69	32521.28	2248.67
SRM610-18	4639935.36	2609783.61	-2503.15	-375.34	170506.96	1317927.29	146820.41	11673.09
AP1-18	38633.06	-606581.83	-3743.92	-1479.75	-185968.77	14932947.69	-426.58	85899.75
AP2-18	22063.64	-608562.32	-3684.56	-1334.63	-131144.67	13652275.69	-880.19	77686.98
AP3-18	85551.64	-606537.39	-3640.68	-1398.35	-186036.08	13362509.69	514.18	91344.02
AP4-18	116757.45	-607714.35	-3792.68	-1794.07	-226538.17	12367183.69	829.94	67264.24
zero correction								
SRM614-17	5398748.86	3749147.81	3763.20	2122.23	94919.89	1891182.09	71616.07	1875.15
SRM612-17	6773738.36	4723324.31	3163.12	1945.67	132868.09	2421996.49	91692.22	3790.08
SRM610-17	4031079.36	2084105.31	972.11	1449.75	367657.77	1181068.09	129266.91	9089.55
AP1-17	85096.88	0.00	0.00	237.26	84296.64	13305386.69	4321.92	268045.82
AP2-17	49787.16	0.00	0.00	46.02	205693.27	12583328.69	3105.28	235242.27
AP3-17	154715.88	0.00	0.00	496.38	320241.46	11556348.69	3414.76	232577.01
AP4-17	121112.74	0.00	0.00	0.00	0.00	10875071.69	3154.96	184338.82
41LU1-1	144558.17	0.00	0.00	8791.19	364316.34	6665593.69	0.00	90599.57
41LU1-2	272478.80	0.00	0.00	7933.98	778396.96	6374719.69	0.00	82055.76
41LU1-3	79463.01	0.00	0.00	6661.14	238116.40	5364258.69	0.00	64315.38
41LU1-4	20426.95	0.00	0.00	4781.61	170655.59	5518422.19	0.00	60573.16
41LU1-5	20044.95	0.00	0.00	3907.44	110693.21	4308339.69	0.00	44056.67
41LU1-6	24419.14	0.00	0.00	3142.72	147011.65	3936508.19	0.00	38656.96
41LU1-7	55963.36	0.00	0.00	2552.31	142885.90	14649068.69	2520.79	137644.40
41LU1-8	18603.46	0.00	0.00	5038.37	0.00	10413676.69	0.00	82872.96
41LU1-9	19991.75	0.00	0.00	4586.53	0.00	10455520.69	0.00	74308.28
41LU1-10	43747.97	0.00	0.00	1830.11	8310.08	14673266.69	653.34	101813.28
41LU1-11	66623.13	0.00	0.00	1140.91	324641.15	20123913.69	4230.76	136730.84
41LU1-12	56247.68	0.00	0.00	1158.23	124200.40	18953875.69	3256.84	124432.37
SRM614-18	5262459.86	3938781.31	0.00	0.00	0.00	1700206.09	13751.82	716.46
SRM612-18	6547468.36	5351146.31	0.00	0.00	0.00	2208019.69	32521.28	2248.67
SRM610-18	4639935.36	2609783.61	0.00	0.00	170506.96	1317927.29	146820.41	11673.09
AP1-18	38633.06	0.00	0.00	0.00	0.00	14932947.69	0.00	85899.75
AP2-18	22063.64	0.00	0.00	0.00	0.00	13652275.69	0.00	77686.98
AP3-18	85551.64	0.00	0.00	0.00	0.00	13362509.69	514.18	91344.02
AP4-18	116757.45	0.00	0.00	0.00	0.00	12367183.69	829.94	67264.24
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-17	2.854695	1.982436	0.001990	0.001122	0.050191	1.000000	0.037868	0.000992

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	2.796758	1.950178	0.001306	0.000803	0.054859	1.000000	0.037858	0.001565
SRM610-17	3.413080	1.764594	0.000823	0.001227	0.311293	1.000000	0.109449	0.007696
AP1-17	0.006396	0.000000	0.000000	0.000018	0.006336	1.000000	0.000325	0.020146
AP2-17	0.003957	0.000000	0.000000	0.000004	0.016346	1.000000	0.000247	0.018695
AP3-17	0.013388	0.000000	0.000000	0.000043	0.027711	1.000000	0.000295	0.020125
AP4-17	0.011137	0.000000	0.000000	0.000000	0.000000	1.000000	0.000290	0.016951
41LU1-1	0.021687	0.000000	0.000000	0.001319	0.054656	1.000000	0.000000	0.013592
41LU1-2	0.042744	0.000000	0.000000	0.001245	0.122107	1.000000	0.000000	0.012872
41LU1-3	0.014813	0.000000	0.000000	0.001242	0.044389	1.000000	0.000000	0.011990
41LU1-4	0.003702	0.000000	0.000000	0.000866	0.030925	1.000000	0.000000	0.010977
41LU1-5	0.004653	0.000000	0.000000	0.000907	0.025693	1.000000	0.000000	0.010226
41LU1-6	0.006203	0.000000	0.000000	0.000798	0.037346	1.000000	0.000000	0.009820
41LU1-7	0.003820	0.000000	0.000000	0.000174	0.009754	1.000000	0.000172	0.009396
41LU1-8	0.001786	0.000000	0.000000	0.000484	0.000000	1.000000	0.000000	0.007958
41LU1-9	0.001912	0.000000	0.000000	0.000439	0.000000	1.000000	0.000000	0.007107
41LU1-10	0.002981	0.000000	0.000000	0.000125	0.000566	1.000000	0.000045	0.006939
41LU1-11	0.003311	0.000000	0.000000	0.000057	0.016132	1.000000	0.000210	0.006794
41LU1-12	0.002968	0.000000	0.000000	0.000061	0.006553	1.000000	0.000172	0.006565
SRM614-18	3.095189	2.316649	0.000000	0.000000	0.000000	1.000000	0.008088	0.000421
SRM612-18	2.965312	2.423505	0.000000	0.000000	0.000000	1.000000	0.014729	0.001018
SRM610-18	3.520631	1.980218	0.000000	0.000000	0.129375	1.000000	0.111403	0.008857
AP1-18	0.002587	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.005752
AP2-18	0.001616	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.005690
AP3-18	0.006402	0.000000	0.000000	0.000000	0.000000	1.000000	0.000038	0.006836
AP4-18	0.009441	0.000000	0.000000	0.000000	0.000000	1.000000	0.000067	0.005439
standardize signal averages AP								
AP1	0.004491	0.000000	0.000000	0.000009	0.003168	1.000000	0.000162	0.012949
AP2	0.002786	0.000000	0.000000	0.000002	0.008173	1.000000	0.000123	0.012193
AP3	0.009895	0.000000	0.000000	0.000021	0.013856	1.000000	0.000167	0.013481
AP4	0.010289	0.000000	0.000000	0.000000	0.000000	1.000000	0.000179	0.011195
linest from std sig ave								
	0.026124	0.000000	0.000000	0.450675	0.000981	1.000000	0.021929	0.089058
standardize signal averages SRM								
srm614-2	2.974942	2.149543	0.000995	0.000561	0.025095	1.000000	0.022978	0.000706
srm612-2	2.881035	2.186841	0.000653	0.000402	0.027429	1.000000	0.026293	0.001292
srm610-2	3.466855	1.872406	0.000412	0.000614	0.220334	1.000000	0.110426	0.008277
linest from std sig ave								
	0.045260	1.887459	1.369453	3.943846	0.028167	1.000000	0.043325	0.603350
concentration data								
SRM614-17	6395.88	0.00	0.00	43.37	121.24	85763.00	71.22	7.57
SRM612-17	6266.07	0.00	0.00	31.05	132.52	85763.00	71.20	11.95
SRM610-17	7646.93	0.00	0.00	47.44	751.97	85763.00	205.84	58.78
AP1-17	66.65	0.00	0.00	3.21	71.19	398936.00	2.84	715.74
AP2-17	41.23	0.00	0.00	0.66	183.68	398936.00	2.16	664.19
AP3-17	139.53	0.00	0.00	7.72	311.38	398936.00	2.58	715.02
AP4-17	116.07	0.00	0.00	0.00	0.00	398936.00	2.54	602.23
41LU1-1	226.02	0.00	0.00	237.12	614.15	398936.00	0.00	482.90
41LU1-2	445.47	0.00	0.00	223.77	1372.07	398936.00	0.00	457.32
41LU1-3	154.38	0.00	0.00	223.26	498.79	398936.00	0.00	425.97
41LU1-4	38.58	0.00	0.00	155.78	347.49	398936.00	0.00	389.98
41LU1-5	48.49	0.00	0.00	163.06	288.70	398936.00	0.00	363.31
41LU1-6	64.65	0.00	0.00	143.54	419.64	398936.00	0.00	348.89
41LU1-7	39.81	0.00	0.00	31.32	109.60	398936.00	1.51	333.83
41LU1-8	18.62	0.00	0.00	86.99	0.00	398936.00	0.00	282.74
41LU1-9	19.93	0.00	0.00	78.87	0.00	398936.00	0.00	252.50
41LU1-10	31.07	0.00	0.00	22.42	6.36	398936.00	0.39	246.52
41LU1-11	34.50	0.00	0.00	10.19	181.27	398936.00	1.84	241.40
41LU1-12	30.93	0.00	0.00	10.99	73.63	398936.00	1.50	233.24
SRM614-18	6934.70	0.00	0.00	0.00	0.00	85763.00	15.21	3.22
SRM612-18	6643.71	0.00	0.00	0.00	0.00	85763.00	27.70	7.78
SRM610-18	7887.89	0.00	0.00	0.00	312.53	85763.00	209.51	67.65
AP1-18	26.96	0.00	0.00	0.00	0.00	398936.00	0.00	204.37
AP2-18	16.84	0.00	0.00	0.00	0.00	398936.00	0.00	202.17
AP3-18	66.72	0.00	0.00	0.00	0.00	398936.00	0.34	242.87
AP4-18	98.39	0.00	0.00	0.00	0.00	398936.00	0.59	193.24
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-19	44321.57	134375.08	993.13	2060.61	171623.89	35898.84	3374.38	661.92
SRM614-19	5886403.00	5319256.50	3249.30	3465.94	222954.38	1853070.40	13010.03	1135.81
SRM612-19	5873474.50	5314379.50	3090.18	3829.02	419199.88	1850417.40	26700.35	2743.14
SRM610-19	3405057.50	2912588.30	1942.21	3549.10	538708.38	980413.88	118290.98	10787.98
AP1-19	112290.07	36389.77	1043.57	2592.53	155958.28	12730462.00	6782.68	31217.06
AP2-19	73645.06	31527.02	870.16	2594.77	210849.19	9653971.00	5566.55	25888.91
AP3-19	118638.95	29951.41	1093.49	2662.18	164220.64	13430533.00	7685.68	36221.88
AP4-19	134611.03	26360.35	1116.49	2454.69	138294.78	12959954.00	8422.37	30493.13
THEO-1	824981.00	61105.98	534.16	6583.48	741274.63	4634115.50	2923.78	12215.27
THEO-2	1286969.40	72584.77	599.08	7857.72	1015180.70	6394489.00	3673.78	16520.97
THEO-2	820171.63	50458.52	661.40	9643.77	786531.69	7624431.00	3902.42	16639.29
THEO-3	2056805.00	133742.75	591.44	5876.83	1379056.30	5723546.50	3587.10	16551.97
THEO-4	4916330.50	309745.25	767.92	7673.64	3208392.80	6242119.00	4311.34	30333.81
THEO-5	662927.50	45459.25	656.68	8293.05	741444.88	7841789.00	4170.38	18728.43
THEO-6	4226893.00	246932.11	615.04	6536.48	2584442.30	5226891.50	3810.26	20761.96
THEO-7	2495597.80	141099.75	644.72	7879.04	1817665.10	6597289.50	3984.50	19313.35
THEO-8	141426.03	17660.70	450.04	7418.32	344111.31	5522911.50	3104.70	10804.26
THEO-9	766154.00	47291.66	498.12	7935.40	795005.44	6493888.50	3700.22	15273.17
THEO-10	98627.84	15566.61	552.16	8462.89	370154.09	7094439.50	3661.26	14566.64
THEO-11	1504175.60	85492.68	555.40	7746.96	1250100.30	6692865.50	3858.26	17956.18
THEO-12	4654798.00	260738.59	578.00	6724.84	2661051.80	5371759.50	3812.18	22704.97
THEO-13	152372.22	19234.63	484.88	7767.56	427594.69	6055128.00	3312.30	12571.95
THEO-14	826847.38	49620.40	453.68	6893.28	756737.56	5627532.00	3245.94	12372.75
THEO-15	1297253.90	93261.52	543.68	7623.84	1066679.80	5819209.00	3476.38	13822.56
THEO-16	2878826.80	242444.34	505.00	6564.52	1886305.80	5417291.00	3753.38	17415.38
THEO-17	2324205.30	119967.39	545.76	8352.25	1605553.80	7040202.50	4284.66	19453.11
THEO-18	1008986.40	59574.41	518.52	7825.44	930107.75	6857206.50	3957.22	16048.01
SRM614-20	4909139.00	4982415.50	2463.17	3082.78	233063.55	1557526.10	6586.52	1149.49
SRM612-20	4695145.50	4510678.00	2282.01	3040.42	279092.84	1431213.80	18786.59	2177.89
SRM610-20	2894079.50	2554489.50	1397.73	2909.74	430986.94	827748.88	105072.63	9076.17
AP1-20	106797.48	9906.94	680.00	2227.61	174120.94	10792350.00	5071.31	19873.19
AP2-20	41389.23	9533.01	602.24	2164.77	171863.77	7822328.00	3951.42	15281.85
AP3-20	129147.09	12903.23	885.25	2370.37	155749.44	12562504.00	7292.84	34511.59
AP4-20	107127.48	12548.47	821.04	2073.21	128923.65	10852258.00	7003.08	22029.44
blank-20	30043.65	8306.09	157.40	1589.57	219157.52	76746.91	1070.57	852.48
blank average	37182.61	71340.58	575.26	1825.09	195390.71	56322.88	2222.47	757.20
blank subtraction								
SRM614-19	5849220.39	5247915.92	2674.04	1640.85	27563.68	1796747.52	10787.56	378.60
SRM612-19	5836291.89	5243038.92	2514.91	2003.93	223809.18	1794094.52	24477.88	1985.93
SRM610-19	3367874.89	2841247.72	1366.95	1724.01	343317.68	924091.00	116068.51	10030.78
AP1-19	75107.46	-34950.82	468.30	767.44	-39432.43	12674139.12	4560.21	30459.85
AP2-19	36462.45	-39813.57	294.90	769.68	15458.49	9597648.12	3344.08	25131.70
AP3-19	81456.34	-41389.18	518.22	837.08	-31170.07	13374210.12	5463.21	35464.68
AP4-19	97428.42	-44980.24	541.22	629.60	-57095.93	12903631.12	6199.89	29735.93
THEO-1	787798.39	-10234.60	-41.10	4758.39	545883.93	4577792.62	701.30	11458.07
THEO-2	1249786.79	1244.19	23.82	6032.63	819790.00	6338166.12	1451.31	15763.77
THEO-2	782989.02	-20882.06	86.14	7818.68	591140.99	7568108.12	1679.95	15882.09
THEO-3	2019622.39	62402.17	16.18	4051.74	1183665.60	5667223.62	1364.63	15794.77
THEO-4	4879147.89	238404.67	192.66	5848.55	3013002.10	6185796.12	2088.87	29576.61
THEO-5	625744.89	-25881.33	81.42	6467.96	546054.18	7785466.12	1947.91	17971.22
THEO-6	4189710.39	175591.53	39.78	4711.39	2389051.60	5170568.62	1587.79	20004.75
THEO-7	2458415.19	69759.17	69.46	6053.95	1622274.40	6540966.62	1762.03	18556.14
THEO-8	104243.42	-53679.88	-125.22	5593.23	148720.61	5466588.62	882.23	10047.06
THEO-9	728971.39	-24048.92	-77.14	6110.31	599614.74	6437565.62	1477.75	14515.96
THEO-10	61445.23	-55773.98	-23.10	6637.80	174763.39	7038116.62	1438.79	13809.44
THEO-11	1466992.99	14152.10	-19.86	5921.87	1054709.60	6636542.62	1635.79	17198.98
THEO-12	4617615.39	189398.01	2.74	4899.75	2465661.10	5315436.62	1589.71	21947.76
THEO-13	115189.61	-52105.95	-90.38	5942.47	232203.99	5998805.12	1089.83	11814.75
THEO-14	789664.77	-21720.19	-121.58	5068.19	561346.86	5571209.12	1023.47	11615.55
THEO-15	1260071.29	21920.94	-31.58	5798.75	871289.10	5762886.12	1253.91	13065.35
THEO-16	2841644.19	171103.76	-70.26	4739.43	1690915.10	5360968.12	1530.91	16658.17
THEO-17	2287022.69	48626.81	-29.50	6527.16	1410163.10	6983879.62	2062.19	18695.90
THEO-18	971803.79	-11766.17	-56.74	6000.35	734717.05	6800883.62	1734.75	15290.81
SRM614-20	4871956.39	4911074.92	1887.91	1257.69	37672.84	1501203.22	4364.04	392.28
SRM612-20	4657962.89	4439337.42	1706.75	1215.33	83702.14	1374890.92	16564.11	1420.69
SRM610-20	2856896.89	2483148.92	822.46	1084.65	235596.24	771426.00	102850.16	8318.97
AP1-20	69614.87	-61433.65	104.74	402.52	-21269.77	10736027.12	2848.84	19115.99
AP2-20	4206.63	-61807.57	26.98	339.68	-23526.94	7766005.12	1728.95	14524.64
AP3-20	91964.48	-58437.35	309.98	545.28	-39641.27	12506181.12	5070.37	33754.39
AP4-20	69944.87	-58792.11	245.78	248.12	-66467.06	10795935.12	4780.61	21272.24
zero correction								
SRM614-19	5849220.39	5247915.92	2674.04	1640.85	27563.68	1796747.52	10787.56	378.60

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	5836291.89	5243038.92	2514.91	2003.93	223809.18	1794094.52	24477.88	1985.93
SRM610-19	3367874.89	2841247.72	1366.95	1724.01	343317.68	924091.00	116068.51	10030.78
AP1-19	75107.46	0.00	468.30	767.44	0.00	12674139.12	4560.21	30459.85
AP2-19	36462.45	0.00	294.90	769.68	15458.49	9597648.12	3344.08	25131.70
AP3-19	81456.34	0.00	518.22	837.08	0.00	13374210.12	5463.21	35464.68
AP4-19	97428.42	0.00	541.22	629.60	0.00	12903631.12	6199.89	29735.93
THEO-1	787798.39	0.00	0.00	4758.39	545883.93	4577792.62	701.30	11458.07
THEO-2	1249786.79	1244.19	23.82	6032.63	819790.00	6338166.12	1451.31	15763.77
THEO-2	782989.02	0.00	86.14	7818.68	591140.99	7568108.12	1679.95	15882.09
THEO-3	2019622.39	62402.17	16.18	4051.74	1183665.60	5667223.62	1364.63	15794.77
THEO-4	4879147.89	238404.67	192.66	5848.55	3013002.10	6185796.12	2088.87	29576.61
THEO-5	625744.89	0.00	81.42	6467.96	546054.18	7785466.12	1947.91	17971.22
THEO-6	4189710.39	175591.53	39.78	4711.39	2389051.60	5170568.62	1587.79	20004.75
THEO-7	2458415.19	69759.17	69.46	6053.95	1622274.40	6540966.62	1762.03	18556.14
THEO-8	104243.42	0.00	0.00	5593.23	148720.61	5466588.62	882.23	10047.06
THEO-9	728971.39	0.00	0.00	6110.31	599614.74	6437565.62	1477.75	14515.96
THEO-10	61445.23	0.00	0.00	6637.80	174763.39	7038116.62	1438.79	13809.44
THEO-11	1466992.99	14152.10	0.00	5921.87	1054709.60	6636542.62	1635.79	17198.98
THEO-12	4617615.39	189398.01	2.74	4899.75	2465661.10	5315436.62	1589.71	21947.76
THEO-13	115189.61	0.00	0.00	5942.47	232203.99	5998805.12	1089.83	11814.75
THEO-14	789664.77	0.00	0.00	5068.19	561346.86	5571209.12	1023.47	11615.55
THEO-15	1260071.29	21920.94	0.00	5798.75	871289.10	5762886.12	1253.91	13065.35
THEO-16	2841644.19	171103.76	0.00	4739.43	1690915.10	5360968.12	1530.91	16658.17
THEO-17	2287022.69	48626.81	0.00	6527.16	1410163.10	6983879.62	2062.19	18695.90
THEO-18	971803.79	0.00	0.00	6000.35	734717.05	6000883.62	1734.75	15290.81
SRM614-20	4871956.39	4911074.92	1887.91	1257.69	37672.84	1501203.22	4364.04	392.28
SRM612-20	4657962.89	4439337.42	1706.75	1215.33	83702.14	1374890.92	16564.11	1420.69
SRM610-20	2856896.89	2483148.92	822.46	1084.65	235596.24	771426.00	102850.16	8318.97
AP1-20	69614.87	0.00	104.74	402.52	0.00	10736027.12	2848.84	19115.99
AP2-20	4206.63	0.00	26.98	339.68	0.00	7766005.12	1728.95	14524.64
AP3-20	91964.48	0.00	309.98	545.28	0.00	12506181.12	5070.37	33754.39
AP4-20	69944.87	0.00	245.78	248.12	0.00	10795935.12	4780.61	21272.24

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-19	3.255449	2.920787	0.001488	0.000913	0.015341	1.000000	0.006004	0.000211
SRM612-19	3.253057	2.922387	0.001402	0.001117	0.124748	1.000000	0.013644	0.001107
SRM610-19	3.644527	3.074641	0.001479	0.001866	0.371519	1.000000	0.125603	0.010855
AP1-19	0.005926	0.000000	0.000037	0.000061	0.000000	1.000000	0.000360	0.002403
AP2-19	0.003799	0.000000	0.000031	0.000080	0.001611	1.000000	0.000348	0.002619
AP3-19	0.006091	0.000000	0.000039	0.000063	0.000000	1.000000	0.000408	0.002652
AP4-19	0.007550	0.000000	0.000042	0.000049	0.000000	1.000000	0.000480	0.002304
THEO-1	0.172091	0.000000	0.000000	0.001039	0.119246	1.000000	0.000153	0.002503
THEO-2	0.197184	0.000196	0.000004	0.000952	0.129342	1.000000	0.000229	0.002487
THEO-2	0.103459	0.000000	0.000011	0.001033	0.078109	1.000000	0.000222	0.002099
THEO-3	0.356369	0.011011	0.000003	0.000715	0.208862	1.000000	0.000241	0.002787
THEO-4	0.788766	0.038541	0.000031	0.000945	0.487084	1.000000	0.000338	0.004781
THEO-5	0.080373	0.000000	0.000010	0.000831	0.070138	1.000000	0.000250	0.002308
THEO-6	0.810300	0.033960	0.000008	0.000911	0.462048	1.000000	0.000307	0.003869
THEO-7	0.375849	0.010665	0.000011	0.000926	0.248018	1.000000	0.000269	0.002837
THEO-8	0.019069	0.000000	0.000000	0.001023	0.027205	1.000000	0.000161	0.001838
THEO-9	0.113237	0.000000	0.000000	0.000949	0.093143	1.000000	0.000230	0.002255
THEO-10	0.008730	0.000000	0.000000	0.000943	0.024831	1.000000	0.000204	0.001962
THEO-11	0.221048	0.002132	0.000000	0.000892	0.158925	1.000000	0.000246	0.002592
THEO-12	0.868718	0.035632	0.000001	0.000922	0.463868	1.000000	0.000299	0.004129
THEO-13	0.019202	0.000000	0.000000	0.000991	0.038708	1.000000	0.000182	0.001970
THEO-14	0.141740	0.000000	0.000000	0.000910	0.100759	1.000000	0.000184	0.002085
THEO-15	0.218653	0.003804	0.000000	0.001006	0.151190	1.000000	0.000218	0.002267
THEO-16	0.530062	0.031917	0.000000	0.000884	0.315412	1.000000	0.000286	0.003107
THEO-17	0.327472	0.006963	0.000000	0.000935	0.201917	1.000000	0.000295	0.002677
THEO-18	0.142894	0.000000	0.000000	0.000882	0.108033	1.000000	0.000255	0.002248

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	3.245368	3.271426	0.001258	0.000838	0.025095	1.000000	0.002907	0.000261
SRM612-20	3.387878	3.228865	0.001241	0.000884	0.060879	1.000000	0.012048	0.001033
SRM610-20	3.703397	3.218907	0.001066	0.001406	0.305404	1.000000	0.133325	0.010784
AP1-20	0.006484	0.000000	0.000010	0.000037	0.000000	1.000000	0.000265	0.001781
AP2-20	0.000542	0.000000	0.000003	0.000044	0.000000	1.000000	0.000223	0.001870
AP3-20	0.007354	0.000000	0.000025	0.000044	0.000000	1.000000	0.000405	0.002699
AP4-20	0.006479	0.000000	0.000023	0.000023	0.000000	1.000000	0.000443	0.001970

standardize signal averages AP

AP1	0.006205	0.000000	0.000023	0.000049	0.000000	1.000000	0.000313	0.002092
AP2	0.002170	0.000000	0.000017	0.000062	0.000805	1.000000	0.000286	0.002244
AP3	0.006722	0.000000	0.000032	0.000053	0.000000	1.000000	0.000407	0.002675
AP4	0.007015	0.000000	0.000032	0.000036	0.000000	1.000000	0.000462	0.002137

linest from std sig ave

	0.031770	0.000000	16929.079633	0.158182	0.007702	1.000000	0.010002	0.480961
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standardize signal averages SRM

srm614-2	3.250408	3.096106	0.001373	0.000876	0.020218	1.000000	0.004455	0.000236
srm612-2	3.320468	3.075626	0.001322	0.001000	0.092813	1.000000	0.012846	0.001070
srm610-2	3.673962	3.146774	0.001273	0.001636	0.338461	1.000000	0.129464	0.010819

linest from std sig ave

	0.041346	1.263247	1.158130	2.017551	0.008324	1.000000	0.039663	0.468137
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concentration data

SRM614-19	8870.02	0.00	2160793.94	12.39	10.95	85763.00	5.15	8.69
SRM612-19	8863.50	0.00	2035219.12	15.15	89.06	85763.00	11.70	45.66
SRM610-19	9930.13	0.00	2147684.36	25.31	265.23	85763.00	107.74	447.74
AP1-19	75.11	0.00	249542.62	3.82	0.00	398936.00	1.44	461.13
AP2-19	48.15	0.00	207514.76	5.06	5.35	398936.00	1.39	502.42
AP3-19	77.19	0.00	261688.77	3.95	0.00	398936.00	1.63	508.79
AP4-19	95.70	0.00	283270.22	3.08	0.00	398936.00	1.92	442.16
THEO-1	2181.10	0.00	0.00	65.59	395.99	398936.00	0.61	480.25
THEO-2	2499.13	0.00	25381.48	60.06	429.52	398936.00	0.91	477.21
THEO-2	1311.25	0.00	76869.91	65.19	259.39	398936.00	0.89	402.66
THEO-3	4516.65	0.00	19281.74	45.12	693.59	398936.00	0.96	534.76
THEO-4	9996.90	0.00	210346.34	59.66	1617.51	398936.00	1.35	917.41
THEO-5	1018.66	0.00	70629.41	52.43	232.91	398936.00	1.00	442.90
THEO-6	10269.81	0.00	51959.55	57.50	1534.37	398936.00	1.23	742.35
THEO-7	4763.54	0.00	71718.60	58.41	823.62	398936.00	1.07	544.33
THEO-8	241.68	0.00	0.00	64.57	90.34	398936.00	0.64	352.64
THEO-9	1435.18	0.00	0.00	59.90	309.31	398936.00	0.92	432.65
THEO-10	110.65	0.00	0.00	59.52	82.46	398936.00	0.82	376.47
THEO-11	2801.58	0.00	0.00	56.31	527.76	398936.00	0.98	497.25
THEO-12	11010.21	0.00	3481.34	58.17	1540.42	398936.00	1.19	792.25
THEO-13	243.37	0.00	0.00	62.51	128.54	398936.00	0.72	377.90
THEO-14	1796.43	0.00	0.00	57.41	334.60	398936.00	0.73	400.04
THEO-15	2771.23	0.00	0.00	63.50	502.07	398936.00	0.87	435.00
THEO-16	6718.05	0.00	0.00	55.79	1047.42	398936.00	1.14	596.21
THEO-17	4150.41	0.00	0.00	58.98	670.53	398936.00	1.18	513.64
THEO-18	1811.05	0.00	0.00	55.68	358.76	398936.00	1.02	431.40
SRM614-20	8842.55	0.00	1825892.64	11.37	17.92	85763.00	2.49	10.78
SRM612-20	9230.84	0.00	1802332.41	11.99	43.46	85763.00	10.33	42.62
SRM610-20	10090.53	0.00	1547947.70	19.07	218.03	85763.00	114.36	444.82
AP1-20	82.18	0.00	65888.26	2.37	0.00	398936.00	1.06	341.64
AP2-20	6.87	0.00	23463.00	2.76	0.00	398936.00	0.89	358.86
AP3-20	93.20	0.00	167397.13	2.75	0.00	398936.00	1.62	517.87
AP4-20	82.11	0.00	153753.98	1.45	0.00	398937.00	1.77	378.07

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-15	42410.16	306321.75	2393.85	2697.78	370245.44	54285.75	4121.86	502.84
SRM614-15	4763783.00	3483744.50	3445.86	3902.18	442327.13	1426313.40	19340.27	1269.13
SRM612-15	4837995.00	3748151.80	3411.26	4373.26	1019211.40	1499745.60	28497.12	2713.18
SRM610-15	3034747.30	2232178.30	2156.01	3650.54	589496.50	842109.56	100327.48	8371.93
AP1-15	94933.13	89753.70	1352.61	3242.38	319414.00	11595399.00	7284.76	55839.91
AP2-15	117535.42	76754.35	1259.45	3179.34	325225.69	12378903.00	7015.04	57856.57
AP3-15	179486.20	61833.11	1628.81	3019.82	251188.89	16752093.00	10273.74	94760.62

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	161949.88	55938.56	1332.81	2982.42	225674.27	15148527.00	10110.70	62741.03
LA3324-2-1	30091.17	46997.86	718.68	8049.85	342429.78	3903672.30	3136.74	17347.78
LA3324-2-2	28160.40	41094.71	697.08	9351.81	331588.94	4729720.00	3066.90	19342.91
LA3324-2-3	45913.82	38442.14	685.72	10217.18	363905.47	5337020.00	3230.18	22195.65
LA3324-2-4	23625.09	35233.96	722.12	12707.87	337533.47	7151954.00	3715.62	26433.51
LA3324-2-5	17167.02	31130.10	719.60	12871.31	318663.44	7314936.50	3678.74	25604.31
LA3324-2-6	27016.59	28852.56	760.72	13095.31	317154.16	7281375.50	3818.46	25036.82
LA3324-2-7	59683.46	31899.50	599.64	9048.29	319331.41	4854066.00	3076.50	16659.13
LA3324-2-8	40928.59	27817.40	669.44	10962.42	305831.69	5424952.00	3266.62	19277.67
LA3324-2-9	32943.86	26447.55	605.68	10973.94	298973.38	5545226.00	3201.30	20205.31
LA3324-2-10	47507.63	28331.04	594.16	9154.49	335641.69	5560667.50	3222.46	17333.94
LA3324-2-11	29602.49	22437.69	593.52	10642.06	285956.97	6846980.00	3450.86	20290.19
LA3324-2-12	44547.57	23698.81	761.92	10938.90	326797.88	9769403.00	4456.83	28205.84
SRM614-16	4735902.00	4118348.00	2139.25	3417.42	245674.70	1417131.40	7617.76	1299.97
SRM612-16	4963508.50	4262528.50	2242.45	3516.90	308625.59	1480086.10	20087.11	2526.41
SRM610-16	3167389.80	2593003.50	1476.57	3235.98	404370.84	894249.38	110639.38	9816.54
AP1-16	53604.62	14657.04	791.64	2849.46	172032.53	10867493.00	5173.87	25314.74
AP2-16	46685.74	13427.64	852.52	2769.10	165056.33	11611699.00	5616.03	28065.36
AP3-16	155026.52	18013.94	1243.65	2642.86	152303.63	15932897.00	9261.05	53871.31
AP4-16	151107.58	17488.94	1230.93	2641.57	131680.70	14587744.00	9266.37	36944.69
blank-16	9792.46	16721.14	277.40	1953.09	176232.36	77540.32	1312.73	940.29
blank average	26101.31	161521.44	1335.63	2325.43	273238.90	65913.03	2717.30	721.56
blank subtraction								
SRM614-15	4737681.69	3322223.06	2110.23	1576.75	169088.23	1360400.37	16622.97	547.56
SRM612-15	4811893.69	3586630.36	2075.63	2047.83	745972.50	1433832.57	25779.83	1991.61
SRM610-15	3008645.99	2070656.86	820.38	1325.11	316257.60	776196.53	97610.18	7650.36
AP1-15	68831.83	-71767.74	16.98	916.95	46175.10	11529485.97	4567.47	55118.35
AP2-15	91434.11	-84767.09	-76.18	853.90	51986.79	12312989.97	4297.74	57135.00
AP3-15	153384.89	-99688.33	293.18	694.38	-22050.01	16686179.97	7556.44	94039.05
AP4-15	135848.57	-105582.89	-2.82	656.98	-47564.63	15082613.97	7393.40	62019.47
LA3324-2-1	3989.86	-114523.58	-616.94	5724.41	69190.88	3837759.27	419.44	16626.21
LA3324-2-2	2059.09	-120426.73	-638.54	7026.38	58350.04	4663806.97	349.60	18621.34
LA3324-2-3	19812.51	-123079.31	-649.90	7891.75	90666.57	5271106.97	512.88	21474.08
LA3324-2-4	-2476.22	-126287.49	-613.50	10382.44	64294.57	7086040.97	998.33	25711.94
LA3324-2-5	-8934.29	-130391.35	-616.02	10545.88	45424.54	7249023.47	961.45	24882.74
LA3324-2-6	915.29	-132668.88	-574.90	10769.88	43915.26	7215462.47	1101.17	24315.26
LA3324-2-7	33582.15	-129621.94	-735.98	6722.86	46092.51	4788152.97	359.20	15937.57
LA3324-2-8	14827.28	-133704.05	-666.18	8636.99	32592.79	5359038.97	549.32	18556.10
LA3324-2-9	6842.56	-135073.89	-729.94	8648.51	25734.48	5479312.97	484.00	19483.75
LA3324-2-10	21406.32	-133190.40	-741.46	6829.06	62402.79	5494754.47	505.16	16612.37
LA3324-2-11	3501.18	-139083.76	-742.10	8316.63	12718.07	6781066.97	733.56	19568.63
LA3324-2-12	18446.26	-137822.63	-573.70	8613.47	53558.98	9703489.97	1739.53	27484.27
SRM614-16	4709800.69	3956826.56	803.62	1091.99	-27564.20	1351218.37	4900.47	578.40
SRM612-16	4937407.19	4101007.06	906.83	1191.47	35386.69	1414173.07	17369.82	1804.85
SRM610-16	3141288.49	2431482.06	140.94	910.55	131131.94	828336.35	107922.08	9094.97
AP1-16	27503.31	-146864.40	-543.98	524.02	-101206.37	10801579.97	2456.57	24593.18
AP2-16	20584.43	-148093.81	-483.10	443.66	-108182.57	11545785.97	2898.74	27343.79
AP3-16	128925.21	-143507.50	-91.98	317.42	-120935.27	15866983.97	6543.76	53149.74
AP4-16	125006.27	-144032.50	-104.70	316.14	-141558.20	14521830.97	6549.08	36223.12
zero correction								
SRM614-15	4737681.69	3322223.06	2110.23	1576.75	169088.23	1360400.37	16622.97	547.56
SRM612-15	4811893.69	3586630.36	2075.63	2047.83	745972.50	1433832.57	25779.83	1991.61
SRM610-15	3008645.99	2070656.86	820.38	1325.11	316257.60	776196.53	97610.18	7650.36
AP1-15	68831.83	0.00	16.98	916.95	46175.10	11529485.97	4567.47	55118.35
AP2-15	91434.11	0.00	0.00	853.90	51986.79	12312989.97	4297.74	57135.00
AP3-15	153384.89	0.00	293.18	694.38	0.00	16686179.97	7556.44	94039.05
AP4-15	135848.57	0.00	0.00	656.98	0.00	15082613.97	7393.40	62019.47
LA3324-2-1	3989.86	0.00	0.00	5724.41	69190.88	3837759.27	419.44	16626.21
LA3324-2-2	2059.09	0.00	0.00	7026.38	58350.04	4663806.97	349.60	18621.34
LA3324-2-3	19812.51	0.00	0.00	7891.75	90666.57	5271106.97	512.88	21474.08
LA3324-2-4	0.00	0.00	0.00	10382.44	64294.57	7086040.97	998.33	25711.94
LA3324-2-5	0.00	0.00	0.00	10545.88	45424.54	7249023.47	961.45	24882.74
LA3324-2-6	915.29	0.00	0.00	10769.88	43915.26	7215462.47	1101.17	24315.26
LA3324-2-7	33582.15	0.00	0.00	6722.86	46092.51	4788152.97	359.20	15937.57
LA3324-2-8	14827.28	0.00	0.00	8636.99	32592.79	5359038.97	549.32	18556.10
LA3324-2-9	6842.56	0.00	0.00	8648.51	25734.48	5479312.97	484.00	19483.75
LA3324-2-10	21406.32	0.00	0.00	6829.06	62402.79	5494754.47	505.16	16612.37
LA3324-2-11	3501.18	0.00	0.00	8316.63	12718.07	6781066.97	733.56	19568.63
LA3324-2-12	18446.26	0.00	0.00	8613.47	53558.98	9703489.97	1739.53	27484.27
SRM614-16	4709800.69	3956826.56	803.62	1091.99	0.00	1351218.37	4900.47	578.40
SRM612-16	4937407.19	4101007.06	906.83	1191.47	35386.69	1414173.07	17369.82	1804.85
SRM610-16	3141288.49	2431482.06	140.94	910.55	131131.94	828336.35	107922.08	9094.97
AP1-16	27503.31	0.00	0.00	524.02	0.00	10801579.97	2456.57	24593.18
AP2-16	20584.43	0.00	0.00	443.66	0.00	11545785.97	2898.74	27343.79
AP3-16	128925.21	0.00	0.00	317.42	0.00	15866983.97	6543.76	53149.74
AP4-16	125006.27	0.00	0.00	316.14	0.00	14521830.97	6549.08	36223.12

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-15	3.482564	2.442092	0.001551	0.001159	0.124293	1.000000	0.012219	0.000403
SRM612-15	3.355966	2.501429	0.001448	0.001428	0.520265	1.000000	0.017980	0.001389
SRM610-15	3.876139	2.667697	0.001057	0.001707	0.407445	1.000000	0.125754	0.009856
AP1-15	0.005970	0.000000	0.000001	0.000080	0.004005	1.000000	0.000396	0.004781
AP2-15	0.007426	0.000000	0.000000	0.000069	0.004222	1.000000	0.000349	0.004640
AP3-15	0.009192	0.000000	0.000018	0.000042	0.000000	1.000000	0.000453	0.005636
AP4-15	0.009007	0.000000	0.000000	0.000044	0.000000	1.000000	0.000490	0.004112
LA3324-2-1	0.001040	0.000000	0.000000	0.001492	0.018029	1.000000	0.000109	0.004332
LA3324-2-2	0.000442	0.000000	0.000000	0.001507	0.012511	1.000000	0.000075	0.003993
LA3324-2-3	0.003759	0.000000	0.000000	0.001497	0.017201	1.000000	0.000097	0.004074
LA3324-2-4	0.000000	0.000000	0.000000	0.001465	0.009073	1.000000	0.000141	0.003629
LA3324-2-5	0.000000	0.000000	0.000000	0.001455	0.006266	1.000000	0.000133	0.003433
LA3324-2-6	0.000127	0.000000	0.000000	0.001493	0.006086	1.000000	0.000153	0.003370
LA3324-2-7	0.007014	0.000000	0.000000	0.001404	0.009626	1.000000	0.000075	0.003329
LA3324-2-8	0.002767	0.000000	0.000000	0.001612	0.006082	1.000000	0.000103	0.003463
LA3324-2-9	0.001249	0.000000	0.000000	0.001578	0.004697	1.000000	0.000088	0.003556
LA3324-2-10	0.003896	0.000000	0.000000	0.001243	0.011357	1.000000	0.000092	0.003023
LA3324-2-11	0.000516	0.000000	0.000000	0.001226	0.001876	1.000000	0.000108	0.002886
LA3324-2-12	0.001901	0.000000	0.000000	0.000888	0.005520	1.000000	0.000179	0.002832
SRM614-16	3.485596	2.928340	0.000595	0.000808	0.000000	1.000000	0.003627	0.000428
SRM612-16	3.491374	2.899933	0.000641	0.000843	0.025023	1.000000	0.012283	0.001276
SRM610-16	3.792286	2.935380	0.000170	0.001099	0.158308	1.000000	0.130288	0.010980
AP1-16	0.002546	0.000000	0.000000	0.000049	0.000000	1.000000	0.000227	0.002277
AP2-16	0.001783	0.000000	0.000000	0.000038	0.000000	1.000000	0.000251	0.002368
AP3-16	0.008125	0.000000	0.000000	0.000020	0.000000	1.000000	0.000412	0.003350
AP4-16	0.008608	0.000000	0.000000	0.000022	0.000000	1.000000	0.000451	0.002494
standardize signal averages AP								
AP1	0.004258	0.000000	0.000001	0.000064	0.002002	1.000000	0.000312	0.003529
AP2	0.004604	0.000000	0.000000	0.000054	0.002111	1.000000	0.000300	0.003504
AP3	0.008659	0.000000	0.000009	0.000031	0.000000	1.000000	0.000433	0.004493
AP4	0.008808	0.000000	0.000000	0.000033	0.000000	1.000000	0.000471	0.003303
linest from std sig ave								
	0.028599	0.000000	58628.073603	0.167976	0.001547	1.000000	0.009695	0.295259
standardize signal averages SRM								
srm614-2	3.484080	2.685216	0.001073	0.000984	0.062146	1.000000	0.007923	0.000415
srm612-2	3.423670	2.700681	0.001044	0.001135	0.272644	1.000000	0.015131	0.001333
srm610-2	3.834213	2.801538	0.000614	0.001403	0.282876	1.000000	0.128021	0.010418
linest from std sig ave								
	0.039448	1.437381	1.236746	1.819872	0.002834	1.000000	0.039919	0.484104
concentration data								
SRM614-15	8541.69	0.00	7799540.67	16.70	30.21	85763.00	10.16	10.19
SRM612-15	8231.19	0.00	7278760.99	20.58	126.44	85763.00	14.95	35.17
SRM610-15	9507.02	0.00	5314365.65	24.59	99.02	85763.00	104.56	249.58
AP1-15	68.11	0.00	34446.18	5.33	4.53	398936.00	1.53	563.11
AP2-15	84.72	0.00	0.00	4.65	4.77	398936.00	1.35	546.57
AP3-15	104.88	0.00	410949.78	2.79	0.00	398936.00	1.75	663.83
AP4-15	102.76	0.00	0.00	2.92	0.00	398936.00	1.90	484.35
LA3324-2-1	11.86	0.00	0.00	99.95	20.38	398936.00	0.42	510.30
LA3324-2-2	5.04	0.00	0.00	100.96	14.14	398936.00	0.29	470.30
LA3324-2-3	42.88	0.00	0.00	100.33	19.44	398936.00	0.38	479.87
LA3324-2-4	0.00	0.00	0.00	98.19	10.26	398936.00	0.54	427.40
LA3324-2-5	0.00	0.00	0.00	97.49	7.08	398936.00	0.51	404.32
LA3324-2-6	1.45	0.00	0.00	100.02	6.88	398936.00	0.59	396.94

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	80.02	0.00	0.00	94.09	10.88	398936.00	0.29	392.07
LA3324-2-8	31.57	0.00	0.00	108.00	6.88	398936.00	0.40	407.86
LA3324-2-9	14.25	0.00	0.00	105.77	5.31	398936.00	0.34	418.84
LA3324-2-10	44.45	0.00	0.00	83.28	12.84	398936.00	0.36	356.11
LA3324-2-11	5.89	0.00	0.00	82.19	2.12	398936.00	0.42	339.91
LA3324-2-12	21.69	0.00	0.00	59.48	6.24	398936.00	0.69	333.63
SRM614-16	8549.13	0.00	2990426.99	11.64	0.00	85763.00	3.02	10.84
SRM612-16	8563.30	0.00	3224233.96	12.14	6.08	85763.00	10.21	32.32
SRM610-16	9301.35	0.00	855531.16	15.84	38.47	85763.00	108.33	278.03
AP1-16	29.05	0.00	0.00	3.25	0.00	398936.00	0.88	268.18
AP2-16	20.34	0.00	0.00	2.58	0.00	398936.00	0.97	278.96
AP3-16	92.70	0.00	0.00	1.34	0.00	398936.00	1.60	394.56
AP4-16	98.21	0.00	0.00	1.46	0.00	398936.00	1.74	293.81

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-13	46294.62	283899.88	1915.45	2648.69	349802.69	78038.96	5287.07	513.96
SRM614-13	6278081.00	5027094.50	3876.42	4071.98	333427.00	2017898.60	21504.48	1299.69
SRM612-13	5961563.00	4520142.50	3100.66	3885.30	348609.69	1809968.60	30426.81	2385.85
SRM610-13	3672268.80	2745297.00	2116.77	3919.54	635347.25	1046139.60	124560.26	10667.98
AP1-13	97079.19	75747.87	1344.09	3460.10	327440.00	15065098.00	8847.61	55866.28
AP2-13	82642.91	62117.03	1154.81	3019.50	265715.22	12215295.00	6920.48	42954.24
AP3-13	164040.64	53135.94	1638.01	3108.06	235165.00	18040334.00	10901.34	63924.92
AP4-13	218464.39	51575.49	1522.37	3020.62	238611.09	15986475.00	11285.46	60458.06
LA3324-1-1	175101.39	54422.91	913.89	10037.58	498905.69	8313157.00	4611.83	23787.93
LA3324-1-2	84205.99	38652.22	736.60	9393.13	353639.56	7100219.00	4014.34	19404.43
LA3324-1-3	68688.91	34548.11	686.48	8214.85	321568.72	5887016.00	3550.94	15986.25
LA3324-1-4	150238.89	41500.79	1014.25	4456.91	427272.88	11679442.00	5656.43	32701.15
LA3324-1-5	47569.47	26361.23	923.61	5919.71	296946.44	9855397.00	4719.03	25069.46
LA3324-1-6	80101.73	28440.36	891.05	5650.39	320578.91	10754498.00	5268.71	27946.84
LA3324-1-7	60825.10	24371.22	960.77	6180.67	315851.34	11239279.00	5193.15	28811.80
LA3324-1-8	146021.70	32290.26	902.25	6012.07	391858.53	12793434.00	5721.95	32801.02
LA3324-1-9	716071.50	81130.62	976.21	5554.79	876328.44	12451836.00	5813.27	32841.50
LA3324-1-10	157185.31	26879.15	501.00	7957.16	371382.81	5762679.50	3242.94	13571.24
LA3324-1-11	77490.59	23156.81	491.56	8414.37	288704.09	4997153.50	3012.14	14470.32
LA3324-1-12	149647.69	26878.39	519.88	8533.37	333933.19	5087063.50	3039.42	12782.39
LA3324-1-13	356987.53	43206.61	599.24	10411.58	562052.88	7261808.00	3861.50	18180.66
LA3324-1-14	201453.02	26519.79	649.20	11922.79	425604.69	7305630.00	3868.98	17936.18
LA3324-1-15	188786.47	23873.54	595.64	12069.19	419729.59	7202197.00	3888.06	17977.38
LA3324-1-16	101895.21	21617.68	563.52	9535.01	347918.56	6454430.50	3447.06	15465.81
LA3324-1-17	110667.74	20689.04	631.80	10993.34	328039.94	7231636.00	3596.74	16828.70
LA3324-1-18	53706.34	14437.68	578.80	11207.30	264775.94	7362476.00	3664.06	16855.38
SRM614-14	4444515.00	4270479.00	2161.89	2954.74	154329.91	1403291.00	5983.91	1165.13
SRM612-14	4619979.00	4330437.00	2195.65	3171.42	186422.53	1434073.00	18029.54	2309.69
SRM610-14	3098713.50	2713400.50	1463.37	3069.58	380361.78	900169.13	114843.92	10079.26
AP1-14	47273.87	10099.50	889.36	2581.49	161270.31	12537096.00	5691.91	23456.41
AP2-14	40465.43	9009.65	784.44	2337.49	125090.70	9522681.00	4822.63	18483.58
AP3-14	110335.54	13564.68	1116.77	2369.37	123607.45	14663551.00	8112.33	32059.78
AP4-14	173146.53	14524.08	917.77	2388.21	113102.23	12587861.00	8059.29	26093.91
blank-14	13014.59	9568.41	198.32	1694.97	142905.08	84709.27	1244.21	941.89
blank average	29654.61	146734.15	1056.89	2171.83	246353.89	81374.12	3265.64	727.92

blank subtraction								
SRM614-13	6248426.39	4880360.35	2819.54	1900.15	87073.12	1936524.48	18238.84	571.76
SRM612-13	5931908.39	4373408.35	2043.77	1713.47	102255.81	1728594.48	27161.17	1657.93
SRM610-13	3642614.19	2598562.85	1059.89	1747.71	388993.37	964765.48	121294.62	9940.06
AP1-13	67424.58	-70986.28	287.20	1288.27	81086.12	14983723.88	5581.97	55138.35
AP2-13	52988.30	-84617.12	97.92	847.66	19361.33	12133920.88	3654.84	42226.32
AP3-13	134386.03	-93598.21	581.12	936.23	-11188.89	17958959.88	7635.70	63197.00
AP4-13	188809.78	-95158.66	465.48	848.78	-7742.80	15905100.88	8019.83	59730.14
LA3324-1-1	145446.78	-92311.24	-143.00	7865.74	252551.81	8231782.88	1346.19	23060.01
LA3324-1-2	54551.38	-108081.93	-320.28	7221.30	107285.68	7018844.88	748.70	18676.51
LA3324-1-3	39034.30	-112186.03	-370.40	6043.01	75214.84	5805641.88	285.30	15258.33
LA3324-1-4	120584.28	-105233.35	-42.64	2285.07	180919.00	11598067.88	2390.79	31973.22
LA3324-1-5	17914.86	-120372.92	-133.28	3747.88	50592.56	9774022.88	1453.39	24341.54
LA3324-1-6	50447.12	-118293.79	-165.84	3478.56	74225.03	10673123.88	2003.07	27218.91
LA3324-1-7	31170.49	-122362.93	-96.12	4008.84	69497.46	11157904.88	1927.51	28083.88
LA3324-1-8	116367.09	-114443.89	-154.64	3840.24	145504.65	12712059.88	2456.31	32073.10
LA3324-1-9	686416.89	-65603.53	-80.68	3382.96	629974.56	12370461.88	2547.63	32113.58

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	127530.70	-119855.00	-555.88	5785.33	125028.93	5681305.38	-22.70	12843.31
LA3324-1-11	47835.99	-123577.34	-565.32	6242.54	42350.21	4915779.38	-253.50	13742.40
LA3324-1-12	119993.08	-119855.75	-537.00	6361.54	87579.31	5005689.38	-226.22	12054.47
LA3324-1-13	327332.92	-103527.54	-457.64	8239.75	315699.00	7180433.88	595.86	17452.74
LA3324-1-14	171798.41	-120214.36	-407.68	9750.95	179250.81	7224255.88	603.34	17208.26
LA3324-1-15	159131.86	-122860.61	-461.24	9897.36	173375.71	7120822.88	622.42	17249.46
LA3324-1-16	72240.60	-125116.47	-493.36	7363.18	101564.68	6373056.38	181.42	14737.88
LA3324-1-17	81013.13	-126045.11	-425.08	8821.51	81686.06	7150261.88	331.10	16100.77
LA3324-1-18	24051.74	-132296.47	-478.08	9035.47	18422.06	7281101.88	398.42	16127.45
SRM614-14	4414860.39	4123744.85	1105.01	782.90	-92023.98	1321916.88	2718.28	437.20
SRM612-14	4590324.39	4183702.85	1138.77	999.59	-59931.36	1352698.88	14763.90	1581.77
SRM610-14	3069058.89	2566666.35	406.48	897.75	134007.90	818795.01	111578.28	9351.33
AP1-14	17619.26	-136634.65	-167.52	409.66	-85083.58	12455721.88	2426.27	22728.49
AP2-14	10810.82	-137724.50	-272.44	165.66	-121263.19	9441306.88	1556.99	17755.66
AP3-14	80680.93	-133169.47	59.88	197.54	-122746.44	14582176.88	4846.69	31331.86
AP4-14	143491.92	-132210.07	-139.12	216.38	-133251.66	12506486.88	4793.65	25365.98

zero correction								
SRM614-13	6248426.39	4880360.35	2819.54	1900.15	87073.12	1936524.48	18238.84	571.76
SRM612-13	5931908.39	4373408.35	2043.77	1713.47	102255.81	1728594.48	27161.17	1657.93
SRM610-13	3642614.19	2598562.85	1059.89	1747.71	388993.37	964765.48	121294.62	9940.06
AP1-13	67424.58	0.00	287.20	1288.27	81086.12	14983723.88	5581.97	55138.35
AP2-13	52988.30	0.00	97.92	847.66	19361.33	12133920.88	3654.84	42226.32
AP3-13	134386.03	0.00	581.12	936.23	0.00	17958959.88	7635.70	63197.00
AP4-13	188809.78	0.00	465.48	848.78	0.00	15905100.88	8019.83	59730.14
LA3324-1-1	145446.78	0.00	0.00	7865.74	252551.81	8231782.88	1346.19	23060.01
LA3324-1-2	54551.38	0.00	0.00	7221.30	107285.68	7018844.88	748.70	18676.51
LA3324-1-3	39034.30	0.00	0.00	6043.01	75214.84	5805641.88	285.30	15258.33
LA3324-1-4	120584.28	0.00	0.00	2285.07	180919.00	11598067.88	2390.79	31973.22
LA3324-1-5	17914.86	0.00	0.00	3747.88	50592.56	9774022.88	1453.39	24341.54
LA3324-1-6	50447.12	0.00	0.00	3478.56	74225.03	10673123.88	2003.07	27218.91
LA3324-1-7	31170.49	0.00	0.00	4008.84	69497.46	11157904.88	1927.51	28083.88
LA3324-1-8	116367.09	0.00	0.00	3840.24	145504.65	12712059.88	2456.31	32073.10
LA3324-1-9	686416.89	0.00	0.00	3382.96	629974.56	12370461.88	2547.63	32113.58
LA3324-1-10	127530.70	0.00	0.00	5785.33	125028.93	5681305.38	0.00	12843.31
LA3324-1-11	47835.99	0.00	0.00	6242.54	42350.21	4915779.38	0.00	13742.40
LA3324-1-12	119993.08	0.00	0.00	6361.54	87579.31	5005689.38	0.00	12054.47
LA3324-1-13	327332.92	0.00	0.00	8239.75	315699.00	7180433.88	595.86	17452.74
LA3324-1-14	171798.41	0.00	0.00	9750.95	179250.81	7224255.88	603.34	17208.26
LA3324-1-15	159131.86	0.00	0.00	9897.36	173375.71	7120822.88	622.42	17249.46
LA3324-1-16	72240.60	0.00	0.00	7363.18	101564.68	6373056.38	181.42	14737.88
LA3324-1-17	81013.13	0.00	0.00	8821.51	81686.06	7150261.88	331.10	16100.77
LA3324-1-18	24051.74	0.00	0.00	9035.47	18422.06	7281101.88	398.42	16127.45
SRM614-14	4414860.39	4123744.85	1105.01	782.90	0.00	1321916.88	2718.28	437.20
SRM612-14	4590324.39	4183702.85	1138.77	999.59	0.00	1352698.88	14763.90	1581.77
SRM610-14	3069058.89	2566666.35	406.48	897.75	134007.90	818795.01	111578.28	9351.33
AP1-14	17619.26	0.00	0.00	409.66	0.00	12455721.88	2426.27	22728.49
AP2-14	10810.82	0.00	0.00	165.66	0.00	9441306.88	1556.99	17755.66
AP3-14	80680.93	0.00	59.88	197.54	0.00	14582176.88	4846.69	31331.86
AP4-14	143491.92	0.00	0.00	216.38	0.00	12506486.88	4793.65	25365.98

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-13	3.226619	2.520165	0.001456	0.000981	0.044964	1.000000	0.009418	0.000295
SRM612-13	3.431637	2.530037	0.001182	0.000991	0.059155	1.000000	0.015713	0.000959
SRM610-13	3.775647	2.693466	0.001099	0.001812	0.403200	1.000000	0.125724	0.010303
AP1-13	0.004500	0.000000	0.000019	0.000086	0.005412	1.000000	0.000373	0.003680
AP2-13	0.004367	0.000000	0.000008	0.000070	0.001596	1.000000	0.000301	0.003480
AP3-13	0.007483	0.000000	0.000032	0.000052	0.000000	1.000000	0.000425	0.003519
AP4-13	0.011871	0.000000	0.000029	0.000053	0.000000	1.000000	0.000504	0.003755
LA3324-1-1	0.017669	0.000000	0.000000	0.000956	0.030680	1.000000	0.000164	0.002801

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.007772	0.000000	0.000000	0.001029	0.015285	1.000000	0.000107	0.002661
LA3324-1-3	0.006724	0.000000	0.000000	0.001041	0.012955	1.000000	0.000049	0.002628
LA3324-1-4	0.010397	0.000000	0.000000	0.000197	0.015599	1.000000	0.000206	0.002757
LA3324-1-5	0.001833	0.000000	0.000000	0.000383	0.005176	1.000000	0.000149	0.002490
LA3324-1-6	0.004727	0.000000	0.000000	0.000326	0.006954	1.000000	0.000188	0.002550
LA3324-1-7	0.002794	0.000000	0.000000	0.000359	0.006229	1.000000	0.000173	0.002517
LA3324-1-8	0.009154	0.000000	0.000000	0.000302	0.011446	1.000000	0.000193	0.002523
LA3324-1-9	0.055488	0.000000	0.000000	0.000273	0.050926	1.000000	0.000206	0.002596
LA3324-1-10	0.022447	0.000000	0.000000	0.001018	0.022007	1.000000	0.000000	0.002261
LA3324-1-11	0.009731	0.000000	0.000000	0.001270	0.008615	1.000000	0.000000	0.002796
LA3324-1-12	0.023971	0.000000	0.000000	0.001271	0.017496	1.000000	0.000000	0.002408
LA3324-1-13	0.045587	0.000000	0.000000	0.001148	0.043967	1.000000	0.000083	0.002431
LA3324-1-14	0.023781	0.000000	0.000000	0.001350	0.024812	1.000000	0.000084	0.002382
LA3324-1-15	0.022347	0.000000	0.000000	0.001390	0.024348	1.000000	0.000087	0.002422
LA3324-1-16	0.011335	0.000000	0.000000	0.001155	0.015937	1.000000	0.000028	0.002313
LA3324-1-17	0.011330	0.000000	0.000000	0.001234	0.011424	1.000000	0.000046	0.002252
LA3324-1-18	0.003303	0.000000	0.000000	0.001241	0.002530	1.000000	0.000055	0.002215
SRM614-14	3.339741	3.119519	0.000836	0.000592	0.000000	1.000000	0.002056	0.000331
SRM612-14	3.393456	3.092856	0.000842	0.000739	0.000000	1.000000	0.010914	0.001169
SRM610-14	3.748263	3.134687	0.000496	0.001096	0.163665	1.000000	0.136271	0.011421
AP1-14	0.001415	0.000000	0.000000	0.000033	0.000000	1.000000	0.000195	0.001825
AP2-14	0.001145	0.000000	0.000000	0.000018	0.000000	1.000000	0.000165	0.001881
AP3-14	0.005533	0.000000	0.000004	0.000014	0.000000	1.000000	0.000332	0.002149
AP4-14	0.011473	0.000000	0.000000	0.000017	0.000000	1.000000	0.000383	0.002028
standardize signal averages AP								
AP1	0.002957	0.000000	0.000010	0.000059	0.002706	1.000000	0.000284	0.002752
AP2	0.002756	0.000000	0.000004	0.000044	0.000798	1.000000	0.000233	0.002680
AP3	0.006508	0.000000	0.000018	0.000033	0.000000	1.000000	0.000379	0.002834
AP4	0.011672	0.000000	0.000015	0.000035	0.000000	1.000000	0.000444	0.002892
linest from std sig ave								
	0.029287	0.000000	33482.418175	0.182297	0.000622	1.000000	0.011043	0.398935
standardize signal averages SRM								
srm614-2	3.283180	2.819842	0.001146	0.000787	0.022482	1.000000	0.005737	0.000313
srm612-2	3.412546	2.811447	0.001012	0.000865	0.029578	1.000000	0.013314	0.001064
srm610-2	3.761955	2.914077	0.000798	0.001454	0.283432	1.000000	0.130998	0.010862
linest from std sig ave								
	0.040488	1.377299	1.331835	2.288764	0.026121	1.000000	0.039162	0.466200
concentration data								
SRM614-13	8104.37	0.00	4180915.82	15.34	100.73	85763.00	8.92	10.10
SRM612-13	8619.32	0.00	3395126.85	15.50	132.52	85763.00	14.88	32.82
SRM610-13	9483.38	0.00	3154671.89	28.32	903.25	85763.00	119.07	352.51
AP1-13	52.57	0.00	256027.75	6.25	56.39	398936.00	1.64	585.65
AP2-13	51.02	0.00	107793.53	5.08	16.63	398936.00	1.33	553.84
AP3-13	87.43	0.00	432222.24	3.79	0.00	398936.00	1.87	560.04
AP4-13	138.70	0.00	390919.21	3.88	0.00	398936.00	2.22	597.67
LA3324-1-1	206.44	0.00	0.00	69.49	319.70	398936.00	0.72	445.83
LA3324-1-2	90.81	0.00	0.00	74.82	159.28	398936.00	0.47	423.48
LA3324-1-3	78.55	0.00	0.00	75.70	135.00	398936.00	0.22	418.28
LA3324-1-4	121.47	0.00	0.00	14.33	162.55	398936.00	0.91	438.74
LA3324-1-5	21.41	0.00	0.00	27.89	53.94	398936.00	0.66	396.35
LA3324-1-6	55.22	0.00	0.00	23.70	72.47	398936.00	0.83	405.87
LA3324-1-7	32.64	0.00	0.00	26.13	64.90	398936.00	0.76	400.57
LA3324-1-8	106.95	0.00	0.00	21.97	119.28	398936.00	0.85	401.54
LA3324-1-9	648.30	0.00	0.00	19.89	530.67	398936.00	0.91	413.15
LA3324-1-10	262.27	0.00	0.00	74.06	229.33	398936.00	0.00	359.78
LA3324-1-11	113.69	0.00	0.00	92.35	89.77	398936.00	0.00	444.91
LA3324-1-12	280.07	0.00	0.00	92.42	182.32	398936.00	0.00	383.26
LA3324-1-13	532.62	0.00	0.00	83.45	458.15	398936.00	0.37	386.83
LA3324-1-14	277.84	0.00	0.00	98.16	258.56	398936.00	0.37	379.10
LA3324-1-15	261.10	0.00	0.00	101.08	253.72	398936.00	0.39	385.52
LA3324-1-16	132.44	0.00	0.00	84.02	166.07	398936.00	0.13	368.04
LA3324-1-17	132.38	0.00	0.00	89.72	119.05	398936.00	0.20	358.37
LA3324-1-18	38.59	0.00	0.00	90.25	26.37	398936.00	0.24	352.51
SRM614-14	8388.51	0.00	2400365.20	9.26	0.00	85763.00	1.95	11.32
SRM612-14	8523.42	0.00	2417409.76	11.55	0.00	85763.00	10.34	40.01
SRM610-14	9414.60	0.00	1425552.69	17.14	366.64	85763.00	129.06	390.75
AP1-14	16.53	0.00	0.00	2.39	0.00	398936.00	0.86	290.41
AP2-14	13.38	0.00	0.00	1.28	0.00	398936.00	0.73	299.30
AP3-14	64.64	0.00	54850.58	0.99	0.00	398936.00	1.46	341.96
AP4-14	134.05	0.00	0.00	1.26	0.00	398936.00	1.69	322.79
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-11	36705.41	1179264.90	7860.08	6265.84	766062.44	241399.67	16585.81	665.48
SRM614-11	5512923.50	4052548.30	7591.48	6280.92	710755.56	2048383.50	61915.67	2282.57
SRM612-11	5779602.00	4088140.80	6823.68	6048.95	787184.44	2121967.00	65824.53	4326.18
SRM610-11	3384964.50	2430804.00	5399.71	5709.35	1110361.40	1210200.50	112148.79	8766.65
AP1-11	84161.59	399883.25	3670.02	4772.23	696486.19	11658909.00	13074.51	165234.61
AP2-11	58804.01	373471.97	3244.78	4487.11	633847.31	10924054.00	13561.60	159557.17
AP3-11	128035.08	304779.72	3085.18	4210.38	575592.25	14420667.00	14875.12	245112.45
AP4-11	152463.98	265878.75	2794.14	4023.62	554090.63	13768881.00	14646.68	190640.19
M17-24-141-1	25117.26	258921.45	2285.81	7064.56	695947.06	2384767.00	8626.01	27929.44
M17-24-141-2	15310.21	209614.09	1904.85	7476.16	624181.94	2634636.50	8302.05	28015.40
M17-24-141-3	14968.60	176688.11	1715.09	7584.16	594273.31	2874780.30	7323.96	27083.99
M17-24-141-4	19255.75	170699.20	1612.49	7593.56	636054.06	3558994.00	7804.64	30363.97
M17-24-141-5	14502.12	159161.22	1421.41	7361.56	607442.44	3381037.50	7479.44	27688.00
M17-24-141-6	16437.89	146925.55	1427.33	7264.60	592336.81	3339893.50	7228.60	26319.11
M17-24-141-7	49160.96	142395.84	1263.09	6644.96	690442.31	3139481.00	6718.64	25236.70
M17-24-141-8	16155.49	130997.77	1273.29	6358.84	566333.00	3023039.80	6785.28	22619.49
M17-24-141-9	17158.82	123627.09	1167.85	6750.04	558335.50	3219329.80	6658.00	23319.25
M17-24-141-10	101337.61	127907.84	1111.53	8836.41	1175400.60	4833830.00	8257.21	36071.88
M17-24-141-11	57500.60	114414.41	1188.85	9935.14	1285399.30	6580049.00	10802.46	44659.13
M17-24-141-12	90777.51	111710.79	1166.65	9611.01	1584505.00	7591565.00	13924.80	50798.97
M17-24-141-13	1271069.80	186871.20	1421.77	8904.05	3704903.50	16916434.00	22238.24	118480.87
M17-24-141-14	1119503.60	146602.11	1387.29	10837.26	3412981.30	17000604.00	23045.77	111549.51
M17-24-141-15	467839.25	118959.99	1401.01	10326.06	2593386.30	17156276.00	23824.45	107359.69
M17-24-141-16	1195441.60	162245.00	1530.37	7480.64	2174136.00	18045208.00	12114.71	121878.89
M17-24-141-17	167768.63	96319.66	1394.89	7842.96	1020064.90	18575122.00	11949.79	122366.45
M17-24-141-18	331440.88	100581.09	1421.53	8523.53	1274967.50	18744902.00	11411.43	118183.91
SRM614-12	4798477.50	3629964.50	2411.09	4037.46	514265.34	1660288.80	18434.94	1424.37
SRM612-12	6025616.50	4676150.50	2931.42	4299.58	554130.25	2077908.60	34697.43	2757.62
SRM610-12	3645016.30	2662975.50	1843.29	4081.02	837722.44	1196119.00	121935.88	10267.82
AP1-12	49428.32	62314.47	1040.69	3364.54	462548.66	12245426.00	7700.44	62278.75
AP2-12	46487.10	58326.37	1056.57	3200.30	414663.81	12366042.00	7691.28	64822.09
AP3-12	119985.40	57966.41	1308.97	3194.50	386518.81	16765092.00	10520.22	103367.86
AP4-12	170603.36	59322.81	1381.73	3255.14	378992.91	16336545.00	11897.99	97630.91
blank-12	8794.17	78353.72	692.08	2480.97	524557.13	134708.84	4239.90	829.04
blank average	22749.79	628809.31	4276.08	4373.40	645309.79	188054.26	10412.86	747.26

blank subtraction								
SRM614-11	5490173.71	3423738.99	3315.40	1907.51	65445.78	1860329.25	51502.81	1535.31
SRM612-11	5756852.21	3459331.49	2547.59	1675.55	141874.66	1933912.75	55411.67	3578.92
SRM610-11	3362214.71	1801994.69	1123.63	1335.95	465051.62	1022146.25	101735.93	8019.39
AP1-11	61411.81	-228926.06	-606.06	398.82	51176.41	11470854.75	2661.66	164487.35
AP2-11	36054.22	-255337.34	-1031.31	113.70	-11462.47	10735999.75	3148.74	158809.91
AP3-11	105285.29	-324029.59	-1190.91	-163.02	-69717.53	14232612.75	4462.27	244365.19
AP4-11	129714.19	-362930.56	-1481.95	-349.78	-91219.15	13580826.75	4233.82	189892.93
M17-24-141-1	2367.47	-369887.86	-1990.27	2691.15	50637.28	2196712.75	-1786.85	27182.17
M17-24-141-2	-7439.58	-419195.22	-2371.23	3102.76	-21127.84	2446582.25	-2110.81	27268.13
M17-24-141-3	-7781.18	-452121.20	-2560.99	3210.76	-51036.47	2686726.05	-3088.90	26336.73
M17-24-141-4	-3494.04	-458110.11	-2663.59	3220.16	-9255.72	3370939.75	-2608.21	29616.71
M17-24-141-5	-8247.67	-469648.09	-2854.68	2988.16	-37867.34	3192983.25	-2933.42	26940.73
M17-24-141-6	-6311.89	-481883.76	-2848.76	2891.20	-52972.97	3151839.25	-3184.26	25571.84
M17-24-141-7	26411.17	-486413.47	-3013.00	2271.55	45132.53	2951426.75	-3694.22	24489.44
M17-24-141-8	-6594.30	-497811.54	-3002.80	1985.43	-78976.78	2834985.55	-3627.58	21872.22
M17-24-141-9	-5590.97	-505182.22	-3108.24	2376.63	-86974.28	3031275.55	-3754.86	22571.99
M17-24-141-10	78587.82	-500901.47	-3164.56	4463.01	530090.82	4645775.75	-2155.65	35324.62
M17-24-141-11	34750.81	-514394.90	-3087.24	5561.73	640089.52	6391994.75	389.60	43911.87
M17-24-141-12	68027.72	-517098.52	-3109.44	5237.61	939195.22	7403510.75	3511.94	50051.70
M17-24-141-13	1248320.01	-441938.11	-2854.32	4530.65	3059593.72	16728379.75	11825.39	117733.61
M17-24-141-14	1096753.81	-482207.20	-2888.80	6463.86	2767671.52	16812549.75	12632.91	110802.25
M17-24-141-15	445089.46	-509849.32	-2875.08	5952.65	1948076.52	16968221.75	13411.59	106612.43
M17-24-141-16	1172691.81	-466564.31	-2745.72	3107.24	1528826.22	17857153.75	1701.85	121131.63
M17-24-141-17	145018.84	-532489.65	-2881.20	3469.56	374755.12	18387067.75	1536.93	121619.19
M17-24-141-18	308691.09	-528228.22	-2854.56	4150.12	629657.72	18556847.75	998.57	117436.65
SRM614-12	4775727.71	3001155.19	-1864.99	-335.94	-131044.45	1472234.55	8022.08	677.10
SRM612-12	6002866.71	4047341.19	-1344.67	-73.82	-91179.53	1889854.35	24284.58	2010.35
SRM610-12	3622266.51	2034166.19	-2432.79	-292.38	192412.66	1008064.75	11523.02	9520.55
AP1-12	26678.53	-566494.84	-3235.40	-1008.87	-182761.13	12057371.75	-2712.42	61531.49
AP2-12	23737.31	-570482.94	-3219.52	-1173.11	-230645.98	12177987.75	-2721.58	64074.82
AP3-12	97235.61	-570842.90	-2967.12	-1178.91	-258790.98	16577037.75	107.36	102620.60
AP4-12	147853.57	-569486.50	-2894.36	-1118.27	-266316.88	16148490.75	1485.13	96883.64

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
SRM614-11	5490173.71	3423738.99	3315.40	1907.51	65445.78	1860329.25	51502.81	1535.31
SRM612-11	5756852.21	3459331.49	2547.59	1675.55	141874.66	1933912.75	55411.67	3578.92
SRM610-11	3362214.71	1801994.69	1123.63	1335.95	465051.62	1022146.25	101735.93	8019.39
AP1-11	61411.81	0.00	0.00	398.82	51176.41	11470854.75	2661.66	164487.35
AP2-11	36054.22	0.00	0.00	113.70	0.00	10735999.75	3148.74	158809.91
AP3-11	105285.29	0.00	0.00	0.00	0.00	14232612.75	4462.27	244365.19
AP4-11	129714.19	0.00	0.00	0.00	0.00	13580826.75	4233.82	189892.93
M17-24-141-1	2367.47	0.00	0.00	2691.15	50637.28	2196712.75	0.00	27182.17
M17-24-141-2	0.00	0.00	0.00	3102.76	0.00	2446582.25	0.00	27268.13
M17-24-141-3	0.00	0.00	0.00	3210.76	0.00	2686726.05	0.00	26336.73
M17-24-141-4	0.00	0.00	0.00	3220.16	0.00	3370939.75	0.00	29616.71
M17-24-141-5	0.00	0.00	0.00	2988.16	0.00	3192983.25	0.00	26940.73
M17-24-141-6	0.00	0.00	0.00	2891.20	0.00	3151839.25	0.00	25571.84
M17-24-141-7	26411.17	0.00	0.00	2271.55	45132.53	2951426.75	0.00	24489.44
M17-24-141-8	0.00	0.00	0.00	1985.43	0.00	2834985.55	0.00	21872.22
M17-24-141-9	0.00	0.00	0.00	2376.63	0.00	3031275.55	0.00	22571.99
M17-24-141-10	78587.82	0.00	0.00	4463.01	530090.82	4645775.75	0.00	35324.62
M17-24-141-11	34750.81	0.00	0.00	5561.73	640089.52	6391994.75	389.60	43911.87
M17-24-141-12	68027.72	0.00	0.00	5237.61	939195.22	7403510.75	3511.94	50051.70
M17-24-141-13	1248320.01	0.00	0.00	4530.65	3059593.72	16728379.75	11825.39	117733.61
M17-24-141-14	1096753.81	0.00	0.00	6463.86	2767671.52	16812549.75	12632.91	110802.25
M17-24-141-15	445089.46	0.00	0.00	5952.65	1948076.52	16968221.75	13411.59	106612.43
M17-24-141-16	1172691.81	0.00	0.00	3107.24	1528826.22	17857153.75	1701.85	121131.63
M17-24-141-17	145018.84	0.00	0.00	3469.56	374755.12	18387067.75	1536.93	121619.19
M17-24-141-18	308691.09	0.00	0.00	4150.12	629657.72	18556847.75	998.57	117436.65
SRM614-12	4775727.71	3001155.19	0.00	0.00	0.00	1472234.55	8022.08	677.10
SRM612-12	6002866.71	4047341.19	0.00	0.00	0.00	1889854.35	24284.58	2010.35
SRM610-12	3622266.51	2034166.19	0.00	0.00	192412.66	1008064.75	111523.02	9520.55
AP1-12	26678.53	0.00	0.00	0.00	0.00	12057371.75	0.00	61531.49
AP2-12	23737.31	0.00	0.00	0.00	0.00	12177987.75	0.00	64074.82
AP3-12	97235.61	0.00	0.00	0.00	0.00	16577037.75	107.36	102620.60
AP4-12	147853.57	0.00	0.00	0.00	0.00	16148490.75	1485.13	96883.64
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-11	2.951184	1.840394	0.001782	0.001025	0.035180	1.000000	0.027685	0.000825
SRM612-11	2.976790	1.788773	0.001317	0.000866	0.073361	1.000000	0.028653	0.001851
SRM610-11	3.289368	1.762952	0.001099	0.001307	0.454976	1.000000	0.099532	0.007846
AP1-11	0.005354	0.000000	0.000000	0.000035	0.004461	1.000000	0.000232	0.014340
AP2-11	0.003358	0.000000	0.000000	0.000011	0.000000	1.000000	0.000293	0.014792
AP3-11	0.007397	0.000000	0.000000	0.000000	0.000000	1.000000	0.000314	0.017169
AP4-11	0.009551	0.000000	0.000000	0.000000	0.000000	1.000000	0.000312	0.013982
M17-24-141-1	0.001078	0.000000	0.000000	0.001225	0.023051	1.000000	0.000000	0.012374
M17-24-141-2	0.000000	0.000000	0.000000	0.001268	0.000000	1.000000	0.000000	0.011145
M17-24-141-3	0.000000	0.000000	0.000000	0.001195	0.000000	1.000000	0.000000	0.009803
M17-24-141-4	0.000000	0.000000	0.000000	0.000955	0.000000	1.000000	0.000000	0.008786
M17-24-141-5	0.000000	0.000000	0.000000	0.000936	0.000000	1.000000	0.000000	0.008437
M17-24-141-6	0.000000	0.000000	0.000000	0.000917	0.000000	1.000000	0.000000	0.008113
M17-24-141-7	0.008949	0.000000	0.000000	0.000770	0.015292	1.000000	0.000000	0.008297
M17-24-141-8	0.000000	0.000000	0.000000	0.000700	0.000000	1.000000	0.000000	0.007715
M17-24-141-9	0.000000	0.000000	0.000000	0.000784	0.000000	1.000000	0.000000	0.007446
M17-24-141-10	0.016916	0.000000	0.000000	0.000961	0.114102	1.000000	0.000000	0.007604
M17-24-141-11	0.005437	0.000000	0.000000	0.000870	0.100139	1.000000	0.000061	0.006870
M17-24-141-12	0.009189	0.000000	0.000000	0.000707	0.126858	1.000000	0.000474	0.006761
M17-24-141-13	0.074623	0.000000	0.000000	0.000271	0.182898	1.000000	0.000707	0.007038
M17-24-141-14	0.065234	0.000000	0.000000	0.000384	0.164619	1.000000	0.000751	0.006590
M17-24-141-15	0.026231	0.000000	0.000000	0.000351	0.114807	1.000000	0.000790	0.006283
M17-24-141-16	0.065671	0.000000	0.000000	0.000174	0.085614	1.000000	0.000095	0.006783
M17-24-141-17	0.007887	0.000000	0.000000	0.000189	0.020381	1.000000	0.000084	0.006614

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.016635	0.000000	0.000000	0.000224	0.033931	1.000000	0.000054	0.006328
SRM614-12	3.243863	2.038503	0.000000	0.000000	0.000000	1.000000	0.005449	0.000460
SRM612-12	3.176365	2.141615	0.000000	0.000000	0.000000	1.000000	0.012850	0.001064
SRM610-12	3.593288	2.017892	0.000000	0.000000	0.190873	1.000000	0.110631	0.009444
AP1-12	0.002213	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.005103
AP2-12	0.001949	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.005262
AP3-12	0.005866	0.000000	0.000000	0.000000	0.000000	1.000000	0.000006	0.006191
AP4-12	0.009156	0.000000	0.000000	0.000000	0.000000	1.000000	0.000092	0.006000
standardize signal averages AP								
AP1	0.003783	0.000000	0.000000	0.000017	0.002231	1.000000	0.000116	0.009721
AP2	0.002654	0.000000	0.000000	0.000005	0.000000	1.000000	0.000147	0.010027
AP3	0.006632	0.000000	0.000000	0.000000	0.000000	1.000000	0.000160	0.011680
AP4	0.009354	0.000000	0.000000	0.000000	0.000000	1.000000	0.000202	0.009991
linest from std sig ave								
	0.032793	0.000000	0.000000	0.608018	0.000000	1.000000	0.023643	0.106796
standardize signal averages SRM								
srm614-2	3.097524	1.939449	0.000891	0.000513	0.017590	1.000000	0.016567	0.000643
srm612-2	3.076577	1.965194	0.000659	0.000433	0.036681	1.000000	0.020751	0.001457
srm610-2	3.441328	1.890422	0.000550	0.000654	0.322924	1.000000	0.105081	0.008645
linest from std sig ave								
	0.044063	2.030975	1.774806	4.080964	0.021063	1.000000	0.046889	0.577086
concentration data								
SRM614-11	8300.07	0.00	0.00	53.47	63.55	85763.00	56.14	7.56
SRM612-11	8372.08	0.00	0.00	45.18	132.52	85763.00	58.10	16.95
SRM610-11	9251.19	0.00	0.00	68.15	821.87	85763.00	201.82	71.86
AP1-11	70.04	0.00	0.00	8.43	37.49	398936.00	2.19	610.93
AP2-11	43.93	0.00	0.00	2.57	0.00	398936.00	2.77	630.22
AP3-11	96.78	0.00	0.00	0.00	0.00	398936.00	2.96	731.50
AP4-11	124.95	0.00	0.00	0.00	0.00	398936.00	2.94	595.72
M17-24-141-1	14.10	0.00	0.00	297.16	193.69	398936.00	0.00	527.19
M17-24-141-2	0.00	0.00	0.00	307.61	0.00	398936.00	0.00	474.85
M17-24-141-3	0.00	0.00	0.00	289.87	0.00	398936.00	0.00	417.63
M17-24-141-4	0.00	0.00	0.00	231.71	0.00	398936.00	0.00	374.32
M17-24-141-5	0.00	0.00	0.00	227.00	0.00	398936.00	0.00	359.48
M17-24-141-6	0.00	0.00	0.00	222.50	0.00	398936.00	0.00	345.66
M17-24-141-7	117.07	0.00	0.00	186.69	128.49	398936.00	0.00	353.51
M17-24-141-8	0.00	0.00	0.00	169.87	0.00	398936.00	0.00	328.70
M17-24-141-9	0.00	0.00	0.00	190.18	0.00	398936.00	0.00	317.25
M17-24-141-10	221.30	0.00	0.00	233.02	958.76	398936.00	0.00	323.95
M17-24-141-11	71.12	0.00	0.00	211.05	841.44	398936.00	0.57	292.69
M17-24-141-12	120.21	0.00	0.00	171.60	1065.95	398936.00	4.47	288.03
M17-24-141-13	976.25	0.00	0.00	65.69	1536.83	398936.00	6.67	299.85
M17-24-141-14	853.42	0.00	0.00	93.26	1383.24	398936.00	7.09	280.78
M17-24-141-15	343.16	0.00	0.00	85.09	964.69	398936.00	7.45	267.69
M17-24-141-16	859.13	0.00	0.00	42.21	719.39	398936.00	0.90	289.00
M17-24-141-17	103.18	0.00	0.00	45.77	171.26	398936.00	0.79	281.80
M17-24-141-18	217.62	0.00	0.00	54.25	285.11	398936.00	0.51	269.62
SRM614-12	9123.21	0.00	0.00	0.00	0.00	85763.00	11.05	4.21
SRM612-12	8933.38	0.00	0.00	0.00	0.00	85763.00	26.06	9.74
SRM610-12	10105.95	0.00	0.00	0.00	344.79	85763.00	224.32	86.50
AP1-12	28.95	0.00	0.00	0.00	0.00	398936.00	0.00	217.42
AP2-12	25.50	0.00	0.00	0.00	0.00	398936.00	0.00	224.17
AP3-12	76.74	0.00	0.00	0.00	0.00	398936.00	0.06	263.75
AP4-12	119.78	0.00	0.00	0.00	0.00	398936.00	0.87	255.61
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
blank-9	45360.09	242118.08	1926.77	2566.81	404944.19	50847.45	3841.26	572.12
SRM614-9	7212888.50	5836495.00	4114.42	4340.18	386918.09	2414780.00	20889.36	1349.73
SRM612-9	6070860.50	4478649.00	3180.58	4049.10	636169.63	1872944.50	29792.41	3064.18
SRM610-9	3783370.30	2889045.30	2235.21	3991.42	965209.31	1067598.30	127630.00	11389.10
AP1-9	168699.11	85204.40	1353.89	3535.18	548082.94	12795888.00	7677.36	43476.93
AP2-9	139312.83	63738.28	1364.21	3080.90	417234.94	13478759.00	7229.76	43440.77
AP3-9	250280.38	56090.75	1514.85	3144.58	389550.47	17933580.00	10215.58	60062.98

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	342419.09	55440.03	1513.77	3035.14	376013.28	16293381.00	11125.94	60117.58
M17-24-97-1	573642.81	97375.02	803.08	10115.30	1171536.60	7572376.00	9015.69	21779.44
M17-24-97-2	132473.83	42807.60	720.12	9871.70	535692.25	6990762.00	7890.32	18443.70
M17-24-97-3	155361.36	45071.77	741.44	10370.34	563355.06	7759916.50	8489.45	19590.11
M17-24-97-4	785841.50	115412.02	623.44	8217.29	1630302.50	5452402.50	3479.50	17392.78
M17-24-97-5	129360.05	31601.90	622.84	8680.85	598466.50	5480574.00	3181.38	13936.24
M17-24-97-6	340481.41	42522.40	521.00	9173.05	765465.63	5807653.50	3283.54	15391.13
M17-24-97-7	435397.16	61443.27	525.72	7880.24	1132440.90	5016125.50	3030.42	14175.92
M17-24-97-8	343730.13	37989.45	505.28	8152.09	791323.88	4629229.50	2877.26	13213.03
M17-24-97-9	139521.77	25906.47	518.32	8503.29	568508.31	5236983.00	2978.78	12988.55
M17-24-97-10	310070.03	47037.34	460.48	6815.40	882190.13	4092263.50	2891.10	11250.74
M17-24-97-11	208996.63	28695.04	500.28	7850.00	671878.19	4703700.50	2817.82	12407.43
M17-24-97-12	241173.91	30926.98	486.68	8090.01	684782.69	5021783.50	2852.58	13106.71
M17-24-97-13	2935217.50	210468.19	601.52	7209.48	3214429.00	4420830.00	3163.78	20591.88
M17-24-97-14	675884.56	55262.95	453.36	7834.60	1215741.50	4790404.00	2784.06	14302.00
M17-24-97-15	283348.00	35231.88	513.12	7949.44	849870.38	4725330.50	2656.49	12529.03
M17-24-97-16	1458156.80	158103.38	601.64	7884.20	2229009.00	5442899.50	3318.34	17278.74
M17-24-97-17	513938.06	54857.03	541.52	8661.53	1124949.40	5987087.50	3174.02	15013.60
M17-24-97-18	1856888.60	130273.02	604.64	8707.53	1827512.30	6063343.00	3366.42	18913.71
SRM614-10	6132123.50	6121106.00	3013.86	3520.30	327882.69	2040769.80	7814.24	1367.01
SRM612-10	4633483.50	4289858.00	2108.93	3160.78	377533.53	1429642.50	18962.95	2288.09
SRM610-10	2981411.80	2639064.50	1420.65	3124.22	537695.81	866169.19	113381.44	9874.70
AP1-10	62889.11	9615.01	760.84	2612.45	256495.97	10464611.00	5250.07	17086.18
AP2-10	59521.34	9346.33	856.52	2453.33	215128.17	10869989.00	5297.87	20524.64
AP3-10	132405.42	13288.00	1236.53	2305.25	194644.42	14681103.00	8134.25	34807.68
AP4-10	345781.88	16140.69	1179.49	2452.37	179353.73	13801045.00	9144.65	32825.18
blank-10	25618.31	9142.49	189.80	1660.65	324858.34	77059.07	1291.09	937.45
blank average	35489.20	125630.29	1058.29	2113.73	364901.27	63953.26	2566.17	754.78

blank subtraction								
SRM614-9	7177399.30	5710864.71	3056.14	2226.45	22016.83	2350826.74	18323.18	594.94
SRM612-9	6035371.30	4353018.71	2122.29	1935.37	271268.37	1808991.24	27226.23	2309.39
SRM610-9	3747881.10	2763415.01	1176.93	1877.69	600308.05	1003645.04	125063.83	10634.32
AP1-9	133209.91	-40425.89	295.60	1421.45	183181.68	12731934.74	5111.19	42722.14
AP2-9	103823.63	-61892.01	305.92	967.17	52333.68	13414805.74	4663.59	42685.98
AP3-9	214791.18	-69539.53	456.56	1030.85	24649.21	17869626.74	7649.40	59308.19
AP4-9	306929.89	-70190.25	455.48	921.41	11112.02	16229427.74	8559.77	59362.79
M17-24-97-1	538153.61	-28255.26	-255.20	8001.57	806635.34	7508422.74	6449.52	21024.66
M17-24-97-2	96984.63	-82822.68	-338.16	7757.96	170790.99	6926808.74	5324.15	17688.92
M17-24-97-3	119872.16	-80558.51	-316.84	8256.61	198453.80	7695963.24	5923.27	18835.33
M17-24-97-4	750352.30	-10218.27	-434.84	6103.55	1265401.24	5388449.24	913.33	16637.99
M17-24-97-5	93870.85	-94028.39	-435.44	6567.12	233565.24	5416620.74	615.20	13181.45
M17-24-97-6	304992.21	-83107.89	-537.28	7059.32	400564.37	5743700.24	717.36	14636.34
M17-24-97-7	399907.96	-64187.02	-532.56	5766.51	767539.64	4952172.24	464.24	13421.14
M17-24-97-8	308240.93	-87640.83	-553.00	6038.35	426422.62	4565276.24	311.08	12458.25
M17-24-97-9	104032.57	-99723.82	-539.96	6389.56	203607.05	5173029.74	412.60	12233.77
M17-24-97-10	274580.83	-78592.94	-597.80	4701.67	517288.87	4028310.24	324.92	10495.96
M17-24-97-11	173507.43	-96935.24	-558.00	5736.27	306976.93	4639747.24	251.64	11652.65
M17-24-97-12	205684.71	-94703.31	-571.60	5976.27	319881.43	4957830.24	286.40	12351.93
M17-24-97-13	2899728.30	84837.90	-456.76	5095.75	2849527.74	4356876.74	597.60	19837.09
M17-24-97-14	640395.36	-70367.33	-604.92	5720.87	850840.24	4726450.74	217.88	13547.22
M17-24-97-15	247858.80	-90398.41	-545.16	5835.71	484969.12	4661377.24	90.32	11774.25
M17-24-97-16	1422667.60	32473.09	-456.64	5770.47	1864107.74	5378946.24	752.16	16523.95
M17-24-97-17	478448.86	-70773.26	-516.76	6547.80	760048.14	5923134.24	607.84	14258.82
M17-24-97-18	1821399.40	4642.73	-453.64	6593.80	1462611.04	5999389.74	800.24	18158.92
SRM614-10	6096634.30	5995475.71	1955.57	1406.57	-37018.58	1976816.54	5248.07	612.22
SRM612-10	4597994.30	4164227.71	1050.65	1047.05	12632.27	1365689.24	16396.77	1533.31
SRM610-10	2945922.60	2513434.21	362.36	1010.49	172794.55	802215.93	110815.27	9119.91
AP1-10	27399.91	-116015.27	-297.44	498.72	-108405.30	10400657.74	2683.90	16331.39
AP2-10	24032.14	-116283.95	-201.76	339.60	-149773.10	10806035.74	2731.70	19769.85
AP3-10	96916.22	-112342.29	178.24	191.52	-170256.85	14617149.74	5568.07	34052.89
AP4-10	310292.68	-109489.60	121.20	338.64	-185547.54	13737091.74	6578.48	32070.40

zero correction								
SRM614-9	7177399.30	5710864.71	3056.14	2226.45	22016.83	2350826.74	18323.18	594.94
SRM612-9	6035371.30	4353018.71	2122.29	1935.37	271268.37	1808991.24	27226.23	2309.39
SRM610-9	3747881.10	2763415.01	1176.93	1877.69	600308.05	1003645.04	125063.83	10634.32
AP1-9	133209.91	0.00	295.60	1421.45	183181.68	12731934.74	5111.19	42722.14
AP2-9	103823.63	0.00	305.92	967.17	52333.68	13414805.74	4663.59	42685.98
AP3-9	214791.18	0.00	456.56	1030.85	24649.21	17869626.74	7649.40	59308.19
AP4-9	306929.89	0.00	455.48	921.41	11112.02	16229427.74	8559.77	59362.79
M17-24-97-1	538153.61	0.00	0.00	8001.57	806635.34	7508422.74	6449.52	21024.66
M17-24-97-2	96984.63	0.00	0.00	7757.96	170790.99	6926808.74	5324.15	17688.92
M17-24-97-3	119872.16	0.00	0.00	8256.61	198453.80	7695963.24	5923.27	18835.33
M17-24-97-4	750352.30	0.00	0.00	6103.55	1265401.24	5388449.24	913.33	16637.99
M17-24-97-5	93870.85	0.00	0.00	6567.12	233565.24	5416620.74	615.20	13181.45
M17-24-97-6	304992.21	0.00	0.00	7059.32	400564.37	5743700.24	717.36	14636.34
M17-24-97-7	399907.96	0.00	0.00	5766.51	767539.64	4952172.24	464.24	13421.14

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	308240.93	0.00	0.00	6038.35	426422.62	4565276.24	311.08	12458.25
M17-24-97-9	104032.57	0.00	0.00	6389.56	203607.05	5173029.74	412.60	12233.77
M17-24-97-10	274580.83	0.00	0.00	4701.67	517288.87	4028310.24	324.92	10495.96
M17-24-97-11	173507.43	0.00	0.00	5736.27	306976.93	4639747.24	251.64	11652.65
M17-24-97-12	205684.71	0.00	0.00	5976.27	319881.43	4957830.24	286.40	12351.93
M17-24-97-13	2899728.30	84837.90	0.00	5095.75	2849527.74	4356876.74	597.60	19837.09
M17-24-97-14	640395.36	0.00	0.00	5720.87	850840.24	4726450.74	217.88	13547.22
M17-24-97-15	247858.80	0.00	0.00	5835.71	484969.12	4661377.24	90.32	11774.25
M17-24-97-16	1422667.60	32473.09	0.00	5770.47	1864107.74	5378946.24	752.16	16523.95
M17-24-97-17	478448.86	0.00	0.00	6547.80	760048.14	5923134.24	607.84	14258.82
M17-24-97-18	1821399.40	4642.73	0.00	6593.80	1462611.04	5999389.74	800.24	18158.92
SRM614-10	6096634.30	5995475.71	1955.57	1406.57	0.00	1976816.54	5248.07	612.22
SRM612-10	4597994.30	4164227.71	1050.65	1047.05	12632.27	1365689.24	16396.77	1533.31
SRM610-10	2945922.60	2513434.21	362.36	1010.49	172794.55	802215.93	110815.27	9119.91
AP1-10	27399.91	0.00	0.00	498.72	0.00	10400657.74	2683.90	16331.39
AP2-10	24032.14	0.00	0.00	339.60	0.00	10806035.74	2731.70	19769.85
AP3-10	96916.22	0.00	178.24	191.52	0.00	14617149.74	5568.07	34052.89
AP4-10	310292.68	0.00	121.20	338.64	0.00	13737091.74	6578.48	32070.40

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-9	3.053138	2.429301	0.001300	0.000947	0.009366	1.000000	0.007794	0.000253
SRM612-9	3.336319	2.406324	0.001173	0.001070	0.149956	1.000000	0.015051	0.001277
SRM610-9	3.734270	2.753379	0.001173	0.001871	0.598128	1.000000	0.124610	0.010596
AP1-9	0.010463	0.000000	0.000023	0.000112	0.014388	1.000000	0.000401	0.003356
AP2-9	0.007739	0.000000	0.000023	0.000072	0.003901	1.000000	0.000348	0.003182
AP3-9	0.012020	0.000000	0.000026	0.000058	0.001379	1.000000	0.000428	0.003319
AP4-9	0.018912	0.000000	0.000028	0.000057	0.000685	1.000000	0.000527	0.003658
M17-24-97-1	0.071673	0.000000	0.000000	0.001066	0.107431	1.000000	0.000859	0.002800
M17-24-97-2	0.014001	0.000000	0.000000	0.001120	0.024657	1.000000	0.000769	0.002554
M17-24-97-3	0.015576	0.000000	0.000000	0.001073	0.025787	1.000000	0.000770	0.002447
M17-24-97-4	0.139252	0.000000	0.000000	0.001133	0.234836	1.000000	0.000169	0.003088
M17-24-97-5	0.017330	0.000000	0.000000	0.001212	0.043120	1.000000	0.000114	0.002434
M17-24-97-6	0.053100	0.000000	0.000000	0.001229	0.069740	1.000000	0.000125	0.002548
M17-24-97-7	0.080754	0.000000	0.000000	0.001164	0.154990	1.000000	0.000094	0.002710
M17-24-97-8	0.067519	0.000000	0.000000	0.001323	0.093406	1.000000	0.000068	0.002729
M17-24-97-9	0.020111	0.000000	0.000000	0.001235	0.039359	1.000000	0.000080	0.002365
M17-24-97-10	0.068163	0.000000	0.000000	0.001167	0.128413	1.000000	0.000081	0.002606
M17-24-97-11	0.037396	0.000000	0.000000	0.001236	0.066162	1.000000	0.000054	0.002511
M17-24-97-12	0.041487	0.000000	0.000000	0.001205	0.064520	1.000000	0.000058	0.002491
M17-24-97-13	0.665552	0.019472	0.000000	0.001170	0.654030	1.000000	0.000137	0.004553
M17-24-97-14	0.135492	0.000000	0.000000	0.001210	0.180017	1.000000	0.000046	0.002866
M17-24-97-15	0.053173	0.000000	0.000000	0.001252	0.104040	1.000000	0.000019	0.002526
M17-24-97-16	0.264488	0.006037	0.000000	0.001073	0.346556	1.000000	0.000140	0.003072
M17-24-97-17	0.080776	0.000000	0.000000	0.001105	0.128319	1.000000	0.000103	0.002407
M17-24-97-18	0.303597	0.000774	0.000000	0.001099	0.243793	1.000000	0.000133	0.003027
SRM614-10	3.084067	3.032894	0.000989	0.000712	0.000000	1.000000	0.002655	0.000310
SRM612-10	3.366794	3.049177	0.000769	0.000767	0.009250	1.000000	0.012006	0.001123
SRM610-10	3.672231	3.133114	0.000452	0.001260	0.215397	1.000000	0.138136	0.011368
AP1-10	0.002634	0.000000	0.000000	0.000048	0.000000	1.000000	0.000058	0.001570
AP2-10	0.002224	0.000000	0.000000	0.000031	0.000000	1.000000	0.000253	0.001830
AP3-10	0.006630	0.000000	0.000012	0.000013	0.000000	1.000000	0.000381	0.002330
AP4-10	0.022588	0.000000	0.000009	0.000025	0.000000	1.000000	0.000479	0.002335

standardize signal averages AP								
AP1	0.006549	0.000000	0.000012	0.000080	0.007194	1.000000	0.000330	0.002463
AP2	0.004982	0.000000	0.000011	0.000052	0.001951	1.000000	0.000300	0.002506
AP3	0.009325	0.000000	0.000019	0.000035	0.000690	1.000000	0.000404	0.002824
AP4	0.020750	0.000000	0.000018	0.000041	0.000342	1.000000	0.000503	0.002996

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.016728	0.000000	29434.029860	0.144424	0.000511	1.000000	0.009582	0.409475
standardize signal averages SRM								
srms614-2	3.068603	2.731097	0.001145	0.000829	0.004683	1.000000	0.005225	0.000281
srms612-2	3.351556	2.727750	0.000971	0.000918	0.079603	1.000000	0.013528	0.001200
srms610-2	3.703251	2.943247	0.000812	0.001565	0.406762	1.000000	0.131373	0.010982
linest from std sig ave								
	0.041719	1.399345	1.370474	2.154721	0.009706	1.000000	0.039057	0.460674
concentration data								
SRM614-9	4380.23	0.00	3281722.65	11.73	7.80	85763.00	6.41	8.89
SRM612-9	4786.50	0.00	2961545.07	13.25	124.82	85763.00	12.37	44.83
SRM610-9	5357.42	0.00	2960185.53	23.17	497.87	85763.00	102.41	372.10
AP1-9	69.82	0.00	272624.80	6.43	55.71	398936.00	1.53	548.14
AP2-9	51.65	0.00	267780.37	4.15	15.11	398936.00	1.33	519.79
AP3-9	80.21	0.00	300011.38	3.32	5.34	398936.00	1.64	542.16
AP4-9	126.21	0.00	329550.18	3.27	2.65	398936.00	2.02	597.51
M17-24-97-1	478.31	0.00	0.00	61.40	415.96	398936.00	3.28	457.42
M17-24-97-2	93.44	0.00	0.00	64.53	95.47	398936.00	2.94	417.16
M17-24-97-3	103.95	0.00	0.00	61.81	99.84	398936.00	2.94	399.80
M17-24-97-4	929.30	0.00	0.00	65.26	909.27	398936.00	0.65	504.39
M17-24-97-5	115.65	0.00	0.00	69.85	166.96	398936.00	0.43	397.53
M17-24-97-6	354.36	0.00	0.00	70.81	270.03	398936.00	0.48	416.27
M17-24-97-7	538.91	0.00	0.00	67.09	600.11	398936.00	0.36	442.71
M17-24-97-8	450.59	0.00	0.00	76.21	361.66	398936.00	0.26	445.78
M17-24-97-9	134.21	0.00	0.00	71.17	152.40	398936.00	0.30	386.32
M17-24-97-10	454.88	0.00	0.00	67.25	497.21	398936.00	0.31	425.63
M17-24-97-11	249.56	0.00	0.00	71.23	256.18	398936.00	0.21	410.26
M17-24-97-12	276.86	0.00	0.00	69.45	249.82	398936.00	0.22	406.98
M17-24-97-13	4441.56	0.00	0.00	67.39	2532.36	398936.00	0.52	743.76
M17-24-97-14	904.20	0.00	0.00	69.74	697.01	398936.00	0.18	468.22
M17-24-97-15	354.85	0.00	0.00	72.13	402.83	398936.00	0.07	412.62
M17-24-97-16	1765.06	0.00	0.00	61.81	1341.84	398936.00	0.53	501.82
M17-24-97-17	539.06	0.00	0.00	63.69	496.84	398936.00	0.39	393.24
M17-24-97-18	2026.06	0.00	0.00	63.32	943.95	398936.00	0.51	494.44
SRM614-10	4424.60	0.00	2497220.51	8.81	0.00	85763.00	2.18	10.88
SRM612-10	4830.22	0.00	1942022.15	9.50	7.70	85763.00	9.87	39.43
SRM610-10	5268.42	0.00	1140252.29	15.60	179.29	85763.00	113.52	399.23
AP1-10	17.58	0.00	0.00	2.76	0.00	398936.00	0.99	256.50
AP2-10	14.84	0.00	0.00	1.81	0.00	398936.00	0.97	298.86
AP3-10	44.25	0.00	143185.13	0.75	0.00	398936.00	1.46	380.56
AP4-10	150.74	0.00	103600.85	1.42	0.00	398936.00	1.83	381.36
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-7	39652.62	1612308.40	8220.73	7083.56	923982.56	488153.03	34399.04	794.32
SRM614-7	5961206.00	4707542.50	8184.09	6754.48	834577.38	2530591.50	91740.31	2755.74
SRM612-7	5418293.00	3979596.50	6708.52	5952.63	866922.56	2170390.80	77583.91	3426.62
SRM610-7	3086376.50	2354590.50	5260.83	5568.83	1336647.60	1279560.50	112193.47	9187.89
AP1-7	84761.48	488620.16	3627.02	4711.03	772285.00	10734665.00	17612.54	153613.03
AP2-7	69584.51	398811.25	3278.50	4516.11	698015.00	12371373.00	16702.90	170937.31
AP3-7	161996.23	319147.41	3020.74	3954.70	626715.50	16770591.00	18184.94	281129.78
AP4-7	208874.05	273581.31	2641.81	3990.10	599258.13	14781896.00	17136.10	189176.38
34HP45-837-1	28377.20	259124.89	1984.33	10182.58	704588.50	4386994.50	11173.70	41428.43
34HP45-837-2	26360.03	228119.67	1910.25	10383.74	715160.63	4286509.00	10157.34	38721.34
34HP45-837-3	41628.79	199309.16	1656.57	9109.93	697533.94	3622775.80	9365.21	30717.25
34HP45-837-4	52393.57	170667.84	1686.33	19817.59	693031.31	9515912.00	10384.82	72509.33
34HP45-837-5	41738.88	151813.66	1486.01	18500.34	655519.00	8841641.00	9500.05	63142.36
34HP45-837-6	66862.86	147937.52	1515.65	17858.58	721725.88	8236474.50	9147.97	57347.56
34HP45-837-7	182993.11	160448.14	1390.49	16273.37	941111.38	8231937.00	9585.57	59164.25
34HP45-837-8	80205.53	131283.19	1269.09	17280.98	715574.44	8328226.50	9265.01	55189.31
34HP45-837-9	101931.25	125128.18	1274.17	13791.60	687535.38	6759802.50	8783.01	40050.63
34HP45-837-10	61659.31	119130.23	1003.93	9671.45	672906.38	5169738.50	6873.44	28788.96
34HP45-837-11	21331.04	104109.02	990.41	10341.50	557111.81	5623187.50	6919.32	31598.74
34HP45-837-12	32436.22	102700.82	1019.61	11248.54	588543.50	6028146.00	6952.00	33081.59
34HP45-837-13	275287.38	159063.14	893.13	7278.48	1262040.00	3922663.30	6303.68	24519.58
34HP45-837-14	104460.03	101062.81	858.28	7608.48	745765.38	3997772.50	5348.55	20570.92
34HP45-837-15	112587.20	97007.66	854.08	8321.49	741750.63	4308385.50	5113.27	21008.72

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	6094174.00	5040028.50	2946.86	4248.94	430275.09	2102749.30	16380.65	1490.61
SRM612-8	5862234.50	4633061.00	2644.77	4113.06	461493.44	1943373.30	29468.53	2542.61
SRM610-8	4103577.80	3111619.80	2026.97	4118.26	784710.63	1301546.80	142422.13	11646.39
AP1-8	75865.55	47649.51	1052.89	3556.78	417404.59	13584380.00	7667.60	45434.66
AP2-8	86590.36	41945.59	1168.33	3469.78	394791.63	15900044.00	8198.97	55650.79
AP3-8	166008.86	44794.85	1646.81	3046.50	333270.31	19786086.00	12069.27	95132.66
AP4-8	192100.08	45455.30	1433.77	3174.26	309908.09	17186342.00	11896.27	69760.79
blank-8	11067.22	66296.45	531.68	2241.97	425889.63	134472.00	3607.70	818.72
blank average	25359.92	839302.43	4376.20	4662.77	674936.10	311312.52	19003.37	806.52
blank subtraction								
SRM614-7	5935846.08	3868240.07	3807.88	2091.71	159641.29	2219278.99	72736.95	1949.21
SRM612-7	5392933.08	3140294.07	2332.31	1289.87	191986.47	1859078.29	58580.55	2620.09
SRM610-7	3061016.58	1515288.07	884.62	906.07	661711.51	968247.99	93190.10	8381.37
AP1-7	59401.56	-350682.27	-749.18	48.26	97348.91	10423352.49	-1390.83	152806.51
AP2-7	44224.59	-440491.18	-1097.71	-146.66	23078.91	12060060.49	-2300.47	170130.79
AP3-7	136636.31	-520155.02	-1355.47	-708.06	-48220.59	16459278.49	-818.43	280323.26
AP4-7	183514.13	-565721.12	-1734.39	-672.66	-75677.97	14470583.49	-1867.27	188369.86
34HP45-837-1	3017.28	-580177.54	-2391.87	5519.81	29652.41	4075681.99	-7829.66	40621.91
34HP45-837-2	1000.11	-611182.76	-2465.95	5720.97	40224.54	3975196.49	-8846.03	37914.82
34HP45-837-3	16268.87	-639993.27	-2719.64	4447.16	22597.84	3311463.29	-9638.15	29910.73
34HP45-837-4	27033.65	-668634.59	-2689.88	15154.83	18095.22	9204599.49	-8618.55	71702.80
34HP45-837-5	16378.95	-687488.77	-2890.20	13837.58	-19417.09	8530328.49	-9503.31	62335.83
34HP45-837-6	41502.94	-691364.91	-2860.56	13195.81	46789.79	7925161.99	-9855.40	56541.04
34HP45-837-7	157633.19	-678854.29	-2985.72	11610.60	266175.29	7920624.49	-9417.79	58357.73
34HP45-837-8	54845.61	-708019.24	-3107.12	12618.21	40638.34	8016913.99	-9738.36	54382.79
34HP45-837-9	76571.33	-714174.25	-3102.04	9128.83	12599.29	6448489.99	-10220.36	39244.10
34HP45-837-10	36299.39	-720172.20	-3372.28	5008.69	-2029.71	4858425.99	-12129.93	27982.44
34HP45-837-11	-4028.88	-735193.41	-3385.80	5678.73	-117824.29	5311874.99	-12084.05	30792.21
34HP45-837-12	7076.30	-736601.61	-3356.60	6585.78	-86392.60	5716833.49	-12051.37	32275.06
34HP45-837-13	249927.46	-680239.29	-3483.08	2615.71	587103.91	3611350.79	-12699.69	23713.05
34HP45-837-14	79100.11	-738239.62	-3517.92	2945.72	70829.29	3686459.99	-13654.82	19764.39
34HP45-837-15	87227.28	-742294.76	-3522.12	3658.72	66814.54	3997072.99	-13890.10	20202.19
SRM614-8	6068814.08	4200726.07	-1429.35	-413.82	-244661.01	1791436.79	-2622.72	684.08
SRM612-8	5836874.58	3793758.57	-1731.43	-549.70	-213442.66	1632060.79	10465.16	1736.09
SRM610-8	4078217.88	2272317.37	-2349.23	-544.50	109774.54	990234.29	123418.76	10839.86
AP1-8	50505.63	-791652.92	-3323.32	-1105.99	-257531.51	13273067.49	-11335.74	44628.13
AP2-8	61230.44	-797356.83	-3207.88	-1192.99	-280144.47	15588731.49	-10804.40	54844.27
AP3-8	140648.94	-794507.57	-2729.40	-1616.27	-341665.79	19474773.49	-6934.10	94326.13
AP4-8	166740.16	-793847.13	-2942.44	-1488.51	-365028.01	16875029.49	-7107.10	68954.26
zero correction								
SRM614-7	5935846.08	3868240.07	3807.88	2091.71	159641.29	2219278.99	72736.95	1949.21
SRM612-7	5392933.08	3140294.07	2332.31	1289.87	191986.47	1859078.29	58580.55	2620.09
SRM610-7	3061016.58	1515288.07	884.62	906.07	661711.51	968247.99	93190.10	8381.37
AP1-7	59401.56	0.00	0.00	48.26	97348.91	10423352.49	0.00	152806.51
AP2-7	44224.59	0.00	0.00	0.00	23078.91	12060060.49	0.00	170130.79
AP3-7	136636.31	0.00	0.00	0.00	0.00	16459278.49	0.00	280323.26
AP4-7	183514.13	0.00	0.00	0.00	0.00	14470583.49	0.00	188369.86
34HP45-837-1	3017.28	0.00	0.00	5519.81	29652.41	4075681.99	0.00	40621.91
34HP45-837-2	1000.11	0.00	0.00	5720.97	40224.54	3975196.49	0.00	37914.82
34HP45-837-3	16268.87	0.00	0.00	4447.16	22597.84	3311463.29	0.00	29910.73
34HP45-837-4	27033.65	0.00	0.00	15154.83	18095.22	9204599.49	0.00	71702.80
34HP45-837-5	16378.95	0.00	0.00	13837.58	0.00	8530328.49	0.00	62335.83
34HP45-837-6	41502.94	0.00	0.00	13195.81	46789.79	7925161.99	0.00	56541.04
34HP45-837-7	157633.19	0.00	0.00	11610.60	266175.29	7920624.49	0.00	58357.73
34HP45-837-8	54845.61	0.00	0.00	12618.21	40638.34	8016913.99	0.00	54382.79
34HP45-837-9	76571.33	0.00	0.00	9128.83	12599.29	6448489.99	0.00	39244.10
34HP45-837-10	36299.39	0.00	0.00	5008.69	0.00	4858425.99	0.00	27982.44
34HP45-837-11	0.00	0.00	0.00	5678.73	0.00	5311874.99	0.00	30792.21
34HP45-837-12	7076.30	0.00	0.00	6585.78	0.00	5716833.49	0.00	32275.06
34HP45-837-13	249927.46	0.00	0.00	2615.71	587103.91	3611350.79	0.00	23713.05
34HP45-837-14	79100.11	0.00	0.00	2945.72	70829.29	3686459.99	0.00	19764.39
34HP45-837-15	87227.28	0.00	0.00	3658.72	66814.54	3997072.99	0.00	20202.19
SRM614-8	6068814.08	4200726.07	0.00	0.00	0.00	1791436.79	0.00	684.08
SRM612-8	5836874.58	3793758.57	0.00	0.00	0.00	1632060.79	10465.16	1736.09
SRM610-8	4078217.88	2272317.37	0.00	0.00	109774.54	990234.29	123418.76	10839.86
AP1-8	50505.63	0.00	0.00	0.00	0.00	13273067.49	0.00	44628.13
AP2-8	61230.44	0.00	0.00	0.00	0.00	15588731.49	0.00	54844.27
AP3-8	140648.94	0.00	0.00	0.00	0.00	19474773.49	0.00	94326.13
AP4-8	166740.16	0.00	0.00	0.00	0.00	16875029.49	0.00	68954.26
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-7	2.674673	1.743017	0.001716	0.000943	0.071934	1.000000	0.032775	0.000878
SRM612-7	2.900864	1.689167	0.001255	0.000694	0.103270	1.000000	0.031511	0.001409
SRM610-7	3.161397	1.564979	0.000914	0.000936	0.683411	1.000000	0.096246	0.008656
AP1-7	0.005699	0.000000	0.000000	0.000005	0.009340	1.000000	0.000000	0.014660
AP2-7	0.003667	0.000000	0.000000	0.000000	0.001914	1.000000	0.000000	0.014107
AP3-7	0.008301	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.017031
AP4-7	0.012682	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.013017
34HP45-837-1	0.000740	0.000000	0.000000	0.001354	0.007275	1.000000	0.000000	0.009967
34HP45-837-2	0.000252	0.000000	0.000000	0.001439	0.010119	1.000000	0.000000	0.009538
34HP45-837-3	0.004913	0.000000	0.000000	0.001343	0.006824	1.000000	0.000000	0.009032
34HP45-837-4	0.002937	0.000000	0.000000	0.001646	0.001966	1.000000	0.000000	0.007790
34HP45-837-5	0.001920	0.000000	0.000000	0.001622	0.000000	1.000000	0.000000	0.007308
34HP45-837-6	0.005237	0.000000	0.000000	0.001665	0.005904	1.000000	0.000000	0.007134
34HP45-837-7	0.019902	0.000000	0.000000	0.001466	0.033605	1.000000	0.000000	0.007368
34HP45-837-8	0.006841	0.000000	0.000000	0.001574	0.005069	1.000000	0.000000	0.006784
34HP45-837-9	0.011874	0.000000	0.000000	0.001416	0.001954	1.000000	0.000000	0.006086
34HP45-837-10	0.007471	0.000000	0.000000	0.001031	0.000000	1.000000	0.000000	0.005760
34HP45-837-11	0.000000	0.000000	0.000000	0.001069	0.000000	1.000000	0.000000	0.005797
34HP45-837-12	0.001238	0.000000	0.000000	0.001152	0.000000	1.000000	0.000000	0.005646
34HP45-837-13	0.069206	0.000000	0.000000	0.000724	0.162572	1.000000	0.000000	0.006566
34HP45-837-14	0.021457	0.000000	0.000000	0.000799	0.019213	1.000000	0.000000	0.005361
34HP45-837-15	0.021823	0.000000	0.000000	0.000915	0.016716	1.000000	0.000000	0.005054
SRM614-8	3.387680	2.344892	0.000000	0.000000	0.000000	1.000000	0.000000	0.000382
SRM612-8	3.576383	2.324520	0.000000	0.000000	0.000000	1.000000	0.006412	0.001064
SRM610-8	4.118437	2.294727	0.000000	0.000000	0.110857	1.000000	0.124636	0.010947
AP1-8	0.003805	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003362
AP2-8	0.003928	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003518
AP3-8	0.007222	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.004844
AP4-8	0.009881	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.004086
standardize signal averages AP								
AP1	0.004752	0.000000	0.000000	0.000002	0.004670	1.000000	0.000000	0.009011
AP2	0.003797	0.000000	0.000000	0.000000	0.000957	1.000000	0.000000	0.008813
AP3	0.007762	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.010937
AP4	0.011281	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.008552
linest from std sig ave								
	0.027051	0.000000	0.000000	3.791053	0.000261	1.000000	0.000000	0.118017
standardize signal averages SRM								
srm614-2	3.031176	2.043954	0.000858	0.000471	0.035967	1.000000	0.016388	0.000630
srm612-2	3.238623	2.006844	0.000627	0.000347	0.051635	1.000000	0.018961	0.001237
srm610-2	3.639917	1.929853	0.000457	0.000468	0.397134	1.000000	0.110441	0.009801
linest from std sig ave								
	0.042621	1.967341	1.734390	4.567781	0.014963	1.000000	0.045030	0.513503
concentration data								
SRM614-7	6205.18	0.00	0.00	306.44	92.31	85763.00	0.00	8.89
SRM612-7	6729.93	0.00	0.00	225.58	132.52	85763.00	0.00	14.26
SRM610-7	7334.36	0.00	0.00	304.25	876.98	85763.00	0.00	87.61
AP1-7	61.50	0.00	0.00	7.00	55.75	398936.00	0.00	690.21
AP2-7	39.57	0.00	0.00	0.00	11.42	398936.00	0.00	664.18
AP3-7	89.59	0.00	0.00	0.00	0.00	398936.00	0.00	801.86
AP4-7	136.86	0.00	0.00	0.00	0.00	398936.00	0.00	612.88
34HP45-837-1	7.99	0.00	0.00	2048.27	43.43	398936.00	0.00	469.26
34HP45-837-2	2.72	0.00	0.00	2176.58	60.40	398936.00	0.00	449.06
34HP45-837-3	53.02	0.00	0.00	2031.08	40.73	398936.00	0.00	425.26
34HP45-837-4	31.69	0.00	0.00	2490.06	11.73	398936.00	0.00	366.76
34HP45-837-5	20.72	0.00	0.00	2453.34	0.00	398936.00	0.00	344.05
34HP45-837-6	56.51	0.00	0.00	2518.21	35.24	398936.00	0.00	335.90
34HP45-837-7	214.77	0.00	0.00	2216.96	200.59	398936.00	0.00	346.89
34HP45-837-8	73.83	0.00	0.00	2380.42	30.26	398936.00	0.00	319.38
34HP45-837-9	128.14	0.00	0.00	2141.02	11.66	398936.00	0.00	286.53
34HP45-837-10	80.63	0.00	0.00	1559.16	0.00	398936.00	0.00	271.17

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	0.00	0.00	0.00	1616.84	0.00	398936.00	0.00	272.92
34HP45-837-12	13.36	0.00	0.00	1742.27	0.00	398936.00	0.00	265.80
34HP45-837-13	746.85	0.00	0.00	1095.43	970.41	398936.00	0.00	309.15
34HP45-837-14	231.56	0.00	0.00	1208.49	114.69	398936.00	0.00	252.42
34HP45-837-15	235.50	0.00	0.00	1384.36	99.78	398936.00	0.00	237.96
SRM614-8	7859.33	0.00	0.00	0.00	0.00	85763.00	0.00	3.87
SRM612-8	8297.12	0.00	0.00	0.00	0.00	85763.00	0.00	10.77
SRM610-8	9554.67	0.00	0.00	0.00	142.26	85763.00	0.00	110.80
AP1-8	41.06	0.00	0.00	0.00	0.00	398936.00	0.00	158.30
AP2-8	42.39	0.00	0.00	0.00	0.00	398936.00	0.00	165.64
AP3-8	77.94	0.00	0.00	0.00	0.00	398936.00	0.00	228.04
AP4-8	106.63	0.00	0.00	0.00	0.00	398936.00	0.00	192.38

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-5	36276.13	1288872.10	7667.04	6513.36	988445.88	299341.13	20269.40	888.65
SRM614-5	4469884.00	3466990.30	7708.48	6532.92	933216.13	1704701.10	56804.48	2030.37
SRM612-5	5055562.50	3798774.80	6627.40	6371.44	1233928.00	1937472.40	62856.23	4257.94
SRM610-5	3356808.00	2592321.00	5383.63	5912.43	1620800.80	1266956.60	115754.89	9137.49
AP1-5	106604.52	427219.34	3783.94	4900.15	885740.25	13309826.00	14873.20	183227.36
AP2-5	92381.32	338677.09	3311.18	4691.91	833286.19	14335065.00	13816.92	175217.47
AP3-5	204375.06	283534.66	3168.66	4262.74	679935.19	17414356.00	16543.61	263441.72
AP4-5	192153.00	243882.17	2705.82	4024.26	634908.81	16837352.00	15699.97	174385.39
34HP45-718-1	3056184.80	398146.56	2209.45	15574.93	7034939.50	8662782.00	11225.02	67061.74
34HP45-718-2	929889.88	228978.45	2077.05	23906.73	1574136.50	12905859.00	11720.91	101386.81
34HP45-718-3	3767389.50	354625.66	2158.49	25930.35	3456355.30	15191735.00	13227.48	110785.59
34HP45-718-4	330953.59	169276.19	1980.29	5627.39	1145990.50	21380688.00	18915.31	150262.48
34HP45-718-5	232059.50	150439.33	1746.29	5404.87	1036289.80	16693505.00	14326.44	107327.20
34HP45-718-6	536481.69	173521.83	1776.41	5212.87	1245365.40	15947195.00	13406.16	100462.45
34HP45-718-7	725298.50	164658.41	1709.69	4971.27	1341255.60	17443154.00	13695.44	101257.48
34HP45-718-8	588133.88	141333.75	1584.13	5508.75	1271004.60	18409378.00	14399.04	101628.53
34HP45-718-9	841014.81	153311.70	1619.77	5945.71	1562649.60	19285384.00	15887.21	103195.90
34HP45-718-10	1807879.40	235099.72	1512.21	4826.03	2228587.50	16075189.00	12672.11	86706.93
34HP45-718-11	633874.69	132997.11	1439.13	4767.23	1230845.10	17174366.00	12005.47	86909.13
34HP45-718-12	319251.16	109879.98	1493.53	4653.15	1030257.40	18393506.00	11637.91	89797.87
34HP45-718-13	11573877.00	906316.50	1416.29	4533.43	8415199.00	16097566.00	13264.03	53101.78
34HP45-718-14	13737206.00	985537.31	1494.69	4143.62	9727070.00	16361776.00	13184.67	68356.34
34HP45-718-15	8704175.00	580158.75	1177.89	4085.10	6892965.00	18055068.00	11765.87	66895.18
34HP45-718-16	175671.27	69997.39	1286.33	6203.48	1115190.00	16141453.00	9216.73	65701.53
34HP45-718-17	64087.28	48053.79	1306.65	6377.08	723367.63	18824324.00	9391.85	77102.99
34HP45-718-18	81583.02	48548.15	1148.65	8033.61	696894.31	17030498.00	8874.97	63962.28
SRM614-6	4420458.50	3502113.50	1961.45	3686.62	506677.41	1416066.00	10019.78	1376.33
SRM612-6	5216323.50	4292439.50	2353.57	4062.38	632345.00	1710037.80	23583.01	2666.05
SRM610-6	3808256.80	3121405.30	1907.21	3918.10	853673.69	1203621.50	129715.89	11150.02
AP1-6	64416.64	35489.96	1068.33	3259.54	421991.84	14178052.00	6795.96	46163.06
AP2-6	54024.50	31661.26	1028.33	3245.86	369683.44	15407114.00	7566.80	49869.56
AP3-6	173288.89	35862.76	1588.21	3007.66	350982.56	18852396.00	11218.66	89505.63
AP4-6	164627.36	32546.86	1162.89	2954.54	302196.06	17194398.00	10879.74	53281.34
blank-6	21342.80	41589.99	430.08	2126.01	457035.09	104073.42	2502.57	903.21
blank average	28809.46	665231.05	4048.56	4319.68	722740.49	201707.28	11385.98	895.93

blank subtraction

SRM614-5	4441074.54	2801759.25	3659.92	2213.23	210475.65	1502993.83	45418.50	1134.45
SRM612-5	5026753.04	3133543.75	2578.83	2051.75	511187.52	1735765.13	51470.25	3362.02
SRM610-5	3327998.54	1927089.95	1335.07	1592.75	898060.32	1065249.33	104368.91	8241.57
AP1-5	77795.06	-238011.71	-264.62	580.46	162999.77	13108118.73	3487.22	182331.43
AP2-5	63571.86	-326553.96	-737.38	372.22	110545.71	14133357.73	2430.93	174321.54
AP3-5	175565.60	-381696.39	-879.91	-56.94	-42805.30	17212648.73	5157.63	262545.79
AP4-5	163343.54	-421348.88	-1342.75	-295.42	-87831.67	16635644.73	4313.98	173489.46
34HP45-718-1	3027375.34	-267084.49	-1839.11	11255.24	6312199.02	8461074.73	-160.96	66165.82
34HP45-718-2	901080.42	-436252.60	-1971.51	19587.05	851396.02	12704151.73	334.92	100490.88
34HP45-718-3	3738580.04	-310605.39	-1890.07	21610.66	2733614.82	14990027.73	1841.49	109889.66
34HP45-718-4	302144.13	-495954.86	-2068.27	1307.71	423250.02	21178980.73	7529.32	149366.55
34HP45-718-5	203250.04	-514791.72	-2302.27	1085.19	313549.32	16491797.73	2940.46	106431.27
34HP45-718-6	507672.23	-491709.22	-2272.15	893.18	522624.92	15745487.73	2020.17	99566.52
34HP45-718-7	696489.04	-500572.64	-2338.87	651.58	618515.12	17241446.73	2309.45	100361.55
34HP45-718-8	559324.42	-523897.30	-2464.43	1189.07	548264.12	18207670.73	3013.06	100732.60
34HP45-718-9	812205.35	-511919.35	-2428.79	1626.03	839909.12	19083676.73	4501.22	102299.97
34HP45-718-10	1779069.94	-430131.33	-2536.35	506.34	1505847.02	15873481.73	1286.13	85811.00

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	605065.23	-532233.94	-2609.43	447.54	508104.62	16972658.73	619.48	86013.21
34HP45-718-12	290441.70	-555351.07	-2555.03	333.46	307516.92	18191798.73	251.92	88901.94
34HP45-718-13	11545067.54	241085.45	-2632.27	213.74	7692458.52	15895858.73	1878.05	52205.85
34HP45-718-14	13708396.54	320306.26	-2553.87	-176.06	9004329.52	16160068.73	1798.69	67460.42
34HP45-718-15	8675365.54	-85072.30	-2870.68	-234.58	6170224.52	17853360.73	379.88	65999.25
34HP45-718-16	146861.81	-595233.66	-2762.24	1883.79	392449.52	15939745.73	-2169.25	64805.61
34HP45-718-17	35277.82	-617177.26	-2741.92	2057.39	627.15	18622616.73	-1994.13	76207.07
34HP45-718-18	52773.55	-616682.89	-2899.92	3713.92	-25846.17	16828790.73	-2511.01	63066.35
SRM614-6	4391649.04	2836882.45	-2087.11	-633.06	-216063.08	1214358.73	-1366.21	480.40
SRM612-6	5187514.04	3627208.45	-1694.99	-257.30	-90395.49	1508330.53	12197.03	1770.13
SRM610-6	3779447.34	2456174.25	-2141.35	-401.58	130933.21	1001914.23	118329.91	10254.10
AP1-6	35607.18	-629741.09	-2980.24	-1060.15	-300748.65	13976344.73	-4590.03	45267.13
AP2-6	25215.04	-633569.79	-3020.24	-1073.83	-353057.05	15205406.73	-3819.18	48973.64
AP3-6	144479.43	-629368.28	-2460.35	-1312.03	-371757.93	18650688.73	-167.32	88609.70
AP4-6	135817.90	-632684.18	-2885.68	-1365.15	-420544.43	16992690.73	-506.24	52385.41
zero correction								
SRM614-5	4441074.54	2801759.25	3659.92	2213.23	210475.65	1502993.83	45418.50	1134.45
SRM612-5	5026753.04	3133543.75	2578.83	2051.75	511187.52	1735765.13	51470.25	3362.02
SRM610-5	3327998.54	1927089.95	1335.07	1592.75	898060.32	1065249.33	104368.91	8241.57
AP1-5	77795.06	0.00	0.00	580.46	162999.77	13108118.73	3487.22	182331.43
AP2-5	63571.86	0.00	0.00	372.22	110545.71	14133357.73	2430.93	174321.54
AP3-5	175565.60	0.00	0.00	0.00	0.00	17212648.73	5157.63	262545.79
AP4-5	163343.54	0.00	0.00	0.00	0.00	16635644.73	4313.98	173489.46
34HP45-718-1	3027375.34	0.00	0.00	11255.24	6312199.02	8461074.73	0.00	66165.82
34HP45-718-2	901080.42	0.00	0.00	19587.05	851396.02	12704151.73	334.92	100490.88
34HP45-718-3	3738580.04	0.00	0.00	21610.66	2733614.82	14990027.73	1841.49	109889.66
34HP45-718-4	302144.13	0.00	0.00	1307.71	423250.02	21178980.73	7529.32	149366.55
34HP45-718-5	203250.04	0.00	0.00	1085.19	313549.32	16491797.73	2940.46	106431.27
34HP45-718-6	507672.23	0.00	0.00	893.18	522624.92	15745487.73	2020.17	99566.52
34HP45-718-7	696489.04	0.00	0.00	651.58	618515.12	17241446.73	2309.45	100361.55
34HP45-718-8	559324.42	0.00	0.00	1189.07	548264.12	18207670.73	3013.06	100732.60
34HP45-718-9	812205.35	0.00	0.00	1626.03	839909.12	19083676.73	4501.22	102299.97
34HP45-718-10	1779069.94	0.00	0.00	506.34	1505847.02	15873481.73	1286.13	85811.00
34HP45-718-11	605065.23	0.00	0.00	447.54	508104.62	16972658.73	619.48	86013.21
34HP45-718-12	290441.70	0.00	0.00	333.46	307516.92	18191798.73	251.92	88901.94
34HP45-718-13	11545067.54	241085.45	0.00	213.74	7692458.52	15895858.73	1878.05	52205.85
34HP45-718-14	13708396.54	320306.26	0.00	0.00	9004329.52	16160068.73	1798.69	67460.42
34HP45-718-15	8675365.54	0.00	0.00	0.00	6170224.52	17853360.73	379.88	65999.25
34HP45-718-16	146861.81	0.00	0.00	1883.79	392449.52	15939745.73	0.00	64805.61
34HP45-718-17	35277.82	0.00	0.00	2057.39	627.15	18622616.73	0.00	76207.07
34HP45-718-18	52773.55	0.00	0.00	3713.92	0.00	16828790.73	0.00	63066.35
SRM614-6	4391649.04	2836882.45	0.00	0.00	0.00	1214358.73	0.00	480.40
SRM612-6	5187514.04	3627208.45	0.00	0.00	0.00	1508330.53	12197.03	1770.13
SRM610-6	3779447.34	2456174.25	0.00	0.00	130933.21	1001914.23	118329.91	10254.10
AP1-6	35607.18	0.00	0.00	0.00	0.00	13976344.73	0.00	45267.13
AP2-6	25215.04	0.00	0.00	0.00	0.00	15205406.73	0.00	48973.64
AP3-6	144479.43	0.00	0.00	0.00	0.00	18650688.73	0.00	88609.70
AP4-6	135817.90	0.00	0.00	0.00	0.00	16992690.73	0.00	52385.41
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-5	2.954819	1.864119	0.002435	0.001473	0.140038	1.000000	0.030219	0.000755
SRM612-5	2.895987	1.805281	0.001486	0.001182	0.294503	1.000000	0.029653	0.001937
SRM610-5	3.124150	1.809051	0.001253	0.001495	0.843052	1.000000	0.097976	0.007737
AP1-5	0.005935	0.000000	0.000000	0.000044	0.012435	1.000000	0.000266	0.013910
AP2-5	0.004498	0.000000	0.000000	0.000026	0.007822	1.000000	0.000172	0.012334
AP3-5	0.010200	0.000000	0.000000	0.000000	0.000000	1.000000	0.000300	0.015253
AP4-5	0.009819	0.000000	0.000000	0.000000	0.000000	1.000000	0.000259	0.010429
34HP45-718-1	0.357800	0.000000	0.000000	0.001330	0.746028	1.000000	0.000000	0.007820
34HP45-718-2	0.070928	0.000000	0.000000	0.001542	0.067017	1.000000	0.000026	0.007910

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.249404	0.000000	0.000000	0.001442	0.182362	1.000000	0.000123	0.007331
34HP45-718-4	0.014266	0.000000	0.000000	0.000062	0.019984	1.000000	0.000356	0.007053
34HP45-718-5	0.012324	0.000000	0.000000	0.000066	0.019012	1.000000	0.000178	0.006454
34HP45-718-6	0.032242	0.000000	0.000000	0.000057	0.033192	1.000000	0.000128	0.006323
34HP45-718-7	0.040396	0.000000	0.000000	0.000038	0.035874	1.000000	0.000134	0.005821
34HP45-718-8	0.030719	0.000000	0.000000	0.000065	0.030112	1.000000	0.000165	0.005532
34HP45-718-9	0.042560	0.000000	0.000000	0.000085	0.044012	1.000000	0.000236	0.005361
34HP45-718-10	0.112078	0.000000	0.000000	0.000032	0.094866	1.000000	0.000081	0.005406
34HP45-718-11	0.035649	0.000000	0.000000	0.000026	0.029937	1.000000	0.000036	0.005068
34HP45-718-12	0.015966	0.000000	0.000000	0.000018	0.016904	1.000000	0.000014	0.004887
34HP45-718-13	0.726294	0.015167	0.000000	0.000013	0.483928	1.000000	0.000118	0.003284
34HP45-718-14	0.848288	0.019821	0.000000	0.000000	0.557196	1.000000	0.000111	0.004175
34HP45-718-15	0.485923	0.000000	0.000000	0.000000	0.345606	1.000000	0.000021	0.003697
34HP45-718-16	0.009214	0.000000	0.000000	0.000118	0.024621	1.000000	0.000000	0.004066
34HP45-718-17	0.001894	0.000000	0.000000	0.000110	0.000034	1.000000	0.000000	0.004092
34HP45-718-18	0.003136	0.000000	0.000000	0.000221	0.000000	1.000000	0.000000	0.003748
SRM614-6	3.616435	2.336116	0.000000	0.000000	0.000000	1.000000	0.000000	0.000396
SRM612-6	3.439242	2.404784	0.000000	0.000000	0.000000	1.000000	0.008086	0.001174
SRM610-6	3.772226	2.451482	0.000000	0.000000	0.130683	1.000000	0.118104	0.010235
AP1-6	0.002548	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003239
AP2-6	0.001658	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003221
AP3-6	0.007747	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.004751
AP4-6	0.007993	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003083
standardize signal averages AP								
AP1	0.004241	0.000000	0.000000	0.000022	0.006218	1.000000	0.000133	0.008574
AP2	0.003078	0.000000	0.000000	0.000013	0.003911	1.000000	0.000086	0.007777
AP3	0.008973	0.000000	0.000000	0.000000	0.000000	1.000000	0.000150	0.010002
AP4	0.008906	0.000000	0.000000	0.000000	0.000000	1.000000	0.000130	0.006756
linest from std sig ave								
	0.028935	0.000000	0.000000	0.473528	0.000450	1.000000	0.026902	0.131788
standardize signal averages SRM								
srm614-2	3.285627	2.100117	0.001218	0.000736	0.070019	1.000000	0.015109	0.000575
srm612-2	3.167615	2.105032	0.000743	0.000591	0.147251	1.000000	0.018870	0.001555
srm610-2	3.448188	2.130266	0.000627	0.000748	0.486867	1.000000	0.108040	0.008986
linest from std sig ave								
	0.042854	1.858158	1.282486	2.824910	0.005247	1.000000	0.046104	0.555372
concentration data								
SRM614-5	7332.50	0.00	0.00	59.80	63.01	85763.00	69.72	8.53
SRM612-5	7186.51	0.00	0.00	48.00	132.52	85763.00	68.41	21.89
SRM610-5	7752.70	0.00	0.00	60.72	379.36	85763.00	226.05	87.45
AP1-5	68.51	0.00	0.00	8.37	26.03	398936.00	2.86	731.31
AP2-5	51.92	0.00	0.00	4.98	16.37	398936.00	1.85	648.46
AP3-5	117.74	0.00	0.00	0.00	0.00	398936.00	3.22	801.93
AP4-5	113.34	0.00	0.00	0.00	0.00	398936.00	2.78	548.29
34HP45-718-1	4130.14	0.00	0.00	251.29	1561.53	398936.00	0.00	411.14
34HP45-718-2	818.73	0.00	0.00	291.25	140.28	398936.00	0.28	415.87
34HP45-718-3	2878.91	0.00	0.00	272.34	381.71	398936.00	1.32	385.42
34HP45-718-4	164.68	0.00	0.00	11.66	41.83	398936.00	3.82	370.79
34HP45-718-5	142.26	0.00	0.00	12.43	39.80	398936.00	1.91	339.30
34HP45-718-6	372.18	0.00	0.00	10.72	69.48	398936.00	1.38	332.46
34HP45-718-7	466.30	0.00	0.00	7.14	75.09	398936.00	1.44	306.04
34HP45-718-8	354.60	0.00	0.00	12.34	63.03	398936.00	1.78	290.87
34HP45-718-9	491.28	0.00	0.00	16.10	92.12	398936.00	2.53	281.83
34HP45-718-10	1293.73	0.00	0.00	6.03	198.57	398936.00	0.87	284.22
34HP45-718-11	411.51	0.00	0.00	4.98	62.66	398936.00	0.39	266.44
34HP45-718-12	184.29	0.00	0.00	3.46	35.38	398936.00	0.15	256.93
34HP45-718-13	8383.72	0.00	0.00	2.54	1012.92	398936.00	1.27	172.67
34HP45-718-14	9791.92	0.00	0.00	0.00	1166.28	398936.00	1.19	219.48
34HP45-718-15	5609.09	0.00	0.00	0.00	723.40	398936.00	0.23	194.36
34HP45-718-16	106.35	0.00	0.00	22.33	51.53	398936.00	0.00	213.75
34HP45-718-17	21.87	0.00	0.00	20.87	0.07	398936.00	0.00	215.15
34HP45-718-18	36.20	0.00	0.00	41.69	0.00	398936.00	0.00	197.03
SRM614-6	8974.33	0.00	0.00	0.00	0.00	85763.00	0.00	4.47
SRM612-6	8534.62	0.00	0.00	0.00	0.00	85763.00	18.66	13.26
SRM610-6	9360.93	0.00	0.00	0.00	58.80	85763.00	272.49	115.68
AP1-6	29.41	0.00	0.00	0.00	0.00	398936.00	0.00	170.28
AP2-6	19.14	0.00	0.00	0.00	0.00	398936.00	0.00	169.33
AP3-6	89.42	0.00	0.00	0.00	0.00	398936.00	0.00	249.79
AP4-6	92.26	0.00	0.00	0.00	0.00	398936.00	0.00	162.08
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-3	43261.68	1447111.40	8370.29	6896.00	1092426.50	339571.19	23107.85	679.72
SRM614-3	6689050.50	5106090.50	8686.25	7674.56	1081631.00	2594312.30	78507.72	3180.42
SRM612-3	6637729.00	5017525.50	7360.28	11537.23	3751242.00	2696675.50	77374.76	10250.70
SRM610-3	3705437.00	2743684.30	5702.67	6872.40	2142936.80	1608335.10	127928.84	16657.01
AP1-3	169725.08	493708.28	4015.82	5886.95	1236611.50	15401618.00	17200.46	209531.78
AP2-3	114704.24	372374.16	3384.78	5346.83	1092404.30	16510675.00	15314.93	199969.33
AP3-3	359571.63	303779.03	3527.86	5337.39	971438.75	22538710.00	21259.00	424163.75
AP4-3	275785.75	263241.13	2870.86	4598.31	728673.31	19052856.00	17808.06	209839.55
34HP45-856-1	354355.47	275384.34	2540.93	6355.44	1519311.90	17230868.00	13379.56	146422.27
34HP45-856-2	452955.06	255128.56	2261.93	5341.51	1212423.90	16644310.00	12205.03	128183.28
34HP45-856-3	572315.56	245452.88	2116.57	5149.71	1200766.90	15346085.00	11490.67	105798.16
34HP45-856-4	4513808.50	892984.19	2302.69	4828.91	3784610.50	12937243.00	13923.92	83411.43
34HP45-856-5	5578978.50	1150091.30	2312.53	5135.67	4135084.00	14630609.00	15106.77	93739.77
34HP45-856-6	4539518.00	861596.88	2185.37	5077.71	4064528.30	15877676.00	13662.44	84696.36
34HP45-856-7	9067633.00	1015817.30	1976.17	5018.47	6593309.50	13728369.00	13795.04	68822.59
34HP45-856-8	10227799.00	1321148.00	2177.09	4874.87	10541006.00	14115467.00	14426.32	67671.18
34HP45-856-9	10864740.00	1262020.50	2025.45	4826.95	6124911.50	13666666.00	13565.76	65761.01
34HP45-856-10	591708.44	172612.97	1429.09	4732.59	1376217.90	15094382.00	9202.85	68076.46
34HP45-856-11	659258.38	159422.14	1516.45	4542.59	1228047.60	15399207.00	9071.69	68391.98
34HP45-856-12	2299395.80	293669.34	1509.85	4649.19	1901150.90	15484993.00	9636.29	68808.63
34HP45-856-13	566395.44	229344.33	1416.29	7821.28	1170394.10	15937361.00	9283.69	63724.00
34HP45-856-14	968043.75	312807.06	1295.89	9620.77	1251925.90	14623041.00	8869.97	52802.58
34HP45-856-15	451071.38	254414.20	1249.93	9612.45	859725.19	12757397.00	8193.89	42604.48
34HP45-856-16	1217458.10	200937.41	1142.61	14180.72	1178999.30	9657872.00	6848.84	36972.45
34HP45-856-17	379072.88	105753.27	982.45	16110.73	835783.13	9848078.00	6276.92	36859.05
34HP45-856-18	540597.38	108319.80	960.53	13349.68	863683.25	8096867.00	5917.15	30854.98
SRM614-4	5295883.50	4337321.50	2426.37	4435.54	493313.25	1711363.40	11829.47	1604.01
SRM612-4	6252937.00	5358570.50	2964.18	4805.39	584770.44	2110629.80	29427.37	3379.34
SRM610-4	4503045.50	3753755.30	2183.33	4537.23	954443.13	1463576.00	162064.08	14091.72
AP1-4	81461.06	38190.34	1080.73	3781.70	459322.06	15663696.00	7785.96	47560.83
AP2-4	61873.63	35085.52	1281.73	3599.34	420824.84	17037676.00	8415.89	53458.78
AP3-4	252321.30	42610.60	1995.89	3565.10	387893.22	23341668.00	15002.20	133605.52
AP4-4	265463.78	40594.47	1532.93	3402.46	342821.25	20823260.00	13905.64	81075.98
blank-4	24078.06	47106.50	454.12	2310.01	455903.28	111079.91	2712.42	1042.77
blank average	33669.87	747108.95	4412.20	4603.01	774164.89	225325.55	12910.13	861.24

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank subtraction								
SRM614-3	6655380.63	4358981.55	4274.04	3071.56	307466.11	2368986.75	65597.59	2319.17
SRM612-3	6604059.13	4270416.55	2948.08	6934.22	2977077.11	2471349.95	64464.63	9389.45
SRM610-3	3671767.13	1996575.35	1290.47	2269.39	1368771.91	1383009.55	115018.71	15795.77
AP1-3	136055.21	-253400.67	-396.38	1283.95	462446.61	15176292.45	4290.32	208670.54
AP2-3	81034.37	-374734.79	-1027.43	743.82	318239.41	16285349.45	2404.79	199108.09
AP3-3	325901.76	-443329.92	-884.34	734.38	197273.86	22313384.45	8348.87	423302.51
AP4-3	242115.88	-483867.82	-1541.35	-4.70	-45491.58	18827530.45	4897.93	208978.31
34HP45-856-1	320685.60	-471724.61	-1871.27	1752.43	745147.01	17005542.45	469.42	145561.03
34HP45-856-2	419285.19	-491980.39	-2150.27	738.50	438259.01	16418984.45	-705.10	127322.04
34HP45-856-3	538645.69	-501656.07	-2295.63	546.70	426602.01	15120759.45	-1419.47	104936.92
34HP45-856-4	4480138.63	145875.24	-2109.51	225.90	3010445.61	12711917.45	1013.79	82550.19
34HP45-856-5	5545308.63	402982.35	-2099.67	532.66	3360919.11	14405283.45	2196.63	92878.52
34HP45-856-6	4505848.13	114487.93	-2226.83	474.70	3290363.41	15652350.45	752.30	83835.11
34HP45-856-7	9033963.13	268708.35	-2436.03	415.46	5819144.61	13503043.45	884.91	67961.34
34HP45-856-8	10194129.13	574039.05	-2235.11	271.86	9766841.11	13890141.45	1516.19	66809.94
34HP45-856-9	10831070.13	514911.55	-2386.75	223.94	5350746.61	13441340.45	655.62	65114.76
34HP45-856-10	558038.57	-574495.98	-2983.12	129.58	602053.01	14869056.45	-3707.28	67215.22
34HP45-856-11	625588.51	-587686.81	-2895.76	-60.42	453882.71	15173881.45	-3838.44	67530.74
34HP45-856-12	2265725.93	-453439.61	-2902.36	46.18	1126986.01	15259667.45	-3273.84	67947.38
34HP45-856-13	532725.57	-517764.62	-2995.92	3218.28	396229.21	15712035.45	-3626.44	62862.76
34HP45-856-14	934373.88	-434301.89	-3116.32	5017.77	477761.01	14397715.45	-4040.16	51941.33
34HP45-856-15	417401.51	-492694.75	-3162.28	5009.45	85560.30	12532071.45	-4716.25	41743.24
34HP45-856-16	1183788.23	-546171.54	-3269.60	9577.71	404834.41	9432546.45	-6061.29	36111.20
34HP45-856-17	345403.01	-641355.68	-3429.76	11507.72	61618.24	9622752.45	-6633.22	35997.80
34HP45-856-18	506927.51	-638789.15	-3451.68	8746.67	89518.36	7871541.45	-6992.98	29993.73
SRM614-4	5262213.63	3590212.55	-1985.83	-167.46	-280851.64	1486037.85	-1080.67	742.76
SRM612-4	6219267.13	4611461.55	-1448.03	202.38	-189394.45	1885304.25	16517.23	2518.09
SRM610-4	4469375.63	3006646.35	-2228.87	-65.78	180278.24	1238250.45	149153.95	13230.47
AP1-4	47791.19	-708918.62	-3331.48	-821.30	-314842.83	15438370.45	-5124.17	46699.58
AP2-4	28203.76	-712023.44	-3130.48	-1003.67	-353340.05	16812350.45	-4494.24	52597.54
AP3-4	218651.43	-704498.35	-2416.31	-1037.91	-386271.67	23116342.45	2092.07	132744.28
AP4-4	231793.91	-706514.48	-2879.28	-1200.55	-431343.64	20597934.45	995.51	80214.73

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
SRM614-3	6655380.63	4358981.55	4274.04	3071.56	307466.11	2368986.75	65597.59	2319.17
SRM612-3	6604059.13	4270416.55	2948.08	6934.22	2977077.11	2471349.95	64464.63	9389.45
SRM610-3	3671767.13	1996575.35	1290.47	2269.39	1368771.91	1383009.55	115018.71	15795.77
AP1-3	136055.21	0.00	0.00	1283.95	462446.61	15176292.45	4290.32	208670.54
AP2-3	81034.37	0.00	0.00	743.82	318239.41	16285349.45	2404.79	199108.09
AP3-3	325901.76	0.00	0.00	734.38	197273.86	22313384.45	8348.87	423302.51
AP4-3	242115.88	0.00	0.00	0.00	0.00	18827530.45	4897.93	208978.31
34HP45-856-1	320685.60	0.00	0.00	1752.43	745147.01	17005542.45	469.42	145561.03
34HP45-856-2	419285.19	0.00	0.00	738.50	438259.01	16418984.45	0.00	127322.04
34HP45-856-3	538645.69	0.00	0.00	546.70	426602.01	15120759.45	0.00	104936.92
34HP45-856-4	4480138.63	145875.24	0.00	225.90	3010445.61	12711917.45	1013.79	82550.19
34HP45-856-5	5545308.63	402982.35	0.00	532.66	3360919.11	14405283.45	2196.63	92878.52
34HP45-856-6	4505848.13	114487.93	0.00	474.70	3290363.41	15652350.45	752.30	83835.11
34HP45-856-7	9033963.13	268708.35	0.00	415.46	5819144.61	13503043.45	884.91	67961.34
34HP45-856-8	10194129.13	574039.05	0.00	271.86	9766841.11	13890141.45	1516.19	66809.94
34HP45-856-9	10831070.13	514911.55	0.00	223.94	5350746.61	13441340.45	655.62	65114.76
34HP45-856-10	558038.57	0.00	0.00	129.58	602053.01	14869056.45	0.00	67215.22
34HP45-856-11	625588.51	0.00	0.00	0.00	453882.71	15173881.45	0.00	67530.74
34HP45-856-12	2265725.93	0.00	0.00	46.18	1126986.01	15259667.45	0.00	67947.38
34HP45-856-13	532725.57	0.00	0.00	3218.28	396229.21	15712035.45	0.00	62862.76
34HP45-856-14	934373.88	0.00	0.00	5017.77	477761.01	14397715.45	0.00	51941.33
34HP45-856-15	417401.51	0.00	0.00	5009.45	85560.30	12532071.45	0.00	41743.24
34HP45-856-16	1183788.23	0.00	0.00	9577.71	404834.41	9432546.45	0.00	36111.20
34HP45-856-17	345403.01	0.00	0.00	11507.72	61618.24	9622752.45	0.00	35997.80
34HP45-856-18	506927.51	0.00	0.00	8746.67	89518.36	7871541.45	0.00	29993.73
SRM614-4	5262213.63	3590212.55	0.00	0.00	0.00	1486037.85	0.00	742.76
SRM612-4	6219267.13	4611461.55	0.00	202.38	0.00	1885304.25	16517.23	2518.09
SRM610-4	4469375.63	3006646.35	0.00	0.00	180278.24	1238250.45	149153.95	13230.47
AP1-4	47791.19	0.00	0.00	0.00	0.00	15438370.45	0.00	46699.58
AP2-4	28203.76	0.00	0.00	0.00	0.00	16812350.45	0.00	52597.54
AP3-4	218651.43	0.00	0.00	0.00	0.00	23116342.45	2092.07	132744.28
AP4-4	231793.91	0.00	0.00	0.00	0.00	20597934.45	995.51	80214.73
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-3	2.809379	1.840019	0.001804	0.001297	0.129788	1.000000	0.027690	0.000979
SRM612-3	2.672248	1.727969	0.001193	0.002806	1.204636	1.000000	0.026085	0.003799
SRM610-3	2.654911	1.443645	0.000933	0.001641	0.989705	1.000000	0.083166	0.011421
AP1-3	0.008965	0.000000	0.000000	0.000085	0.030472	1.000000	0.000283	0.013750
AP2-3	0.004976	0.000000	0.000000	0.000046	0.019541	1.000000	0.000148	0.012226
AP3-3	0.014606	0.000000	0.000000	0.000033	0.008841	1.000000	0.000374	0.018971
AP4-3	0.012860	0.000000	0.000000	0.000000	0.000000	1.000000	0.000260	0.011100
34HP45-856-1	0.018858	0.000000	0.000000	0.000103	0.043818	1.000000	0.000028	0.008560
34HP45-856-2	0.025537	0.000000	0.000000	0.000045	0.026692	1.000000	0.000000	0.007755
34HP45-856-3	0.035623	0.000000	0.000000	0.000036	0.028213	1.000000	0.000000	0.006940
34HP45-856-4	0.352436	0.011475	0.000000	0.000018	0.236821	1.000000	0.000080	0.006494
34HP45-856-5	0.384950	0.027975	0.000000	0.000037	0.233312	1.000000	0.000152	0.006448
34HP45-856-6	0.287870	0.007314	0.000000	0.000030	0.210215	1.000000	0.000048	0.005356
34HP45-856-7	0.669032	0.019900	0.000000	0.000031	0.430951	1.000000	0.000066	0.005033
34HP45-856-8	0.733911	0.041327	0.000000	0.000020	0.703149	1.000000	0.000109	0.004810
34HP45-856-9	0.805803	0.038308	0.000000	0.000017	0.398081	1.000000	0.000049	0.004844
34HP45-856-10	0.037530	0.000000	0.000000	0.000009	0.040490	1.000000	0.000000	0.004520
34HP45-856-11	0.041228	0.000000	0.000000	0.000000	0.029912	1.000000	0.000000	0.004450
34HP45-856-12	0.148478	0.000000	0.000000	0.000003	0.073854	1.000000	0.000000	0.004453
34HP45-856-13	0.033906	0.000000	0.000000	0.000205	0.025218	1.000000	0.000000	0.004001
34HP45-856-14	0.064897	0.000000	0.000000	0.000349	0.033183	1.000000	0.000000	0.003608
34HP45-856-15	0.033307	0.000000	0.000000	0.000400	0.006827	1.000000	0.000000	0.003331
34HP45-856-16	0.125500	0.000000	0.000000	0.001015	0.042919	1.000000	0.000000	0.003828
34HP45-856-17	0.035894	0.000000	0.000000	0.001196	0.006403	1.000000	0.000000	0.003741
34HP45-856-18	0.064400	0.000000	0.000000	0.001111	0.011372	1.000000	0.000000	0.003810

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	3.541103	2.415963	0.000000	0.000000	0.000000	1.000000	0.000000	0.000500
SRM612-4	3.298814	2.446004	0.000000	0.000107	0.000000	1.000000	0.008761	0.001336
SRM610-4	3.609428	2.428141	0.000000	0.000000	0.145591	1.000000	0.120455	0.010685
AP1-4	0.003096	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003025
AP2-4	0.001678	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.003129
AP3-4	0.009459	0.000000	0.000000	0.000000	0.000000	1.000000	0.000091	0.005742
AP4-4	0.011253	0.000000	0.000000	0.000000	0.000000	1.000000	0.000048	0.003894

standardize signal averages AP

AP1	0.006030	0.000000	0.000000	0.000042	0.015236	1.000000	0.000141	0.008387
AP2	0.003327	0.000000	0.000000	0.000023	0.009771	1.000000	0.000074	0.007677
AP3	0.012032	0.000000	0.000000	0.000016	0.004421	1.000000	0.000232	0.012357
AP4	0.012056	0.000000	0.000000	0.000000	0.000000	1.000000	0.000154	0.007497

linest from std sig ave

	0.021457	0.000000	0.000000	0.268971	0.000370	1.000000	0.021737	0.117857
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standardize signal averages SRM

srm614-2	3.175241	2.127991	0.000902	0.000648	0.064894	1.000000	0.013845	0.000739
srm612-2	2.985531	2.086987	0.000596	0.001457	0.602318	1.000000	0.017423	0.002567
srm610-2	3.132169	1.935893	0.000467	0.000820	0.567648	1.000000	0.101810	0.011053

linest from std sig ave

	0.045684	1.910882	1.690286	1.398491	0.001283	1.000000	0.049015	0.443943
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concentration data

SRM614-3	5169.79	0.00	0.00	29.91	14.28	85763.00	51.62	9.90
SRM612-3	4917.45	0.00	0.00	64.72	132.52	85763.00	48.63	38.40
SRM610-3	4885.54	0.00	0.00	37.85	108.88	85763.00	155.04	115.44
AP1-3	76.74	0.00	0.00	9.08	15.59	398936.00	2.45	646.48
AP2-3	42.59	0.00	0.00	4.90	10.00	398936.00	1.28	574.84
AP3-3	125.02	0.00	0.00	3.53	4.52	398936.00	3.24	891.96
AP4-3	110.08	0.00	0.00	0.00	0.00	398936.00	2.26	521.87
34HP45-856-1	161.42	0.00	0.00	11.06	22.42	398936.00	0.24	402.45
34HP45-856-2	218.59	0.00	0.00	4.83	13.66	398936.00	0.00	364.60
34HP45-856-3	304.93	0.00	0.00	3.88	14.44	398936.00	0.00	326.30
34HP45-856-4	3016.80	0.00	0.00	1.91	121.18	398936.00	0.69	305.33
34HP45-856-5	3295.11	0.00	0.00	3.97	119.39	398936.00	1.32	303.15
34HP45-856-6	2464.13	0.00	0.00	3.25	107.57	398936.00	0.42	251.83
34HP45-856-7	5726.81	0.00	0.00	3.30	220.52	398936.00	0.57	236.64
34HP45-856-8	6282.17	0.00	0.00	2.10	359.81	398936.00	0.95	226.15
34HP45-856-9	6897.55	0.00	0.00	1.79	203.70	398936.00	0.42	227.77
34HP45-856-10	321.25	0.00	0.00	0.94	20.72	398936.00	0.00	212.54
34HP45-856-11	352.91	0.00	0.00	0.00	15.31	398936.00	0.00	209.25
34HP45-856-12	1270.95	0.00	0.00	0.32	37.79	398936.00	0.00	209.36
34HP45-856-13	290.23	0.00	0.00	21.98	12.90	398936.00	0.00	188.11
34HP45-856-14	555.51	0.00	0.00	37.40	16.98	398936.00	0.00	169.62
34HP45-856-15	285.10	0.00	0.00	42.89	3.49	398936.00	0.00	156.61
34HP45-856-16	1074.26	0.00	0.00	108.95	21.96	398936.00	0.00	180.00
34HP45-856-17	307.25	0.00	0.00	128.32	3.28	398936.00	0.00	175.89
34HP45-856-18	551.25	0.00	0.00	119.23	5.82	398936.00	0.00	179.16
SRM614-4	6516.31	0.00	0.00	0.00	0.00	85763.00	0.00	5.05
SRM612-4	6070.45	0.00	0.00	2.48	0.00	85763.00	16.33	13.50
SRM610-4	6642.04	0.00	0.00	0.00	16.02	85763.00	224.55	108.00
AP1-4	5.70	0.00	0.00	0.00	0.00	85763.00	0.00	30.58
AP2-4	3.09	0.00	0.00	0.00	0.00	85763.00	0.00	31.62
AP3-4	17.41	0.00	0.00	0.00	0.00	85763.00	0.17	58.04
AP4-4	96.33	0.00	0.00	0.00	0.00	398936.00	0.42	183.10

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

raw data

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-1	28379.00	951939.50	6848.24	5389.35	924145.06	177057.36	10443.58	655.52
SRM614-1	6775005.50	4983804.50	7940.12	7373.60	1025210.20	2173709.00	44185.81	1871.05
SRM612-1	7330961.50	5453551.00	7200.44	9541.01	1820659.40	2442131.00	56234.44	4131.86
SRM610-1	5092579.50	3907465.00	5671.87	8100.25	1771465.80	1669464.50	167860.06	13893.76
AP1-1	122808.53	346394.06	3590.62	5761.71	904870.88	16012663.00	12247.47	132606.83
AP2-1	109879.62	268751.50	3051.46	5354.43	827546.25	17880952.00	12217.55	131488.22
AP3-1	290498.88	218239.23	3026.50	5156.59	708008.44	22507630.00	16234.21	187328.97
AP4-1	312900.22	182691.19	2572.85	4899.31	608048.69	22740736.00	17987.46	154722.98

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	160993.23	185658.69	1952.41	21658.68	1070716.10	11167681.00	7917.44	58412.29
34HP45-695-2	105556.00	158906.14	1772.65	15847.97	830212.69	8434092.00	6627.24	40428.27
34HP45-695-3	174293.83	152558.98	1581.77	17989.46	872301.56	8800700.00	6658.88	37731.53
34HP45-695-4	4371912.50	459334.88	1575.89	5731.07	2919308.80	16846624.00	10841.90	22347.61
34HP45-695-5	3926028.50	414143.28	1365.89	5733.59	2650046.00	14877242.00	9748.54	18564.55
34HP45-695-6	7195169.00	564505.75	1383.49	5508.59	4547763.50	12162934.00	9507.45	29356.41
34HP45-695-7	2591231.00	260932.78	1431.57	10363.70	2222403.50	15492476.00	9027.45	35537.80
34HP45-695-8	2641472.00	223168.45	1206.25	9392.17	2012216.60	15329498.00	8996.21	37214.65
34HP45-695-9	3008392.30	437481.91	1270.17	9895.90	2128969.00	16130534.00	9727.34	30825.33
34HP45-695-10	2047292.10	291661.63	1207.21	17630.82	2440711.50	13182516.00	8073.69	32630.74
34HP45-695-11	1737776.10	168778.88	1184.89	19308.95	1465363.10	12867900.00	7587.24	36474.97
34HP45-695-12	3638778.80	299599.56	1182.25	18929.43	2489132.00	11271015.00	7445.00	38111.98
34HP45-695-13	3164028.50	308093.09	1266.53	18381.42	2686109.80	13677791.00	8198.01	40708.55
34HP45-695-14	781059.94	109863.34	1045.21	18289.14	1007441.90	12869811.00	6996.04	35110.08
34HP45-695-15	2223508.00	190456.11	1076.29	15703.89	1778146.30	13012728.00	7282.72	33426.71
34HP45-695-16	490694.38	104543.51	1137.09	16341.93	1105213.10	12416198.00	6728.80	36722.37
34HP45-695-17	134336.63	50990.97	1030.57	15949.45	637955.31	11871848.00	6173.96	33094.19
34HP45-695-18	208123.97	59866.02	997.13	16770.49	697435.69	12604118.00	6382.88	36024.44
SRM614-2	5410922.50	4657982.50	2679.70	4677.95	441317.53	1707189.80	9632.37	1451.73
SRM612-2	5938174.00	5191401.50	2848.14	5260.71	605667.38	1888639.40	25706.11	2932.62
SRM610-2	4244395.50	3624872.00	2100.21	5051.87	804068.25	1292720.50	159561.34	13717.56
AP1-2	55515.31	26108.63	1004.13	3794.26	382946.59	14255143.00	6930.28	33598.27
AP2-2	60487.78	24307.42	1096.29	3622.14	328747.66	15053346.00	7384.92	35651.88
AP3-2	181797.02	29273.24	1505.09	3484.34	305244.75	19036564.00	11555.35	61712.35
AP4-2	250320.20	34146.35	1525.29	3544.06	291814.41	20323470.00	14771.04	61993.39
blank-2	18717.03	31435.34	349.04	2523.65	376680.28	91204.39	1966.05	963.61
blank average	23548.01	491687.42	3598.64	3956.50	650412.67	134130.88	6204.82	809.56

blank subtraction								
SRM614-1	6751457.49	4492117.08	4341.48	3417.10	374797.53	2039578.12	37980.99	1061.49
SRM612-1	7307413.49	4961863.58	3601.80	5584.51	1170246.73	2308000.12	50029.62	3322.30
SRM610-1	5069031.49	3415777.58	2073.23	4143.74	1121053.13	1535333.62	161655.25	13084.19
AP1-1	99260.52	-145293.36	-8.02	1805.21	254458.21	15878532.12	6042.65	131797.27
AP2-1	86331.61	-222935.92	-547.18	1397.93	177133.58	17746821.12	6012.73	130678.66
AP3-1	266950.87	-273448.19	-572.14	1200.09	57595.77	22373499.12	10029.40	186519.41
AP4-1	289352.21	-308996.23	-1025.79	942.81	-42363.98	22606605.12	11782.65	153913.42
34HP45-695-1	137445.22	-306028.73	-1646.23	17702.18	420303.43	11033550.12	1712.63	57602.72
34HP45-695-2	82007.99	-332781.28	-1825.99	11891.47	179800.02	8299961.12	422.42	3618.71
34HP45-695-3	150745.82	-339128.44	-2016.87	14032.96	221888.89	8666569.12	454.06	36921.97
34HP45-695-4	4348364.49	-32352.54	-2022.75	1774.57	2268896.13	16712493.12	4637.09	21538.04
34HP45-695-5	3902480.49	-77544.14	-2232.75	1777.09	1999633.33	14743111.12	3543.72	17754.98
34HP45-695-6	7171620.99	72818.33	-2215.15	1552.09	3897350.83	12028803.12	3302.64	28546.84
34HP45-695-7	2567682.99	-230754.64	-2167.07	6407.20	1571990.83	15358345.12	2822.64	34728.24
34HP45-695-8	2617923.99	-268518.97	-2392.39	5435.67	1361803.93	15195367.12	2791.40	36405.08
34HP45-695-9	2984844.29	-54205.51	-2328.47	5939.39	1478556.33	15996403.12	3522.52	30015.77
34HP45-695-10	2023744.09	-200025.79	-2391.43	13674.32	1790298.83	13048385.12	1868.87	31821.18
34HP45-695-11	1714228.09	-322908.54	-2413.75	15352.45	814950.43	12733769.12	1382.43	35665.40
34HP45-695-12	3615230.79	-192087.86	-2416.39	14972.92	1838719.33	11136884.12	1240.19	37302.41
34HP45-695-13	3140480.49	-183594.33	-2332.11	14424.92	2035697.13	13543660.12	1993.19	39898.99
34HP45-695-14	757511.93	-381824.08	-2553.43	14332.64	357029.23	12735680.12	791.22	34300.51
34HP45-695-15	2199959.99	-301231.31	-2522.35	11747.39	1127733.63	12878597.12	1077.91	32617.14
34HP45-695-16	467146.37	-387143.91	-2461.55	12385.43	454800.43	12282067.12	523.98	35912.80
34HP45-695-17	110788.62	-440696.45	-2568.07	11992.95	-12457.36	11737717.12	-30.86	32284.62
34HP45-695-18	184575.96	-431821.40	-2601.51	12813.99	47023.02	12469987.12	178.06	35214.88
SRM614-2	5387374.49	4166295.08	-918.95	721.44	-209095.14	1573058.92	3427.56	642.16
SRM612-2	5914625.99	4699714.08	-750.50	1304.21	-44745.29	1754508.52	19501.29	2123.05
SRM610-2	4220847.49	3133184.58	-1498.43	1095.37	153655.58	1158589.62	153356.53	12907.99
AP1-2	31967.30	-465578.79	-2594.51	-162.24	-267466.08	14121012.12	725.46	32788.71
AP2-2	36939.77	-467380.00	-2502.35	-334.36	-321665.01	14919215.12	1180.11	34842.31
AP3-2	158249.01	-462414.17	-2093.55	-472.16	-345167.92	18902433.12	5350.53	60902.78
AP4-2	226772.19	-457541.07	-2073.35	-412.44	-358598.26	20189339.12	8566.23	61183.83

zero correction								
SRM614-1	6751457.49	4492117.08	4341.48	3417.10	374797.53	2039578.12	37980.99	1061.49
SRM612-1	7307413.49	4961863.58	3601.80	5584.51	1170246.73	2308000.12	50029.62	3322.30
SRM610-1	5069031.49	3415777.58	2073.23	4143.74	1121053.13	1535333.62	161655.25	13084.19
AP1-1	99260.52	0.00	0.00	1805.21	254458.21	15878532.12	6042.65	131797.27
AP2-1	86331.61	0.00	0.00	1397.93	177133.58	17746821.12	6012.73	130678.66
AP3-1	266950.87	0.00	0.00	1200.09	57595.77	22373499.12	10029.40	186519.41
AP4-1	289352.21	0.00	0.00	942.81	0.00	22606605.12	11782.65	153913.42
34HP45-695-1	137445.22	0.00	0.00	17702.18	420303.43	11033550.12	1712.63	57602.72
34HP45-695-2	82007.99	0.00	0.00	11891.47	179800.02	8299961.12	422.42	3618.71
34HP45-695-3	150745.82	0.00	0.00	14032.96	221888.89	8666569.12	454.06	36921.97
34HP45-695-4	4348364.49	0.00	0.00	1774.57	2268896.13	16712493.12	4637.09	21538.04
34HP45-695-5	3902480.49	0.00	0.00	1777.09	1999633.33	14743111.12	3543.72	17754.98
34HP45-695-6	7171620.99	72818.33	0.00	1552.09	3897350.83	12028803.12	3302.64	28546.84
34HP45-695-7	2567682.99	0.00	0.00	6407.20	1571990.83	15358345.12	2822.64	34728.24
34HP45-695-8	2617923.99	0.00	0.00	5435.67	1361803.93	15195367.12	2791.40	36405.08

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	2984844.29	0.00	0.00	5939.39	1478556.33	15996403.12	3522.52	30015.77
34HP45-695-10	2023744.09	0.00	0.00	13674.32	1790298.83	13048385.12	1868.87	31821.18
34HP45-695-11	1714228.09	0.00	0.00	15352.45	814950.43	12733769.12	1382.43	35665.40
34HP45-695-12	3615230.79	0.00	0.00	14972.92	1838719.33	11136884.12	1240.19	37302.41
34HP45-695-13	3140480.49	0.00	0.00	14424.92	2035697.13	13543660.12	1993.19	39898.99
34HP45-695-14	757511.93	0.00	0.00	14332.64	357029.23	12735680.12	791.22	34300.51
34HP45-695-15	2199959.99	0.00	0.00	11747.39	1127733.63	12878597.12	1077.91	32617.14
34HP45-695-16	467146.37	0.00	0.00	12385.43	454800.43	12282067.12	523.98	35912.80
34HP45-695-17	110788.62	0.00	0.00	11992.95	0.00	11737717.12	0.00	32284.62
34HP45-695-18	184575.96	0.00	0.00	12813.99	47023.02	12469987.12	178.06	35214.88
SRM614-2	5387374.49	4166295.08	0.00	721.44	0.00	1573058.92	3427.56	642.16
SRM612-2	5914625.99	4699714.08	0.00	1304.21	0.00	1754508.52	19501.29	2123.05
SRM610-2	4220847.49	3133184.58	0.00	1095.37	153655.58	1158589.62	153356.53	12907.99
AP1-2	31967.30	0.00	0.00	0.00	0.00	14121012.12	725.46	32788.71
AP2-2	36939.77	0.00	0.00	0.00	0.00	14919215.12	1180.11	34842.31
AP3-2	158249.01	0.00	0.00	0.00	0.00	18902433.12	5350.53	60902.78
AP4-2	226772.19	0.00	0.00	0.00	0.00	20189339.12	8566.23	61183.83

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-1	3.310223	2.202474	0.002129	0.001675	0.183762	1.000000	0.018622	0.000520
SRM612-1	3.166124	2.149854	0.001561	0.002420	0.507039	1.000000	0.021677	0.001439
SRM610-1	3.301583	2.224779	0.001350	0.002699	0.730169	1.000000	0.105290	0.008522
AP1-1	0.006251	0.000000	0.000000	0.000114	0.016025	1.000000	0.000381	0.008300
AP2-1	0.004865	0.000000	0.000000	0.000079	0.009981	1.000000	0.000339	0.007363
AP3-1	0.011932	0.000000	0.000000	0.000054	0.002574	1.000000	0.000448	0.008337
AP4-1	0.012799	0.000000	0.000000	0.000042	0.000000	1.000000	0.000521	0.006808
34HP45-695-1	0.012457	0.000000	0.000000	0.001604	0.038093	1.000000	0.000155	0.005221
34HP45-695-2	0.009881	0.000000	0.000000	0.001433	0.021663	1.000000	0.000051	0.004773
34HP45-695-3	0.017394	0.000000	0.000000	0.001619	0.025603	1.000000	0.000052	0.004260
34HP45-695-4	0.260186	0.000000	0.000000	0.000106	0.135760	1.000000	0.000277	0.001289
34HP45-695-5	0.264699	0.000000	0.000000	0.000121	0.135632	1.000000	0.000240	0.001204
34HP45-695-6	0.596204	0.006054	0.000000	0.000129	0.324002	1.000000	0.000275	0.002373
34HP45-695-7	0.167185	0.000000	0.000000	0.000417	0.102354	1.000000	0.000184	0.002261
34HP45-695-8	0.172284	0.000000	0.000000	0.000358	0.089620	1.000000	0.000184	0.002396
34HP45-695-9	0.186595	0.000000	0.000000	0.000371	0.092431	1.000000	0.000220	0.001876
34HP45-695-10	0.155095	0.000000	0.000000	0.001048	0.137205	1.000000	0.000143	0.002439
34HP45-695-11	0.134621	0.000000	0.000000	0.001206	0.063999	1.000000	0.000109	0.002801
34HP45-695-12	0.324618	0.000000	0.000000	0.001344	0.165102	1.000000	0.000111	0.003349
34HP45-695-13	0.231878	0.000000	0.000000	0.001065	0.150306	1.000000	0.000147	0.002946
34HP45-695-14	0.059480	0.000000	0.000000	0.001125	0.028034	1.000000	0.000062	0.002693
34HP45-695-15	0.170823	0.000000	0.000000	0.000912	0.087566	1.000000	0.000084	0.002533
34HP45-695-16	0.038035	0.000000	0.000000	0.001008	0.037030	1.000000	0.000043	0.002924
34HP45-695-17	0.009439	0.000000	0.000000	0.001022	0.000000	1.000000	0.000000	0.002751
34HP45-695-18	0.014802	0.000000	0.000000	0.001028	0.003771	1.000000	0.000014	0.002824
SRM614-2	3.424776	2.648531	0.000000	0.000459	0.000000	1.000000	0.002179	0.000408
SRM612-2	3.371101	2.678650	0.000000	0.000743	0.000000	1.000000	0.011115	0.001210
SRM610-2	3.643091	2.704309	0.000000	0.000945	0.132623	1.000000	0.132365	0.011141
AP1-2	0.002264	0.000000	0.000000	0.000000	0.000000	1.000000	0.000051	0.002322
AP2-2	0.002476	0.000000	0.000000	0.000000	0.000000	1.000000	0.000079	0.002335
AP3-2	0.008372	0.000000	0.000000	0.000000	0.000000	1.000000	0.000283	0.003222
AP4-2	0.011232	0.000000	0.000000	0.000000	0.000000	1.000000	0.000424	0.003031

standardize signal averages AP								
AP1	0.004258	0.000000	0.000000	0.000057	0.008013	1.000000	0.000216	0.005311
AP2	0.003670	0.000000	0.000000	0.000039	0.004991	1.000000	0.000209	0.004849
AP3	0.010152	0.000000	0.000000	0.000027	0.001287	1.000000	0.000366	0.005779
AP4	0.012016	0.000000	0.000000	0.000021	0.000000	1.000000	0.000473	0.004919

linest from std sig ave								
	0.024217	0.000000	0.000000	0.202601	0.000559	1.000000	0.011981	0.212475

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	3.367499	2.425502	0.001064	0.001067	0.091881	1.000000	0.010400	0.000464
srM612-2	3.268612	2.414252	0.000780	0.001581	0.253520	1.000000	0.016396	0.001325
srM610-2	3.472337	2.464544	0.000675	0.001822	0.431396	1.000000	0.118827	0.009832
linest from std sig ave								
	0.042002	1.611618	1.507986	1.434770	0.003047	1.000000	0.042717	0.512168
concentration data								
SRM614-1	6875.16	0.00	0.00	29.11	48.03	85763.00	19.13	9.48
SRM612-1	6575.87	0.00	0.00	42.04	132.52	85763.00	22.27	26.23
SRM610-1	6857.22	0.00	0.00	46.90	190.84	85763.00	108.18	155.29
AP1-1	60.39	0.00	0.00	9.19	19.48	398936.00	1.82	703.57
AP2-1	47.00	0.00	0.00	6.37	12.13	398936.00	1.62	624.16
AP3-1	115.27	0.00	0.00	4.34	3.13	398936.00	2.14	706.64
AP4-1	123.66	0.00	0.00	3.37	0.00	398936.00	2.49	577.10
34HP45-695-1	120.35	0.00	0.00	129.68	46.31	398936.00	0.74	442.53
34HP45-695-2	95.46	0.00	0.00	115.80	26.34	398936.00	0.24	404.61
34HP45-695-3	168.05	0.00	0.00	130.87	31.13	398936.00	0.25	361.12
34HP45-695-4	2513.70	0.00	0.00	8.58	165.05	398936.00	1.33	109.24
34HP45-695-5	2557.29	0.00	0.00	9.74	164.89	398936.00	1.15	102.08
34HP45-695-6	5760.02	0.00	0.00	10.43	393.90	398936.00	1.31	201.16
34HP45-695-7	1615.20	0.00	0.00	33.72	124.44	398936.00	0.88	191.67
34HP45-695-8	1664.47	0.00	0.00	28.91	108.95	398936.00	0.88	203.08
34HP45-695-9	1802.72	0.00	0.00	30.01	112.37	398936.00	1.05	159.05
34HP45-695-10	1498.40	0.00	0.00	84.70	166.81	398936.00	0.68	206.71
34HP45-695-11	1300.59	0.00	0.00	97.45	77.81	398936.00	0.52	237.41
34HP45-695-12	3136.18	0.00	0.00	108.66	200.72	398936.00	0.53	283.91
34HP45-695-13	2240.21	0.00	0.00	86.08	182.73	398936.00	0.70	249.71
34HP45-695-14	574.64	0.00	0.00	90.96	34.08	398936.00	0.30	228.29
34HP45-695-15	1650.35	0.00	0.00	73.73	106.46	398936.00	0.40	214.68
34HP45-695-16	367.46	0.00	0.00	81.51	45.02	398936.00	0.20	247.85
34HP45-695-17	91.19	0.00	0.00	82.58	0.00	398936.00	0.00	233.14
34HP45-695-18	143.00	0.00	0.00	83.05	4.58	398936.00	0.07	239.37
SRM614-2	7113.08	0.00	0.00	7.97	0.00	85763.00	2.24	7.44
SRM612-2	7001.60	0.00	0.00	12.92	0.00	85763.00	11.42	22.05
SRM610-2	7566.51	0.00	0.00	16.43	34.66	85763.00	136.00	203.02
AP1-2	21.87	0.00	0.00	0.00	0.00	398936.00	0.25	196.82
AP2-2	23.92	0.00	0.00	0.00	0.00	398936.00	0.38	197.96
AP3-2	80.88	0.00	0.00	0.00	0.00	398936.00	1.35	273.11
AP4-2	108.52	0.00	0.00	0.00	0.00	398936.00	2.03	256.88
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-1	11642.79	437676.22	3394.66	6127.23	663207.69	14205.76	1972.45	704.44
SRM614-1	13086157.00	11932728.00	8730.93	11435.82	1259434.80	4521095.00	36020.84	13357.08
SRM612-1	4397865.00	3791660.50	3426.74	8477.13	1467977.40	1315811.60	23056.89	15770.65
SRM610-1	2539012.00	2162914.30	2204.13	9368.01	1565305.60	725197.88	97983.83	24822.98
AP1-1	194140.66	99922.16	1638.17	5861.71	397940.13	17234698.00	8459.53	67401.26
AP2-1	79836.45	79809.65	1337.81	5261.35	314931.06	14515650.00	7748.64	44468.89
AP3-1	192820.97	76324.63	1663.85	5642.11	385658.50	18871526.00	12181.67	76022.23
AP4-1	405843.06	74016.98	1673.33	5312.79	301733.94	17218138.00	14555.68	68481.87
MZ1-1	46647.50	57983.57	1160.37	19167.55	1258539.50	11670898.00	5648.07	38827.50
MZ1-2	48499.04	52569.94	975.21	18720.71	1317136.10	10284808.00	5322.15	40523.95
MZ1-3	31695.82	46350.94	924.41	16726.06	1076105.90	8964993.00	4449.71	34445.04
MZ1-4	115717.85	75418.70	1055.61	14918.92	2032429.00	10542737.00	5111.11	34929.08
MZ1-5	93377.93	63944.04	897.89	15567.41	2078104.00	10061311.00	5041.19	29534.89
MZ1-6	108001.21	70161.95	881.04	14496.52	1739624.60	8713712.00	4420.50	23022.17
MZ1-7	101410.09	60672.22	981.61	19948.11	2182579.80	11891602.00	5613.71	25968.71
MZ1-8	110424.42	56335.92	1021.53	21599.84	2631315.50	12653483.00	5724.03	27501.92
MZ1-9	93701.45	53336.34	989.05	19911.79	2442299.80	11172397.00	5168.95	24670.78
MZ1-10	76682.63	47577.23	725.84	14158.44	1737553.10	7995536.50	4026.10	18445.10
MZ1-11	73041.17	43998.93	845.20	15916.25	1850756.90	8346782.50	4155.18	20670.48
MZ1-12	75868.51	46489.78	771.48	15583.45	1737539.30	8432016.00	4242.78	20321.88
MZ1-13	255251.84	97265.27	907.85	17987.42	2903196.80	9820444.00	4937.63	22361.33
MZ1-14	309251.84	109433.34	1085.05	22843.49	4116332.50	12017911.00	5786.27	28096.56
MZ1-15	296984.19	97467.95	1124.41	23561.37	4146259.00	12065448.00	5860.19	29980.45
MZ1-16	76667.79	45051.65	691.84	15642.01	2602828.50	7909342.00	3986.46	15824.85

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	47023.79	33232.19	826.96	18165.82	2569829.00	9253765.00	4482.31	20709.00
MZ1-18	87905.02	39870.06	1046.25	23301.73	5110986.00	13429374.00	6048.47	28398.72
MZ1-19	34321.40	34566.31	1294.85	19187.75	4320745.00	18155118.00	8019.13	46601.50
MZ1-20	24372.98	29446.65	1378.57	19589.03	4304417.50	18015248.00	7896.12	48787.56
MZ1-21	24356.62	29231.24	1387.33	23486.45	4943076.00	18980906.00	8448.25	48059.79
srm614-2	8024572.50	9470644.00	5307.11	6538.00	427376.72	2857210.30	12407.43	2811.10
srm612-2	2547537.80	2942184.50	1754.13	4632.19	473690.91	804594.31	13258.52	2900.14
srm610-2	1901241.30	2027907.40	1318.13	4979.79	721554.44	589364.38	81012.26	10422.06
AP1-2	59914.82	25025.10	797.16	3923.10	317966.28	9555008.00	5025.43	15597.25
AP2-2	36895.33	23999.42	658.52	3732.54	279054.47	8161297.50	4703.55	15013.81
AP3-2	123653.18	28746.68	1078.53	4065.38	276283.81	12488206.00	8079.61	33929.99
AP4-2	167215.45	35148.12	1152.13	4122.98	257226.20	12481505.00	10088.42	35365.84
blank-2	7971.00	22759.73	230.36	2741.66	339486.56	62597.43	1062.61	1020.05
blank ave	9806.89	230217.97	1812.51	4434.44	501347.13	38401.60	1517.53	862.24

blank subtraction								
SRM614-1	13076350.11	11702510.03	6918.42	7001.38	758087.68	4482693.40	34503.32	12494.83
SRM612-1	4388058.11	3561442.53	1614.23	4042.68	966630.28	1277410.00	21539.36	14908.40
SRM610-1	2529205.11	1932696.33	391.62	4933.57	1063958.48	686796.28	96466.30	23960.74
AP1-1	184333.77	-130295.81	-174.34	1427.27	-103407.00	17196296.40	6942.00	66539.01
AP2-1	70029.56	-150408.33	-474.70	826.90	-186416.07	14477248.40	6231.12	43606.65
AP3-1	183014.08	-153893.34	-148.66	1207.67	-115688.63	18833124.40	10664.14	75159.98
AP4-1	396036.17	-156201.00	-139.18	878.35	-199613.19	17179736.40	13038.15	67619.62
MZ1-1	36840.61	-172234.41	-652.14	14733.10	757192.38	11632496.40	4130.54	37965.26
MZ1-2	38692.14	-177648.04	-837.30	14286.26	815788.98	10246406.40	3804.62	39661.70
MZ1-3	21888.93	-183867.03	-888.10	12291.61	574758.78	8926591.40	2932.18	33582.79
MZ1-4	105910.96	-154799.27	-756.90	10484.48	1531081.88	10504335.40	3593.58	34066.83
MZ1-5	83571.04	-166273.94	-914.63	11132.96	1576756.88	10022909.40	3523.66	28672.64
MZ1-6	98194.32	-160056.02	-931.47	10062.08	1238277.48	8675310.40	2902.98	22159.93
MZ1-7	91603.20	-169545.75	-830.90	15513.67	1681232.68	11853200.40	4096.18	25106.46
MZ1-8	100617.53	-173882.06	-790.98	17165.40	2129968.38	12615081.40	4206.50	26639.67
MZ1-9	83894.55	-176881.63	-823.46	15477.35	1940952.68	11133995.40	3651.42	23808.53
MZ1-10	66875.74	-182640.75	-1086.67	9723.99	1236205.98	7957134.90	2508.57	17582.86
MZ1-11	63234.28	-186219.05	-967.31	11481.80	1349409.78	8308380.90	2637.66	19808.23
MZ1-12	66061.61	-183728.19	-1041.03	11149.00	1236192.18	8393614.40	2725.26	19459.63
MZ1-13	245444.95	-132952.71	-904.67	13552.98	2401849.68	9782042.40	3420.10	21499.08
MZ1-14	299444.95	-120784.63	-727.46	18409.04	3614985.38	11979509.40	4268.74	27234.31
MZ1-15	287177.30	-132750.03	-688.10	19126.93	3644911.88	12027046.40	4342.66	29118.20
MZ1-16	66860.89	-185166.32	-1120.67	11207.56	2101481.38	7870940.40	2468.93	14962.60
MZ1-17	37216.89	-196985.79	-985.55	13731.38	2068481.88	9215363.40	2964.78	19846.75
MZ1-18	78098.12	-190347.91	-766.26	18867.29	4609638.88	13390972.40	4530.95	27536.48
MZ1-19	24514.50	-195651.66	-517.66	14753.30	3819397.88	18116716.40	6501.60	45739.26
MZ1-20	14566.08	-200771.33	-433.94	15154.58	3803070.38	17976846.40	6378.60	47925.31
MZ1-21	14549.72	-200986.73	-425.18	19052.01	4441728.88	18942504.40	6930.72	47197.54
srm614-2	8014765.61	9240426.03	3494.60	2103.55	-73970.41	2818808.70	10889.90	1948.85
srm612-2	2537730.91	2711966.53	-58.38	197.74	-27656.22	766192.71	11740.99	2037.89
srm610-2	1891434.41	1797689.43	-494.38	545.34	220207.32	550962.78	79494.73	9559.81
AP1-2	50107.92	-205192.87	-1015.35	-511.34	-183380.85	9516606.40	3507.90	14735.00
AP2-2	27088.43	-206218.56	-1153.99	-701.90	-222292.66	8122895.90	3186.02	14151.56
AP3-2	113846.29	-201471.29	-733.98	-369.06	-225063.32	12449804.40	6562.08	33067.75
AP4-2	157408.56	-195069.86	-660.38	-311.46	-244120.93	12443103.40	8570.89	34503.60

zero correction								
SRM614-1	13076350.11	11702510.03	6918.42	7001.38	1259434.80	4482693.40	34503.32	12494.83
SRM612-1	4388058.11	3561442.53	1614.23	4042.68	1467977.40	1277410.00	21539.36	14908.40
SRM610-1	2529205.11	1932696.33	391.62	4933.57	1565305.60	686796.28	96466.30	23960.74
AP1-1	184333.77	0.00	0.00	1427.27	397940.13	17196296.40	6942.00	66539.01
AP2-1	70029.56	0.00	0.00	826.90	314931.06	14477248.40	6231.12	43606.65
AP3-1	183014.08	0.00	0.00	1207.67	385658.50	18833124.40	10664.14	75159.98
AP4-1	396036.17	0.00	0.00	878.35	301733.94	17179736.40	13038.15	67619.62
MZ1-1	36840.61	0.00	0.00	14733.10	1258539.50	11632496.40	4130.54	37965.26
MZ1-2	38692.14	0.00	0.00	14286.26	1317136.10	10246406.40	3804.62	39661.70
MZ1-3	21888.93	0.00	0.00	12291.61	1076105.90	8926591.40	2932.18	33582.79
MZ1-4	105910.96	0.00	0.00	10484.48	2032429.00	10504335.40	3593.58	34066.83
MZ1-5	83571.04	0.00	0.00	11132.96	2078104.00	10022909.40	3523.66	28672.64
MZ1-6	98194.32	0.00	0.00	10062.08	1739624.60	8675310.40	2902.98	22159.93
MZ1-7	91603.20	0.00	0.00	15513.67	2182579.80	11853200.40	4096.18	25106.46
MZ1-8	100617.53	0.00	0.00	17165.40	2631315.50	12615081.40	4206.50	26639.67
MZ1-9	83894.55	0.00	0.00	15477.35	2442299.80	11133995.40	3651.42	23808.53
MZ1-10	66875.74	0.00	0.00	9723.99	1737553.10	7957134.90	2508.57	17582.86
MZ1-11	63234.28	0.00	0.00	11481.80	1850756.90	8308380.90	2637.66	19808.23
MZ1-12	66061.61	0.00	0.00	11149.00	1737539.30	8393614.40	2725.26	19459.63
MZ1-13	245444.95	0.00	0.00	13552.98	2903196.80	9782042.40	3420.10	21499.08
MZ1-14	299444.95	0.00	0.00	18409.04	4116332.50	11979509.40	4268.74	27234.31
MZ1-15	287177.30	0.00	0.00	19126.93	4146259.00	12027046.40	4342.66	29118.20
MZ1-16	66860.89	0.00	0.00	11207.56	2602828.50	7870940.40	2468.93	14962.60
MZ1-17	37216.89	0.00	0.00	13731.38	2569829.00	9215363.40	2964.78	19846.75
MZ1-18	78098.12	0.00	0.00	18867.29	5110986.00	13390972.40	4530.95	27536.48

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	24514.50	0.00	0.00	14753.30	4320745.00	18116716.40	6501.60	45739.26
MZ1-20	14566.08	0.00	0.00	15154.58	4304417.50	17976846.40	6378.60	47925.31
MZ1-21	14549.72	0.00	0.00	19052.01	4943076.00	18942504.40	6930.72	47197.54
srm614-2	8014765.61	9240426.03	3494.60	2103.55	427376.72	2818808.70	10889.90	1948.85
srm612-2	2537730.91	2711966.53	0.00	197.74	473690.91	766192.71	11740.99	2037.89
srm610-2	1891434.41	1797689.43	0.00	545.34	721554.44	550962.78	79494.73	9559.81
AP1-2	50107.92	0.00	0.00	0.00	317966.28	9516606.40	3507.90	14735.00
AP2-2	27088.43	0.00	0.00	0.00	279054.47	8122895.90	3186.02	14151.56
AP3-2	113846.29	0.00	0.00	0.00	276283.81	12449804.40	6562.08	33067.75
AP4-2	157408.56	0.00	0.00	0.00	257226.20	12443103.40	8570.89	34503.60
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	2.917074	2.610598	0.001543	0.001562	0.280955	1.000000	0.007697	0.002787
SRM612-1	3.435121	2.788018	0.001264	0.003165	1.149183	1.000000	0.016862	0.011671
SRM610-1	3.682613	2.814075	0.000570	0.007183	2.279141	1.000000	0.140458	0.034888
AP1-1	0.010719	0.000000	0.000000	0.000083	0.023141	1.000000	0.000404	0.003869
AP2-1	0.004837	0.000000	0.000000	0.000057	0.021754	1.000000	0.000430	0.003012
AP3-1	0.009718	0.000000	0.000000	0.000064	0.020478	1.000000	0.000566	0.003991
AP4-1	0.023053	0.000000	0.000000	0.000051	0.017563	1.000000	0.000759	0.003936
MZ1-1	0.003167	0.000000	0.000000	0.001267	0.108192	1.000000	0.000355	0.003264
MZ1-2	0.003776	0.000000	0.000000	0.001394	0.128546	1.000000	0.000371	0.003871
MZ1-3	0.002452	0.000000	0.000000	0.001377	0.120551	1.000000	0.000328	0.003762
MZ1-4	0.010083	0.000000	0.000000	0.000998	0.193485	1.000000	0.000342	0.003243
MZ1-5	0.008338	0.000000	0.000000	0.001111	0.207335	1.000000	0.000352	0.002861
MZ1-6	0.011319	0.000000	0.000000	0.001160	0.200526	1.000000	0.000335	0.002554
MZ1-7	0.007728	0.000000	0.000000	0.001309	0.184134	1.000000	0.000346	0.002118
MZ1-8	0.007976	0.000000	0.000000	0.001361	0.208585	1.000000	0.000333	0.002112
MZ1-9	0.007535	0.000000	0.000000	0.001390	0.219355	1.000000	0.000328	0.002138
MZ1-10	0.008404	0.000000	0.000000	0.001222	0.218364	1.000000	0.000315	0.002210
MZ1-11	0.007611	0.000000	0.000000	0.001382	0.222758	1.000000	0.000317	0.002384
MZ1-12	0.007870	0.000000	0.000000	0.001328	0.207007	1.000000	0.000325	0.002318
MZ1-13	0.025091	0.000000	0.000000	0.001385	0.296788	1.000000	0.000350	0.002198
MZ1-14	0.024996	0.000000	0.000000	0.001537	0.343614	1.000000	0.000356	0.002273
MZ1-15	0.023878	0.000000	0.000000	0.001590	0.344745	1.000000	0.000361	0.002421
MZ1-16	0.008495	0.000000	0.000000	0.001424	0.330688	1.000000	0.000314	0.001901
MZ1-17	0.004039	0.000000	0.000000	0.001490	0.278864	1.000000	0.000322	0.002154
MZ1-18	0.005832	0.000000	0.000000	0.001409	0.381674	1.000000	0.000338	0.002056
MZ1-19	0.001353	0.000000	0.000000	0.000814	0.238495	1.000000	0.000359	0.002525
MZ1-20	0.000810	0.000000	0.000000	0.000843	0.239442	1.000000	0.000355	0.002666
MZ1-21	0.000768	0.000000	0.000000	0.001006	0.260952	1.000000	0.000366	0.002492
srm614-2	2.843317	3.278132	0.001240	0.000746	0.151616	1.000000	0.003863	0.000691
srm612-2	3.312131	3.539536	0.000000	0.000258	0.618240	1.000000	0.015324	0.002660
srm610-2	3.432962	3.262815	0.000000	0.000990	1.309625	1.000000	0.144283	0.017351
AP1-2	0.005265	0.000000	0.000000	0.000000	0.033412	1.000000	0.000369	0.001548
AP2-2	0.003335	0.000000	0.000000	0.000000	0.034354	1.000000	0.000392	0.001742
AP3-2	0.009144	0.000000	0.000000	0.000000	0.022192	1.000000	0.000527	0.002656
AP4-2	0.012650	0.000000	0.000000	0.000000	0.020672	1.000000	0.000689	0.002773
standardize signal averages AP								
AP1	0.007992	0.000000	0.000000	0.000041	0.028276	1.000000	0.000386	0.002709
AP2	0.004086	0.000000	0.000000	0.000029	0.028054	1.000000	0.000411	0.002377
AP3	0.009431	0.000000	0.000000	0.000032	0.021335	1.000000	0.000547	0.003323
AP4	0.017851	0.000000	0.000000	0.000026	0.019118	1.000000	0.000724	0.003354
linest from std sig ave								
	0.018137	0.000000	0.000000	0.246902	0.000348	1.000000	0.007272	0.370388
standardize signal averages SRM								
srm614-2	2.880195	2.944365	0.001392	0.001154	0.216286	1.000000	0.005780	0.001739
srm612-2	3.373626	3.163777	0.000632	0.001711	0.883711	1.000000	0.016093	0.007165

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	3.557788	3.038445	0.000285	0.004087	1.794383	1.000000	0.142371	0.026119
linest from std sig ave								
	0.042970	1.285993	0.701733	1.068425	0.000874	1.000000	0.035994	0.185002
concentration data								
SRM614-1	4537.44	0.00	0.00	33.07	21.07	85763.00	4.80	88.54
SRM612-1	5343.25	0.00	0.00	67.01	86.16	85763.00	10.52	370.73
SRM610-1	5728.22	0.00	0.00	152.11	170.89	85763.00	87.59	1108.23
AP1-1	77.56	0.00	0.00	8.18	8.07	398936.00	1.17	571.74
AP2-1	35.00	0.00	0.00	5.63	7.59	398936.00	1.25	445.07
AP3-1	70.31	0.00	0.00	6.32	7.14	398936.00	1.64	589.69
AP4-1	166.80	0.00	0.00	5.04	6.13	398936.00	2.20	581.59
MZ1-1	22.92	0.00	0.00	124.75	37.73	398936.00	1.03	482.25
MZ1-2	27.32	0.00	0.00	137.33	44.83	398936.00	1.08	571.95
MZ1-3	17.74	0.00	0.00	135.63	42.04	398936.00	0.95	555.89
MZ1-4	72.95	0.00	0.00	98.31	67.48	398936.00	0.99	479.21
MZ1-5	60.33	0.00	0.00	109.41	72.31	398936.00	1.02	422.70
MZ1-6	81.90	0.00	0.00	114.24	69.94	398936.00	0.97	377.44
MZ1-7	55.92	0.00	0.00	128.92	64.22	398936.00	1.00	312.98
MZ1-8	57.71	0.00	0.00	134.03	72.75	398936.00	0.97	312.03
MZ1-9	54.52	0.00	0.00	136.92	76.51	398936.00	0.95	315.97
MZ1-10	60.81	0.00	0.00	120.37	76.16	398936.00	0.91	326.51
MZ1-11	55.07	0.00	0.00	136.12	77.69	398936.00	0.92	352.28
MZ1-12	56.95	0.00	0.00	130.83	72.20	398936.00	0.94	342.57
MZ1-13	181.55	0.00	0.00	136.47	103.51	398936.00	1.01	324.75
MZ1-14	180.86	0.00	0.00	151.36	119.84	398936.00	1.03	335.92
MZ1-15	172.77	0.00	0.00	156.64	120.24	398936.00	1.05	357.74
MZ1-16	61.46	0.00	0.00	140.25	115.34	398936.00	0.91	280.89
MZ1-17	29.22	0.00	0.00	146.77	97.26	398936.00	0.93	318.23
MZ1-18	42.20	0.00	0.00	138.78	133.12	398936.00	0.98	303.85
MZ1-19	9.79	0.00	0.00	80.21	83.18	398936.00	1.04	373.05
MZ1-20	5.86	0.00	0.00	83.03	83.51	398936.00	1.03	393.92
MZ1-21	5.56	0.00	0.00	99.07	91.01	398936.00	1.06	368.17
srm614-2	4422.72	0.00	0.00	15.80	11.37	85763.00	2.41	21.96
srm612-2	5151.95	0.00	0.00	5.46	46.36	85763.00	9.56	84.49
srm610-2	5339.90	0.00	0.00	20.96	98.19	85763.00	89.98	551.17
AP1-2	38.10	0.00	0.00	0.00	11.65	398936.00	1.07	228.79
AP2-2	24.13	0.00	0.00	0.00	11.98	398936.00	1.14	257.43
AP3-2	66.16	0.00	0.00	0.00	7.74	398936.00	1.53	392.47
AP4-2	91.53	0.00	0.00	0.00	7.21	398936.00	2.00	409.73
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-5	10687.34	1628.77	187.00	1367.81	97288.02	14587.16	1171.21	789.84
SRM614-5	3896714.50	4551644.00	2608.61	6036.07	327311.31	1230125.60	9516.57	3355.50
SRM612-5	4683054.50	5625069.00	3118.10	5739.31	369957.59	1520900.00	24327.14	3838.70
SRM610-5	2489357.00	2351322.30	1513.93	4865.71	542557.56	705315.25	106372.76	11842.79
AP1-5	60671.94	22653.85	695.32	4033.42	377367.84	7330452.50	4769.31	21428.28
AP2-5	46486.34	20096.23	638.00	4051.58	331532.06	7865199.00	4927.71	17222.06
AP3-5	74509.66	22105.08	678.88	3751.82	296590.22	6821711.50	5255.47	20980.48
AP4-5	106015.72	23291.05	765.08	3546.70	259688.03	10171810.00	7481.04	25848.87
MZ2-1b	12726.67	16520.01	402.32	7873.72	300577.50	3403131.80	2427.41	7145.08
MZ2-2b	16400.01	16784.41	394.56	8835.13	370781.81	3766090.30	2495.89	8559.65
MZ2-3b	14535.12	15848.01	431.52	7950.24	342901.69	3363055.30	2391.13	7316.52
MZ2-4b	21691.48	17609.86	476.84	8302.05	322172.72	4606153.00	2838.66	8624.25
MZ2-5b	25142.06	17628.22	518.88	7796.84	349883.84	4727167.50	2877.86	8993.17
MZ2-6b	15402.25	15771.37	437.88	7671.08	306093.31	4096773.00	2591.01	7476.60
MZ2-7b	143053.44	39509.50	493.12	7962.00	599240.06	5212751.50	2910.10	9416.37
MZ2-8b	81243.34	30903.85	536.36	7881.08	501398.50	5256493.50	2981.74	9089.57
MZ2-9b	41147.23	21108.84	466.40	7521.16	376497.06	4618632.00	2694.22	7648.76
MZ2-10b	27074.79	19615.51	533.96	6853.04	386456.50	4100741.50	2530.21	7781.08
MZ2-11b	24350.90	18435.50	502.20	6193.84	385313.50	3771130.50	2403.65	7193.56
MZ2-12b	18876.35	16723.61	381.28	6033.99	335445.91	3246624.00	2228.49	6145.19
MZ2-13b	47209.91	21104.72	484.20	6525.24	479937.63	4796907.50	2752.42	8497.93
MZ2-14b	54207.07	20639.44	563.12	6689.04	524243.41	5554765.00	3025.90	9765.46
MZ2-15b	229317.58	40780.71	604.48	6544.76	797319.00	5995096.50	3335.90	11642.27
srm614-6	2799254.30	3532045.30	2077.93	4143.18	229838.58	940567.50	4984.87	1471.73
srm612-6	3279377.80	4245693.50	2417.37	4115.74	246501.50	1113979.10	16367.49	2380.05

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	1953360.30	1893000.50	1168.45	3790.82	338086.66	587439.44	88361.34	8570.97
AP1-6	43141.64	15718.33	488.84	3365.30	204690.06	5656850.50	3695.94	10531.30
AP2-6	36377.52	14957.60	635.52	3204.38	188868.30	6225281.00	3800.10	10754.86
AP3-6	72127.01	17650.30	611.28	3215.50	193435.53	6035551.00	4589.19	15445.53
AP4-6	104355.23	19516.55	775.72	2943.06	176077.44	9062283.00	7057.52	20415.20
blank-6	9992.18	13767.36	223.32	2504.17	199720.28	54253.75	1061.05	996.85
blank ave	10339.76	7698.06	205.16	1935.99	148504.15	34420.45	1116.13	893.35
blank subtraction								
SRM614-5	3886374.74	4543945.94	2403.45	4100.08	178807.16	1195705.15	8400.45	2462.15
SRM612-5	4672714.74	5617370.94	2912.94	3803.32	221453.44	1486479.55	23211.01	2945.36
SRM610-5	2479017.24	2343624.24	1308.77	2929.72	394053.41	670894.80	105256.63	10949.44
AP1-5	50332.18	14955.78	490.16	2097.43	228863.69	7296032.05	3653.18	20534.94
AP2-5	36146.58	12398.17	432.84	2115.59	183027.91	7830778.55	3811.58	16328.71
AP3-5	64169.90	14407.02	473.72	1815.83	148086.07	6787291.05	4139.34	20087.13
AP4-5	95675.96	15592.99	559.92	1610.71	111183.88	10137389.55	6364.92	24955.52
MZ2-1b	2386.91	8821.95	197.16	5937.73	152073.35	3368711.35	1311.29	6251.74
MZ2-2b	6060.25	9086.35	189.40	6899.14	222277.66	3731669.85	1379.77	7666.30
MZ2-3b	4195.36	8149.95	226.36	6014.25	194397.54	3328634.85	1275.01	6423.18
MZ2-4b	11351.72	9911.80	271.68	6366.06	173668.57	4571732.55	1722.53	7730.90
MZ2-5b	14802.30	9930.16	313.72	5860.85	201379.69	4692747.05	1761.73	8099.83
MZ2-6b	5062.49	8073.31	232.72	5735.09	157589.16	4062352.55	1474.89	6583.26
MZ2-7b	132713.68	31811.44	287.96	6026.01	450735.91	5178331.05	1793.97	8523.03
MZ2-8b	70903.58	23205.79	331.20	5945.09	352894.35	5222073.05	1865.61	8196.23
MZ2-9b	30807.47	13410.78	261.24	5585.17	227992.91	4584211.55	1578.09	6755.42
MZ2-10b	16735.04	11917.45	328.80	4917.05	237952.35	4066321.05	1414.09	6887.74
MZ2-11b	14011.14	10737.44	297.04	4257.84	236809.35	3736710.05	1287.53	6300.22
MZ2-12b	8536.59	9025.55	176.12	4098.00	186941.76	3212203.55	1112.37	5251.85
MZ2-13b	36870.15	13406.66	279.04	4589.25	331433.48	4702487.05	1636.29	7604.58
MZ2-14b	43867.31	12941.37	357.96	4753.05	375739.26	5520344.55	1909.77	8872.11
MZ2-15b	218977.82	33082.65	399.32	4608.77	648814.85	5960676.05	2219.77	10748.92
srm614-6	2788914.54	3524347.24	1872.77	2207.19	81334.43	906147.05	3868.74	578.38
srm612-6	3269038.04	4237995.44	2212.21	2179.75	97997.35	1079558.65	15251.37	1486.71
srm610-6	1943020.54	1885302.44	963.29	1854.83	189582.51	553018.99	87245.21	7677.62
AP1-6	32801.88	8020.26	283.68	1429.31	56185.91	5622430.05	2579.81	9637.95
AP2-6	26037.77	7259.54	430.36	1268.39	40364.15	6190860.55	2683.98	9861.51
AP3-6	61787.25	9952.24	406.12	1279.51	44931.38	6001130.55	3473.06	14552.18
AP4-6	94015.47	11818.49	570.56	1007.07	27573.29	9027862.55	5941.39	19521.85
zero correction								
SRM614-5	3886374.74	4543945.94	2403.45	4100.08	1259434.80	1195705.15	8400.45	2462.15
SRM612-5	4672714.74	5617370.94	2912.94	3803.32	1467977.40	1486479.55	23211.01	2945.36
SRM610-5	2479017.24	2343624.24	1308.77	2929.72	1565305.60	670894.80	105256.63	10949.44
AP1-5	50332.18	14955.78	490.16	2097.43	397940.13	7296032.05	3653.18	20534.94
AP2-5	36146.58	12398.17	432.84	2115.59	314931.06	7830778.55	3811.58	16328.71
AP3-5	64169.90	14407.02	473.72	1815.83	385658.50	6787291.05	4139.34	20087.13
AP4-5	95675.96	15592.99	559.92	1610.71	301733.94	10137389.55	6364.92	24955.52
MZ2-1b	2386.91	8821.95	197.16	5937.73	1258539.50	3368711.35	1311.29	6251.74
MZ2-2b	6060.25	9086.35	189.40	6899.14	1317136.10	3731669.85	1379.77	7666.30
MZ2-3b	4195.36	8149.95	226.36	6014.25	1076105.90	3328634.85	1275.01	6423.18
MZ2-4b	11351.72	9911.80	271.68	6366.06	2032429.00	4571732.55	1722.53	7730.90
MZ2-5b	14802.30	9930.16	313.72	5860.85	2078104.00	4692747.05	1761.73	8099.83
MZ2-6b	5062.49	8073.31	232.72	5735.09	1739624.60	4062352.55	1474.89	6583.26
MZ2-7b	132713.68	31811.44	287.96	6026.01	2182579.80	5178331.05	1793.97	8523.03
MZ2-8b	70903.58	23205.79	331.20	5945.09	2631315.50	5222073.05	1865.61	8196.23
MZ2-9b	30807.47	13410.78	261.24	5585.17	2442299.80	4584211.55	1578.09	6755.42
MZ2-10b	16735.04	11917.45	328.80	4917.05	1737553.10	4066321.05	1414.09	6887.74
MZ2-11b	14011.14	10737.44	297.04	4257.84	1850756.90	3736710.05	1287.53	6300.22
MZ2-12b	8536.59	9025.55	176.12	4098.00	1737539.30	3212203.55	1112.37	5251.85
MZ2-13b	36870.15	13406.66	279.04	4589.25	2903196.80	4702487.05	1636.29	7604.58
MZ2-14b	43867.31	12941.37	357.96	4753.05	4116332.50	5520344.55	1909.77	8872.11
MZ2-15b	218977.82	33082.65	399.32	4608.77	4146259.00	5960676.05	2219.77	10748.92
srm614-6	2788914.54	3524347.24	1872.77	2207.19	2602828.50	906147.05	3868.74	578.38
srm612-6	3269038.04	4237995.44	2212.21	2179.75	2569829.00	1079558.65	15251.37	1486.71
srm610-6	1943020.54	1885302.44	963.29	1854.83	5110986.00	553018.99	87245.21	7677.62
AP1-6	32801.88	8020.26	283.68	1429.31	4320745.00	5622430.05	2579.81	9637.95
AP2-6	26037.77	7259.54	430.36	1268.39	4304417.50	6190860.55	2683.98	9861.51
AP3-6	61787.25	9952.24	406.12	1279.51	4943076.00	6001130.55	3473.06	14552.18
AP4-6	94015.47	11818.49	570.56	1007.07	427376.72	9027862.55	5941.39	19521.85
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-5	3.250279	3.800223	0.002010	0.003429	1.053299	1.000000	0.007026	0.002059
SRM612-5	3.143477	3.778976	0.001960	0.002559	0.987553	1.000000	0.015615	0.001981
SRM610-5	3.695091	3.493281	0.001951	0.004367	2.333161	1.000000	0.156890	0.016321
AP1-5	0.006899	0.002050	0.000067	0.000287	0.054542	1.000000	0.000501	0.002815
AP2-5	0.004616	0.001583	0.000055	0.000270	0.040217	1.000000	0.000487	0.002085
AP3-5	0.009454	0.002123	0.000070	0.000268	0.056821	1.000000	0.000610	0.002960
AP4-5	0.009438	0.001538	0.000055	0.000159	0.029764	1.000000	0.000628	0.002462
MZ2-1b	0.000709	0.002619	0.000059	0.001763	0.373597	1.000000	0.000389	0.001856
MZ2-2b	0.001624	0.002435	0.000051	0.001849	0.352962	1.000000	0.000370	0.002054
MZ2-3b	0.001260	0.002448	0.000068	0.001807	0.323287	1.000000	0.000383	0.001930
MZ2-4b	0.002483	0.002168	0.000059	0.001392	0.444564	1.000000	0.000377	0.001691
MZ2-5b	0.003154	0.002116	0.000067	0.001249	0.442833	1.000000	0.000375	0.001726
MZ2-6b	0.001246	0.001987	0.000057	0.001412	0.428231	1.000000	0.000363	0.001621
MZ2-7b	0.025629	0.006143	0.000056	0.001164	0.421483	1.000000	0.000346	0.001646
MZ2-8b	0.013578	0.004444	0.000063	0.001138	0.503883	1.000000	0.000357	0.001570
MZ2-9b	0.006720	0.002925	0.000057	0.001218	0.532763	1.000000	0.000344	0.001474
MZ2-10b	0.004116	0.002931	0.000081	0.001209	0.427303	1.000000	0.000348	0.001694
MZ2-11b	0.003750	0.002874	0.000079	0.001139	0.495290	1.000000	0.000345	0.001686
MZ2-12b	0.002658	0.002810	0.000055	0.001276	0.540918	1.000000	0.000346	0.001635
MZ2-13b	0.007841	0.002851	0.000059	0.000976	0.617375	1.000000	0.000348	0.001617
MZ2-14b	0.007946	0.002344	0.000065	0.000861	0.745666	1.000000	0.000346	0.001607
MZ2-15b	0.036737	0.005550	0.000067	0.000773	0.695602	1.000000	0.000372	0.001803
srM614-6	3.077773	3.889377	0.002067	0.002436	2.872413	1.000000	0.004269	0.000638
srM612-6	3.028125	3.925674	0.002049	0.002019	2.380444	1.000000	0.014127	0.001377
srM610-6	3.513479	3.409110	0.001742	0.003354	9.241972	1.000000	0.157762	0.013883
AP1-6	0.005834	0.001426	0.000050	0.000254	0.768484	1.000000	0.000459	0.001714
AP2-6	0.004206	0.001173	0.000070	0.000205	0.695286	1.000000	0.000434	0.001593
AP3-6	0.010296	0.001658	0.000068	0.000213	0.823691	1.000000	0.000579	0.002425
AP4-6	0.010414	0.001309	0.000063	0.000112	0.047340	1.000000	0.000658	0.002162
standardize signal averages AP								
AP1	0.006366	0.001738	0.000059	0.000271	0.411513	1.000000	0.000480	0.002264
AP2	0.004411	0.001378	0.000062	0.000238	0.367751	1.000000	0.000460	0.001839
AP3	0.009875	0.001891	0.000069	0.000240	0.440256	1.000000	0.000594	0.002692
AP4	0.009926	0.001424	0.000059	0.000135	0.038552	1.000000	0.000643	0.002312
linest from std sig ave								
	0.024352	0.141500	7434.637684	0.035191	0.000019	1.000000	0.006610	0.479953
standardize signal averages SRM								
srM614-2	3.164026	3.844800	0.002038	0.002932	1.962856	1.000000	0.005647	0.001349
srM612-2	3.085801	3.852325	0.002004	0.002289	1.683999	1.000000	0.014871	0.001679
srM610-2	3.604285	3.451196	0.001846	0.003860	5.787567	1.000000	0.157326	0.015102
linest from std sig ave								
	1.023926	0.992567	1.003915	1.140174	0.000459	1.000000	0.998011	1.085392
concentration data								
SRM614-5	6788.07	46117.36	1281655.80	10.35	41.44	85763.00	3.98	84.76
SRM612-5	6565.02	45859.53	1249487.34	7.72	38.86	85763.00	8.85	81.56
SRM610-5	7717.04	42392.49	1243849.40	13.18	91.80	85763.00	88.94	671.79
AP1-5	67.02	115.71	199258.39	4.04	9.98	398936.00	1.32	538.90
AP2-5	44.84	89.37	163941.13	3.79	7.36	398936.00	1.28	399.25
AP3-5	91.85	119.82	207009.70	3.76	10.40	398936.00	1.61	566.66
AP4-5	91.69	86.83	163819.39	2.23	5.45	398936.00	1.66	471.35
MZ2-1b	6.88	147.83	173588.32	24.75	68.38	398936.00	1.03	355.34
MZ2-2b	15.78	137.45	150536.66	25.96	64.60	398936.00	0.98	393.36
MZ2-3b	12.24	138.21	201696.80	25.37	59.17	398936.00	1.01	369.48
MZ2-4b	24.12	122.39	176255.36	19.55	81.37	398936.00	0.99	323.78
MZ2-5b	30.64	119.45	198280.75	17.53	81.05	398936.00	0.99	330.48
MZ2-6b	12.11	112.18	169911.04	19.82	78.38	398936.00	0.96	310.29
MZ2-7b	248.97	346.78	164933.10	16.34	77.14	398936.00	0.91	315.14
MZ2-8b	131.90	250.85	188110.44	15.98	92.22	398936.00	0.94	300.52
MZ2-9b	65.29	165.14	169020.93	17.10	97.51	398936.00	0.91	282.16
MZ2-10b	39.98	165.44	239825.65	16.98	78.21	398936.00	0.92	324.32
MZ2-11b	36.43	162.21	235771.34	16.00	90.65	398936.00	0.91	322.83
MZ2-12b	25.82	158.61	162618.93	17.91	99.00	398936.00	0.91	313.05

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	76.17	160.94	175996.63	13.70	113.00	398936.00	0.92	309.63
MZ2-14b	77.20	132.33	192324.14	12.09	136.48	398936.00	0.91	307.72
MZ2-15b	356.89	313.30	198696.87	10.85	127.31	398936.00	0.98	345.28
srm614-6	6427.80	47199.29	1317788.28	7.35	113.02	85763.00	2.42	26.27
srm612-6	6324.11	47639.77	1306593.05	6.09	93.66	85763.00	8.01	56.69
srm610-6	7337.75	41371.04	1110643.51	10.12	363.64	85763.00	89.43	571.46
AP1-6	56.68	80.52	149647.73	3.57	140.65	398936.00	1.21	328.22
AP2-6	40.86	66.19	206179.91	2.88	127.26	398936.00	1.14	305.00
AP3-6	100.02	93.62	200718.22	2.99	150.76	398936.00	1.53	464.30
AP4-6	101.17	73.90	187448.46	1.57	8.66	398936.00	1.74	414.04

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-7	39116.94	351211.97	3137.94	4110.22	599877.00	43890.17	3635.98	655.88
SRM614-7	8436165.00	6971929.00	5922.87	6152.39	732063.00	2898205.80	30935.90	1858.93
SRM612-7	8279000.00	6706657.50	5238.19	6092.95	750346.94	2809887.50	47443.79	4643.43
SRM610-7	5643298.00	4439175.00	3711.78	6209.47	1135666.30	1712405.30	206097.72	17488.74
AP1-7	121823.60	126381.67	1911.29	4573.95	421169.56	16255312.00	9333.81	60682.30
AP2-7	166261.78	110596.58	1852.37	4769.15	417658.88	16992156.00	8768.05	68025.14
AP3-7	174223.91	91935.00	1929.89	4412.06	380209.59	20542026.00	12074.99	92888.20
AP4-7	235063.16	73344.98	1614.17	4031.58	318941.19	17446596.00	12954.23	63670.04
T1-1	23519.69	58366.37	1449.53	25312.38	2122629.30	15060642.00	6636.84	57046.92
T1-2	15041.13	49248.52	1191.41	19643.87	1410593.50	11314328.00	5377.47	40768.95
T1-3	14181.80	45641.82	1023.29	16458.65	845528.94	8597973.00	4323.30	29455.37
T1-4	18978.39	44016.77	1200.25	28550.08	884573.31	14214724.00	6312.36	39096.42
T1-5	14410.36	37658.41	1160.89	29854.65	882594.81	14718785.00	6279.68	38934.78
T1-6	13879.04	35644.64	1244.29	31031.30	916541.94	15282160.00	6309.64	40453.83
T1-7	14352.60	37663.17	980.09	21713.36	863809.31	11174805.00	4916.75	27867.92
T1-8	10808.66	30227.25	902.69	20436.83	670612.50	10608763.00	4841.19	24377.66
T1-9	11729.07	28273.56	1019.01	24355.58	821441.00	12136279.00	5270.15	28277.64
T1-10	14530.60	30122.13	1030.77	22501.45	1057865.80	11679199.00	5134.03	27369.23
T1-11	11546.47	25937.51	965.97	23038.21	1033986.60	12415857.00	5418.11	28146.60
T1-12	10612.34	24393.34	983.09	22868.13	985003.31	12442783.00	5424.51	26905.67
T1-13	12554.15	25670.47	1037.69	23770.05	1341133.60	13450166.00	5598.99	29772.53
T1-14	10308.34	22100.61	1087.61	24370.30	1193225.80	14326836.00	5956.39	30973.09
T1-15	10860.26	20670.08	1078.09	23899.41	1208480.30	13474610.00	5568.15	28242.88
T1-16	12197.71	21295.52	914.93	21889.44	1908169.10	11723218.00	4988.99	28082.08
T1-17	11152.18	20140.55	1087.57	23916.73	1975420.30	13802676.00	5809.99	31693.90
T1-18	12032.79	18667.27	1092.17	23747.45	1947226.50	13516727.00	5671.35	28417.16
SRM614-8	5693181.00	5780414.50	2942.94	3994.38	296968.31	1828515.60	8558.37	1548.73
SRM612-8	6245707.00	6160958.00	3189.86	4248.62	325387.19	1984697.50	26625.47	3147.90
SRM610-8	4227916.00	3896479.80	2074.73	4391.06	605720.94	1324043.00	167339.50	14154.40
AP1-8	120555.80	16663.98	759.52	2936.02	221356.05	11763066.00	6022.99	17093.62
AP2-8	68197.74	15969.17	900.09	3048.46	198348.39	13384704.00	6310.96	22569.85
AP3-8	148580.03	20952.68	1215.45	2892.26	211370.78	16242214.00	9522.53	42818.28
AP4-8	154922.67	21728.24	896.09	2945.02	181611.83	13416124.00	9449.77	27873.44
blank-8	7279.12	16444.13	241.00	2278.97	270535.00	75980.71	1136.97	1126.09
blank average	23198.03	183828.05	1689.47	3194.60	435206.00	59935.44	2386.47	890.98

blank subtraction								
SRM614-7	8412966.97	6788100.95	4233.40	2957.80	296857.00	2838270.36	28549.42	967.95
SRM612-7	8255801.97	6522829.45	3548.72	2898.36	315140.94	2749952.06	45057.31	3752.44
SRM610-7	5620099.97	4255346.95	2022.31	3014.88	700460.30	1652469.86	203711.25	16597.75
AP1-7	98625.57	-57446.38	221.82	1379.35	-14036.44	16195376.56	6947.34	59791.32
AP2-7	143063.75	-73231.47	162.90	1574.55	-17547.12	16932220.56	6381.58	67134.16
AP3-7	151025.88	-91893.05	240.42	1217.47	-54996.41	20482090.56	9688.51	91997.22
AP4-7	211865.13	-110483.07	-75.30	836.98	-116264.81	17386660.56	10567.76	62779.05
T1-1	321.66	-125461.68	-239.94	22117.79	1687423.30	15000706.56	4250.36	56155.94
T1-2	-8156.91	-134579.53	-498.06	16449.27	975387.50	11254392.56	2991.00	39877.96
T1-3	-9016.23	-138186.24	-666.18	13264.05	410322.94	8538037.56	1936.83	28564.38
T1-4	-4219.64	-139811.28	-489.22	25355.48	449367.31	14154788.56	3925.88	38205.43
T1-5	-8787.67	-146169.64	-528.58	26660.05	447388.81	14658849.56	3893.20	38043.80
T1-6	-9318.99	-148183.41	-445.18	27836.70	481335.94	15222224.56	3923.16	39562.84
T1-7	-8845.43	-146164.88	-709.38	18518.77	428603.31	11114869.56	2530.27	26976.93
T1-8	-12389.37	-153600.80	-786.78	17242.24	235406.50	10548827.56	2454.71	23486.67
T1-9	-11468.97	-155554.49	-670.46	21160.98	386235.00	12076343.56	2883.68	27386.65
T1-10	-8667.43	-153705.92	-658.70	19306.85	622659.80	11619263.56	2747.56	26478.25
T1-11	-11651.57	-157890.55	-723.50	19843.61	598780.60	12355921.56	3031.64	27255.61
T1-12	-12585.69	-159434.71	-706.38	19673.53	549797.31	12382847.56	3038.04	26014.69

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	-10643.88	-158157.59	-651.78	20575.46	905927.60	13390230.56	3212.52	28881.54
T1-14	-12889.69	-161727.45	-601.86	21175.70	758019.80	14266900.56	3569.92	30082.11
T1-15	-12337.77	-163157.98	-611.38	20704.82	773274.30	13414674.56	3181.68	27351.89
T1-16	-11000.32	-162532.53	-774.54	18694.85	1472963.10	11663282.56	2602.51	27191.09
T1-17	-12045.85	-163687.50	-601.90	20722.14	1540214.30	13742740.56	3423.52	30802.91
T1-18	-11165.24	-165160.79	-597.30	20552.86	1512020.50	13456791.56	3284.88	27526.18
SRM614-8	5669982.97	5596586.45	1253.47	799.78	-138237.69	1768580.16	6171.89	657.74
SRM612-8	6222508.97	5977129.95	1500.39	1054.03	-109818.81	1924762.06	24239.00	2256.91
SRM610-8	4204717.97	3712651.75	385.26	1196.47	170514.94	1174107.56	164953.03	13263.41
AP1-8	97357.77	-167164.08	-929.95	-258.58	-213849.95	11703130.56	3636.52	16202.63
AP2-8	44999.71	-167858.88	-789.38	-146.14	-236857.61	13324768.56	3924.48	21678.86
AP3-8	125382.00	-162875.37	-474.02	-302.34	-223835.22	16182278.56	7136.06	41927.30
AP4-8	131724.64	-162099.81	-793.38	-249.58	-253594.17	13356188.56	7063.30	26982.45
zero correction								
SRM614-7	8412966.97	6788100.95	4233.40	2957.80	1259434.80	2838270.36	28549.42	967.95
SRM612-7	8255801.97	6522829.45	3548.72	2898.36	1467977.40	2749952.06	45057.31	3752.44
SRM610-7	5620099.97	4255346.95	2022.31	3014.88	1565305.60	1652469.86	203711.25	16597.75
AP1-7	98625.57	0.00	221.82	1379.35	397940.13	16195376.56	6947.34	59791.32
AP2-7	143063.75	0.00	162.90	1574.55	314931.06	16932220.56	6381.58	67134.16
AP3-7	151025.88	0.00	240.42	1217.47	385658.50	20482090.56	9688.51	91997.22
AP4-7	211865.13	0.00	0.00	836.98	301733.94	17386660.56	10567.76	62779.05
T1-1	321.66	0.00	0.00	22117.79	1258539.50	15000706.56	4250.36	56155.94
T1-2	0.00	0.00	0.00	16449.27	1317136.10	11254392.56	2991.00	39877.96
T1-3	0.00	0.00	0.00	13264.05	1076105.90	8538037.56	1936.83	28564.38
T1-4	0.00	0.00	0.00	25355.48	2032429.00	14154788.56	3925.88	38205.43
T1-5	0.00	0.00	0.00	26660.05	2078104.00	14658849.56	3893.20	38043.80
T1-6	0.00	0.00	0.00	27836.70	1739624.60	15222224.56	3923.16	39562.84
T1-7	0.00	0.00	0.00	18518.77	2182579.80	11114869.56	2530.27	26976.93
T1-8	0.00	0.00	0.00	17242.24	2631315.50	10548827.56	2454.71	23486.67
T1-9	0.00	0.00	0.00	21160.98	2442299.80	12076343.56	2883.68	27386.65
T1-10	0.00	0.00	0.00	19306.85	1737553.10	11619263.56	2747.56	26478.25
T1-11	0.00	0.00	0.00	19843.61	1850756.90	12355921.56	3031.64	27255.61
T1-12	0.00	0.00	0.00	19673.53	1737539.30	12382847.56	3038.04	26014.69
T1-13	0.00	0.00	0.00	20575.46	2903196.80	13390230.56	3212.52	28881.54
T1-14	0.00	0.00	0.00	21175.70	4116332.50	14266900.56	3569.92	30082.11
T1-15	0.00	0.00	0.00	20704.82	4146259.00	13414674.56	3181.68	27351.89
T1-16	0.00	0.00	0.00	18694.85	2602828.50	11663282.56	2602.51	27191.09
T1-17	0.00	0.00	0.00	20722.14	2569829.00	13742740.56	3423.52	30802.91
T1-18	0.00	0.00	0.00	20552.86	5110986.00	13456791.56	3284.88	27526.18
SRM614-8	5669982.97	5596586.45	1253.47	799.78	4320745.00	1768580.16	6171.89	657.74
SRM612-8	6222508.97	5977129.95	1500.39	1054.03	4304417.50	1924762.06	24239.00	2256.91
SRM610-8	4204717.97	3712651.75	385.26	1196.47	4943076.00	1174107.56	164953.03	13263.41
AP1-8	97357.77	0.00	0.00	0.00	427376.72	11703130.56	3636.52	16202.63
AP2-8	44999.71	0.00	0.00	0.00	473690.91	13324768.56	3924.48	21678.86
AP3-8	125382.00	0.00	0.00	0.00	721554.44	16182278.56	7136.06	41927.30
AP4-8	131724.64	0.00	0.00	0.00	317966.28	13356188.56	7063.30	26982.45
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-7	2.964118	2.391633	0.001492	0.001042	0.443733	1.000000	0.010059	0.000341
SRM612-7	3.002162	2.371979	0.001290	0.001054	0.533819	1.000000	0.016385	0.001365
SRM610-7	3.401030	2.575143	0.001224	0.001824	0.947252	1.000000	0.123277	0.010044
AP1-7	0.006090	0.000000	0.000014	0.000085	0.024571	1.000000	0.000429	0.003692
AP2-7	0.008449	0.000000	0.000010	0.000093	0.018600	1.000000	0.000377	0.003965
AP3-7	0.007374	0.000000	0.000012	0.000059	0.018829	1.000000	0.000473	0.004492
AP4-7	0.012185	0.000000	0.000000	0.000048	0.017354	1.000000	0.000608	0.003611
T1-1	0.000021	0.000000	0.000000	0.001474	0.083899	1.000000	0.000283	0.003744
T1-2	0.000000	0.000000	0.000000	0.001462	0.117033	1.000000	0.000266	0.003543
T1-3	0.000000	0.000000	0.000000	0.001554	0.126037	1.000000	0.000227	0.003346
T1-4	0.000000	0.000000	0.000000	0.001791	0.143586	1.000000	0.000277	0.002699

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000000	0.000000	0.000000	0.001819	0.141764	1.000000	0.000266	0.002595
T1-6	0.000000	0.000000	0.000000	0.001829	0.114282	1.000000	0.000258	0.002599
T1-7	0.000000	0.000000	0.000000	0.001666	0.196366	1.000000	0.000228	0.002427
T1-8	0.000000	0.000000	0.000000	0.001635	0.249442	1.000000	0.000233	0.002226
T1-9	0.000000	0.000000	0.000000	0.001752	0.202238	1.000000	0.000239	0.002268
T1-10	0.000000	0.000000	0.000000	0.001662	0.149541	1.000000	0.000236	0.002279
T1-11	0.000000	0.000000	0.000000	0.001606	0.149787	1.000000	0.000245	0.002206
T1-12	0.000000	0.000000	0.000000	0.001589	0.140318	1.000000	0.000245	0.002101
T1-13	0.000000	0.000000	0.000000	0.001537	0.216815	1.000000	0.000240	0.002157
T1-14	0.000000	0.000000	0.000000	0.001484	0.288523	1.000000	0.000250	0.002109
T1-15	0.000000	0.000000	0.000000	0.001543	0.309084	1.000000	0.000237	0.002039
T1-16	0.000000	0.000000	0.000000	0.001603	0.223164	1.000000	0.000223	0.002331
T1-17	0.000000	0.000000	0.000000	0.001508	0.186995	1.000000	0.000249	0.002241
T1-18	0.000000	0.000000	0.000000	0.001527	0.379807	1.000000	0.000244	0.002046
SRM614-8	3.205952	3.164452	0.000709	0.000452	2.443059	1.000000	0.003490	0.000372
SRM612-8	3.232872	3.105386	0.000780	0.000548	2.236337	1.000000	0.012593	0.001173
SRM610-8	3.581203	3.162105	0.000328	0.001019	4.210071	1.000000	0.140492	0.011297
AP1-8	0.008319	0.000000	0.000000	0.000000	0.036518	1.000000	0.000311	0.001384
AP2-8	0.003377	0.000000	0.000000	0.000000	0.035550	1.000000	0.000295	0.001627
AP3-8	0.007748	0.000000	0.000000	0.000000	0.044589	1.000000	0.000441	0.002591
AP4-8	0.009862	0.000000	0.000000	0.000000	0.023807	1.000000	0.000529	0.002020
standardize signal averages AP								
AP1	0.007204	0.000000	0.000007	0.000043	0.030545	1.000000	0.000370	0.002538
AP2	0.005913	0.000000	0.000005	0.000046	0.027075	1.000000	0.000336	0.002796
AP3	0.007561	0.000000	0.000006	0.000030	0.031709	1.000000	0.000457	0.003541
AP4	0.011024	0.000000	0.000000	0.000024	0.020580	1.000000	0.000568	0.002815
linest from std sig ave								
	0.023897	0.000000	76674.291566	0.218275	0.000328	1.000000	0.008522	0.373669
standardize signal averages SRM								
srm614-2	3.085035	2.778042	0.001100	0.000747	1.443396	1.000000	0.006774	0.000356
srm612-2	3.117517	2.738683	0.001035	0.000801	1.385078	1.000000	0.014489	0.001269
srm610-2	3.491117	2.868624	0.000776	0.001422	2.578661	1.000000	0.131885	0.010670
linest from std sig ave								
	0.043684	1.403425	1.346899	2.419047	0.000558	1.000000	0.038836	0.473417
concentration data								
SRM614-7	6074.94	0.00	9808118.11	19.51	21.23	85763.00	7.35	10.93
SRM612-7	6152.92	0.00	8485869.41	19.73	25.54	85763.00	11.98	43.73
SRM610-7	6970.39	0.00	8047560.20	34.15	45.32	85763.00	90.10	321.89
AP1-7	58.06	0.00	418952.84	7.42	5.47	398936.00	1.46	550.35
AP2-7	80.55	0.00	294281.36	8.10	4.14	398936.00	1.28	591.04
AP3-7	70.30	0.00	359047.40	5.18	4.19	398936.00	1.61	669.56
AP4-7	116.17	0.00	0.00	4.19	3.86	398936.00	2.07	538.26
T1-1	0.20	0.00	0.00	128.39	18.67	398936.00	0.96	558.05
T1-2	0.00	0.00	0.00	127.27	26.04	398936.00	0.90	528.20
T1-3	0.00	0.00	0.00	135.28	28.05	398936.00	0.77	498.72
T1-4	0.00	0.00	0.00	155.98	31.95	398936.00	0.94	402.36
T1-5	0.00	0.00	0.00	158.37	31.55	398936.00	0.90	386.88
T1-6	0.00	0.00	0.00	159.24	25.43	398936.00	0.88	387.44
T1-7	0.00	0.00	0.00	145.08	43.70	398936.00	0.77	361.81
T1-8	0.00	0.00	0.00	142.33	55.51	398936.00	0.79	331.90
T1-9	0.00	0.00	0.00	152.58	45.00	398936.00	0.81	338.06
T1-10	0.00	0.00	0.00	144.69	33.28	398936.00	0.80	339.70
T1-11	0.00	0.00	0.00	139.85	33.33	398936.00	0.83	328.83
T1-12	0.00	0.00	0.00	138.35	31.22	398936.00	0.83	313.18
T1-13	0.00	0.00	0.00	133.80	48.25	398936.00	0.82	321.53
T1-14	0.00	0.00	0.00	129.25	64.20	398936.00	0.85	314.32
T1-15	0.00	0.00	0.00	134.40	68.78	398936.00	0.81	303.95
T1-16	0.00	0.00	0.00	139.58	49.66	398936.00	0.76	347.53
T1-17	0.00	0.00	0.00	131.30	41.61	398936.00	0.85	334.12
T1-18	0.00	0.00	0.00	133.00	84.52	398936.00	0.83	304.93
SRM614-8	6570.58	0.00	4660557.62	8.47	116.87	85763.00	2.55	11.92
SRM612-8	6625.75	0.00	5125973.73	10.25	106.98	85763.00	9.20	37.58
SRM610-8	7339.66	0.00	2157735.56	19.08	201.40	85763.00	102.68	362.02
AP1-8	79.31	0.00	0.00	0.00	8.13	398936.00	1.06	206.38
AP2-8	32.20	0.00	0.00	0.00	7.91	398936.00	1.00	242.53
AP3-8	73.87	0.00	0.00	0.00	9.92	398936.00	1.50	386.23
AP4-8	94.02	0.00	0.00	0.00	5.30	398936.00	1.80	301.15
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-5	49213.08	401735.25	41988.00	296.72	160.24	29874.33	3618.18	534.28
SRM614-5	11700013.00	10370635.00	57283.52	298.60	182.80	3816631.80	40710.51	2325.13
SRM612-5	10213833.00	8305076.50	352345.31	281.52	209.08	3265847.00	54417.79	8444.65
SRM610-5	4758670.50	3819964.50	425545.16	249.00	213.04	1476327.90	160013.14	17484.38
AP1-5	100470.45	145959.63	25826178.00	570.40	317.04	16716393.00	9708.13	76167.99
AP2-5	130879.77	126418.63	28469000.00	621.04	395.40	18708762.00	9710.01	85351.64
AP3-5	321523.63	116439.17	36587440.00	1111.81	568.32	25969892.00	17537.30	204819.56
AP4-5	229739.70	97542.47	27646284.00	659.88	317.20	16186876.00	11769.31	73375.17
TGP12-1	21393.08	69088.63	7884204.00	279.16	225.80	4319411.00	2788.90	16316.21
TGP12-2	17062.26	59835.02	7784122.50	270.48	173.28	4091528.00	2719.26	17156.98
TGP12-3	17312.42	51798.09	7141773.50	245.80	183.68	3644777.00	2542.89	15589.33
TGP12-4	42388.24	52819.98	12304602.00	290.08	254.60	6281136.00	3489.42	24912.90
TGP12-5	36955.01	45482.10	15699178.00	353.84	268.32	8130419.50	4026.50	31495.38
TGP12-6	45493.22	45827.22	27457608.00	595.16	503.04	15764636.00	6659.20	66790.85
TGP12-7	34409.52	42966.40	31669182.00	665.44	691.00	19283056.00	7835.96	79544.57
TGP12-8	25442.38	37419.21	31151490.00	683.28	578.68	19005014.00	7622.80	73876.54
TGP12-9	16655.90	35257.20	30676532.00	709.64	605.16	18600496.00	7562.60	68812.87
TGP12-10	41972.15	36793.77	25733020.00	501.48	349.52	14004837.00	5944.83	47580.59
TGP12-11	23299.85	30600.33	26078816.00	541.40	366.68	14140069.00	5746.95	45526.57
TGP12-12	20026.11	30122.53	26048772.00	511.80	325.48	13909644.00	5559.59	44428.13
TGP12-13	12592.03	26274.03	13147336.00	324.32	178.00	6770205.00	3209.50	17511.66
TGP12-14	12110.75	23847.38	13723419.00	302.56	252.04	6943949.00	3302.58	18486.10
TGP12-15	12109.63	23212.93	14140967.00	317.40	217.08	7143660.50	3251.06	18687.75
TGP12-16	58208.57	27444.31	23554934.00	441.00	351.76	12621785.00	5165.23	32532.14
TGP12-17	75837.07	25504.26	22728468.00	439.32	327.76	12221192.00	4822.67	30788.69
TGP12-18	23300.69	24478.74	21002742.00	442.56	286.72	10888382.00	4492.31	26342.51
SRM614-6	7850260.50	8041051.50	12315.07	182.28	114.32	2430703.00	10622.90	1323.69
SRM612-6	7172848.00	6856293.50	19797.99	155.12	143.24	2136417.00	28421.48	3214.26
SRM610-6	3605965.50	3184081.30	43741.25	122.40	147.76	980705.25	130375.25	11567.47
AP1-6	66718.09	19271.43	24270520.00	468.48	258.68	13213738.00	6113.91	23770.33
AP2-6	61885.19	18896.55	26524082.00	527.92	332.76	14788598.00	6692.40	30477.65
AP3-6	221875.77	31861.14	34610684.00	905.29	491.64	21289368.00	12900.87	84157.71
AP4-6	183482.52	27964.76	26478856.00	516.44	304.64	13589162.00	9464.21	35832.80
blank-6	8397.45	17648.10	4174.70	112.96	73.52	76304.15	847.08	773.48
blank average	28805.26	209691.68	23081.35	204.84	116.88	53089.24	2232.63	653.88
blank subtraction								
SRM614-5	11671207.74	10160943.33	34202.17	93.76	65.92	3763542.56	38477.88	1671.25
SRM612-5	10185027.74	8095384.83	329263.96	76.68	92.20	3212757.76	52185.15	7790.76
SRM610-5	4729865.24	3610272.83	402463.81	44.16	96.16	1423238.66	157780.51	16830.50
AP1-5	71665.19	-63732.05	25803096.65	365.56	200.16	16663303.76	7475.50	75514.11
AP2-5	102074.51	-83273.05	28445918.65	416.20	278.52	18655672.76	7477.38	84697.76
AP3-5	292718.37	-93252.51	36564358.65	906.97	451.44	25916802.76	15304.67	204165.68
AP4-5	200934.44	-112149.21	27623202.65	455.04	200.32	16133786.76	9536.67	72721.29
TGP12-1	-7412.18	-140603.04	7861122.65	74.32	108.92	4266321.76	556.26	15662.33
TGP12-2	-11743.01	-149856.66	7761041.15	65.64	56.40	4038438.76	486.62	16503.09
TGP12-3	-11492.84	-157893.59	7118692.15	40.96	66.80	3591687.76	310.26	14935.44
TGP12-4	13582.98	-156871.70	12281520.65	85.24	137.72	6228046.76	1256.79	24259.01
TGP12-5	8149.75	-164209.58	15676096.65	149.00	151.44	8077330.26	1793.87	30841.49
TGP12-6	16687.95	-163864.46	27434526.65	390.32	386.16	15711546.76	4426.57	66136.97
TGP12-7	5604.25	-166725.27	31646100.65	460.60	574.12	19229966.76	5603.33	78890.69
TGP12-8	-3362.88	-172272.46	31128408.65	478.44	461.80	18951924.76	5390.17	73222.66
TGP12-9	-12149.37	-174434.48	30653450.65	504.80	488.28	18547406.76	5329.97	68158.98
TGP12-10	13166.89	-172897.91	25709938.65	296.64	232.64	13951747.76	3712.20	46926.71
TGP12-11	-5505.41	-179091.34	26055734.65	336.56	249.80	14086979.76	3514.32	44872.69
TGP12-12	-8779.15	-179569.15	26025690.65	306.96	208.60	13856554.76	3326.96	43774.25
TGP12-13	-16213.23	-183417.65	13124254.65	119.48	61.12	6717115.76	976.87	16857.77
TGP12-14	-16694.51	-185844.30	13700337.65	97.72	135.16	6890859.76	1069.95	17832.22
TGP12-15	-16695.63	-186478.75	14117885.65	112.56	100.20	7090571.26	1018.43	18033.86
TGP12-16	29403.30	-182247.36	23531852.65	236.16	234.88	12568695.76	2932.60	31878.26
TGP12-17	47031.81	-184187.41	22705386.65	234.48	210.88	12168102.76	2590.03	30134.81
TGP12-18	-5504.57	-185212.94	20979660.65	237.72	169.84	10835292.76	2259.67	25688.62
SRM614-6	7821455.24	7831359.83	-10766.28	-22.56	-2.56	2377613.76	8390.27	669.80
SRM612-6	7144042.74	6646601.83	-3283.36	-49.72	26.36	2083327.76	26188.85	2560.37
SRM610-6	3577160.24	2974389.63	20659.90	-82.44	30.88	927616.01	128142.62	10913.58
AP1-6	37912.83	-190420.25	24247438.65	263.64	141.80	13160648.76	3881.28	23116.45
AP2-6	33079.93	-190795.13	26501000.65	323.08	215.88	14735508.76	4459.76	29823.77
AP3-6	193070.51	-177830.54	34587602.65	700.44	374.76	21236278.76	10668.24	83503.83
AP4-6	154677.26	-181726.92	26455774.65	311.60	187.76	13536072.76	7231.58	35178.92
zero correction								
SRM614-5	11671207.74	10160943.33	34202.17	93.76	65.92	3763542.56	38477.88	1671.25

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	10185027.74	8095384.83	329263.96	76.68	92.20	3212757.76	52185.15	7790.76
SRM610-5	4729865.24	3610272.83	402463.81	44.16	96.16	1423238.66	157780.51	16830.50
AP1-5	71665.19	0.00	25803096.65	365.56	200.16	16663303.76	7475.50	75514.11
AP2-5	102074.51	0.00	28445918.65	416.20	278.52	18655672.76	7477.38	84697.76
AP3-5	292718.37	0.00	36564358.65	906.97	451.44	25916802.76	15304.67	204165.68
AP4-5	200934.44	0.00	27623202.65	455.04	200.32	16133786.76	9536.67	72721.29
TGP12-1	0.00	0.00	7861122.65	74.32	108.92	4266321.76	556.26	15662.33
TGP12-2	0.00	0.00	7761041.15	65.64	56.40	4038438.76	486.62	16503.09
TGP12-3	0.00	0.00	7118692.15	40.96	66.80	3591687.76	310.26	14935.44
TGP12-4	13582.98	0.00	12281520.65	85.24	137.72	6228046.76	1256.79	24259.01
TGP12-5	8149.75	0.00	15676096.65	149.00	151.44	8077330.26	1793.87	30841.49
TGP12-6	16687.95	0.00	27434526.65	390.32	386.16	15711546.76	4426.57	66136.97
TGP12-7	5604.25	0.00	31646100.65	460.60	574.12	19229966.76	5603.33	78890.69
TGP12-8	0.00	0.00	31128408.65	478.44	461.80	18951924.76	5390.17	73222.66
TGP12-9	0.00	0.00	30653450.65	504.80	488.28	18547406.76	5329.97	68158.98
TGP12-10	13166.89	0.00	25709938.65	296.64	232.64	13951747.76	3712.20	46926.71
TGP12-11	0.00	0.00	26055734.65	336.56	249.80	14086979.76	3514.32	44872.69
TGP12-12	0.00	0.00	26025690.65	306.96	208.60	13856554.76	3326.96	43774.25
TGP12-13	0.00	0.00	13124254.65	119.48	61.12	6717115.76	976.87	16857.77
TGP12-14	0.00	0.00	13700337.65	97.72	135.16	6890859.76	1069.95	17832.22
TGP12-15	0.00	0.00	14117885.65	112.56	100.20	7090571.26	1018.43	18033.86
TGP12-16	29403.30	0.00	23531852.65	236.16	234.88	12568695.76	2932.60	31878.26
TGP12-17	47031.81	0.00	22705386.65	234.48	210.88	12168102.76	2590.03	30134.81
TGP12-18	0.00	0.00	20979660.65	237.72	169.84	10835292.76	2259.67	25688.62
SRM614-6	7821455.24	7831359.83	0.00	0.00	0.00	2377613.76	8390.27	669.80
SRM612-6	7144042.74	6646601.83	0.00	0.00	26.36	2083327.76	26188.85	2560.37
SRM610-6	3577160.24	2974389.63	20659.90	0.00	30.88	927616.01	128142.62	10913.58
AP1-6	37912.83	0.00	24247438.65	263.64	141.80	13160648.76	3881.28	23116.45
AP2-6	33079.93	0.00	26501000.65	323.08	215.88	14735508.76	4459.76	29823.77
AP3-6	193070.51	0.00	34587602.65	700.44	374.76	21236278.76	10668.24	83503.83
AP4-6	154677.26	0.00	26455774.65	311.60	187.76	13536072.76	7231.58	35178.92

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-5	3.101123	2.699835	0.009088	0.000025	0.000018	1.000000	0.010224	0.000444
SRM612-5	3.170182	2.519762	0.102486	0.000024	0.000029	1.000000	0.016243	0.002425
SRM610-5	3.323311	2.536660	0.282780	0.000031	0.000068	1.000000	0.110860	0.011825
AP1-5	0.004301	0.000000	1.548498	0.000022	0.000012	1.000000	0.000449	0.004532
AP2-5	0.005471	0.000000	1.524787	0.000022	0.000015	1.000000	0.000401	0.004540
AP3-5	0.011295	0.000000	1.410836	0.000035	0.000017	1.000000	0.000591	0.007878
AP4-5	0.012454	0.000000	1.712134	0.000028	0.000012	1.000000	0.000591	0.004507
TGP12-1	0.000000	0.000000	1.842600	0.000017	0.000026	1.000000	0.000130	0.003671
TGP12-2	0.000000	0.000000	1.921792	0.000016	0.000014	1.000000	0.000120	0.004087
TGP12-3	0.000000	0.000000	1.981991	0.000011	0.000019	1.000000	0.000086	0.004158
TGP12-4	0.002181	0.000000	1.971970	0.000014	0.000022	1.000000	0.000202	0.003895
TGP12-5	0.001009	0.000000	1.940752	0.000018	0.000019	1.000000	0.000222	0.003818
TGP12-6	0.001062	0.000000	1.746138	0.000025	0.000025	1.000000	0.000282	0.004209
TGP12-7	0.000291	0.000000	1.645666	0.000024	0.000030	1.000000	0.000291	0.004102
TGP12-8	0.000000	0.000000	1.642493	0.000025	0.000024	1.000000	0.000284	0.003864
TGP12-9	0.000000	0.000000	1.652708	0.000027	0.000026	1.000000	0.000287	0.003675
TGP12-10	0.000944	0.000000	1.842775	0.000021	0.000017	1.000000	0.000266	0.003364
TGP12-11	0.000000	0.000000	1.849632	0.000024	0.000018	1.000000	0.000249	0.003185
TGP12-12	0.000000	0.000000	1.878222	0.000022	0.000015	1.000000	0.000240	0.003159
TGP12-13	0.000000	0.000000	1.953853	0.000018	0.000009	1.000000	0.000145	0.002510
TGP12-14	0.000000	0.000000	1.988190	0.000014	0.000020	1.000000	0.000155	0.002588
TGP12-15	0.000000	0.000000	1.991079	0.000016	0.000014	1.000000	0.000144	0.002543
TGP12-16	0.002339	0.000000	1.872259	0.000019	0.000019	1.000000	0.000233	0.002536
TGP12-17	0.003865	0.000000	1.865976	0.000019	0.000017	1.000000	0.000213	0.002477
TGP12-18	0.000000	0.000000	1.936234	0.000022	0.000016	1.000000	0.000209	0.002371
SRM614-6	3.289624	3.293790	0.000000	0.000000	0.000000	1.000000	0.003529	0.000282
SRM612-6	3.429150	3.190377	0.000000	0.000000	0.000013	1.000000	0.012571	0.001229

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	3.856294	3.206488	0.022272	0.000000	0.000033	1.000000	0.138142	0.011765
AP1-6	0.002881	0.000000	1.842420	0.000020	0.000011	1.000000	0.000295	0.001756
AP2-6	0.002245	0.000000	1.798445	0.000022	0.000015	1.000000	0.000303	0.002024
AP3-6	0.009092	0.000000	1.628704	0.000033	0.000018	1.000000	0.000502	0.003932
AP4-6	0.011427	0.000000	1.954465	0.000023	0.000014	1.000000	0.000534	0.002599
standardize signal averages AP								
AP1	0.003591	0.000000	1.695459	0.000021	0.000011	1.000000	0.000372	0.003144
AP2	0.003858	0.000000	1.661616	0.000022	0.000015	1.000000	0.000352	0.003282
AP3	0.010193	0.000000	1.519770	0.000034	0.000018	1.000000	0.000546	0.005905
AP4	0.011941	0.000000	1.833299	0.000026	0.000013	1.000000	0.000563	0.003553
linest from std sig ave								
	0.024482	0.000000	0.275682	0.298048	0.713806	1.000000	0.008003	0.257755
standardize signal averages SRM								
srm614-2	3.195373	2.996812	0.004544	0.000012	0.000009	1.000000	0.006876	0.000363
srm612-2	3.299666	2.855070	0.051243	0.000012	0.000021	1.000000	0.014407	0.001827
srm610-2	3.589803	2.871574	0.152526	0.000016	0.000050	1.000000	0.124501	0.011795
linest from std sig ave								
	0.042022	1.348902	0.024800	157.953412	37.367488	1.000000	0.041092	0.425880
concentration data								
SRM614-5	6511.27	0.00	214.86	0.64	56.13	85763.00	7.02	9.82
SRM612-5	6656.27	0.00	2423.12	0.61	91.97	85763.00	11.15	53.61
SRM610-5	6977.78	0.00	6685.87	0.79	216.53	85763.00	76.09	261.41
AP1-5	42.00	0.00	170303.17	2.61	179.07	398936.00	1.43	465.99
AP2-5	53.44	0.00	167695.37	2.65	222.56	398936.00	1.28	466.84
AP3-5	110.31	0.00	155163.14	4.16	259.67	398936.00	1.89	810.05
AP4-5	121.64	0.00	188299.75	3.35	185.09	398936.00	1.89	463.48
TGP12-1	0.00	0.00	202648.31	2.07	380.59	398936.00	0.42	377.50
TGP12-2	0.00	0.00	211357.91	1.93	208.19	398936.00	0.38	420.21
TGP12-3	0.00	0.00	217978.50	1.36	277.25	398936.00	0.28	427.59
TGP12-4	21.30	0.00	216876.40	1.63	329.64	398936.00	0.64	400.53
TGP12-5	9.85	0.00	213443.09	2.19	279.49	398936.00	0.71	392.62
TGP12-6	10.37	0.00	192039.49	2.95	366.39	398936.00	0.90	432.85
TGP12-7	2.85	0.00	180989.63	2.85	445.07	398936.00	0.93	421.85
TGP12-8	0.00	0.00	180640.70	3.00	363.25	398936.00	0.91	397.28
TGP12-9	0.00	0.00	181764.13	3.24	392.45	398936.00	0.92	377.88
TGP12-10	9.22	0.00	202667.65	2.53	248.57	398936.00	0.85	345.86
TGP12-11	0.00	0.00	203421.78	2.84	264.35	398936.00	0.80	327.55
TGP12-12	0.00	0.00	206566.08	2.63	224.42	398936.00	0.77	324.84
TGP12-13	0.00	0.00	214883.88	2.11	135.64	398936.00	0.46	258.06
TGP12-14	0.00	0.00	218660.27	1.69	292.40	398936.00	0.50	266.10
TGP12-15	0.00	0.00	218977.98	1.89	210.66	398936.00	0.46	261.53
TGP12-16	22.85	0.00	205910.23	2.23	278.58	398936.00	0.74	260.80
TGP12-17	37.75	0.00	205219.23	2.29	258.35	398936.00	0.68	254.66
TGP12-18	0.00	0.00	212946.17	2.61	233.67	398936.00	0.67	243.79
SRM614-6	6907.05	0.00	0.00	0.00	0.00	85763.00	2.42	6.23
SRM612-6	7200.01	0.00	0.00	0.00	40.55	85763.00	8.63	27.17
SRM610-6	8096.86	0.00	526.59	0.00	106.69	85763.00	94.82	260.08
AP1-6	28.14	0.00	202628.53	2.38	160.62	398936.00	0.94	180.61
AP2-6	21.93	0.00	197792.20	2.61	218.40	398936.00	0.97	208.12
AP3-6	88.79	0.00	179124.12	3.92	263.07	398936.00	1.60	404.33
AP4-6	111.60	0.00	214951.17	2.74	206.78	398936.00	1.71	267.24
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-1	30712.13	230561.61	2094.33	4521.51	500195.28	16241.37	3005.58	878.96
SRM614-1	11478045.00	10408950.00	6656.76	8030.33	638676.38	4000607.50	26530.79	3654.62
SRM612-1	11178269.00	9202212.00	5869.71	8481.13	934759.44	3704289.50	53383.94	5586.51
SRM610-1	4891352.50	4208261.00	3099.18	7161.00	1231260.00	1480524.10	188439.78	16705.38
AP1-1	99618.77	97354.19	1761.77	5876.75	431268.81	22006208.00	11017.54	53279.54
AP2-1	97982.44	87536.93	1712.65	6697.00	686981.63	23812092.00	12093.55	60089.94
AP3-1	343600.06	82377.42	2046.69	5227.91	416143.31	23956908.00	16773.70	99787.52
AP4-1	345641.47	77028.84	1802.85	5020.27	322520.41	22327874.00	17948.06	80997.38
TGP18-1	41153.15	51503.57	1620.37	48320.51	1022241.10	23346934.00	9752.49	45249.93
TGP18-2	24651.38	45264.93	1399.01	39825.42	894267.63	19537498.00	8252.25	40070.38

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	25280.18	41854.23	1291.45	36657.05	822713.56	17846678.00	7487.84	34959.48
TGP18-4	360560.59	69720.88	1758.57	34168.07	3504523.80	31575526.00	14556.12	64420.60
TGP18-5	333691.97	65180.16	1725.73	32133.58	3277206.50	30624428.00	13957.64	61640.79
TGP18-6	74311.73	36900.13	1399.73	34287.31	1395561.40	23459648.00	9907.34	43013.20
TGP18-7	39433.94	33649.31	1936.33	44418.57	3240560.50	27904248.00	12034.95	63060.36
TGP18-8	44109.49	30929.93	1877.57	44195.61	3159793.30	28048642.00	12383.75	66137.77
TGP18-9	64640.84	32093.66	1898.49	44841.57	3421368.50	28827464.00	12522.39	66007.97
TGP18-10	137141.97	39331.66	1991.17	38532.46	4353452.00	29739660.00	13427.60	86816.29
TGP18-11	162779.44	40916.03	2203.45	42201.04	3624150.50	32112184.00	15216.29	104368.83
TGP18-12	226251.14	45002.49	2207.69	34282.87	3726709.80	32769442.00	15258.97	92796.68
SRM614-2	5821403.50	5979012.50	3136.34	5141.67	379739.22	1903344.10	8644.97	2095.17
SRM612-2	7818859.00	7598556.00	3862.94	5583.99	432612.03	2550576.00	33773.27	3948.34
SRM610-2	3680279.30	3540960.30	1947.45	4801.75	643318.50	1113191.40	149366.64	13192.27
AP1-2	64032.92	21676.48	987.73	4040.86	247200.08	15814513.00	7057.64	23193.37
AP2-2	64353.16	21107.88	1282.97	4220.90	266792.91	18049752.00	8477.25	29335.45
AP3-2	236120.89	30825.33	1600.45	3640.50	271917.63	18845386.00	12554.19	64444.28
AP4-2	301733.22	37363.13	1495.53	3654.86	238578.14	18221778.00	14695.40	57166.44
blank-2	6880.76	22801.53	323.20	2812.90	315189.38	70270.35	1186.37	1163.33
blank ave	18796.45	126681.57	1208.77	3667.20	407692.33	43255.86	2095.97	1021.15

blank subtraction								
SRM614-1	11459248.55	10282268.43	5447.99	4363.12	230984.05	3957351.64	24434.82	2633.47
SRM612-1	11159472.55	9075530.43	4660.95	4813.93	527067.11	3661033.64	51287.97	4565.37
SRM610-1	4872556.05	4081579.43	1890.41	3493.80	823567.67	1437268.24	186343.81	15684.23
AP1-1	80822.32	-29327.38	553.00	2209.55	23576.48	21962952.14	8921.57	52258.39
AP2-1	79185.99	-39144.64	503.88	3029.80	279289.30	23768836.14	9997.58	59068.79
AP3-1	324803.61	-44304.15	837.92	1560.71	8450.98	23913652.14	14677.72	98766.38
AP4-1	326845.02	-49652.73	594.08	1353.07	-85171.92	22284618.14	15852.09	79976.23
TGP18-1	22356.70	-75178.00	411.60	44653.31	614548.77	23303678.14	7656.52	44228.79
TGP18-2	5854.93	-81416.64	190.24	36158.22	486575.30	19494242.14	6156.27	39049.24
TGP18-3	6483.74	-84827.34	82.68	32989.85	415021.23	17803422.14	5391.87	33938.33
TGP18-4	341764.14	-56960.69	549.80	30500.87	3096831.47	31532270.14	12460.15	63399.46
TGP18-5	314895.52	-61501.41	516.96	28466.38	2869514.17	30581172.14	11861.67	60619.64
TGP18-6	55515.29	-89781.44	190.96	30620.11	987869.07	23416392.14	7811.36	41992.06
TGP18-7	20637.50	-93032.26	727.56	40751.37	2832868.17	27860992.14	9938.98	62039.21
TGP18-8	25313.04	-95751.64	668.80	40528.41	2752100.97	28005386.14	10287.78	65116.63
TGP18-9	45844.40	-94587.91	689.72	41174.37	3013676.17	28784208.14	10426.42	64986.82
TGP18-10	118345.52	-87349.91	782.40	34865.26	3945759.67	29696404.14	11331.62	85795.14
TGP18-11	143982.99	-85765.54	994.69	38533.83	3216458.17	32068928.14	13120.31	103347.68
TGP18-12	207454.69	-81679.08	998.93	30615.67	3319017.47	32726186.14	13162.99	91775.53
SRM614-2	5802607.05	5852330.93	1927.57	1474.47	-27953.11	1860088.24	6549.00	1074.03
SRM612-2	7800062.55	7471874.43	2654.18	1916.79	24919.70	2507320.14	31677.30	2927.20
SRM610-2	3661482.85	3414278.73	738.68	1134.55	235626.17	1069935.54	147270.67	12171.13
AP1-2	45236.48	-105005.09	-221.04	373.66	-160492.25	15771257.14	4961.67	22172.23
AP2-2	45556.71	-105573.69	74.20	553.70	-140899.42	18006496.14	6381.28	28314.30
AP3-2	217324.44	-95856.24	391.68	-26.70	-135774.70	18802130.14	10458.22	63423.14
AP4-2	282936.77	-89318.44	286.76	-12.34	-169114.19	18178522.14	12599.43	56145.30

zero correction								
SRM614-1	11459248.55	10282268.43	5447.99	4363.12	1259434.80	3957351.64	24434.82	2633.47
SRM612-1	11159472.55	9075530.43	4660.95	4813.93	1467977.40	3661033.64	51287.97	4565.37
SRM610-1	4872556.05	4081579.43	1890.41	3493.80	1565305.60	1437268.24	186343.81	15684.23
AP1-1	80822.32	0.00	553.00	2209.55	397940.13	21962952.14	8921.57	52258.39
AP2-1	79185.99	0.00	503.88	3029.80	314931.06	23768836.14	9997.58	59068.79
AP3-1	324803.61	0.00	837.92	1560.71	385658.50	23913652.14	14677.72	98766.38
AP4-1	326845.02	0.00	594.08	1353.07	301733.94	22284618.14	15852.09	79976.23
TGP18-1	22356.70	0.00	411.60	44653.31	1258539.50	23303678.14	7656.52	44228.79
TGP18-2	5854.93	0.00	190.24	36158.22	1317136.10	19494242.14	6156.27	39049.24
TGP18-3	6483.74	0.00	82.68	32989.85	1076105.90	17803422.14	5391.87	33938.33
TGP18-4	341764.14	0.00	549.80	30500.87	2032429.00	31532270.14	12460.15	63399.46
TGP18-5	314895.52	0.00	516.96	28466.38	2078104.00	30581172.14	11861.67	60619.64
TGP18-6	55515.29	0.00	190.96	30620.11	1739624.60	23416392.14	7811.36	41992.06
TGP18-7	20637.50	0.00	727.56	40751.37	2182579.80	27860992.14	9938.98	62039.21
TGP18-8	25313.04	0.00	668.80	40528.41	2631315.50	28005386.14	10287.78	65116.63
TGP18-9	45844.40	0.00	689.72	41174.37	2442299.80	28784208.14	10426.42	64986.82
TGP18-10	118345.52	0.00	782.40	34865.26	1737553.10	29696404.14	11331.62	85795.14
TGP18-11	143982.99	0.00	994.69	38533.83	1850756.90	32068928.14	13120.31	103347.68
TGP18-12	207454.69	0.00	998.93	30615.67	1737539.30	32726186.14	13162.99	91775.53
SRM614-2	5802607.05	5852330.93	1927.57	1474.47	2903196.80	1860088.24	6549.00	1074.03
SRM612-2	7800062.55	7471874.43	2654.18	1916.79	4116332.50	2507320.14	31677.30	2927.20
SRM610-2	3661482.85	3414278.73	738.68	1134.55	4146259.00	1069935.54	147270.67	12171.13
AP1-2	45236.48	0.00	0.00	373.66	2602828.50	15771257.14	4961.67	22172.23
AP2-2	45556.71	0.00	74.20	553.70	2569829.00	18006496.14	6381.28	28314.30
AP3-2	217324.44	0.00	391.68	0.00	5110986.00	18802130.14	10458.22	63423.14
AP4-2	282936.77	0.00	286.76	0.00	4320745.00	18178522.14	12599.43	56145.30

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-1	2.895686	2.598270	0.001377	0.001103	0.318252	1.000000	0.006175	0.000665
SRM612-1	3.048175	2.478953	0.001273	0.001315	0.400973	1.000000	0.014009	0.001247
SRM610-1	3.390151	2.839817	0.001315	0.002431	1.089084	1.000000	0.129651	0.010913
AP1-1	0.003680	0.000000	0.000025	0.000101	0.018119	1.000000	0.000406	0.002379
AP2-1	0.003332	0.000000	0.000021	0.000127	0.013250	1.000000	0.000421	0.002485
AP3-1	0.013582	0.000000	0.000035	0.000065	0.016127	1.000000	0.000614	0.004130
AP4-1	0.014667	0.000000	0.000027	0.000061	0.013540	1.000000	0.000711	0.003589
TGP18-1	0.000959	0.000000	0.000018	0.001916	0.054006	1.000000	0.000329	0.001898
TGP18-2	0.000300	0.000000	0.000010	0.001855	0.067565	1.000000	0.000316	0.002003
TGP18-3	0.000364	0.000000	0.000005	0.001853	0.060444	1.000000	0.000303	0.001906
TGP18-4	0.010839	0.000000	0.000017	0.000967	0.064456	1.000000	0.000395	0.002011
TGP18-5	0.010297	0.000000	0.000017	0.000931	0.067954	1.000000	0.000388	0.001982
TGP18-6	0.002371	0.000000	0.000008	0.001308	0.074291	1.000000	0.000334	0.001793
TGP18-7	0.000741	0.000000	0.000026	0.001463	0.078338	1.000000	0.000357	0.002227
TGP18-8	0.000904	0.000000	0.000024	0.001447	0.093957	1.000000	0.000367	0.002325
TGP18-9	0.001593	0.000000	0.000024	0.001430	0.084849	1.000000	0.000362	0.002258
TGP18-10	0.003985	0.000000	0.000026	0.001174	0.058511	1.000000	0.000382	0.002889
TGP18-11	0.004490	0.000000	0.000031	0.001202	0.057712	1.000000	0.000409	0.003223
TGP18-12	0.006339	0.000000	0.000031	0.000936	0.053093	1.000000	0.000402	0.002804
SRM614-2	3.119533	3.146265	0.001036	0.000793	1.560784	1.000000	0.003521	0.000577
SRM612-2	3.110916	2.980024	0.001059	0.000764	1.641726	1.000000	0.012634	0.001167
SRM610-2	3.422153	3.191107	0.000690	0.001060	3.875242	1.000000	0.137644	0.011376
AP1-2	0.002868	0.000000	0.000000	0.000024	0.165036	1.000000	0.000315	0.001406
AP2-2	0.002530	0.000000	0.000004	0.000031	0.142717	1.000000	0.000354	0.001572
AP3-2	0.011559	0.000000	0.000021	0.000000	0.271830	1.000000	0.000556	0.003373
AP4-2	0.015564	0.000000	0.000016	0.000000	0.237684	1.000000	0.000693	0.003089
standardize signal averages AP								
AP1	0.003274	0.000000	0.000013	0.000062	0.091577	1.000000	0.000360	0.001893
AP2	0.002931	0.000000	0.000013	0.000079	0.077983	1.000000	0.000388	0.002029
AP3	0.012570	0.000000	0.000028	0.000033	0.143979	1.000000	0.000585	0.003752
AP4	0.015116	0.000000	0.000021	0.000030	0.125612	1.000000	0.000702	0.003339
linest from std sig ave								
	0.020041	0.000000	22590.118823	0.142359	0.000096	1.000000	0.007407	0.369402
standardize signal averages SRM								
srm614-2	3.007610	2.872268	0.001206	0.000948	0.939518	1.000000	0.004848	0.000621
srm612-2	3.079546	2.729489	0.001166	0.001040	1.021350	1.000000	0.013322	0.001207
srm610-2	3.406152	3.015462	0.001003	0.001746	2.482163	1.000000	0.133648	0.011144
linest from std sig ave								
	0.983813	0.919313	1.168496	1.324129	0.000756	1.000000	0.971293	0.980127
concentration data								
SRM614-1	4976.95	0.00	2667166.81	13.46	20.65	85763.00	3.92	21.08
SRM612-1	5239.04	0.00	2466543.85	16.05	26.01	85763.00	8.90	39.51
SRM610-1	5826.81	0.00	2548219.39	29.68	70.65	85763.00	82.36	345.72
AP1-1	29.42	0.00	226912.59	5.71	5.47	398936.00	1.20	350.64
AP2-1	26.64	0.00	191048.42	7.24	4.00	398936.00	1.24	366.23
AP3-1	108.59	0.00	315777.24	3.71	4.87	398936.00	1.81	608.65
AP4-1	117.26	0.00	240250.27	3.45	4.09	398936.00	2.10	528.88
TGP18-1	7.67	0.00	159175.07	108.82	16.30	398936.00	0.97	279.69
TGP18-2	2.40	0.00	87946.69	105.34	20.39	398936.00	0.93	295.19
TGP18-3	2.91	0.00	41852.49	105.24	18.24	398936.00	0.89	280.92
TGP18-4	86.65	0.00	157135.24	54.93	19.45	398936.00	1.17	296.30
TGP18-5	82.32	0.00	152344.57	52.86	20.51	398936.00	1.15	292.12
TGP18-6	18.95	0.00	73493.12	74.26	22.42	398936.00	0.99	264.27
TGP18-7	5.92	0.00	235340.37	83.07	23.64	398936.00	1.05	328.15
TGP18-8	7.23	0.00	215218.16	82.19	28.35	398936.00	1.09	342.65
TGP18-9	12.73	0.00	215944.76	81.24	25.61	398936.00	1.07	332.72

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	31.86	0.00	237437.45	66.68	17.66	398936.00	1.13	425.76
TGP18-11	35.90	0.00	279526.59	68.24	17.42	398936.00	1.21	474.92
TGP18-12	50.68	0.00	275080.30	53.13	16.02	398936.00	1.19	413.27
SRM614-2	24940.46	0.00	9338960.43	45.02	471.00	398936.00	10.40	85.09
SRM612-2	5346.87	0.00	2050870.61	9.33	106.51	85763.00	8.03	36.99
SRM610-2	5881.81	0.00	1337579.53	12.95	251.41	85763.00	87.44	360.39
AP1-2	4.93	0.00	0.00	0.29	10.71	85763.00	0.20	44.54
AP2-2	20.23	0.00	37136.36	1.75	43.07	398936.00	1.05	231.73
AP3-2	92.41	0.00	187736.41	0.00	82.03	398936.00	1.64	497.10
AP4-2	124.44	0.00	142162.21	0.00	71.73	398936.00	2.05	455.15

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti	
raw data									
blank-7b		10781	1407	201	1401	58588	6179	1333	737
SRM614-7b		4516318	5500427	3086	5724	296107	1447940	10880	1967
SRM612-7		4926435	5872669	3361	5809	344047	1574699	25026	3469
SRM610-7		2677072	2475300	1502	5384	646401	740940	112770	12532
AP1-7		74429	26591	753	4640	435719	9087209	5479	21350
AP2-7		43956	23898	690	3985	257812	8416911	4816	18596
AP3-7		65757	22649	719	3683	246830	8390196	5500	17764
AP4-7		94050	26088	762	3862	249413	7843137	5823	21480
MZ3-1		14093	18484	462	9985	340916	4555268	2851	9645
MZ3-2		13474	18023	480	9959	395062	4607516	2772	9934
MZ3-3		12568	17460	497	8851	326551	4149379	2572	8876
MZ3-4		24503	26596	1107	17482	3733955	13404904	5911	40503
MZ3-5		21649	25305	928	13078	2751079	10397198	4745	28270
MZ3-6		28711	39182	1012	14640	3272808	12779921	5607	34739
MZ3-7		36546	39496	950	8722	2426937	12686002	5663	33643
MZ3-8		30619	29064	1063	8855	2424002	12482699	5600	31766
MZ3-9		22556	26356	956	8327	2302716	12533051	5448	31689
srm614-8		3056615	3965448	2132	4061	334898	1046720	5423	2266
srm612-8		3374803	4291693	2361	4303	335875	1125717	16400	2588
srm610-8		2175985	2052265	1249	3950	444610	654767	97437	9494
AP1-8		47061	17428	616	3476	308390	7073543	4226	12111
AP2-8		34576	17064	622	3254	218543	7089112	4296	12507
AP3-8		62881	17582	649	3046	232229	7758412	5222	13979
AP4-8		96294	19900	645	3245	192807	7080359	5420	14984
blank-8		14195	14389	174	2225	179923	56775	1330	1117
blank ave		12488	7898	187	1813	119255	31477	1331	927

blank subtraction								
SRM614-7b	4503829.51	5492529.28	2899.02	3910.50	176851.39	1416463.28	9548.45	1039.63
SRM612-7	4913947.01	5864771.28	3173.98	3995.66	224791.70	1543221.68	23694.77	2541.71
SRM610-7	2664583.51	2467402.58	1314.17	3571.14	527145.14	709462.51	111439.03	11604.96
AP1-7	61941.15	18693.27	565.44	2826.46	316463.64	9055731.88	4147.86	20423.29
AP2-7	31467.90	15999.97	502.12	2171.85	138556.48	8385433.88	3484.78	17669.28
AP3-7	53268.74	14751.48	532.00	1869.53	127574.18	8358718.88	4168.46	16837.28
AP4-7	81562.26	18190.10	574.04	2048.41	130157.56	7811659.38	4491.23	20553.21
MZ3-1	1605.37	10586.38	274.40	8172.01	221660.42	4523790.88	1519.69	8717.43
MZ3-2	985.57	10125.34	292.76	8146.21	275806.54	4576038.38	1440.33	9007.23
MZ3-3	79.96	9562.21	309.36	7038.20	207295.92	4117901.38	1240.29	7948.34
MZ3-4	12014.67	18697.90	919.45	15668.61	3614699.81	13373426.88	4579.71	39575.84
MZ3-5	9160.85	17407.26	741.00	11265.02	2631823.31	10365720.88	3413.98	27342.57
MZ3-6	16223.17	31284.65	824.96	12826.87	3153552.31	12748443.88	4275.66	33811.49
MZ3-7	24057.58	31598.58	762.36	6909.36	2307681.01	12654524.88	4331.38	32715.48
MZ3-8	18130.74	21165.88	876.00	7042.28	2304746.51	12451221.88	4268.66	30838.79
MZ3-9	10068.34	18458.10	768.64	6513.60	2183460.31	12501573.88	4116.94	30762.27
srm614-8	3044126.81	3957550.08	1944.69	2248.01	215642.17	1015242.78	4091.86	1338.87
srm612-8	3362315.01	4283794.78	2173.93	2489.53	216619.45	1094239.78	15069.05	1661.03
srm610-8	2163496.81	2044367.38	1061.41	2137.33	325354.42	623290.32	96105.74	8566.67
AP1-8	34573.32	9529.97	428.20	1662.45	189134.42	7042065.38	2894.18	11184.04
AP2-8	22087.85	9166.13	434.96	1440.69	99287.42	7057634.88	2964.94	11580.04
AP3-8	50393.41	9684.25	461.76	1232.61	112973.85	7726934.38	3890.62	13052.25
AP4-8	83806.35	12001.95	457.52	1432.41	73551.59	7048881.88	4088.74	14057.30

zero correction								
SRM614-7b	4503829.51	5492529.28	2899.02	3910.50	1259434.80	1416463.28	9548.45	1039.63
SRM612-7	4913947.01	5864771.28	3173.98	3995.66	1467977.40	1543221.68	23694.77	2541.71
SRM610-7	2664583.51	2467402.58	1314.17	3571.14	1565305.60	709462.51	111439.03	11604.96

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	61941.15	18693.27	565.44	2826.46	397940.13	9055731.88	4147.86	20423.29
AP2-7	31467.90	15999.97	502.12	2171.85	314931.06	8385433.88	3484.78	17669.28
AP3-7	53268.74	14751.48	532.00	1869.53	385658.50	8358718.88	4168.46	16837.28
AP4-7	81562.26	18190.10	574.04	2048.41	301733.94	7811659.38	4491.23	20553.21
MZ3-1	1605.37	10586.38	274.40	8172.01	1258539.50	4523790.88	1519.69	8717.43
MZ3-2	985.57	10125.34	292.76	8146.21	1317136.10	4576038.38	1440.33	9007.23
MZ3-3	79.96	9562.21	309.36	7038.20	1076105.90	4117901.38	1240.29	7948.34
MZ3-4	12014.67	18697.90	919.45	15668.61	2032429.00	13373426.88	4579.71	39575.84
MZ3-5	9160.85	17407.26	741.00	11265.02	2078104.00	10365720.88	3413.98	27342.57
MZ3-6	16223.17	31284.65	824.96	12826.87	1739624.60	12748443.88	4275.66	33811.49
MZ3-7	24057.58	31598.58	762.36	6909.36	2182579.80	12654524.88	4331.38	32715.48
MZ3-8	18130.74	21165.88	876.00	7042.28	2631315.50	12451221.88	4268.66	30838.79
MZ3-9	10068.34	18458.10	768.64	6513.60	2442299.80	12501573.88	4116.94	30762.27
srm614-8	3044126.81	3957550.08	1944.69	2248.01	1737553.10	1015242.78	4091.86	1338.87
srm612-8	3362315.01	4283794.78	2173.93	2489.53	1850756.90	1094239.78	15069.05	1661.03
srm610-8	2163496.81	2044367.38	1061.41	2137.33	1737539.30	623290.32	96105.74	8566.67
AP1-8	34573.32	9529.97	428.20	1662.45	2903196.80	7042065.38	2894.18	11184.04
AP2-8	22087.85	9166.13	434.96	1440.69	4116332.50	7057634.88	2964.94	11580.04
AP3-8	50393.41	9684.25	461.76	1232.61	4146259.00	7726934.38	3890.62	13052.25
AP4-8	83806.35	12001.95	457.52	1432.41	2602828.50	7048881.88	4088.74	14057.30
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83
standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098
standardized signal								
SRM614-7b	3.179630	3.877636	0.002047	0.002761	0.889140	1.000000	0.006741	0.000734
SRM612-7	3.184213	3.800343	0.002057	0.002589	0.951242	1.000000	0.015354	0.001647
SRM610-7	3.755778	3.477848	0.001852	0.005034	2.206326	1.000000	0.157075	0.016357
AP1-7	0.006840	0.002064	0.000062	0.000312	0.043943	1.000000	0.000458	0.002255
AP2-7	0.003753	0.001908	0.000060	0.000259	0.037557	1.000000	0.000416	0.002107
AP3-7	0.006373	0.001765	0.000064	0.000224	0.046138	1.000000	0.000499	0.002014
AP4-7	0.010441	0.002329	0.000073	0.000262	0.038626	1.000000	0.000575	0.002631
MZ3-1	0.000355	0.002340	0.000061	0.001806	0.278205	1.000000	0.000336	0.001927
MZ3-2	0.000215	0.002213	0.000064	0.001780	0.287833	1.000000	0.000315	0.001968
MZ3-3	0.000019	0.002322	0.000075	0.001709	0.261324	1.000000	0.000301	0.001930
MZ3-4	0.000898	0.001398	0.000069	0.001172	0.151975	1.000000	0.000342	0.002959
MZ3-5	0.000884	0.001679	0.000071	0.001087	0.200478	1.000000	0.000329	0.002638
MZ3-6	0.001273	0.002454	0.000065	0.001006	0.136458	1.000000	0.000335	0.002652
MZ3-7	0.001901	0.002497	0.000060	0.000546	0.172474	1.000000	0.000342	0.002585
MZ3-8	0.001456	0.001700	0.000070	0.000566	0.211330	1.000000	0.000343	0.002477
MZ3-9	0.000805	0.001476	0.000061	0.000521	0.195359	1.000000	0.000329	0.002461
srm614-8	2.998423	3.898132	0.001915	0.002214	1.711466	1.000000	0.004030	0.001319
srm612-8	3.072741	3.914859	0.001987	0.002275	1.691363	1.000000	0.013771	0.001518
srm610-8	3.471090	3.279960	0.001703	0.003429	2.787689	1.000000	0.154191	0.013744
AP1-8	0.004910	0.001353	0.000061	0.000236	0.412265	1.000000	0.000411	0.001588
AP2-8	0.003130	0.001299	0.000062	0.000204	0.583245	1.000000	0.000420	0.001641
AP3-8	0.006522	0.001253	0.000060	0.000160	0.536598	1.000000	0.000504	0.001689
AP4-8	0.011889	0.001703	0.000065	0.000203	0.369254	1.000000	0.000580	0.001994
standardize signal averages AP								
AP1	0.005875	0.001709	0.000062	0.000274	0.228104	1.000000	0.000435	0.001922
AP2	0.003441	0.001603	0.000061	0.000232	0.310401	1.000000	0.000418	0.001874
AP3	0.006447	0.001509	0.000062	0.000192	0.291368	1.000000	0.000501	0.001852
AP4	0.011165	0.002016	0.000069	0.000233	0.203940	1.000000	0.000577	0.002313
linest from std sig ave								
	0.027315	0.139127	7324.608095	0.034664	0.000036	1.000000	0.007430	0.554789
standardize signal averages SRM								
srm614-2	3.089026	3.887884	0.001981	0.002488	1.300303	1.000000	0.005386	0.001026
srm612-2	3.128477	3.857601	0.002022	0.002432	1.321303	1.000000	0.014563	0.001582
srm610-2	3.613434	3.378904	0.001778	0.004231	2.497007	1.000000	0.155633	0.015051

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
	1.029908	1.001777	1.029853	1.148502	0.000585	1.000000	1.009945	1.084607
concentration data								
SRM614-7b	7448.57	46267.69	1285670.52	8.21	44.59	85763.00	4.30	34.92
SRM612-7	7459.31	45345.43	1291992.36	7.70	47.70	85763.00	9.78	78.37
SRM610-7	8798.25	41497.44	1163605.00	14.96	110.64	85763.00	100.10	778.29
AP1-7	74.53	114.57	182453.86	4.32	10.25	398936.00	1.36	499.15
AP2-7	40.89	105.90	174973.41	3.58	8.76	398936.00	1.23	466.36
AP3-7	69.44	97.95	185978.16	3.09	10.76	398936.00	1.48	445.82
AP4-7	113.77	129.24	214728.12	3.63	9.01	398936.00	1.70	582.33
MZ3-1	3.87	129.88	177244.05	24.98	64.90	398936.00	1.00	426.50
MZ3-2	2.35	122.81	186944.27	24.62	67.14	398936.00	0.93	435.65
MZ3-3	0.21	128.88	219522.12	23.64	60.96	398936.00	0.89	427.20
MZ3-4	9.79	77.60	200895.77	16.20	35.45	398936.00	1.02	654.97
MZ3-5	9.63	93.21	208885.73	15.03	46.76	398936.00	0.98	583.81
MZ3-6	13.87	136.20	189088.79	13.91	31.83	398936.00	0.99	587.00
MZ3-7	20.72	138.59	176037.15	7.55	40.23	398936.00	1.01	572.19
MZ3-8	15.87	94.35	205580.64	7.82	49.30	398936.00	1.02	548.17
MZ3-9	8.78	81.95	179658.74	7.21	45.57	398936.00	0.98	544.61
srm614-8	7024.07	46512.24	1203275.34	6.58	85.83	85763.00	2.57	62.75
srm612-8	7198.17	46711.84	1248009.42	6.76	84.82	85763.00	8.78	72.23
srm610-8	8131.34	39136.26	1069733.34	10.19	139.80	85763.00	98.26	653.96
AP1-8	53.50	75.11	177679.24	3.26	96.17	398936.00	1.22	351.50
AP2-8	34.10	72.08	180086.09	2.82	136.05	398936.00	1.25	363.15
AP3-8	71.07	69.56	174622.08	2.21	125.17	398936.00	1.49	373.86
AP4-8	129.56	94.50	189661.84	2.81	86.13	398936.00	1.72	441.38
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83
raw data								
	Al	Si	P	Cl	K	Ca	Sc	Ti
blank-5	6506.20	46623.18	561.12	4549.15	425620.31	17800.50	1338.97	779.16
SRM614-5	11991682.00	11940307.00	6864.32	10109.86	791687.25	4019399.50	28837.60	2362.53
SRM612-5	10964333.00	10513302.00	5974.95	9907.74	895801.88	3544371.00	54285.23	5030.35
SRM610-5	4064557.30	3755762.30	2315.81	6410.48	695551.75	1134743.30	159938.66	14696.88
AP1-5	122502.48	38541.70	1091.41	5581.83	698751.63	15603143.00	8552.77	48983.07
AP2-5	115546.45	41856.43	1496.09	7673.88	1076833.90	22032990.00	11130.82	75893.74
AP3-5	222070.13	40122.27	1708.93	5693.63	553980.69	19421534.00	13036.15	93037.04
AP4-5	363078.28	57409.81	2014.93	4771.75	383618.91	19639088.00	18001.14	116264.81
V1-1	884991.88	279993.06	873.88	20179.31	1731979.40	9344501.00	5186.55	242919.13
V1-2	940953.13	267659.09	975.69	22031.05	1398264.90	11325449.00	5826.83	486480.06
V1-3	555564.44	161138.03	739.44	19207.63	1079683.40	8534103.00	4446.95	130200.22
V1-4	931037.25	154505.39	852.96	18756.19	2005790.80	9014157.00	4694.59	26236.71
V1-5	506087.13	82236.34	797.44	20681.92	1374658.50	9691278.00	4786.27	23786.65
V1-6	537341.88	65202.09	801.20	19845.71	1199037.50	8841005.00	4404.11	23645.77
V1-7	579963.13	91054.88	786.12	17743.22	1539289.30	8532065.00	4292.14	21254.84
V1-8	474567.56	61704.27	795.80	19364.15	1370435.30	8786136.00	4469.75	22207.81
V1-9	910462.50	85447.76	848.80	22833.89	1895770.40	11367063.00	5286.47	27121.19
V1-10	286514.22	48958.59	697.76	16012.49	987448.69	6873389.00	3691.02	18951.27
V1-11	274841.44	43848.97	581.32	17799.10	935834.69	7226131.50	3740.18	20893.40
V1-12	247261.39	42717.04	625.40	17999.78	902598.69	6694753.50	3458.30	22742.61
V1-13	474521.56	138286.86	670.12	14227.44	1741680.00	6314834.00	3531.82	19409.87
V1-14	185363.44	37538.93	546.72	14572.88	910810.06	5961232.00	3347.50	17086.62
V1-15	278913.22	81515.66	635.72	14772.28	1045690.80	6527912.00	3440.38	17741.78
SRM614-6	3827351.00	4076017.80	2263.89	4993.11	320126.84	1201488.60	6148.03	1415.65
SRM612-6	7037492.00	7546621.00	4136.38	5935.59	370291.91	2323551.50	31791.86	3586.90
SRM610-6	3819575.50	3927745.30	2217.73	5109.39	587574.69	1148679.80	159976.42	14547.52
AP1-6	54696.47	18044.90	733.28	3471.86	264714.81	10365208.00	5547.43	19407.91
AP2-6	64902.00	17354.42	1137.89	4609.43	337467.03	16807834.00	7928.76	32047.90
AP3-6	214778.17	25137.50	1381.81	4196.38	242397.72	17846072.00	11022.02	53024.78
AP4-6	225930.31	32954.82	1285.97	3637.50	219101.11	13657731.00	11806.51	55689.59
blank-6	15860.65	14738.44	240.32	2434.41	278742.00	76370.31	1228.97	1194.09
blank average	11183.42	30680.81	400.72	3491.78	352181.16	47085.41	1283.97	986.63
blank subtraction								
SRM614-5	11980498.58	11909626.19	6463.60	6618.08	439506.10	3972314.09	27553.63	1375.91
SRM612-5	10953149.58	10482621.19	5574.23	6415.96	543620.73	3497285.59	53001.26	4043.72
SRM610-5	4053373.88	3725081.49	1915.09	2918.70	343370.60	1087657.89	158654.69	13710.26
AP1-5	111319.06	7860.89	690.68	2090.05	346570.48	15556057.59	7268.80	47996.45
AP2-5	104363.03	11175.62	1095.37	4182.10	724652.75	21985904.59	9846.85	74907.12

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	210886.71	9441.45	1308.21	2201.85	201799.54	19374448.59	11752.19	92050.41
AP4-5	351894.86	26728.99	1614.21	1279.97	31437.75	19592002.59	16717.17	115278.18
V1-1	873808.46	249312.25	473.16	16687.53	1379798.25	9297415.59	3902.58	241932.50
V1-2	929769.71	236978.28	574.96	18539.27	1046083.75	11278363.59	4542.87	485493.43
V1-3	544381.02	130457.22	338.72	15715.85	727502.25	8487017.59	3162.98	129213.59
V1-4	919853.83	123824.58	452.24	15264.41	1653609.65	8967071.59	3410.62	25250.08
V1-5	494903.71	51555.53	396.72	17190.14	1022477.35	9644192.59	3502.30	22800.03
V1-6	526158.46	34521.27	400.48	16353.93	846856.35	8793919.59	3120.14	22659.15
V1-7	568779.71	60374.06	385.40	14251.44	1187108.15	8484979.59	3008.18	20268.21
V1-8	463384.14	31023.45	395.08	15872.37	1018254.15	8739050.59	3185.78	21221.18
V1-9	899279.08	54766.94	448.08	19342.11	1543589.25	11319977.59	4002.50	26134.57
V1-10	275330.80	18277.78	297.04	12520.71	635267.54	6826303.59	2407.05	17964.64
V1-11	263658.02	13168.15	180.60	14307.32	583653.54	7179046.09	2456.21	19906.77
V1-12	236077.97	12036.23	224.68	14508.00	550417.54	6647668.09	2174.33	21755.98
V1-13	463338.14	107606.05	269.40	10735.66	1389498.85	6267748.59	2247.85	18423.24
V1-14	174180.02	6858.12	146.00	11081.10	558628.91	5914146.59	2063.53	16099.99
V1-15	267729.80	50834.84	235.00	11280.50	693509.65	6480826.59	2156.41	16755.15
SRM614-6	3816167.58	4045336.99	1863.17	1501.33	-32054.32	1154403.19	4864.07	429.02
SRM612-6	7026308.58	7515940.19	3735.66	2443.81	18110.75	2276466.09	30507.89	2600.27
SRM610-6	3808392.08	3897064.49	1817.01	1617.61	235393.54	1101594.39	158692.45	13560.90
AP1-6	43513.05	-12635.91	332.56	-19.92	-87466.35	10318122.59	4263.46	18421.28
AP2-6	53718.58	-13326.40	737.16	1117.65	-14714.13	16760748.59	6644.80	31061.27
AP3-6	203594.75	-5543.31	981.09	704.60	-109783.44	17798986.59	9738.05	52038.15
AP4-6	214746.89	2274.01	885.25	145.72	-133080.05	13610645.59	10522.54	54702.97

zero correction

SRM614-5	11980498.58	11909626.19	6463.60	6618.08	439506.10	3972314.09	27553.63	1375.91
SRM612-5	10953149.58	10482621.19	5574.23	6415.96	543620.73	3497285.59	53001.26	4043.72
SRM610-5	4053373.88	3725081.49	1915.09	2918.70	343370.60	1087657.89	158654.69	13710.26
AP1-5	111319.06	7860.89	690.68	2090.05	346570.48	15556057.59	7268.80	47996.45
AP2-5	104363.03	11175.62	1095.37	4182.10	724652.75	21985904.59	9846.85	74907.12
AP3-5	210886.71	9441.45	1308.21	2201.85	201799.54	19374448.59	11752.19	92050.41
AP4-5	351894.86	26728.99	1614.21	1279.97	31437.75	19592002.59	16717.17	115278.18
V1-1	873808.46	249312.25	473.16	16687.53	1379798.25	9297415.59	3902.58	241932.50
V1-2	929769.71	236978.28	574.96	18539.27	1046083.75	11278363.59	4542.87	485493.43
V1-3	544381.02	130457.22	338.72	15715.85	727502.25	8487017.59	3162.98	129213.59
V1-4	919853.83	123824.58	452.24	15264.41	1653609.65	8967071.59	3410.62	25250.08
V1-5	494903.71	51555.53	396.72	17190.14	1022477.35	9644192.59	3502.30	22800.03
V1-6	526158.46	34521.27	400.48	16353.93	846856.35	8793919.59	3120.14	22659.15
V1-7	568779.71	60374.06	385.40	14251.44	1187108.15	8484979.59	3008.18	20268.21
V1-8	463384.14	31023.45	395.08	15872.37	1018254.15	8739050.59	3185.78	21221.18
V1-9	899279.08	54766.94	448.08	19342.11	1543589.25	11319977.59	4002.50	26134.57
V1-10	275330.80	18277.78	297.04	12520.71	635267.54	6826303.59	2407.05	17964.64
V1-11	263658.02	13168.15	180.60	14307.32	583653.54	7179046.09	2456.21	19906.77
V1-12	236077.97	12036.23	224.68	14508.00	550417.54	6647668.09	2174.33	21755.98
V1-13	463338.14	107606.05	269.40	10735.66	1389498.85	6267748.59	2247.85	18423.24
V1-14	174180.02	6858.12	146.00	11081.10	558628.91	5914146.59	2063.53	16099.99
V1-15	267729.80	50834.84	235.00	11280.50	693509.65	6480826.59	2156.41	16755.15
SRM614-6	3816167.58	4045336.99	1863.17	1501.33	0.00	1154403.19	4864.07	429.02
SRM612-6	7026308.58	7515940.19	3735.66	2443.81	18110.75	2276466.09	30507.89	2600.27
SRM610-6	3808392.08	3897064.49	1817.01	1617.61	235393.54	1101594.39	158692.45	13560.90
AP1-6	43513.05	0.00	332.56	0.00	0.00	10318122.59	4263.46	18421.28
AP2-6	53718.58	0.00	737.16	1117.65	0.00	16760748.59	6644.80	31061.27
AP3-6	203594.75	0.00	981.09	704.60	0.00	17798986.59	9738.05	52038.15
AP4-6	214746.89	2274.01	885.25	145.72	0.00	13610645.59	10522.54	54702.97

certified concentration

SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration

SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal

SRM614-5	3.016000	2.998158	0.001627	0.001666	0.110642	1.000000	0.006936	0.000346
SRM612-5	3.131900	2.997359	0.001594	0.001835	0.155441	1.000000	0.015155	0.001156
SRM610-5	3.726699	3.424865	0.001761	0.002683	0.315697	1.000000	0.145868	0.012605

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.007156	0.000505	0.000044	0.000134	0.022279	1.000000	0.000467	0.003085
AP2-5	0.004747	0.000508	0.000050	0.000190	0.032960	1.000000	0.000448	0.003407
AP3-5	0.010885	0.000487	0.000068	0.000114	0.010416	1.000000	0.000607	0.004751
AP4-5	0.017961	0.001364	0.000082	0.000065	0.001605	1.000000	0.000853	0.005884
V1-1	0.093984	0.026815	0.000051	0.001795	0.148407	1.000000	0.000420	0.026021
V1-2	0.082438	0.021012	0.000051	0.001644	0.092751	1.000000	0.000403	0.043046
V1-3	0.064143	0.015371	0.000040	0.001852	0.085719	1.000000	0.000373	0.015225
V1-4	0.102581	0.013809	0.000050	0.001702	0.184409	1.000000	0.000380	0.002816
V1-5	0.051316	0.005346	0.000041	0.001782	0.106020	1.000000	0.000363	0.002364
V1-6	0.059832	0.003926	0.000046	0.001860	0.096300	1.000000	0.000355	0.002577
V1-7	0.067034	0.007115	0.000045	0.001680	0.139907	1.000000	0.000355	0.002389
V1-8	0.053025	0.003550	0.000045	0.001816	0.116518	1.000000	0.000365	0.002428
V1-9	0.079442	0.004838	0.000040	0.001709	0.136360	1.000000	0.000354	0.002309
V1-10	0.040334	0.002678	0.000044	0.001834	0.093062	1.000000	0.000353	0.002632
V1-11	0.036726	0.001834	0.000025	0.001993	0.081300	1.000000	0.000342	0.002773
V1-12	0.035513	0.001811	0.000034	0.002182	0.082799	1.000000	0.000327	0.003273
V1-13	0.073924	0.017168	0.000043	0.001713	0.221690	1.000000	0.000359	0.002939
V1-14	0.029451	0.001160	0.000025	0.001874	0.094456	1.000000	0.000349	0.002722
V1-15	0.041311	0.007844	0.000036	0.001741	0.107009	1.000000	0.000333	0.002585
SRM614-6	3.305749	3.504267	0.001614	0.001301	0.000000	1.000000	0.004213	0.000372
SRM612-6	3.086498	3.301582	0.001641	0.001074	0.007956	1.000000	0.013401	0.001142
SRM610-6	3.457164	3.537658	0.001649	0.001468	0.213684	1.000000	0.144057	0.012310
AP1-6	0.004217	0.000000	0.000032	0.000000	0.000000	1.000000	0.000413	0.001785
AP2-6	0.003205	0.000000	0.000044	0.000067	0.000000	1.000000	0.000396	0.001853
AP3-6	0.011439	0.000000	0.000055	0.000040	0.000000	1.000000	0.000547	0.002924
AP4-6	0.015778	0.000167	0.000065	0.000011	0.000000	1.000000	0.000773	0.004019
standardize signal averages AP								
AP1	0.005687	0.000253	0.000038	0.000067	0.011139	1.000000	0.000440	0.002435
AP2	0.003976	0.000254	0.000047	0.000128	0.016480	1.000000	0.000422	0.002630
AP3	0.011162	0.000244	0.000061	0.000077	0.005208	1.000000	0.000577	0.003837
AP4	0.016870	0.000766	0.000074	0.000038	0.000802	1.000000	0.000813	0.004952
linest from std sig ave								
	0.019043	0.589644	8032.080379	0.091174	0.000464	1.000000	0.006664	0.294313
standardize signal averages SRM								
srm614-2	3.160875	3.251213	0.001621	0.001483	0.055321	1.000000	0.005575	0.000359
srm612-2	3.109199	3.149471	0.001617	0.001454	0.081698	1.000000	0.014278	0.001149
srm610-2	3.591931	3.481262	0.001705	0.002076	0.264691	1.000000	0.144963	0.012458
linest from std sig ave								
	0.042892	1.189220	0.984777	1.319198	0.009457	1.000000	0.035416	0.406664
concentration data								
SRM614-5	4925.64	151615.74	1120878.84	13.03	89.73	85763.00	3.96	8.74
SRM612-5	5114.92	151575.33	1097948.32	14.35	126.07	85763.00	8.66	29.19
SRM610-5	6086.33	173194.14	1212900.15	20.98	256.04	85763.00	83.37	318.17
AP1-5	54.36	118.87	142269.25	4.89	84.05	398936.00	1.24	362.26
AP2-5	36.06	119.57	159641.66	6.92	124.34	398936.00	1.19	400.03
AP3-5	82.69	114.63	216360.76	4.13	39.29	398936.00	1.61	557.84
AP4-5	136.45	320.92	264005.06	2.38	6.05	398936.00	2.27	690.85
V1-1	713.98	6307.75	163072.05	65.28	559.88	398936.00	1.12	3055.24
V1-2	626.27	4942.60	163352.30	59.79	349.92	398936.00	1.07	5054.17
V1-3	487.28	3615.81	127884.95	67.35	323.39	398936.00	0.99	1787.58
V1-4	779.30	3248.25	161603.97	61.92	695.70	398936.00	1.01	330.62
V1-5	389.84	1257.48	131811.08	64.83	399.97	398936.00	0.97	277.58
V1-6	454.54	923.42	145925.80	67.64	363.30	398936.00	0.94	302.53
V1-7	509.25	1673.76	145544.12	61.09	527.81	398936.00	0.94	280.46
V1-8	402.82	835.06	144862.02	66.06	439.58	398936.00	0.97	285.11
V1-9	603.51	1138.06	126836.33	62.15	514.43	398936.00	0.94	271.07
V1-10	306.41	629.84	139432.19	66.71	351.09	398936.00	0.94	308.99
V1-11	279.00	431.47	80609.20	72.49	306.71	398936.00	0.91	325.57
V1-12	269.79	425.91	108300.08	79.38	312.37	398936.00	0.87	384.26
V1-13	561.59	4038.48	137727.21	62.30	836.35	398936.00	0.95	345.12
V1-14	223.74	272.78	79103.28	68.15	356.35	398936.00	0.93	319.63
V1-15	313.83	1845.12	116190.64	63.31	403.71	398936.00	0.88	303.55
SRM614-6	5398.85	177209.47	1111790.74	10.17	0.00	85763.00	2.41	9.38
SRM612-6	5040.77	166959.78	1130405.57	8.39	6.45	85763.00	7.66	28.83
SRM610-6	5646.13	178898.05	1136223.18	11.48	173.31	85763.00	82.34	310.72
AP1-6	32.04	0.00	103276.86	0.00	0.00	398936.00	1.10	209.62
AP2-6	24.35	0.00	140929.55	2.43	0.00	398936.00	1.05	217.59
AP3-6	86.90	0.00	176621.20	1.44	0.00	398936.00	1.45	343.27
AP4-6	119.86	39.30	208408.80	0.39	0.00	398936.00	2.06	471.89
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11

Appendix A. Raw trace element datasheets from laser ablation.

	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

	Al	Si	P	Cl	K	Ca	Sc	Ti
raw data								
blank-3	6123.63	42057.60	577.20	3711.54	363199.81	10775.62	1257.69	719.52
SRM614-3	8192664.50	8360421.00	4830.23	9286.93	1596256.80	2782306.50	19802.55	3799.42
SRM612-3	8289655.00	7825995.00	4378.02	7708.40	1109023.90	2674659.50	41523.04	4694.83
SRM610-3	3543391.30	3478668.30	2123.37	5763.07	1069373.40	1024694.60	139994.47	13947.32
AP1-3	143827.28	35550.16	1584.81	6129.15	784228.44	23501712.00	10935.54	61477.79
AP2-3	84721.04	31808.14	1229.29	4700.35	433987.69	18310480.00	9037.01	52215.01
AP3-3	225687.67	35634.04	1638.57	4472.03	310040.38	21699798.00	13453.92	73171.85
AP4-3	347510.75	42287.56	1414.33	4514.87	328962.97	18671358.00	14736.64	70565.84
V3-1	388981.19	91455.59	655.00	14270.04	1037085.40	6159929.00	3448.26	15633.69
V3-2	67198.34	26233.99	650.28	16997.34	568285.88	7143103.50	3885.14	14817.80
V3-3	117254.10	34115.67	714.44	18567.82	640543.38	8029293.00	3941.38	16895.46
V3-4	361925.53	82486.51	830.96	16840.81	1213200.00	9466878.00	4717.51	23646.89
V3-5	105928.40	36409.05	740.96	15339.61	789550.38	9111227.00	4363.82	21988.44
V3-6	112358.11	34220.20	929.41	19069.99	956600.75	11978199.00	5469.19	28360.68
V3-7	300768.66	79851.49	1553.85	19155.95	2367791.80	22066602.00	9319.13	63094.20
V3-8	62919.72	25768.26	1718.05	19768.83	1911266.00	23806508.00	10167.78	66127.25
V3-9	61341.59	24618.50	1661.65	20633.48	1923643.50	25064824.00	10874.38	70418.20
SRM614-4	5659719.50	6251379.00	3395.34	5321.03	390949.59	1929301.90	8937.93	2181.13
SRM612-4	6091488.50	6335725.50	3371.02	4976.47	404172.88	1990700.80	27444.35	3460.02
SRM610-4	2910905.80	3181933.50	1865.65	4378.30	571497.94	879780.88	116725.70	11660.15
AP1-4	68235.95	16203.09	1253.77	4045.38	293230.69	18354846.00	8188.81	30803.61
AP2-4	46461.98	15128.69	936.13	3313.30	203645.03	13468207.00	6501.68	24263.70
AP3-4	158392.81	22579.85	1490.93	3549.34	206897.08	18683336.00	11355.50	50695.57
AP4-4	200234.64	26014.19	1268.53	3370.70	178892.64	15960730.00	12011.39	38970.42
blank-4	8391.21	13685.44	203.00	2444.21	245069.06	75003.74	1192.69	1402.21
blank average	7257.42	27871.52	390.10	3077.88	304134.44	42889.68	1225.19	1060.87

blank subtraction								
SRM614-3	8185407.08	8332549.48	4440.12	6209.06	1292122.37	2739416.82	18577.36	2738.56
SRM612-3	8282397.58	7798123.48	3987.92	4630.53	804889.47	2631769.82	40297.85	3633.96
SRM610-3	3536133.88	3450796.78	1733.27	2685.20	765238.97	981804.92	138769.28	12886.45
AP1-3	136569.86	7678.64	1194.71	3051.28	480094.01	23458822.32	9710.35	60416.92
AP2-3	77463.62	3936.62	839.18	1622.47	129853.26	18267590.32	7811.82	51154.15
AP3-3	218430.25	7762.52	1248.47	1394.15	5905.95	21656908.32	12228.73	72110.99
AP4-3	340253.33	14416.04	1024.23	1436.99	24828.54	18628468.32	13511.46	69504.97
V3-1	381723.77	63584.08	264.90	11192.16	732950.97	6117039.32	2223.07	14572.82
V3-2	59940.92	-1637.53	260.18	13919.46	264151.45	7100213.82	2659.95	13756.94
V3-3	109996.68	6244.15	324.34	15489.95	336408.95	7986403.32	2716.20	15834.59
V3-4	354668.11	54614.99	440.86	13762.94	909065.57	9423988.32	3492.32	22586.03
V3-5	98670.98	8537.53	350.86	12261.73	485415.95	9068337.32	3138.64	20927.58
V3-6	105100.69	6348.68	539.30	15992.11	652466.32	11935309.32	4244.00	27299.81
V3-7	293511.24	51979.97	1163.75	16078.07	2063657.37	22023712.32	8093.95	62033.33
V3-8	55662.29	-2103.25	1327.95	16690.95	1607131.57	23763618.32	8942.59	65066.38
V3-9	54084.17	-3253.02	1271.55	17555.60	1619509.07	25021934.32	9649.19	69357.33
SRM614-4	5652462.08	6223507.48	3005.24	2243.15	86815.16	1886412.22	7712.74	1120.27
SRM612-4	6084231.08	6307853.98	2980.92	1898.59	100038.45	1947811.12	26219.17	2399.15
SRM610-4	2903648.38	3154061.98	1475.55	1300.43	267363.51	836891.20	115500.51	10599.28
AP1-4	60978.52	-11668.43	863.66	967.51	-10903.75	18311956.32	6963.62	29742.75
AP2-4	39204.56	-12742.83	546.02	235.42	-100489.41	13425317.32	5276.49	23202.83
AP3-4	151135.39	-5291.67	1100.83	471.46	-97237.36	18640446.32	10130.32	49634.70
AP4-4	192977.22	-1857.33	878.42	292.82	-125241.80	15917840.32	10786.20	37909.55

zero correction								
SRM614-3	8185407.08	8332549.48	4440.12	6209.06	1292122.37	2739416.82	18577.36	2738.56
SRM612-3	8282397.58	7798123.48	3987.92	4630.53	804889.47	2631769.82	40297.85	3633.96
SRM610-3	3536133.88	3450796.78	1733.27	2685.20	765238.97	981804.92	138769.28	12886.45
AP1-3	136569.86	7678.64	1194.71	3051.28	480094.01	23458822.32	9710.35	60416.92
AP2-3	77463.62	3936.62	839.18	1622.47	129853.26	18267590.32	7811.82	51154.15
AP3-3	218430.25	7762.52	1248.47	1394.15	5905.95	21656908.32	12228.73	72110.99
AP4-3	340253.33	14416.04	1024.23	1436.99	24828.54	18628468.32	13511.46	69504.97
V3-1	381723.77	63584.08	264.90	11192.16	732950.97	6117039.32	2223.07	14572.82
V3-2	59940.92	0.00	260.18	13919.46	264151.45	7100213.82	2659.95	13756.94
V3-3	109996.68	6244.15	324.34	15489.95	336408.95	7986403.32	2716.20	15834.59
V3-4	354668.11	54614.99	440.86	13762.94	909065.57	9423988.32	3492.32	22586.03
V3-5	98670.98	8537.53	350.86	12261.73	485415.95	9068337.32	3138.64	20927.58
V3-6	105100.69	6348.68	539.30	15992.11	652466.32	11935309.32	4244.00	27299.81
V3-7	293511.24	51979.97	1163.75	16078.07	2063657.37	22023712.32	8093.95	62033.33
V3-8	55662.29	0.00	1327.95	16690.95	1607131.57	23763618.32	8942.59	65066.38
V3-9	54084.17	0.00	1271.55	17555.60	1619509.07	25021934.32	9649.19	69357.33
SRM614-4	5652462.08	6223507.48	3005.24	2243.15	86815.16	1886412.22	7712.74	1120.27

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	6084231.08	6307853.98	2980.92	1898.59	100038.45	1947811.12	26219.17	2399.15
SRM610-4	2903648.38	3154061.98	1475.55	1300.43	267363.51	836891.20	115500.51	10599.28
AP1-4	60978.52	0.00	863.66	967.51	0.00	18311956.32	6963.62	29742.75
AP2-4	39204.56	0.00	546.02	235.42	0.00	13425317.32	5276.49	23202.83
AP3-4	151135.39	0.00	1100.83	471.46	0.00	18640446.32	10130.32	49634.70
AP4-4	192977.22	0.00	878.42	292.82	0.00	15917840.32	10786.20	37909.55

certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	398936	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	398936	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	398936	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	398936	2.93	437.83

standardized concentration								
SRM614	0.141611	3.924221	0.000109	0.000000	0.000000	1.000000	0.000026	0.000043
SRM612	0.141611	3.924221	0.000643	0.000000	0.000773	1.000000	0.000479	0.000561
SRM610	0.141611	3.924221	0.003994	0.005480	0.005667	1.000000	0.005143	0.005060
STD AP1	0.000070	0.000015	0.440333	0.000009	0.000000	1.000000	0.000000	0.001178
STD AP2	0.000107	0.000140	0.450743	0.000009	0.000006	1.000000	0.000002	0.001114
STD AP3	0.000204	0.000345	0.481767	0.000007	0.000015	1.000000	0.000004	0.001068
STD AP4	0.000332	0.000435	0.485041	0.000008	0.000018	1.000000	0.000007	0.001098

standardized signal								
SRM614-3	2.988011	3.041724	0.001621	0.002267	0.471678	1.000000	0.006782	0.001000
SRM612-3	3.147083	2.963072	0.001515	0.001759	0.305836	1.000000	0.015312	0.001381
SRM610-3	3.601666	3.514748	0.001765	0.002735	0.779421	1.000000	0.141341	0.013125
AP1-3	0.005822	0.000327	0.000051	0.000130	0.020465	1.000000	0.000414	0.002575
AP2-3	0.004240	0.000215	0.000046	0.000089	0.007108	1.000000	0.000428	0.002800
AP3-3	0.010086	0.000358	0.000058	0.000064	0.000273	1.000000	0.000565	0.003330
AP4-3	0.018265	0.000774	0.000055	0.000077	0.001333	1.000000	0.000725	0.003731
V3-1	0.062403	0.010395	0.000043	0.001830	0.119821	1.000000	0.000363	0.002382
V3-2	0.008442	0.000000	0.000037	0.001960	0.037203	1.000000	0.000375	0.001938
V3-3	0.013773	0.000782	0.000041	0.001940	0.042123	1.000000	0.000340	0.001983
V3-4	0.037635	0.005795	0.000047	0.001460	0.096463	1.000000	0.000371	0.002397
V3-5	0.010881	0.000941	0.000039	0.001352	0.053529	1.000000	0.000346	0.002308
V3-6	0.008806	0.000532	0.000045	0.001340	0.054667	1.000000	0.000356	0.002287
V3-7	0.013327	0.002360	0.000053	0.000730	0.093702	1.000000	0.000368	0.002817
V3-8	0.002342	0.000000	0.000056	0.000702	0.067630	1.000000	0.000376	0.002738
V3-9	0.002161	0.000000	0.000051	0.000702	0.064724	1.000000	0.000386	0.002772
SRM614-4	2.996409	3.299124	0.001593	0.001189	0.046021	1.000000	0.004089	0.000594
SRM612-4	3.123625	3.238432	0.001530	0.000975	0.051359	1.000000	0.013461	0.001232
SRM610-4	3.469565	3.768784	0.001763	0.001554	0.319472	1.000000	0.138011	0.012665
AP1-4	0.003330	0.000000	0.000047	0.000053	0.000000	1.000000	0.000380	0.001624
AP2-4	0.002920	0.000000	0.000041	0.000018	0.000000	1.000000	0.000393	0.001728
AP3-4	0.008108	0.000000	0.000059	0.000025	0.000000	1.000000	0.000543	0.002663
AP4-4	0.012123	0.000000	0.000055	0.000018	0.000000	1.000000	0.000678	0.002382

standardize signal averages AP								
AP1	0.004576	0.000164	0.000049	0.000091	0.010233	1.000000	0.000397	0.002100
AP2	0.003580	0.000108	0.000043	0.000053	0.003554	1.000000	0.000410	0.002264
AP3	0.009097	0.000179	0.000058	0.000045	0.000136	1.000000	0.000554	0.002996
AP4	0.015194	0.000387	0.000055	0.000048	0.000666	1.000000	0.000701	0.003056

linest from std sig ave								
	0.021906	1.124334	8950.220127	0.126682	0.000304	1.000000	0.007256	0.414653

standardize signal averages SRM								
srm614-2	2.992210	3.170424	0.001607	0.001728	0.258850	1.000000	0.005435	0.000797
srm612-2	3.135354	3.100752	0.001523	0.001367	0.178598	1.000000	0.014386	0.001306
srm610-2	3.535616	3.641766	0.001764	0.002144	0.549446	1.000000	0.139676	0.012895

linest from std sig ave								
	0.043741	1.181358	1.023156	1.243202	0.004326	1.000000	0.036737	0.391532

concentration data								
SRM614-3	5613.69	293302.17	1244144.29	24.63	174.99	85763.00	4.22	35.55
SRM612-3	5912.55	285718.06	1163141.25	19.12	113.47	85763.00	9.53	49.10
SRM610-3	6766.59	338914.12	1355110.15	29.71	289.17	85763.00	87.96	466.76
AP1-3	50.88	146.82	181841.11	6.57	35.32	398936.00	1.20	426.03
AP2-3	37.06	96.66	164026.21	4.49	12.27	398936.00	1.24	463.22
AP3-3	88.14	160.77	205834.21	3.25	0.47	398936.00	1.63	550.80
AP4-3	159.62	347.11	196315.92	3.90	2.30	398936.00	2.10	617.20
V3-1	545.35	4662.36	154625.11	92.47	206.78	398936.00	1.05	394.09
V3-2	73.78	0.00	130840.42	99.08	64.20	398936.00	1.08	320.51
V3-3	120.36	350.69	145006.90	98.02	72.69	398936.00	0.98	327.98

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	328.89	2599.42	167034.17	73.81	166.47	398936.00	1.07	396.45
V3-5	95.09	422.28	138148.31	68.33	92.38	398936.00	1.00	381.75
V3-6	76.96	238.59	161337.81	67.72	94.34	398936.00	1.03	378.37
V3-7	116.47	1058.63	188670.87	36.89	161.71	398936.00	1.06	465.93
V3-8	20.47	0.00	199528.66	35.50	116.71	398936.00	1.09	452.93
V3-9	18.89	0.00	181446.48	35.46	111.70	398936.00	1.12	458.52
SRM614-4	5629.47	318122.29	1222857.34	12.92	17.07	85763.00	2.54	21.12
SRM612-4	5868.48	312270.01	1174726.31	10.59	19.05	85763.00	8.38	43.80
SRM610-4	6518.41	363409.86	1353374.88	16.88	118.52	85763.00	85.89	450.39
AP1-4	29.10	0.00	168402.09	2.67	0.00	398936.00	1.10	268.68
AP2-4	25.52	0.00	145218.97	0.89	0.00	398936.00	1.14	285.89
AP3-4	70.86	0.00	210862.50	1.28	0.00	398936.00	1.57	440.47
AP4-4	105.95	0.00	197041.38	0.93	0.00	398936.00	1.96	393.96
certified concentration								
SRM614	12145.00	336553.00	9.31			85763.00	2.20	3.70
SRM612	12145.00	336553.00	55.16		66.26	85763.00	41.05	48.11
SRM610	12145.00	336553.00	342.50	470.00	486.00	85763.00	441.10	434.00
STD AP1	28.01	5.79	175664.63	3.50	0.00	329216.15	0.04	469.75
STD AP2	42.83	55.65	179817.71	3.63	2.47	340184.01	0.61	444.42
STD AP3	81.56	137.47	192194.18	2.79	6.13	366960.95	1.69	426.17
STD AP4	132.44	173.68	193500.19	3.01	6.99	368945.58	2.93	437.83

Appendix A. Raw trace element datasheets from laser ablation.

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-3	1183.93	62704.51	10455.94	2334346.80	28959.64	3542.46	1015.05	1108.85
SRM614-3	2777.42	61518.23	9790.58	1764345.80	22595.73	4451.98	2100.17	8920.53
SRM612-3	52746.98	110483.63	66731.06	1559222.50	19726.87	15640.01	52431.86	39112.22
SRM610-3	296732.75	352621.47	376646.25	1787252.00	24543.90	73374.09	336394.53	194887.17
AP1-3	1477.29	63959.76	11674.95	1205003.80	48774.20	4142.86	1341.93	1875.65
AP2-3	1930.49	73534.45	22509.41	1229353.10	101076.41	5106.71	4835.15	6507.72
AP3-3	5738.67	144928.50	98128.83	2023070.90	160889.63	12288.23	28685.60	39418.70
AP4-3	6693.44	184255.83	121979.20	2348976.30	214164.28	16029.37	35990.60	52445.98
EVA2.5-1	1089.65	77065.91	9497.73	1050668.90	198349.52	4360.22	3039.34	6048.75
EVA2.5-2	1079.77	81844.10	8297.97	1175296.50	199342.92	4221.42	2722.78	5878.35
EVA2.5-3	1121.85	83795.95	13692.88	1103799.80	196934.47	4338.50	2774.26	5353.87
EVA2.5-4	1145.77	77831.84	8410.49	873030.44	213133.92	4292.58	2919.14	3012.30
EVA2.5-5	1208.29	77565.04	7910.32	849147.44	235668.28	4566.67	3230.82	2204.73
EVA2.5-6	1202.81	78325.88	7918.96	817004.63	254439.63	4476.63	3365.82	2394.45
EVA2.5-7	1062.73	76001.02	7841.56	759088.88	270109.91	4571.59	2952.30	2270.33
EVA2.5-8	1132.77	78301.08	8246.73	743552.63	280783.53	4652.71	3062.90	1936.73
EVA2.5-9	1141.77	79004.13	8473.85	728416.31	291306.69	4518.19	2959.86	1931.77
EVA2.5-10	1046.65	81979.42	6898.44	701844.25	296930.16	4804.71	3067.14	2560.85
EVA2.5-11	1013.85	83543.51	7788.64	700859.63	299060.75	4857.31	3030.10	2702.46
EVA2.5-12	1075.41	84902.44	8396.05	687554.69	302881.53	4953.55	3188.50	2993.50
EVA2.5-13	1054.49	86814.01	8435.77	702008.19	303490.94	5224.99	2987.74	2745.26
EVA2.5-14	1107.25	87295.41	8679.13	694225.94	306000.56	5269.15	3035.54	2619.49
EVA2.5-15	1084.97	88050.22	8504.53	687674.94	310789.47	5059.03	3010.18	2730.62
SRM614-4	1978.49	95226.62	6114.47	583831.38	128993.41	5456.71	2305.97	5679.67
SRM612-4	37825.45	124168.54	42670.64	563919.56	58238.21	12561.83	32976.07	25240.50
SRM610-4	238646.06	317114.19	261789.95	832108.25	59863.54	54963.07	230865.70	141126.95
AP1-4	1239.53	91299.44	7863.88	545694.19	107311.88	5264.87	1489.01	2016.21
AP2-4	1581.17	94270.49	13544.96	558366.06	216501.17	5475.15	3914.06	4055.34
AP3-4	4237.38	139312.39	62957.04	1123573.40	256731.77	9865.66	19545.87	25652.74
AP4-4	3970.42	143119.61	52955.26	1109985.90	280351.34	9889.66	16674.09	22396.09
blank-4	866.88	93765.81	5108.83	652580.69	301104.66	5465.35	2811.30	909.81
blank average	1025.41	78235.16	7782.38	1493463.75	165032.15	4503.91	1913.17	1009.33
blank subtraction								
SRM614-3	1752.01	-16716.93	2008.19	270882.06	-142436.42	-51.92	187.00	7911.20
SRM612-3	51721.57	32248.47	58948.67	65758.76	-145305.28	11136.10	50518.68	38102.89
SRM610-3	295707.34	274386.31	368863.87	293788.26	-140488.25	68870.19	334481.36	193877.84
AP1-3	451.88	-14275.40	3892.56	-288459.95	-116257.96	-361.04	-571.24	866.32
AP2-3	905.09	-4700.71	14727.02	-264110.65	-63955.74	602.80	2921.98	5498.39
AP3-3	4713.27	66693.34	90346.44	529607.16	-4142.52	7784.32	26772.43	38409.38
AP4-3	5668.03	106020.67	114196.82	855512.56	49132.13	11525.46	34077.43	51436.65
EVA2.5-1	64.24	-1169.24	1715.35	-442794.85	33317.37	-143.68	1126.17	5039.43
EVA2.5-2	54.36	3608.94	515.58	-318167.25	34310.77	-282.48	809.60	4869.03
EVA2.5-3	96.44	5560.79	5910.49	-389663.95	31902.32	-165.40	861.08	4344.54
EVA2.5-4	120.36	-403.32	628.10	-620433.31	48101.77	-211.32	1005.97	2002.97
EVA2.5-5	182.88	-670.12	127.94	-644316.31	70636.13	62.76	1317.65	1195.41
EVA2.5-6	177.40	90.72	136.58	-676459.12	89407.48	-27.28	1452.65	1385.13
EVA2.5-7	37.32	-2234.14	59.18	-734374.87	105077.76	67.68	1039.13	1261.01
EVA2.5-8	107.36	65.92	464.34	-749911.12	115751.38	148.80	1149.73	927.41
EVA2.5-9	116.36	768.97	691.46	-765047.44	126274.54	14.28	1046.69	922.45
EVA2.5-10	21.24	3744.26	-883.94	-791619.50	131898.01	300.80	1153.97	1551.53
EVA2.5-11	-11.56	5308.35	6.26	-792604.12	134028.60	353.40	1116.93	1693.13
EVA2.5-12	50.00	6667.28	613.66	-805909.06	137849.38	449.64	1275.33	1984.17
EVA2.5-13	29.08	8578.85	653.38	-791455.56	138458.79	721.08	1074.57	1735.93
EVA2.5-14	81.84	9060.26	896.75	-799237.81	140968.41	765.24	1122.37	1610.17
EVA2.5-15	59.56	9815.06	722.14	-805788.81	145757.32	555.12	1097.01	1721.29
SRM614-4	953.09	16991.46	-1667.91	-909632.37	-36038.74	952.81	392.80	4670.35
SRM612-4	36800.05	45933.38	34888.26	-929544.19	-106793.94	8057.93	31062.90	24231.18
SRM610-4	237620.65	238879.03	254007.57	-661355.50	-105168.62	50459.16	228952.53	140117.62
AP1-4	214.12	13064.28	81.50	-947769.56	-57720.27	760.96	-424.16	1006.89
AP2-4	555.76	16035.33	5762.57	-935097.69	51469.02	971.25	2000.89	3046.02
AP3-4	3211.98	61077.23	55174.65	-369890.35	91699.62	5361.75	17632.70	24643.42
AP4-4	2945.02	64884.45	45172.87	-383477.85	115319.19	5385.75	14760.92	21386.76
zero correction								
SRM614-3	1752.01	78737.96	2008.19	2418732.30	24190.50	0.00	187.00	7911.20
SRM612-3	51721.57	98290.23	58948.67	2045371.10	20946.56	11136.10	50518.68	38102.89

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	295707.34	236988.38	368863.87	1951190.80	21739.44	68870.19	334481.36	193877.84
AP1-3	451.88	117126.58	3892.56	1451349.40	37493.05	0.00	0.00	866.32
AP2-3	905.09	92334.24	14727.02	1252933.10	52376.25	602.80	2921.98	5498.39
AP3-3	4713.27	142094.59	90346.44	1784311.50	89552.98	7784.32	26772.43	38409.38
AP4-3	5668.03	229243.77	114196.82	2441099.30	123853.81	11525.46	34077.43	51436.65
EVA2.5-1	64.24	84222.75	1715.35	1100127.00	110971.70	0.00	1126.17	5039.43
EVA2.5-2	54.36	84665.00	515.58	1059454.50	119738.07	0.00	809.60	4869.03
EVA2.5-3	96.44	89014.34	5910.49	980571.19	124442.02	0.00	861.08	4344.54
EVA2.5-4	120.36	89119.10	628.10	1451190.30	149483.33	0.00	1005.97	2002.97
EVA2.5-5	182.88	89358.66	127.94	1308256.00	154723.67	62.76	1317.65	1195.41
EVA2.5-6	177.40	92897.60	136.58	1378534.60	161408.23	0.00	1452.65	1385.13
EVA2.5-7	37.32	94425.01	59.18	1249673.00	163045.84	67.68	1039.13	1261.01
EVA2.5-8	107.36	100838.53	464.34	1223222.90	157646.77	148.80	1149.73	927.41
EVA2.5-9	116.36	101544.41	691.46	1140509.60	163000.67	14.28	1046.69	922.45
EVA2.5-10	21.24	103082.86	0.00	1031154.90	164902.38	300.80	1153.97	1551.53
EVA2.5-11	0.00	102564.90	6.26	1033477.00	167228.50	353.40	1116.93	1693.13
EVA2.5-12	50.00	102840.22	613.66	1054930.60	168927.42	449.64	1275.33	1984.17
EVA2.5-13	29.08	105075.88	653.38	1958944.80	189742.95	721.08	1074.57	1735.93
EVA2.5-14	81.84	103728.34	896.75	2121016.50	197953.28	765.24	1122.37	1610.17
EVA2.5-15	59.56	102510.18	722.14	2065038.80	203360.86	555.12	1097.01	1721.29
SRM614-4	953.09	106143.67	0.00	991322.06	189270.78	952.81	392.80	4670.35
SRM612-4	36800.05	105374.23	34888.26	886733.13	189761.98	8057.93	31062.90	24231.18
SRM610-4	237620.65	108088.25	254007.57	1266223.80	198158.19	50459.16	228952.53	140117.62
AP1-4	214.12	103512.30	81.50	814415.75	200681.48	760.96	0.00	1006.89
AP2-4	555.76	100688.80	5762.57	746672.88	205565.52	971.25	2000.89	3046.02
AP3-4	3211.98	100204.48	55174.65	732617.75	211009.75	5361.75	17632.70	24643.42
AP4-4	2945.02	105379.31	45172.87	638737.44	84045.11	5385.75	14760.92	21386.76

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-3	0.000430	0.019328	0.000493	0.593741	0.005938	0.000000	0.000046	0.001942
SRM612-3	0.014514	0.027582	0.016542	0.573971	0.005878	0.003125	0.014177	0.010692
SRM610-3	0.229505	0.183932	0.286284	1.514364	0.016872	0.053452	0.259599	0.150473
AP1-3	0.000023	0.005845	0.000194	0.072431	0.001871	0.000000	0.000000	0.000043
AP2-3	0.000043	0.004402	0.000702	0.059735	0.002497	0.000029	0.000139	0.000262
AP3-3	0.000201	0.006074	0.003862	0.076268	0.003828	0.000333	0.001144	0.001642
AP4-3	0.000281	0.011364	0.005661	0.121006	0.006139	0.000571	0.001689	0.002550
EVA2.5-1	0.000006	0.007296	0.000149	0.095300	0.009613	0.000000	0.000098	0.000437
EVA2.5-2	0.000007	0.010691	0.000065	0.133779	0.015119	0.000000	0.000102	0.000615
EVA2.5-3	0.000011	0.010204	0.000678	0.112404	0.014265	0.000000	0.000099	0.000498
EVA2.5-4	0.000008	0.006114	0.000043	0.099551	0.010254	0.000000	0.000069	0.000137
EVA2.5-5	0.000010	0.005044	0.000007	0.073843	0.008733	0.000004	0.000074	0.000067
EVA2.5-6	0.000009	0.004973	0.000007	0.073793	0.008640	0.000000	0.000078	0.000074
EVA2.5-7	0.000003	0.007994	0.000005	0.105798	0.013804	0.000006	0.000088	0.000107
EVA2.5-8	0.000008	0.007858	0.000036	0.095322	0.012285	0.000012	0.000090	0.000072
EVA2.5-9	0.000009	0.007489	0.000051	0.084111	0.012021	0.000001	0.000077	0.000068
EVA2.5-10	0.000002	0.010895	0.000000	0.108986	0.017429	0.000032	0.000122	0.000164
EVA2.5-11	0.000000	0.009223	0.000001	0.092938	0.015039	0.000032	0.000100	0.000152
EVA2.5-12	0.000004	0.008648	0.000052	0.088710	0.014205	0.000038	0.000107	0.000167
EVA2.5-13	0.000002	0.009033	0.000056	0.168403	0.016311	0.000062	0.000092	0.000149
EVA2.5-14	0.000006	0.008012	0.000069	0.163823	0.015290	0.000059	0.000087	0.000124

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000005	0.008070	0.000057	0.162567	0.016009	0.000044	0.000086	0.000136
SRM614-4	0.000394	0.043930	0.000000	0.410282	0.078334	0.000394	0.000163	0.001933
SRM612-4	0.016253	0.046539	0.015409	0.391632	0.083810	0.003559	0.013719	0.010702
SRM610-4	0.252168	0.114705	0.269558	1.343741	0.210289	0.053548	0.242969	0.148696
AP1-4	0.000015	0.007199	0.000006	0.056641	0.013957	0.000053	0.000000	0.000070
AP2-4	0.000038	0.006868	0.000393	0.050933	0.014022	0.000066	0.000136	0.000208
AP3-4	0.000193	0.006026	0.003318	0.044057	0.012689	0.000322	0.001060	0.001482
AP4-4	0.000221	0.007922	0.003396	0.048020	0.006319	0.000405	0.001110	0.001608

standardize signal averages AP

AP1	0.000019	0.006522	0.000100	0.064536	0.007914	0.000026	0.000000	0.000057
AP2	0.000041	0.005635	0.000548	0.055334	0.008260	0.000047	0.000138	0.000235
AP3	0.000197	0.006050	0.003590	0.060162	0.008259	0.000328	0.001102	0.001562
AP4	0.000251	0.009643	0.004528	0.084513	0.006229	0.000488	0.001399	0.002079

linest from std sig ave

0.013078	0.003017	0.008251	0.032818	0.284913	0.113465	0.009667	0.013151
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standardize signal averages SRM

srm614-2	0.000412	0.031629	0.000246	0.502012	0.042136	0.000197	0.000104	0.001937
srm612-2	0.015384	0.037061	0.015975	0.482801	0.044844	0.003342	0.013948	0.010697
srm610-2	0.240836	0.149319	0.277921	1.429052	0.113581	0.053500	0.251284	0.149584

linest from std sig ave

0.021419	0.029345	0.018211	0.003139	0.038043	0.096890	0.018826	0.033570
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concentration data

SRM614-3	0.48	5.00	0.35	1671.12	145.10	0.00	0.04	2.19
SRM612-3	16.28	7.14	11.71	1615.48	143.63	30.41	11.75	12.06
SRM610-3	257.42	47.58	202.57	4262.27	412.28	520.14	215.22	169.71
AP1-3	0.12	7.03	0.64	948.28	212.68	0.00	0.00	0.23
AP2-3	0.23	5.30	2.31	782.06	283.82	1.30	0.54	1.38
AP3-3	1.05	7.31	12.71	998.52	435.08	15.06	4.41	8.61
AP4-3	1.47	13.67	18.63	1584.24	697.83	25.86	6.51	13.38
EVA2.5-1	0.03	8.78	0.49	1247.69	1092.65	0.00	0.38	2.29
EVA2.5-2	0.04	12.87	0.21	1751.46	1718.51	0.00	0.39	3.23
EVA2.5-3	0.06	12.28	2.23	1471.62	1621.38	0.00	0.38	2.61
EVA2.5-4	0.04	7.36	0.14	1303.35	1165.55	0.00	0.27	0.72
EVA2.5-5	0.05	6.07	0.02	966.78	992.64	0.16	0.29	0.35
EVA2.5-6	0.05	5.98	0.02	966.11	982.06	0.00	0.30	0.39
EVA2.5-7	0.02	9.62	0.02	1385.14	1568.95	0.26	0.34	0.56
EVA2.5-8	0.04	9.46	0.12	1247.98	1396.33	0.52	0.35	0.38
EVA2.5-9	0.04	9.01	0.17	1101.21	1366.35	0.05	0.30	0.36
EVA2.5-10	0.01	13.11	0.00	1426.87	1981.03	1.44	0.47	0.86
EVA2.5-11	0.00	11.10	0.00	1216.77	1709.31	1.44	0.39	0.80
EVA2.5-12	0.02	10.41	0.17	1161.41	1614.59	1.71	0.41	0.88
EVA2.5-13	0.01	10.87	0.18	2204.78	1854.00	2.81	0.36	0.78
EVA2.5-14	0.03	9.64	0.23	2144.81	1737.84	2.68	0.33	0.65
EVA2.5-15	0.02	9.71	0.19	2128.36	1819.65	1.98	0.33	0.71
SRM614-4	0.44	11.36	0.00	1154.77	1914.10	3.84	0.13	2.18
SRM612-4	18.23	12.04	10.90	1102.27	2047.89	34.63	11.37	12.07
SRM610-4	282.84	29.67	190.74	3782.04	5138.42	521.08	201.44	167.71
AP1-4	0.08	8.66	0.02	741.56	1586.39	2.40	0.00	0.37
AP2-4	0.20	8.27	1.29	666.83	1593.80	3.00	0.53	1.09
AP3-4	1.01	7.25	10.92	576.80	1442.29	14.60	4.09	7.77
AP4-4	1.16	9.53	11.18	628.69	718.17	18.33	4.28	8.44

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

V Cr Mn Fe56 Fe57 Ni Co Cu63

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	1303.73	65861.81	12313.71	2157661.50	30323.93	4405.74	966.05	1251.29
SRM614-5	2387.97	63981.84	10609.06	1709499.50	25429.02	4607.47	1673.81	5751.79
SRM612-5	44513.17	104567.27	57515.13	1515604.60	22547.81	13910.36	43558.97	32773.86
SRM610-5	273403.97	332387.56	340757.03	1771869.00	25578.82	67427.34	302018.16	182390.94
AP1-5	1371.09	64645.00	11046.78	1250711.30	44150.65	4272.66	1164.97	1510.33
AP2-5	1655.65	71439.84	17744.22	1197960.40	96055.06	4875.79	3820.86	4769.79
AP3-5	4141.86	120841.32	62480.91	1724036.30	146850.91	10012.22	18340.22	23406.53
AP4-5	4504.11	123922.38	73270.34	1757383.60	191805.44	9868.90	21951.32	29700.13
EVA3-1	1495.17	73474.49	75704.63	1091309.30	195406.86	4581.67	3063.98	3359.38
EVA3-2	1237.77	73094.53	46463.98	976433.75	213195.44	4451.63	3600.14	2869.26
EVA3-3	1440.29	73686.85	29501.73	1105608.60	232217.27	4314.70	3721.22	2482.93
SRM614-6	1502.01	76658.83	5529.35	825430.38	121025.48	4423.78	1946.17	4407.46
SRM612-6	34961.12	111188.14	41164.11	843558.06	83176.95	11713.87	32613.38	24857.30
SRM610-6	246397.63	321142.47	287586.34	1134291.50	73965.30	58906.77	254918.19	158792.17
AP1-6	1149.89	79709.81	7623.16	762506.56	122652.32	4674.51	1590.65	1820.73
AP2-6	1501.81	84247.88	13453.56	783522.94	193323.28	5143.11	3960.94	3932.10
AP3-6	4225.54	134966.64	66864.62	1384733.90	236736.30	10815.06	20149.99	25935.71
AP4-6	4783.35	147909.72	78971.45	1580369.50	270380.34	11001.82	25135.02	34357.72
blank-6	836.00	72644.69	4601.95	885922.25	229093.28	4334.98	2468.81	1187.97
blank average	1069.87	69253.25	8457.83	1521791.88	129708.61	4370.36	1717.43	1219.63

blank subtraction								
SRM614-5	1318.11	-5271.41	2151.23	187707.63	-104279.58	237.10	-43.62	4532.17
SRM612-5	43443.31	35314.02	49057.30	-6187.27	-107160.80	9539.99	41841.54	31554.24
SRM610-5	272334.10	263134.31	332299.20	250077.13	-104129.78	63056.97	300300.73	181171.31
AP1-5	301.22	-4608.25	2588.95	-271080.58	-85557.96	-97.70	-552.46	290.70
AP2-5	585.78	2186.59	9286.39	-323831.48	-33653.54	505.42	2103.43	3550.16
AP3-5	3072.00	51588.07	54023.08	202244.43	17142.30	5641.85	16622.79	22186.90
AP4-5	3434.24	54669.13	64812.51	235591.73	62096.83	5498.53	20233.89	28480.50
EVA3-1	425.30	4221.24	67246.80	-430482.58	65698.25	211.30	2146.55	2139.75
EVA3-2	167.90	3841.28	38006.15	-545358.13	83486.83	81.26	1882.71	1649.63
EVA3-3	370.42	4433.60	21043.90	-416183.28	102508.66	-55.66	2003.79	1263.31
SRM614-6	432.14	7405.58	-2928.48	-696361.50	-8683.13	53.42	228.74	3187.84
SRM612-6	33891.25	41934.89	32706.29	-678233.82	-46531.66	7343.50	30895.95	23637.67
SRM610-6	245327.76	251889.22	279128.51	-387500.38	-55743.31	54536.41	253200.76	157572.54
AP1-6	80.02	10456.55	-834.67	-759285.32	-7056.28	304.14	-126.78	601.10
AP2-6	431.94	14994.62	4995.73	-738268.94	63614.67	772.74	2243.51	2712.48
AP3-6	3155.68	65713.39	58406.79	-137057.98	107027.69	6444.70	18432.56	24716.08
AP4-6	3713.48	78656.47	70513.62	58577.63	140671.73	6631.46	23417.59	33138.09

zero correction								
SRM614-5	1318.11	78737.96	2151.23	2418732.30	24190.50	237.10	0.00	4532.17
SRM612-5	43443.31	98290.23	49057.30	2045371.10	20946.56	9539.99	41841.54	31554.24
SRM610-5	272334.10	236988.38	332299.20	1951190.80	21739.44	63056.97	300300.73	181171.31
AP1-5	301.22	117126.58	2588.95	1451349.40	37493.05	0.00	0.00	290.70
AP2-5	585.78	92334.24	9286.39	1252933.10	52376.25	505.42	2103.43	3550.16
AP3-5	3072.00	142094.59	54023.08	1784311.50	89552.98	5641.85	16622.79	22186.90
AP4-5	3434.24	229243.77	64812.51	2441099.30	123853.81	5498.53	20233.89	28480.50
EVA3-1	425.30	84222.75	67246.80	1100127.00	110971.70	211.30	2146.55	2139.75
EVA3-2	167.90	84665.00	38006.15	1059454.50	119738.07	81.26	1882.71	1649.63
EVA3-3	370.42	89014.34	21043.90	980571.19	124442.02	0.00	2003.79	1263.31
SRM614-6	432.14	89119.10	0.00	1451190.30	149483.33	53.42	228.74	3187.84
SRM612-6	33891.25	89358.66	32706.29	1308256.00	154723.67	7343.50	30895.95	23637.67
SRM610-6	245327.76	92897.60	279128.51	1378534.60	161408.23	54536.41	253200.76	157572.54
AP1-6	80.02	94425.01	0.00	1249673.00	163045.84	304.14	0.00	601.10
AP2-6	431.94	100838.53	4995.73	1223222.90	157646.77	772.74	2243.51	2712.48
AP3-6	3155.68	101544.41	58406.79	1140509.60	163000.67	6444.70	18432.56	24716.08
AP4-6	3713.48	103082.86	70513.62	1031154.90	164902.38	6631.46	23417.59	33138.09

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
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Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000476	0.028428	0.000777	0.873275	0.008734	0.000086	0.000000	0.001636
SRM612-5	0.014826	0.033543	0.016742	0.698014	0.007148	0.003256	0.014279	0.010768
SRM610-5	0.226989	0.197529	0.276970	1.626309	0.018120	0.052558	0.250299	0.151006
AP1-5	0.000018	0.006916	0.000153	0.085701	0.002214	0.000000	0.000000	0.000017
AP2-5	0.000035	0.005516	0.000555	0.074852	0.003129	0.000030	0.000126	0.000212
AP3-5	0.000151	0.006972	0.002651	0.087552	0.004394	0.000277	0.000816	0.001089
AP4-5	0.000191	0.012783	0.003614	0.136114	0.006906	0.000307	0.001128	0.001588
EVA3-1	0.000023	0.004561	0.003642	0.059577	0.006010	0.000011	0.000116	0.000116
EVA3-2	0.000010	0.005002	0.002245	0.062595	0.007074	0.000005	0.000111	0.000097
EVA3-3	0.000025	0.005898	0.001394	0.064973	0.008246	0.000000	0.000133	0.000084
SRM614-6	0.000267	0.055158	0.000000	0.898173	0.092518	0.000033	0.000142	0.001973
SRM612-6	0.015109	0.039836	0.014580	0.583215	0.068975	0.003274	0.013773	0.010538
SRM610-6	0.230420	0.087252	0.262167	1.294764	0.151600	0.051222	0.237814	0.147997
AP1-6	0.000006	0.006635	0.000000	0.087817	0.011458	0.000021	0.000000	0.000042
AP2-6	0.000029	0.006781	0.000336	0.082258	0.010601	0.000052	0.000151	0.000182
AP3-6	0.000175	0.005629	0.003238	0.063220	0.009035	0.000357	0.001022	0.001370
AP4-6	0.000241	0.006682	0.004571	0.066841	0.010689	0.000430	0.001518	0.002148

standardize signal averages AP

AP1	0.000012	0.006776	0.000076	0.086759	0.006836	0.000011	0.000000	0.000030
AP2	0.000032	0.006149	0.000445	0.078555	0.006865	0.000041	0.000138	0.000197
AP3	0.000163	0.006300	0.002944	0.075386	0.006715	0.000317	0.000919	0.001229
AP4	0.000216	0.009732	0.004092	0.101478	0.008798	0.000368	0.001323	0.001868

linest from std sig ave

	0.015521	0.002887	0.009499	0.025694	0.300767	0.135993	0.010759	0.015400
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standardize signal averages SRM

srm614-2	0.000372	0.041793	0.000388	0.885724	0.050626	0.000059	0.000071	0.001805
srm612-2	0.014967	0.036689	0.015661	0.640614	0.038062	0.003265	0.014026	0.010653
srm610-2	0.228705	0.142391	0.269568	1.460537	0.084860	0.051890	0.244057	0.149501

linest from std sig ave

	0.022553	0.029588	0.018775	0.002465	0.042566	0.099895	0.019382	0.033590
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concentration data

SRM614-5	0.63	7.04	0.63	1924.32	225.29	1.00	0.00	2.16
SRM612-5	19.74	8.31	13.64	1538.12	184.39	37.97	13.18	14.22
SRM610-5	302.16	48.91	225.64	3583.69	467.39	612.99	230.95	199.44
AP1-5	0.11	7.97	0.58	878.45	265.64	0.00	0.00	0.11
AP2-5	0.22	6.35	2.10	767.25	375.44	1.64	0.54	1.30
AP3-5	0.93	8.03	10.05	897.42	527.24	15.02	3.50	6.69
AP4-5	1.19	14.72	13.69	1395.19	828.63	16.63	4.84	9.76
EVA3-1	0.14	5.25	13.80	610.68	721.08	0.62	0.50	0.71
EVA3-2	0.06	5.76	8.51	641.61	848.83	0.26	0.48	0.60
EVA3-3	0.15	6.79	5.28	665.99	989.36	0.00	0.57	0.51
SRM614-6	0.36	13.66	0.00	1979.19	2386.49	0.39	0.13	2.61
SRM612-6	20.11	9.86	11.88	1285.16	1779.19	38.18	12.71	13.92
SRM610-6	306.72	21.60	213.58	2853.11	3910.47	597.42	219.43	195.47
AP1-6	0.03	7.64	0.00	900.13	1374.75	1.16	0.00	0.26
AP2-6	0.18	7.81	1.27	843.16	1272.02	2.82	0.65	1.12
AP3-6	1.08	6.48	12.27	648.01	1084.12	19.38	4.39	8.42
AP4-6	1.49	7.70	17.32	685.13	1282.57	23.32	6.52	13.20

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-3	2988.06	325326.50	37623.09	59178.61	833818.94	8108.17	650.08	819.36
SRM614-3	3085.90	80238.97	34099.39	105996.12	2415292.30	6555.96	1606.65	4365.70
SRM612-3	2359.81	90569.56	21848.28	80087.93	1801604.80	6924.48	1364.37	3881.78
SRM610-3	142709.80	264374.34	152498.83	79357.61	1569910.50	39634.10	125995.71	66692.49
AP1-3	2096.09	132299.27	16363.21	56168.32	1187868.00	8122.37	4918.07	5086.35
AP2-3	2567.37	132126.19	26717.19	51895.97	1123365.40	8278.29	5677.55	8869.81
AP3-3	6360.16	193902.00	97531.43	78731.92	1823544.50	14040.28	28914.00	43746.73
AP4-3	9045.81	321851.28	152906.02	121308.04	2800669.50	25620.10	46982.47	79101.92
MZ5-1	2061.77	129369.33	19479.75	60636.02	1432034.30	7351.84	5581.79	5467.67
MZ5-2	1808.69	123401.25	15298.97	47087.31	1098724.40	6816.60	4767.87	4074.14
MZ5-3	2014.65	128879.41	18542.66	58660.65	1379320.30	7064.20	6024.71	5553.19
MZ5-4	1652.41	125369.27	13246.31	41273.35	933749.19	6825.32	3648.18	2664.46
MZ5-5	1587.41	126681.99	12349.83	39411.82	892895.94	6638.88	3957.38	2737.78

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	1920.49	128385.09	14204.56	42752.72	973513.31	6920.04	4997.35	3443.90
MZ5-7	1765.73	126905.71	15371.53	40493.71	928275.38	6572.44	3983.42	3355.70
MZ5-8	1750.77	121068.96	16413.97	39481.50	889563.63	6393.04	3767.62	3200.98
MZ5-9	1516.37	118302.02	15009.97	34542.79	789099.56	6098.43	4301.54	3068.10
MZ5-10	2225.21	115607.29	20280.15	49836.72	1152559.80	6143.23	4101.62	2803.78
MZ5-11	1630.49	112726.95	17161.58	35429.16	814503.81	5994.39	4589.07	2999.66
MZ5-12	1553.29	111375.15	15121.77	31975.26	727786.38	5803.23	4387.70	2704.62
MZ5-13	1452.77	118538.66	16305.33	38732.78	880363.56	6010.47	3754.94	3292.30
MZ5-14	1660.97	115514.21	18333.54	40917.99	910257.06	6048.31	3744.66	3443.30
MZ5-15	1862.21	117895.59	21849.80	44962.13	1007704.80	6207.71	4140.34	4089.66
MZ5-16	1504.17	111872.51	16573.69	37372.05	825624.94	6154.55	4340.94	16420.13
MZ5-17	1562.89	112769.63	18147.54	37272.81	835036.06	6410.32	4375.50	3486.34
MZ5-18	1410.97	112318.23	16565.85	35642.24	791451.69	6283.08	4172.70	3362.42
SRM612-4	1505.73	129135.97	6836.96	29278.01	618589.38	7330.84	2155.81	2710.42
SRM612-4	19120.23	144768.14	21471.92	30984.73	630872.69	11208.62	15779.97	13456.28
SRM610-4	140370.22	260982.67	134947.08	40106.55	766471.63	37514.05	125429.19	78077.04
AP1-4	1568.21	127194.48	8761.89	29851.29	608449.00	7331.32	2780.54	2102.65
AP2-4	1699.81	132520.42	13591.64	31095.46	641775.25	7914.92	3508.42	4092.10
AP3-4	3981.02	164540.05	53265.42	47373.23	1043245.60	11315.46	16266.17	22195.45
AP4-4	5119.75	253693.63	79760.89	75269.23	1655715.40	20030.19	24131.54	36143.60
blank-4	1168.49	121410.48	5710.71	27153.39	602587.50	7233.76	2468.41	966.29
blank average	2078.27	223368.49	21666.90	43166.00	718203.22	7670.96	1559.25	892.83

blank subtraction								
SRM614-3	1007.63	-143129.52	12432.49	62830.12	1697089.08	-1115.01	47.40	3472.88
SRM612-3	281.54	-132798.94	181.38	36921.93	1083401.58	-746.48	-194.88	2988.96
SRM610-3	140631.53	41005.85	130831.93	36191.61	851707.28	31963.14	124436.46	65799.67
AP1-3	17.82	-91069.22	-5303.69	13002.31	469664.78	451.40	3358.82	4193.52
AP2-3	489.10	-91242.30	5050.29	8729.97	405162.18	607.32	4118.30	7976.98
AP3-3	4281.88	-29466.49	75864.53	35565.92	1105341.28	6369.31	27354.75	42853.90
AP4-3	6967.54	98482.79	131239.12	78142.04	2082466.28	17949.14	45423.22	78209.10
MZ5-1	-16.50	-93999.16	-2187.15	17470.02	713831.08	-319.12	4022.54	4574.85
MZ5-2	-269.58	-99967.24	-6367.94	3921.30	380521.18	-854.36	3208.62	3181.32
MZ5-3	-63.62	-94489.08	-3124.24	15494.65	661117.08	-606.76	4465.47	4660.37
MZ5-4	-425.86	-97999.22	-8420.59	-1892.65	215545.97	-845.64	2088.93	1771.63
MZ5-5	-490.86	-96686.50	-9317.07	-3754.18	174692.72	-1032.09	2398.13	1844.95
MZ5-6	-157.78	-94983.40	-7462.34	-413.28	255310.09	-750.92	3438.10	2551.07
MZ5-7	-312.54	-96462.78	-6295.38	-2672.30	210072.16	-1098.53	2424.17	2462.87
MZ5-8	-327.50	-102299.53	-5252.93	-3684.50	171360.41	-1277.93	2208.37	2308.15
MZ5-9	-561.90	-105066.47	-6656.94	-8623.21	70896.34	-1572.53	2742.30	2175.27
MZ5-10	146.94	-107761.20	-1386.75	6670.72	434356.58	-1527.73	2542.37	1910.95
MZ5-11	-447.78	-110641.54	-4505.33	-7736.84	96300.59	-1676.57	3029.82	2106.83
MZ5-12	-524.98	-111993.34	-6545.14	-11190.74	9583.16	-1867.73	2828.46	1811.79
MZ5-13	-625.50	-104829.83	-5361.57	-4433.23	162160.34	-1660.49	2195.69	2399.47
MZ5-14	-417.30	-107854.28	-3333.36	-2248.02	192053.84	-1622.65	2185.41	2550.47
MZ5-15	-216.06	-105472.90	182.90	1796.13	289501.58	-1463.25	2581.09	3196.84
MZ5-16	-574.10	-111495.98	-5093.21	-5793.95	107421.72	-1516.41	2781.70	15527.31
MZ5-17	-515.38	-110598.86	-3519.36	-5893.19	116832.84	-1260.65	2816.26	2593.51
MZ5-18	-667.30	-111050.26	-5101.05	-7523.76	73248.47	-1387.89	2613.45	2469.59
SRM614-4	-572.54	-94232.52	-14829.94	-13888.00	-99613.84	-340.12	596.56	1817.59
SRM612-4	17041.96	-78600.35	-194.98	-12181.27	-87330.53	3537.66	14220.72	12563.45
SRM610-4	138291.95	37614.18	113280.18	-3059.46	48268.41	29843.09	123869.94	77184.21
AP1-4	-510.06	-96174.01	-12905.01	-13314.72	-109754.22	-339.64	1221.29	1209.83
AP2-4	-378.46	-90848.07	-8075.26	-12070.55	-76427.97	243.96	1949.17	3199.28
AP3-4	1902.75	-58828.44	31598.52	4207.22	325042.38	3644.50	14706.92	21302.62
AP4-4	3041.48	30325.14	58093.99	32103.22	937512.18	12359.23	22572.29	35250.78

zero correction								
SRM614-3	1007.63	0.00	12432.49	62830.12	1697089.08	0.00	47.40	3472.88
SRM612-3	281.54	0.00	181.38	36921.93	1083401.58	0.00	0.00	2988.96
SRM610-3	140631.53	41005.85	130831.93	36191.61	851707.28	31963.14	124436.46	65799.67
AP1-3	17.82	0.00	0.00	13002.31	469664.78	451.40	3358.82	4193.52
AP2-3	489.10	0.00	5050.29	8729.97	405162.18	607.32	4118.30	7976.98
AP3-3	4281.88	0.00	75864.53	35565.92	1105341.28	6369.31	27354.75	42853.90
AP4-3	6967.54	98482.79	131239.12	78142.04	2082466.28	17949.14	45423.22	78209.10
MZ5-1	0.00	0.00	0.00	17470.02	713831.08	0.00	4022.54	4574.85
MZ5-2	0.00	0.00	0.00	3921.30	380521.18	0.00	3208.62	3181.32
MZ5-3	0.00	0.00	0.00	15494.65	661117.08	0.00	4465.47	4660.37
MZ5-4	0.00	0.00	0.00	0.00	215545.97	0.00	2088.93	1771.63
MZ5-5	0.00	0.00	0.00	0.00	174692.72	0.00	2398.13	1844.95
MZ5-6	0.00	0.00	0.00	0.00	255310.09	0.00	3438.10	2551.07
MZ5-7	0.00	0.00	0.00	0.00	210072.16	0.00	2424.17	2462.87
MZ5-8	0.00	0.00	0.00	0.00	171360.41	0.00	2208.37	2308.15
MZ5-9	0.00	0.00	0.00	0.00	70896.34	0.00	2742.30	2175.27
MZ5-10	146.94	0.00	0.00	6670.72	434356.58	0.00	2542.37	1910.95
MZ5-11	0.00	0.00	0.00	0.00	96300.59	0.00	3029.82	2106.83
MZ5-12	0.00	0.00	0.00	0.00	9583.16	0.00	2828.46	1811.79
MZ5-13	0.00	0.00	0.00	0.00	162160.34	0.00	2195.69	2399.47

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	0.00	0.00	0.00	0.00	192053.84	0.00	2185.41	2550.47
MZ5-15	0.00	0.00	182.90	1796.13	289501.58	0.00	2581.09	3196.84
MZ5-16	0.00	0.00	0.00	0.00	107421.72	0.00	2781.70	15527.31
MZ5-17	0.00	0.00	0.00	0.00	116832.84	0.00	2816.26	2593.51
MZ5-18	0.00	0.00	0.00	0.00	73248.47	0.00	2613.45	2469.59
SRM614-4	0.00	0.00	0.00	0.00	0.00	0.00	596.56	1817.59
SRM612-4	17041.96	0.00	0.00	0.00	0.00	3537.66	14220.72	12563.45
SRM610-4	138291.95	37614.18	113280.18	0.00	48268.41	29843.09	123869.94	77184.21
AP1-4	0.00	0.00	0.00	0.00	0.00	0.00	1221.29	1209.83
AP2-4	0.00	0.00	0.00	0.00	0.00	243.96	1949.17	3199.28
AP3-4	1902.75	0.00	31598.52	4207.22	325042.38	3644.50	14706.92	21302.62
AP4-4	3041.48	30325.14	58093.99	32103.22	937512.18	12359.23	22572.29	35250.78

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-3	0.000858	0.000000	0.010588	0.053508	1.445286	0.000000	0.000040	0.002958
SRM612-3	0.000328	0.000000	0.000211	0.042970	1.260856	0.000000	0.000000	0.003479
SRM610-3	0.282201	0.082285	0.262536	0.072625	1.709095	0.064139	0.249703	0.132038
AP1-3	0.000001	0.000000	0.000000	0.000991	0.035806	0.000034	0.000256	0.000320
AP2-3	0.000034	0.000000	0.000348	0.000601	0.027901	0.000042	0.000284	0.000549
AP3-3	0.000288	0.000000	0.005110	0.002395	0.074447	0.000429	0.001842	0.002886
AP4-3	0.000427	0.006036	0.008043	0.004789	0.127630	0.001100	0.002784	0.004793
MZ5-1	0.000000	0.000000	0.000000	0.001376	0.056234	0.000000	0.000317	0.000360
MZ5-2	0.000000	0.000000	0.000000	0.000286	0.027767	0.000000	0.000234	0.000232
MZ5-3	0.000000	0.000000	0.000000	0.001323	0.056447	0.000000	0.000381	0.000398
MZ5-4	0.000000	0.000000	0.000000	0.000000	0.025501	0.000000	0.000247	0.000210
MZ5-5	0.000000	0.000000	0.000000	0.000000	0.018752	0.000000	0.000257	0.000198
MZ5-6	0.000000	0.000000	0.000000	0.000000	0.025611	0.000000	0.000345	0.000256
MZ5-7	0.000000	0.000000	0.000000	0.000000	0.014358	0.000000	0.000166	0.000168
MZ5-8	0.000000	0.000000	0.000000	0.000000	0.010778	0.000000	0.000139	0.000145
MZ5-9	0.000000	0.000000	0.000000	0.000000	0.004720	0.000000	0.000183	0.000145
MZ5-10	0.000009	0.000000	0.000000	0.000404	0.026290	0.000000	0.000154	0.000116
MZ5-11	0.000000	0.000000	0.000000	0.000000	0.005213	0.000000	0.000164	0.000114
MZ5-12	0.000000	0.000000	0.000000	0.000000	0.000570	0.000000	0.000168	0.000108
MZ5-13	0.000000	0.000000	0.000000	0.000000	0.012697	0.000000	0.000172	0.000188
MZ5-14	0.000000	0.000000	0.000000	0.000000	0.014196	0.000000	0.000162	0.000189
MZ5-15	0.000000	0.000000	0.000013	0.000126	0.020314	0.000000	0.000181	0.000224
MZ5-16	0.000000	0.000000	0.000000	0.000000	0.007384	0.000000	0.000191	0.0001067
MZ5-17	0.000000	0.000000	0.000000	0.000000	0.007659	0.000000	0.000185	0.000170
MZ5-18	0.000000	0.000000	0.000000	0.000000	0.004651	0.000000	0.000166	0.000157
SRM614-4	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000899	0.002740
SRM612-4	0.024012	0.000000	0.000000	0.000000	0.000000	0.004985	0.020037	0.017702
SRM610-4	0.307075	0.083522	0.251537	0.000000	0.107179	0.066266	0.275051	0.171386
AP1-4	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000130	0.000129
AP2-4	0.000000	0.000000	0.000000	0.000000	0.000000	0.000024	0.000193	0.000317
AP3-4	0.000175	0.000000	0.002910	0.000388	0.029939	0.000336	0.001355	0.001962
AP4-4	0.000272	0.002708	0.005189	0.002867	0.083733	0.001104	0.002016	0.003148

standardize signal averages AP								
AP1	0.000001	0.000000	0.000000	0.000496	0.017903	0.000017	0.000193	0.000224
AP2	0.000017	0.000000	0.000174	0.000301	0.013950	0.000033	0.000238	0.000433
AP3	0.000232	0.000000	0.004010	0.001391	0.052193	0.000382	0.001599	0.002424
AP4	0.000349	0.004372	0.006616	0.003828	0.105682	0.001102	0.002400	0.003971

linest from std sig ave								
	0.010114	0.009788	0.006158	0.808464	0.029759	0.052688	0.006018	0.007400

standardize signal averages SRM								
srM614-2	0.000429	0.000000	0.005294	0.026754	0.722643	0.000000	0.000470	0.002849
srM612-2	0.012170	0.000000	0.000106	0.021485	0.630428	0.002492	0.010019	0.010590
srM610-2	0.294638	0.082903	0.257037	0.036312	0.908137	0.065203	0.262377	0.151712

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
	0.017514	0.056990	0.019650	0.083194	0.003012	0.079528	0.018032	0.033097
concentration data								
SRM614-3	0.74	0.00	5.59	3710.03	3688.69	0.00	0.02	1.88
SRM612-3	0.28	0.00	0.11	2979.35	3217.99	0.00	0.00	2.21
SRM610-3	244.79	69.07	138.64	5035.52	4361.99	289.83	128.87	83.80
AP1-3	0.01	0.00	0.00	319.71	425.08	0.72	0.61	0.94
AP2-3	0.14	0.00	0.85	193.89	331.24	0.88	0.68	1.62
AP3-3	1.16	0.00	12.55	772.59	883.84	9.02	4.42	8.52
AP4-3	1.72	23.57	19.76	1544.63	1515.22	23.12	6.68	14.15
MZ5-1	0.00	0.00	0.00	443.88	667.61	0.00	0.76	1.06
MZ5-2	0.00	0.00	0.00	92.29	329.65	0.00	0.56	0.69
MZ5-3	0.00	0.00	0.00	426.69	670.14	0.00	0.92	1.17
MZ5-4	0.00	0.00	0.00	0.00	302.75	0.00	0.59	0.62
MZ5-5	0.00	0.00	0.00	0.00	222.62	0.00	0.62	0.58
MZ5-6	0.00	0.00	0.00	0.00	304.06	0.00	0.83	0.76
MZ5-7	0.00	0.00	0.00	0.00	170.46	0.00	0.40	0.50
MZ5-8	0.00	0.00	0.00	0.00	127.95	0.00	0.33	0.43
MZ5-9	0.00	0.00	0.00	0.00	56.04	0.00	0.44	0.43
MZ5-10	0.04	0.00	0.00	130.22	312.11	0.00	0.37	0.34
MZ5-11	0.00	0.00	0.00	0.00	61.89	0.00	0.39	0.34
MZ5-12	0.00	0.00	0.00	0.00	6.76	0.00	0.40	0.32
MZ5-13	0.00	0.00	0.00	0.00	150.74	0.00	0.41	0.55
MZ5-14	0.00	0.00	0.00	0.00	168.53	0.00	0.39	0.56
MZ5-15	0.00	0.00	0.03	40.65	241.17	0.00	0.43	0.66
MZ5-16	0.00	0.00	0.00	0.00	87.66	0.00	0.46	3.15
MZ5-17	0.00	0.00	0.00	0.00	90.93	0.00	0.44	0.50
MZ5-18	0.00	0.00	0.00	0.00	55.22	0.00	0.40	0.46
SRM614-4	0.00	0.00	0.00	0.00	0.00	0.00	0.46	1.74
SRM612-4	20.83	0.00	0.00	0.00	0.00	22.52	10.34	11.23
SRM610-4	266.37	70.11	132.83	0.00	273.55	299.44	141.95	108.77
AP1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.38
AP2-4	0.00	0.00	0.00	0.00	0.00	0.51	0.46	0.94
AP3-4	0.71	0.00	7.15	124.98	355.43	7.06	3.25	5.79
AP4-4	1.10	10.58	12.75	924.77	994.07	23.20	4.84	9.29
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	1456.77	165963.41	16378.45	64264.44	1400451.10	14348.36	1023.17	1194.13
SRM614-1	2898.30	91049.84	33384.87	117240.10	2732712.30	9402.85	1705.61	4439.39
SRM612-1	33736.43	118192.19	49962.08	83043.11	1936758.80	14843.36	31033.54	25418.86
SRM610-1	124837.34	218589.42	157567.05	77823.23	1721976.90	38356.46	135140.08	85457.60
AP1-1	2019.17	105718.59	14049.52	56709.68	1276853.90	7198.72	1359.77	2983.30
AP2-1	2320.81	118886.95	16994.22	53379.50	1203714.80	7620.20	2574.45	3617.10
AP3-1	2641.77	134788.77	26553.43	55092.59	1247656.40	9433.41	6331.16	9566.73
AP4-1	3289.38	165862.22	43026.20	63527.32	1451313.00	11640.91	11017.78	16344.65
MZ4-1	1754.29	132142.47	74145.70	46601.94	1034170.80	8250.53	2146.33	1749.65
MZ4-2	1769.01	131662.81	352786.50	48944.75	1117891.80	8051.49	2587.97	1792.05
MZ4-3	2092.41	132442.55	866126.25	62386.03	1439907.10	8238.13	2935.14	2403.77
MZ4-4	2000.49	132669.50	33307.27	51427.01	1165737.00	7947.56	2695.02	2150.57
MZ4-5	1916.05	132016.78	27335.35	50888.73	1156804.10	7905.96	2599.13	1930.61
MZ4-6	2019.65	133153.88	27902.20	50190.68	1125537.50	8153.41	2842.70	1992.25
MZ4-7	1912.25	137644.38	24453.82	52699.50	1183868.50	8518.41	4390.98	2243.93
MZ4-8	1844.05	138299.81	21378.12	50991.65	1128002.10	8511.61	5959.91	2145.81
MZ4-9	1793.89	140268.42	24782.54	49718.08	1103653.80	8886.09	4388.22	1990.29
MZ4-10	2067.37	170262.72	29877.85	64270.96	1318669.00	13999.96	2429.81	1697.93
MZ4-11	2048.93	163995.80	25965.11	61792.31	1311408.80	12095.43	2683.74	1586.73
MZ4-12	2164.53	159035.73	28916.40	61076.06	1313557.10	11331.38	2875.90	1705.77
SRM614-2	2262.05	165691.14	13377.68	47456.39	929977.75	12264.11	1507.73	3842.74
SRM612-2	27631.40	171239.00	33434.15	43739.73	811556.94	15247.93	23155.65	18497.30
SRM610-2	132123.83	267575.78	150129.28	51642.85	940915.19	39748.70	130123.65	80607.94
AP1-2	1452.37	139779.27	11590.15	39592.98	766807.63	8982.89	909.73	1570.37
AP2-2	1563.53	144049.28	13949.00	40126.39	791674.88	8981.21	1926.09	2635.93
AP3-2	2571.65	156146.88	27389.96	44684.01	914589.19	10296.86	6563.72	8894.17
AP4-2	3101.14	175496.03	36309.84	51694.09	1089331.50	11424.78	9280.73	13721.56
blank-2	1593.89	173540.22	13693.68	51360.65	1037681.10	14024.48	1541.05	1153.81
blank average	1525.33	169751.82	15036.06	57812.54	1219066.10	14186.42	1282.11	1173.97

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction								
SRM614-1	1372.97	-78701.98	18348.80	59427.56	1513646.20	-4783.57	423.50	3265.42
SRM612-1	32211.10	-51559.63	34926.02	25230.56	717692.70	656.94	29751.43	24244.90
SRM610-1	123312.01	48837.61	142530.99	20010.69	502910.80	24170.04	133857.97	84283.64
AP1-1	493.84	-64033.23	-986.55	-1102.86	57787.80	-6987.70	77.66	1809.33
AP2-1	795.48	-50864.87	1958.15	-4433.04	-15351.30	-6566.22	1292.35	2443.13
AP3-1	1116.45	-34963.05	11517.37	-2719.95	28590.30	-4753.01	5049.05	8392.77
AP4-1	1764.05	-3889.60	27990.14	5714.77	232246.90	-2545.52	9735.67	15170.68
MZ4-1	228.96	-37609.35	59109.63	-11210.60	-184895.30	-5935.89	864.22	575.68
MZ4-2	243.68	-38089.01	337750.44	-8867.79	-101174.30	-6134.93	1305.87	618.08
MZ4-3	567.08	-37309.27	851090.19	4573.49	220841.00	-5948.29	1653.03	1229.81
MZ4-4	475.16	-37082.32	18271.20	-6385.54	-53329.10	-6238.86	1412.91	976.61
MZ4-5	390.72	-37735.04	12299.29	-6923.82	-62262.00	-6280.46	1317.03	756.64
MZ4-6	494.32	-36597.94	12866.13	-7621.86	-93528.60	-6033.01	1560.59	818.28
MZ4-7	386.92	-32107.44	9417.75	-5113.05	-35197.60	-5668.01	3108.88	1069.97
MZ4-8	318.72	-31452.01	6342.05	-6820.90	-91064.00	-5674.81	4677.81	971.85
MZ4-9	268.56	-29483.40	9746.47	-8094.47	-115412.30	-5300.33	3106.12	816.32
MZ4-10	542.04	510.90	14841.78	6458.42	99602.90	-186.46	1147.71	523.96
MZ4-11	523.60	-5756.02	10929.04	3979.76	92342.70	-2090.99	1401.63	412.76
MZ4-12	639.20	-10716.09	13880.34	3263.52	94491.00	-2855.04	1593.79	531.80
SRM614-2	736.72	-4060.67	-1658.39	-10356.16	-289088.35	-1922.31	225.62	2668.78
SRM612-2	26106.07	1487.19	18398.08	-14072.82	-407509.16	1061.51	21873.54	17323.34
SRM610-2	130598.50	97823.97	135093.22	-6169.69	-278150.91	25562.28	128841.54	79433.97
AP1-2	-72.96	-29972.55	-3445.92	-18219.56	-452258.47	-5203.53	-372.38	396.40
AP2-2	38.20	-25702.54	-1087.07	-17686.16	-427391.22	-5205.21	643.98	1461.97
AP3-2	1046.33	-13604.94	12353.89	-13128.53	-304476.91	-3889.56	5281.61	7720.20
AP4-2	1575.81	5744.22	21273.78	-6118.45	-129734.60	-2761.64	7998.63	12547.59
zero correction								
SRM614-1	1372.97	0.00	18348.80	59427.56	1513646.20	0.00	423.50	3265.42
SRM612-1	32211.10	0.00	34926.02	25230.56	717692.70	656.94	29751.43	24244.90
SRM610-1	123312.01	48837.61	142530.99	20010.69	502910.80	24170.04	133857.97	84283.64
AP1-1	493.84	0.00	0.00	0.00	57787.80	0.00	77.66	1809.33
AP2-1	795.48	0.00	1958.15	0.00	0.00	0.00	1292.35	2443.13
AP3-1	1116.45	0.00	11517.37	0.00	28590.30	0.00	5049.05	8392.77
AP4-1	1764.05	0.00	27990.14	5714.77	232246.90	0.00	9735.67	15170.68
MZ4-1	228.96	0.00	59109.63	0.00	0.00	0.00	864.22	575.68
MZ4-2	243.68	0.00	337750.44	0.00	0.00	0.00	1305.87	618.08
MZ4-3	567.08	0.00	851090.19	4573.49	220841.00	0.00	1653.03	1229.81
MZ4-4	475.16	0.00	18271.20	0.00	0.00	0.00	1412.91	976.61
MZ4-5	390.72	0.00	12299.29	0.00	0.00	0.00	1317.03	756.64
MZ4-6	494.32	0.00	12866.13	0.00	0.00	0.00	1560.59	818.28
MZ4-7	386.92	0.00	9417.75	0.00	0.00	0.00	3108.88	1069.97
MZ4-8	318.72	0.00	6342.05	0.00	0.00	0.00	4677.81	971.85
MZ4-9	268.56	0.00	9746.47	0.00	0.00	0.00	3106.12	816.32
MZ4-10	542.04	510.90	14841.78	6458.42	99602.90	0.00	1147.71	523.96
MZ4-11	523.60	0.00	10929.04	3979.76	92342.70	0.00	1401.63	412.76
MZ4-12	639.20	0.00	13880.34	3263.52	94491.00	0.00	1593.79	531.80
SRM614-2	736.72	0.00	0.00	0.00	0.00	0.00	225.62	2668.78
SRM612-2	26106.07	1487.19	18398.08	0.00	0.00	1061.51	21873.54	17323.34
SRM610-2	130598.50	97823.97	135093.22	0.00	0.00	25562.28	128841.54	79433.97
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	396.40
AP2-2	38.20	0.00	0.00	0.00	0.00	0.00	643.98	1461.97
AP3-2	1046.33	0.00	12353.89	0.00	0.00	0.00	5281.61	7720.20
AP4-2	1575.81	5744.22	21273.78	0.00	0.00	0.00	7998.63	12547.59
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-1	0.001721	0.000000	0.022999	0.074488	1.897237	0.000000	0.000531	0.004093
SRM612-1	0.023181	0.000000	0.025134	0.018157	0.516487	0.000473	0.021411	0.017448

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.282185	0.111759	0.326165	0.045792	1.150852	0.055310	0.306318	0.192873
AP1-1	0.000060	0.000000	0.000000	0.000000	0.007053	0.000000	0.000009	0.000221
AP2-1	0.000118	0.000000	0.000289	0.000000	0.000000	0.000000	0.000191	0.000361
AP3-1	0.000173	0.000000	0.001782	0.000000	0.004424	0.000000	0.000781	0.001299
AP4-1	0.000208	0.000000	0.003296	0.000673	0.027349	0.000000	0.001146	0.001786
MZ4-1	0.000036	0.000000	0.009362	0.000000	0.000000	0.000000	0.000137	0.000091
MZ4-2	0.000037	0.000000	0.051463	0.000000	0.000000	0.000000	0.000199	0.000094
MZ4-3	0.000087	0.000000	0.130893	0.000703	0.033964	0.000000	0.000254	0.000189
MZ4-4	0.000075	0.000000	0.002899	0.000000	0.000000	0.000000	0.000224	0.000155
MZ4-5	0.000063	0.000000	0.001998	0.000000	0.000000	0.000000	0.000214	0.000123
MZ4-6	0.000080	0.000000	0.002094	0.000000	0.000000	0.000000	0.000254	0.000133
MZ4-7	0.000077	0.000000	0.001876	0.000000	0.000000	0.000000	0.000619	0.000213
MZ4-8	0.000066	0.000000	0.001318	0.000000	0.000000	0.000000	0.000972	0.000202
MZ4-9	0.000054	0.000000	0.001966	0.000000	0.000000	0.000000	0.000626	0.000165
MZ4-10	0.000112	0.000105	0.003057	0.001330	0.020514	0.000000	0.000236	0.000108
MZ4-11	0.000088	0.000000	0.001835	0.000668	0.015503	0.000000	0.000235	0.000069
MZ4-12	0.000095	0.000000	0.002053	0.000483	0.013973	0.000000	0.000236	0.000079
SRM614-2	0.000704	0.000000	0.000000	0.000000	0.000000	0.000000	0.000216	0.002550
SRM612-2	0.025092	0.001429	0.017683	0.000000	0.000000	0.001020	0.021024	0.016650
SRM610-2	0.292595	0.219166	0.302665	0.000000	0.000000	0.057270	0.288658	0.177965
AP1-2	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000069
AP2-2	0.000006	0.000000	0.000000	0.000000	0.000000	0.000000	0.000108	0.000245
AP3-2	0.000163	0.000000	0.001925	0.000000	0.000000	0.000000	0.000823	0.001203
AP4-2	0.000199	0.000724	0.002680	0.000000	0.000000	0.000000	0.001008	0.001581
standardize signal averages AP								
AP1	0.000030	0.000000	0.000000	0.000000	0.003527	0.000000	0.000005	0.000145
AP2	0.000062	0.000000	0.000145	0.000000	0.000000	0.000000	0.000150	0.000303
AP3	0.000168	0.000000	0.001854	0.000000	0.002212	0.000000	0.000802	0.001251
AP4	0.000203	0.000362	0.002988	0.000336	0.013675	0.000000	0.001077	0.001684
linest from std sig ave								
	0.015290	0.118258	0.013587	6.961295	0.218512	0.000000	0.012880	0.016162
standardize signal averages SRM								
srm614-2	0.001212	0.000000	0.011499	0.037244	0.948619	0.000000	0.000373	0.003322
srm612-2	0.024136	0.000715	0.021409	0.009079	0.258243	0.000747	0.021217	0.017049
srm610-2	0.287390	0.165463	0.314415	0.022896	0.575426	0.056290	0.297488	0.185419
linest from std sig ave								
	0.017928	0.028566	0.016073	0.064198	0.002494	0.092040	0.015892	0.027036
concentration data								
SRM614-1	2.26	0.00	26.80	44470.82	35554.65	0.00	0.59	5.67
SRM612-1	30.40	0.00	29.29	10840.21	9679.08	0.00	23.65	24.19
SRM610-1	370.04	1133.48	380.06	27338.88	21567.23	0.00	338.37	267.35
AP1-1	0.37	0.00	0.00	0.00	614.83	0.00	0.05	1.42
AP2-1	0.72	0.00	1.57	0.00	0.00	0.00	0.98	2.33
AP3-1	1.05	0.00	9.66	0.00	385.67	0.00	4.01	8.37
AP4-1	1.27	0.00	17.87	1868.91	2384.10	0.00	5.89	11.52
MZ4-1	0.22	0.00	50.74	0.00	0.00	0.00	0.70	0.59
MZ4-2	0.23	0.00	278.94	0.00	0.00	0.00	1.02	0.61
MZ4-3	0.53	0.00	709.46	1953.35	2960.72	0.00	1.31	1.22
MZ4-4	0.46	0.00	15.71	0.00	0.00	0.00	1.15	1.00
MZ4-5	0.39	0.00	10.83	0.00	0.00	0.00	1.10	0.79
MZ4-6	0.49	0.00	11.35	0.00	0.00	0.00	1.31	0.86
MZ4-7	0.47	0.00	10.17	0.00	0.00	0.00	3.18	1.37
MZ4-8	0.40	0.00	7.14	0.00	0.00	0.00	5.00	1.30
MZ4-9	0.33	0.00	10.65	0.00	0.00	0.00	3.22	1.06
MZ4-10	0.68	4.96	16.57	3694.10	1788.29	0.00	1.21	0.70
MZ4-11	0.54	0.00	9.94	1855.48	1351.40	0.00	1.21	0.45
MZ4-12	0.58	0.00	11.13	1340.27	1218.10	0.00	1.21	0.51
SRM614-2	0.92	0.00	0.00	0.00	0.00	0.00	0.24	3.53
SRM612-2	32.90	14.50	20.60	0.00	0.00	0.00	23.22	23.08
SRM610-2	383.69	2222.81	352.67	0.00	0.00	0.00	318.86	246.68
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45
AP2-2	0.04	0.00	0.00	0.00	0.00	0.00	0.56	1.58
AP3-2	0.99	0.00	10.43	0.00	0.00	0.00	4.23	7.76
AP4-2	1.21	34.14	14.53	0.00	0.00	0.00	5.18	10.19
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-3	935.77	54596.23	8255.05	2951962.00	29862.53	3876.14	1059.73	999.13
SRM614-3	2051.73	54024.54	9499.89	2485946.30	25099.98	5376.35	2044.69	7473.68
SRM612-3	40723.67	96222.78	78183.40	2424244.50	26953.71	14951.96	44244.37	34760.23
SRM610-3	271395.28	339434.00	359476.94	2531385.30	34100.03	69075.79	296258.47	178381.97
AP1-3	1663.05	65842.61	61373.15	2154235.50	66665.41	6062.51	2161.37	2129.85
AP2-3	1856.09	72241.25	60201.74	1951650.40	119971.88	6310.72	4968.43	5679.47
AP3-3	4682.11	115725.38	112502.20	2411955.00	179769.22	10926.86	24537.78	34223.91
AP4-3	6858.28	192980.92	157635.64	3057017.50	229264.97	18920.59	40774.75	59587.34
TGP3-1	3103.02	71986.37	212896.75	1839981.50	226578.44	6064.11	6690.44	3050.22
TGP3-2	2797.86	68131.14	169947.05	1601532.10	258460.73	5386.91	5728.75	2458.13
TGP3-3	2706.34	67752.74	174201.86	1613093.90	280976.78	5174.99	5567.03	2651.97
TGP3-4	3776.70	70234.16	505213.41	4216507.50	337240.41	5580.39	6068.75	3197.02
TGP3-5	3001.70	69237.99	300351.19	2456423.30	326623.19	5134.71	5374.35	2618.29
TGP3-6	2939.78	69027.07	342149.38	2634565.50	340887.75	5330.43	5498.59	3504.06
TGP3-7	6639.28	72989.33	737621.38	6021947.50	417695.66	5679.71	5741.19	4346.86
TGP3-8	4357.10	71474.40	532134.19	4064565.80	386014.84	5303.79	5020.75	2923.86
TGP3-9	3454.30	71351.28	269240.63	1850643.50	361957.78	4881.75	4334.22	2202.53
TGP3-10	5654.35	73118.17	458973.47	2262013.80	382888.47	4905.43	5178.31	2826.06
TGP3-11	5756.31	73601.62	429922.63	1752087.40	377612.06	4985.51	4905.07	2662.62
TGP3-12	5704.95	75205.66	333299.22	1342240.90	370479.38	5043.95	4951.07	2550.29
TGP3-13	2284.97	73461.21	501975.88	2872487.00	407838.06	4969.51	5397.31	3036.50
TGP3-14	1638.57	75021.19	431415.09	2516588.50	405421.69	5077.23	4979.11	2574.21
TGP3-15	2645.37	78650.04	716883.69	3360063.50	414825.13	5625.91	6039.03	4592.55
SRM614-4	1453.13	81293.30	5635.15	650734.88	195122.42	4736.79	2614.25	5393.03
SRM612-4	34318.59	113613.24	40673.03	676964.06	136792.97	11626.91	32612.42	24259.30
SRM610-4	227048.13	302479.16	247594.52	923849.06	126192.47	52480.18	220653.77	133387.42
AP1-4	902.77	85565.52	7134.84	625463.44	193188.73	4880.27	2161.53	1805.05
AP2-4	1160.57	90877.87	13403.08	654640.81	260159.02	5423.27	4247.30	3693.50
AP3-4	2950.82	118246.02	44484.37	996381.69	298348.13	7940.22	14371.32	18715.55
AP4-4	5610.87	186823.17	93301.09	1731834.00	335920.63	14240.28	29739.77	41543.31
blank-4	574.32	79661.77	4144.06	722536.25	374326.34	4787.71	3251.82	703.48
blank average	755.04	67129.00	6199.56	1837249.13	202094.43	4331.92	2155.77	851.30
blank subtraction								
SRM614-3	1296.69	-13104.45	3300.34	648697.18	-176994.45	1044.43	-111.08	6622.38
SRM612-3	39968.62	29093.78	71983.84	586995.38	-175140.72	10620.04	42088.60	33908.93
SRM610-3	270640.24	272305.00	353277.38	694136.18	-167994.40	64743.86	294102.70	177530.67
AP1-3	908.01	-1286.39	55173.59	316986.38	-135429.02	1730.59	5.60	1278.55
AP2-3	1101.05	5112.25	54002.18	114401.28	-82122.55	1978.79	2812.66	4828.17
AP3-3	3927.06	48596.38	106302.64	574705.88	-22325.21	6594.94	22382.00	33372.61
AP4-3	6103.23	125851.92	151436.08	1219768.38	27170.54	14588.66	38618.98	58736.03
TGP3-1	2347.97	4857.37	206697.19	2732.38	24484.01	1732.19	4534.67	2198.91
TGP3-2	2042.81	1002.14	163747.49	-235717.03	56366.30	1054.99	3572.98	1606.83
TGP3-3	1951.29	623.75	168002.30	-224155.23	78882.35	843.06	3411.26	1800.67
TGP3-4	3021.66	3105.16	499013.85	2379258.38	135145.98	1248.47	3912.98	2345.71
TGP3-5	2246.65	2109.00	294151.63	619174.18	124528.76	802.78	3218.58	1766.99
TGP3-6	2184.73	1898.07	335949.82	797316.38	138793.32	998.51	3342.82	2652.76
TGP3-7	5884.23	5860.33	731421.82	4184698.38	215601.23	1347.79	3585.42	3495.56
TGP3-8	3602.06	4345.40	525934.63	2227316.68	183920.41	971.87	2864.98	2072.55
TGP3-9	2699.26	4222.28	263041.07	13394.38	159863.35	549.82	2178.45	1351.23
TGP3-10	4899.31	5989.18	452773.91	424764.68	180794.04	573.50	3022.54	1974.75
TGP3-11	5001.27	6472.62	423723.07	-85161.73	175517.63	653.58	2749.30	1811.31
TGP3-12	4949.91	8076.67	327099.66	-495008.23	168384.95	712.02	2795.30	1698.99
TGP3-13	1529.93	6332.21	495776.32	1035237.88	205743.63	637.58	3241.54	2185.19
TGP3-14	883.52	7892.19	425215.53	679339.38	203327.26	745.30	2823.34	1722.91
TGP3-15	1890.33	11521.04	710684.13	1522814.38	212730.70	1293.99	3883.26	3741.24
SRM614-4	698.08	14164.30	-564.40	-1186514.25	-6972.01	404.86	458.48	4541.73
SRM612-4	33563.55	46484.24	34473.47	-1160285.07	-65301.46	7294.98	30456.65	23407.99
SRM610-4	226293.09	235350.16	241394.96	-913400.07	-75901.96	48148.25	218498.00	132536.12
AP1-4	147.72	18436.53	935.29	-1211785.69	-8905.70	548.34	5.76	953.75
AP2-4	405.52	23748.87	7203.52	-1182608.32	58064.59	1091.35	2091.53	2842.20
AP3-4	2195.77	51117.02	38284.82	-840867.44	96253.70	3608.80	12215.55	17864.24
AP4-4	4855.83	119694.17	87101.53	-105415.13	133826.20	9908.36	27584.00	40692.01
zero correction								
SRM614-3	1296.69	0.00	3300.34	648697.18	0.00	1044.43	0.00	6622.38
SRM612-3	39968.62	29093.78	71983.84	586995.38	0.00	10620.04	42088.60	33908.93
SRM610-3	270640.24	272305.00	353277.38	694136.18	0.00	64743.86	294102.70	177530.67
AP1-3	908.01	0.00	55173.59	316986.38	0.00	1730.59	5.60	1278.55
AP2-3	1101.05	5112.25	54002.18	114401.28	0.00	1978.79	2812.66	4828.17
AP3-3	3927.06	48596.38	106302.64	574705.88	0.00	6594.94	22382.00	33372.61
AP4-3	6103.23	125851.92	151436.08	1219768.38	27170.54	14588.66	38618.98	58736.03
TGP3-1	2347.97	4857.37	206697.19	2732.38	24484.01	1732.19	4534.67	2198.91
TGP3-2	2042.81	1002.14	163747.49	0.00	56366.30	1054.99	3572.98	1606.83
TGP3-3	1951.29	623.75	168002.30	0.00	78882.35	843.06	3411.26	1800.67

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	3021.66	3105.16	499013.85	2379258.38	135145.98	1248.47	3912.98	2345.71
TGP3-5	2246.65	2109.00	294151.63	619174.18	124528.76	802.78	3218.58	1766.99
TGP3-6	2184.73	1898.07	335949.82	797316.38	138793.32	998.51	3342.82	2652.76
TGP3-7	5884.23	5860.33	731421.82	4184698.38	215601.23	1347.79	3585.42	3495.56
TGP3-8	3602.06	4345.40	525934.63	2227316.68	183920.41	971.87	2864.98	2072.55
TGP3-9	2699.26	4222.28	263041.07	13394.38	159863.35	549.82	2178.45	1351.23
TGP3-10	4899.31	5989.18	452773.91	424764.68	180794.04	573.50	3022.54	1974.75
TGP3-11	5001.27	6472.62	423723.07	0.00	175517.63	653.58	2749.30	1811.31
TGP3-12	4949.91	8076.67	327099.66	0.00	168384.95	712.02	2795.30	1698.99
TGP3-13	1529.93	6332.21	495776.32	1035237.88	205743.63	637.58	3241.54	2185.19
TGP3-14	883.52	7892.19	425215.53	679339.38	203327.26	745.30	2823.34	1722.91
TGP3-15	1890.33	11521.04	710684.13	1522814.38	212730.70	1293.99	3883.26	3741.24
SRM614-4	698.08	14164.30	0.00	0.00	0.00	404.86	458.48	4541.73
SRM612-4	33563.55	46484.24	34473.47	0.00	0.00	7294.98	30456.65	23407.99
SRM610-4	226293.09	235350.16	241394.96	0.00	0.00	48148.25	218498.00	132536.12
AP1-4	147.72	18436.53	935.29	0.00	0.00	548.34	5.76	953.75
AP2-4	405.52	23748.87	7203.52	0.00	58064.59	1091.35	2091.53	2842.20
AP3-4	2195.77	51117.02	38284.82	0.00	96253.70	3608.80	12215.55	17864.24
AP4-4	4855.83	119694.17	87101.53	0.00	133826.20	9908.36	27584.00	40692.01

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-3	0.000401	0.000000	0.001021	0.200624	0.000000	0.000323	0.000000	0.002048
SRM612-3	0.013046	0.009496	0.023496	0.191601	0.000000	0.003466	0.013738	0.011068
SRM610-3	0.198908	0.200132	0.259643	0.510159	0.000000	0.047584	0.216152	0.130477
AP1-3	0.000050	0.000000	0.003066	0.017616	0.000000	0.000096	0.000000	0.000071
AP2-3	0.000064	0.000296	0.003124	0.006617	0.000000	0.000114	0.000163	0.000279
AP3-3	0.000176	0.002183	0.004776	0.025821	0.000000	0.000296	0.001006	0.001499
AP4-3	0.000311	0.006413	0.007717	0.062158	0.001385	0.000743	0.001968	0.002993
TGP3-1	0.000092	0.000190	0.008081	0.000107	0.000957	0.000068	0.000177	0.000086
TGP3-2	0.000088	0.000043	0.007050	0.000000	0.002427	0.000045	0.000154	0.000069
TGP3-3	0.000093	0.000030	0.008034	0.000000	0.003772	0.000040	0.000163	0.000086
TGP3-4	0.000118	0.000121	0.019452	0.092746	0.005268	0.000049	0.000153	0.000091
TGP3-5	0.000093	0.000087	0.012149	0.025572	0.005143	0.000033	0.000133	0.000073
TGP3-6	0.000095	0.000083	0.014669	0.034814	0.006060	0.000044	0.000146	0.000116
TGP3-7	0.000275	0.000273	0.034132	0.195283	0.010061	0.000063	0.000167	0.000163
TGP3-8	0.000171	0.000206	0.024939	0.105616	0.008721	0.000046	0.000136	0.000098
TGP3-9	0.000113	0.000176	0.010969	0.000559	0.006667	0.000023	0.000091	0.000056
TGP3-10	0.000245	0.000300	0.022654	0.021253	0.009046	0.000029	0.000151	0.000099
TGP3-11	0.000239	0.000309	0.020260	0.000000	0.008392	0.000031	0.000131	0.000087
TGP3-12	0.000229	0.000374	0.015160	0.000000	0.007804	0.000033	0.000130	0.000079
TGP3-13	0.000136	0.000563	0.044085	0.092055	0.018295	0.000057	0.000288	0.000194
TGP3-14	0.000077	0.000688	0.037062	0.059211	0.017722	0.000065	0.000246	0.000150
TGP3-15	0.000128	0.000780	0.048129	0.103129	0.014407	0.000088	0.000263	0.000253
SRM614-4	0.000355	0.007201	0.000000	0.000000	0.000000	0.000206	0.000233	0.002309
SRM612-4	0.015504	0.021472	0.015924	0.000000	0.000000	0.003370	0.014069	0.010813
SRM610-4	0.239462	0.249047	0.255443	0.000000	0.000000	0.050950	0.231214	0.140249
AP1-4	0.000012	0.001447	0.000073	0.000000	0.000000	0.000043	0.000000	0.000075
AP2-4	0.000031	0.001789	0.000543	0.000000	0.004373	0.000082	0.000158	0.000214
AP3-4	0.000134	0.003117	0.002335	0.000000	0.005869	0.000220	0.000745	0.001089
AP4-4	0.000315	0.007771	0.005655	0.000000	0.008688	0.000643	0.001791	0.002642

standardize signal averages AP								
AP1	0.000031	0.000724	0.001570	0.008808	0.000000	0.000070	0.000000	0.000073
AP2	0.000047	0.001042	0.001833	0.003309	0.002186	0.000098	0.000160	0.000247
AP3	0.000155	0.002650	0.003555	0.012911	0.002935	0.000258	0.000875	0.001294
AP4	0.000313	0.007092	0.006686	0.031079	0.005036	0.000693	0.001879	0.002817

line1 from std sig ave								
	0.012024	0.006325	0.006089	0.104128	0.587205	0.089811	0.008328	0.011109

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	0.000378	0.003600	0.000510	0.100312	0.000000	0.000264	0.000117	0.002179
srM612-2	0.014275	0.015484	0.019710	0.095800	0.000000	0.003418	0.013903	0.010941
srM610-2	0.219185	0.224589	0.257543	0.255079	0.000000	0.049267	0.223683	0.135363

linest from std sig ave								
	0.023533	0.021077	0.019636	0.016872	0.000000	0.105181	0.021144	0.037071

concentration data								
SRM614-3	0.41	0.00	0.53	1791.63	0.00	2.49	0.00	1.95
SRM612-3	13.45	5.15	12.27	1711.05	0.00	26.70	9.81	10.55
SRM610-3	205.12	108.56	135.59	4555.88	0.00	366.51	154.39	124.32
AP1-3	0.24	0.00	7.45	731.77	0.00	3.45	0.00	0.31
AP2-3	0.31	0.75	7.59	274.87	0.00	4.10	0.54	1.24
AP3-3	0.85	5.51	11.60	1072.63	0.00	10.62	3.34	6.65
AP4-3	1.49	16.18	18.75	2582.06	324.35	26.64	6.54	13.27
TGP3-1	0.44	0.48	19.63	4.44	224.25	2.43	0.59	0.38
TGP3-2	0.42	0.11	17.12	0.00	568.50	1.63	0.51	0.31
TGP3-3	0.45	0.08	19.51	0.00	883.65	1.44	0.54	0.38
TGP3-4	0.57	0.31	47.25	3852.69	1234.09	1.74	0.51	0.41
TGP3-5	0.45	0.22	29.51	1062.28	1204.81	1.19	0.44	0.32
TGP3-6	0.46	0.21	35.63	1446.18	1419.66	1.56	0.48	0.51
TGP3-7	1.32	0.69	82.91	8112.11	2356.91	2.25	0.56	0.72
TGP3-8	0.82	0.52	60.58	4387.34	2043.02	1.65	0.45	0.44
TGP3-9	0.54	0.44	26.64	23.20	1561.68	0.82	0.30	0.25
TGP3-10	1.18	0.76	55.03	882.85	2119.06	1.03	0.50	0.44
TGP3-11	1.15	0.78	49.21	0.00	1965.96	1.12	0.44	0.38
TGP3-12	1.10	0.94	36.83	0.00	1828.21	1.18	0.43	0.35
TGP3-13	0.65	1.42	107.09	3824.01	4285.77	2.03	0.96	0.86
TGP3-14	0.37	1.74	90.02	2459.64	4151.49	2.33	0.82	0.67
TGP3-15	0.61	1.97	116.91	4284.00	3374.86	3.14	0.87	1.12
SRM614-4	0.37	3.91	0.00	0.00	0.00	1.59	0.17	2.20
SRM612-4	15.99	11.65	8.32	0.00	0.00	25.96	10.05	10.30
SRM610-4	246.94	135.09	133.39	0.00	0.00	392.44	165.15	133.63
AP1-4	0.06	3.65	0.18	0.00	0.00	1.54	0.00	0.33
AP2-4	0.15	4.51	1.32	0.00	1024.38	2.94	0.52	0.95
AP3-4	0.64	7.87	5.67	0.00	1374.96	7.88	2.47	4.83
AP4-4	1.51	19.61	13.74	0.00	2035.32	23.05	5.95	11.71

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	1005.85	54220.23	8626.01	2900452.30	27491.67	3681.74	1096.09	1206.85
SRM614-1	2346.73	54468.19	8663.21	2401771.80	23435.29	5663.99	2174.49	8647.77
SRM612-1	47193.79	100709.33	72573.65	2232873.50	21794.16	16171.01	51222.61	39241.90
SRM610-1	244510.38	307538.69	308117.13	2203493.30	23376.29	64767.81	283447.00	173987.02
AP1-1	1346.77	59545.82	33189.71	1812109.40	57109.24	5808.19	1825.97	2889.18
AP2-1	1823.85	66652.45	66324.66	1817903.60	93900.33	5788.31	5028.79	7388.84
AP3-1	6628.68	157488.41	155488.84	2922128.00	149491.84	15029.20	41677.72	59242.70
AP4-1	6823.84	199486.52	157393.13	3160993.50	195678.98	18823.83	41671.20	65473.49
TGP2-1	2784.14	66675.22	1015359.80	2479302.30	215069.89	6017.15	7144.40	8921.49
TGP2-2	2058.81	65319.57	808456.06	2148604.30	240061.91	5071.43	7209.80	6644.64
TGP2-3	3595.74	66509.62	1435393.30	3241953.30	283619.16	5387.79	7441.80	8527.57
TGP2-4	1663.69	60881.82	605054.94	2070052.90	284561.84	4394.06	3791.30	6180.19
TGP2-5	1105.97	62596.99	124349.02	1284128.30	279668.22	4408.18	3642.50	2943.10
TGP2-6	1062.61	65400.61	128914.20	1251639.60	286063.50	4367.78	3732.94	2926.26
TGP2-7	1655.89	69314.11	131672.14	1528014.40	297140.78	4873.43	4040.46	5904.83
TGP2-8	1029.89	70238.59	52825.94	1094170.80	292263.22	4513.83	3791.02	3474.82
TGP2-9	1176.21	71659.45	50605.93	1043670.40	296842.06	4823.35	3954.22	5019.31
TGP2-10	991.93	72126.41	25863.79	884141.31	306764.66	4917.15	3593.42	1452.89
TGP2-11	1158.97	74042.06	190420.13	938976.38	312086.25	4943.71	3920.58	1970.53
TGP2-12	1069.53	75296.31	58875.33	941960.81	319504.28	4899.51	3968.78	1738.97
TGP2-13	1434.65	77929.44	68947.63	1150778.80	325422.16	5038.87	4031.14	2033.21
TGP2-14	1334.93	79300.88	63360.80	1054040.80	327425.84	5291.27	4088.86	2050.69
TGP2-15	1404.85	80048.09	191834.03	1107973.10	331506.44	5239.23	4534.63	2038.41
TGP2-16	1436.77	83392.75	82196.31	987134.56	328775.66	5344.43	6322.32	3068.42
TGP2-17	1437.57	82145.98	69652.47	865882.50	329308.34	5148.35	6404.40	2244.77
TGP2-18	1591.73	81041.13	151652.38	1012099.80	335513.69	5241.55	6458.32	2459.61
SRM614-2	1466.65	78624.68	5092.95	648227.19	173547.17	4616.91	2546.05	5440.51
SRM612-2	34129.43	110499.46	39976.82	672816.88	115719.89	11766.47	32046.90	24737.46

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	209809.73	286016.84	226792.28	916662.38	111485.27	49561.04	206513.41	130138.09
AP1-2	889.60	82401.66	7238.08	612360.81	246354.03	4644.11	2550.21	1555.93
AP2-2	1054.85	89949.11	13033.39	682654.81	272780.25	5334.39	4429.54	4168.30
AP3-2	5554.35	155061.88	96127.86	1580836.40	311585.22	11747.39	30040.01	40707.15
AP4-2	4192.34	159994.45	74643.46	1460035.90	328516.41	11982.83	22862.73	32898.15
blank-2	545.40	77870.80	3765.54	719447.25	335877.44	4767.03	3088.90	782.08
blank average	775.62	66045.51	6195.78	1809949.78	181684.56	4224.38	2092.49	994.47
blank subtraction								
SRM614-1	1571.11	-11577.32	2467.43	591822.03	-158249.26	1439.61	82.00	7653.30
SRM612-1	46418.16	34663.82	66377.87	422923.73	-159890.40	11946.63	49130.12	38247.43
SRM610-1	243734.76	241493.18	301921.35	393543.53	-158308.26	60543.42	281354.51	172992.55
AP1-1	571.14	-6499.70	26993.93	2159.63	-124575.32	1583.81	-266.52	1894.71
AP2-1	1048.23	606.94	60128.88	7953.83	-87784.23	1563.93	2936.30	6394.38
AP3-1	5853.05	91442.90	149293.06	1112178.23	-32192.72	10804.82	39585.22	58248.23
AP4-1	6048.21	133441.01	151197.35	1351043.73	13994.42	14599.44	39578.70	64479.02
TGP2-1	2008.51	629.71	1009164.02	669352.53	33385.33	1792.77	5051.91	7927.02
TGP2-2	1283.19	-725.95	802260.28	338654.53	58377.35	847.04	5117.31	5650.17
TGP2-3	2820.12	464.10	1429197.52	1432003.53	101934.60	1163.41	5349.31	7533.10
TGP2-4	888.06	-5163.69	598859.16	260103.13	102877.28	169.68	1698.81	5185.73
TGP2-5	330.34	-3448.52	118153.24	-525821.48	97983.66	183.80	1550.01	1948.63
TGP2-6	286.98	-644.90	122718.42	-558310.18	104378.94	143.40	1640.45	1931.79
TGP2-7	880.26	3268.60	125476.36	-281935.38	115456.22	649.04	1947.97	4910.37
TGP2-8	254.26	4193.08	46630.16	-715778.98	110578.66	289.44	1698.53	2480.35
TGP2-9	400.58	5613.93	44410.15	-766279.38	115157.50	598.96	1861.73	4024.84
TGP2-10	216.30	6080.89	19668.01	-925808.47	125080.10	692.76	1500.93	458.42
TGP2-11	383.34	7996.54	184224.35	-870973.40	130401.69	719.32	1828.09	976.07
TGP2-12	293.90	9250.79	52679.56	-867988.97	137819.72	675.12	1876.29	744.50
TGP2-13	659.02	11883.93	62751.85	-659170.98	143737.60	814.48	1938.65	1038.75
TGP2-14	559.30	13255.37	57165.03	-755908.98	145741.28	1066.89	1996.37	1056.23
TGP2-15	629.22	14002.58	185638.25	-701976.68	149821.88	1014.85	2442.13	1043.95
TGP2-16	661.14	17347.24	76000.53	-822815.22	147091.10	1120.05	4229.82	2073.95
TGP2-17	661.94	16100.47	63456.69	-944067.28	147623.78	923.97	4311.90	1250.31
TGP2-18	816.10	14995.62	145456.60	-797849.98	153829.13	1017.17	4365.82	1465.15
SRM614-2	691.02	12579.17	-1102.83	-1161722.59	-8137.39	392.52	453.56	4446.05
SRM612-2	33353.81	44453.95	33781.05	-1137132.90	-65964.67	7542.08	29954.41	23742.99
SRM610-2	209034.11	219971.33	220596.50	-893287.40	-70199.29	45336.66	204420.92	129143.62
AP1-2	113.98	16356.15	1042.31	-1197588.97	64669.47	419.72	457.72	561.46
AP2-2	279.22	23903.60	6837.62	-1127294.97	91095.69	1110.01	2337.05	3173.84
AP3-2	4778.73	89016.37	89932.08	-229113.38	129900.66	7523.00	27947.52	39712.68
AP4-2	3416.72	93948.94	68447.69	-349913.88	146831.85	7758.44	20770.24	31903.68
zero correction								
SRM614-1	1571.11	0.00	2467.43	591822.03	0.00	1439.61	82.00	7653.30
SRM612-1	46418.16	34663.82	66377.87	422923.73	0.00	11946.63	49130.12	38247.43
SRM610-1	243734.76	241493.18	301921.35	393543.53	0.00	60543.42	281354.51	172992.55
AP1-1	571.14	0.00	26993.93	2159.63	0.00	1583.81	0.00	1894.71
AP2-1	1048.23	606.94	60128.88	7953.83	0.00	1563.93	2936.30	6394.38
AP3-1	5853.05	91442.90	149293.06	1112178.23	0.00	10804.82	39585.22	58248.23
AP4-1	6048.21	133441.01	151197.35	1351043.73	13994.42	14599.44	39578.70	64479.02
TGP2-1	2008.51	629.71	1009164.02	669352.53	33385.33	1792.77	5051.91	7927.02
TGP2-2	1283.19	0.00	802260.28	338654.53	58377.35	847.04	5117.31	5650.17
TGP2-3	2820.12	464.10	1429197.52	1432003.53	101934.60	1163.41	5349.31	7533.10
TGP2-4	888.06	0.00	598859.16	260103.13	102877.28	169.68	1698.81	5185.73
TGP2-5	330.34	0.00	118153.24	0.00	97983.66	183.80	1550.01	1948.63
TGP2-6	286.98	0.00	122718.42	0.00	104378.94	143.40	1640.45	1931.79
TGP2-7	880.26	3268.60	125476.36	0.00	115456.22	649.04	1947.97	4910.37
TGP2-8	254.26	4193.08	46630.16	0.00	110578.66	289.44	1698.53	2480.35
TGP2-9	400.58	5613.93	44410.15	0.00	115157.50	598.96	1861.73	4024.84
TGP2-10	216.30	6080.89	19668.01	0.00	125080.10	692.76	1500.93	458.42
TGP2-11	383.34	7996.54	184224.35	0.00	130401.69	719.32	1828.09	976.07
TGP2-12	293.90	9250.79	52679.56	0.00	137819.72	675.12	1876.29	744.50
TGP2-13	659.02	11883.93	62751.85	0.00	143737.60	814.48	1938.65	1038.75
TGP2-14	559.30	13255.37	57165.03	0.00	145741.28	1066.89	1996.37	1056.23
TGP2-15	629.22	14002.58	185638.25	0.00	149821.88	1014.85	2442.13	1043.95
TGP2-16	661.14	17347.24	76000.53	0.00	147091.10	1120.05	4229.82	2073.95
TGP2-17	661.94	16100.47	63456.69	0.00	147623.78	923.97	4311.90	1250.31
TGP2-18	816.10	14995.62	145456.60	0.00	153829.13	1017.17	4365.82	1465.15
SRM614-2	691.02	12579.17	0.00	0.00	0.00	392.52	453.56	4446.05
SRM612-2	33353.81	44453.95	33781.05	0.00	0.00	7542.08	29954.41	23742.99
SRM610-2	209034.11	219971.33	220596.50	0.00	0.00	45336.66	204420.92	129143.62
AP1-2	113.98	16356.15	1042.31	0.00	64669.47	419.72	457.72	561.46
AP2-2	279.22	23903.60	6837.62	0.00	91095.69	1110.01	2337.05	3173.84
AP3-2	4778.73	89016.37	89932.08	0.00	129900.66	7523.00	27947.52	39712.68
AP4-2	3416.72	93948.94	68447.69	0.00	146831.85	7758.44	20770.24	31903.68
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-1	0.000402	0.000000	0.000631	0.151406	0.000000	0.000368	0.000021	0.001958
SRM612-1	0.013729	0.010252	0.019632	0.125084	0.000000	0.003533	0.014531	0.011312
SRM610-1	0.219733	0.217712	0.272189	0.354789	0.000000	0.054581	0.253648	0.155957
AP1-1	0.000027	0.000000	0.001258	0.000101	0.000000	0.000074	0.000000	0.000088
AP2-1	0.000064	0.000037	0.003666	0.000485	0.000000	0.000095	0.000179	0.000390
AP3-1	0.000278	0.004349	0.007100	0.052896	0.000000	0.000514	0.001883	0.002770
AP4-1	0.000306	0.006745	0.007643	0.068295	0.000707	0.000738	0.002001	0.003259
TGP2-1	0.000078	0.000025	0.039387	0.026124	0.001303	0.000070	0.000197	0.000309
TGP2-2	0.000054	0.000000	0.033471	0.014129	0.002436	0.000035	0.000214	0.000236
TGP2-3	0.000118	0.000019	0.059606	0.059723	0.004251	0.000049	0.000223	0.000314
TGP2-4	0.000081	0.000000	0.054499	0.023670	0.009362	0.000015	0.000155	0.000472
TGP2-5	0.000028	0.000000	0.010142	0.000000	0.008411	0.000016	0.000133	0.000167
TGP2-6	0.000029	0.000000	0.012447	0.000000	0.010587	0.000015	0.000166	0.000196
TGP2-7	0.000096	0.000358	0.013730	0.000000	0.012634	0.000071	0.000213	0.000537
TGP2-8	0.000026	0.000428	0.004764	0.000000	0.011297	0.000030	0.000174	0.000253
TGP2-9	0.000040	0.000565	0.004472	0.000000	0.011596	0.000060	0.000187	0.000405
TGP2-10	0.000017	0.000475	0.001538	0.000000	0.009778	0.000054	0.000117	0.000036
TGP2-11	0.000027	0.000567	0.013056	0.000000	0.009242	0.000051	0.000130	0.000069
TGP2-12	0.000023	0.000729	0.004152	0.000000	0.010862	0.000053	0.000148	0.000059
TGP2-13	0.000056	0.001003	0.005297	0.000000	0.012132	0.000069	0.000164	0.000088
TGP2-14	0.000042	0.000988	0.004261	0.000000	0.010864	0.000080	0.000149	0.000079
TGP2-15	0.000040	0.000894	0.011852	0.000000	0.009565	0.000065	0.000156	0.000067
TGP2-16	0.000031	0.000801	0.003510	0.000000	0.006793	0.000052	0.000195	0.000096
TGP2-17	0.000031	0.000742	0.002926	0.000000	0.006806	0.000043	0.000199	0.000058
TGP2-18	0.000037	0.000687	0.006664	0.000000	0.007047	0.000047	0.000200	0.000067
SRM614-2	0.000311	0.005670	0.000000	0.000000	0.000000	0.000177	0.000204	0.002004
SRM612-2	0.015712	0.020941	0.015913	0.000000	0.000000	0.003553	0.014111	0.011185
SRM610-2	0.244443	0.257233	0.257964	0.000000	0.000000	0.053016	0.239049	0.151020
AP1-2	0.000008	0.001099	0.000070	0.000000	0.004346	0.000028	0.000031	0.000038
AP2-2	0.000023	0.002009	0.000575	0.000000	0.007656	0.000093	0.000196	0.000267
AP3-2	0.000262	0.004876	0.004927	0.000000	0.007116	0.000412	0.001531	0.002175
AP4-2	0.000229	0.006284	0.004578	0.000000	0.009821	0.000519	0.001389	0.002134

standardize signal averages AP								
AP1	0.000017	0.000550	0.000664	0.000050	0.002173	0.000051	0.000015	0.000063
AP2	0.000044	0.001023	0.002120	0.000242	0.003828	0.000094	0.000188	0.000328
AP3	0.000270	0.004613	0.006014	0.026448	0.003558	0.000463	0.001707	0.002473
AP4	0.000267	0.006515	0.006111	0.034148	0.005264	0.000628	0.001695	0.002697

linest from std sig ave								
	0.010724	0.005993	0.005365	0.073320	0.553122	0.087289	0.007002	0.009176

standardize signal averages SRM								
srm614-2	0.000357	0.002835	0.000316	0.075703	0.000000	0.000273	0.000113	0.001981
srm612-2	0.014720	0.015597	0.017773	0.062542	0.000000	0.003543	0.014321	0.011248
srm610-2	0.232088	0.237472	0.265077	0.177394	0.000000	0.053799	0.246348	0.153488

linest from std sig ave								
	0.022226	0.019937	0.019087	0.023997	0.000000	0.096338	0.019201	0.032713

concentration data								
SRM614-1	0.37	0.00	0.29	952.06	0.00	2.76	0.01	1.54
SRM612-1	12.63	5.27	9.03	786.54	0.00	26.45	8.73	8.90
SRM610-1	202.10	111.90	125.24	2230.97	0.00	408.61	152.31	122.73
AP1-1	0.11	0.00	2.69	2.94	0.00	2.57	0.00	0.32
AP2-1	0.27	0.09	7.85	14.18	0.00	3.32	0.50	1.43
AP3-1	1.19	10.40	15.20	1547.20	0.00	17.89	5.26	10.14
AP4-1	1.31	16.13	16.36	1997.64	156.10	25.70	5.59	11.93
TGP2-1	0.34	0.06	84.30	764.14	287.52	2.44	0.55	1.13
TGP2-2	0.23	0.00	71.64	413.28	537.44	1.23	0.60	0.86
TGP2-3	0.50	0.05	127.57	1746.91	938.09	1.69	0.62	1.15

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	0.35	0.00	116.64	692.36	2065.87	0.54	0.43	1.73
TGP2-5	0.12	0.00	21.71	0.00	1855.91	0.55	0.37	0.61
TGP2-6	0.12	0.00	26.64	0.00	2336.09	0.51	0.46	0.72
TGP2-7	0.41	0.86	29.39	0.00	2787.73	2.47	0.60	1.97
TGP2-8	0.11	1.02	10.20	0.00	2492.70	1.03	0.48	0.93
TGP2-9	0.17	1.35	9.57	0.00	2558.67	2.10	0.52	1.48
TGP2-10	0.07	1.14	3.29	0.00	2157.67	1.89	0.33	0.13
TGP2-11	0.12	1.35	27.94	0.00	2039.30	1.78	0.36	0.25
TGP2-12	0.10	1.74	8.89	0.00	2396.78	1.85	0.41	0.21
TGP2-13	0.24	2.40	11.34	0.00	2677.10	2.39	0.46	0.32
TGP2-14	0.18	2.36	9.12	0.00	2397.32	2.77	0.42	0.29
TGP2-15	0.17	2.14	25.37	0.00	2110.65	2.26	0.44	0.24
TGP2-16	0.13	1.92	7.51	0.00	1498.84	1.80	0.55	0.35
TGP2-17	0.13	1.77	6.26	0.00	1501.79	1.48	0.56	0.21
TGP2-18	0.16	1.64	14.26	0.00	1555.06	1.62	0.56	0.25
SRM614-2	0.29	2.91	0.00	0.00	0.00	1.32	0.12	1.58
SRM612-2	14.45	10.76	7.32	0.00	0.00	26.60	8.47	8.80
SRM610-2	224.83	132.21	118.69	0.00	0.00	396.89	143.54	118.85
AP1-2	0.03	2.63	0.15	0.00	959.03	0.98	0.09	0.14
AP2-2	0.10	4.80	1.23	0.00	1689.43	3.25	0.55	0.98
AP3-2	1.12	11.66	10.54	0.00	1570.23	14.35	4.28	7.96
AP4-2	0.98	15.02	9.80	0.00	2167.13	18.07	3.88	7.81

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-11	1213.93	57811.93	9397.69	2598742.30	29564.77	3499.30	1024.65	1190.45
SRM614-11	2676.58	60336.66	9929.26	2118780.50	25143.30	5524.51	2145.69	8296.21
SRM612-11	47341.59	104261.79	60760.63	1874328.30	22888.85	15303.13	47903.27	37278.93
SRM610-11	352953.56	397420.44	390652.88	2105834.30	27101.63	79397.37	354779.31	219335.72
AP1-11	1674.61	63192.84	11962.71	1493217.40	51464.21	5102.75	2363.89	3327.06
AP2-11	1978.45	71448.24	21027.24	1451735.90	99027.56	5614.39	5535.59	7346.40
AP3-11	5664.87	132993.98	99406.76	2213193.50	159387.06	11490.31	30898.77	44533.81
AP4-11	11386.38	354820.06	243286.38	4324271.00	239684.31	31877.18	72160.48	122060.93
GCK4-1	1190.81	68133.31	8569.41	1191664.40	221922.33	4464.87	9999.22	2622.65
GCK4-2	1203.93	69118.23	5364.47	942108.75	235984.81	4634.75	8926.61	2520.21
GCK4-3	1126.65	71639.48	5736.67	929703.25	252520.19	4535.83	10516.46	2439.17
GCK4-4	1373.21	74597.46	6154.47	832668.56	262600.84	4906.11	11468.94	2869.50
GCK4-5	1198.93	72846.73	5548.95	768385.44	276045.94	4495.51	10440.14	2742.94
GCK4-6	1262.85	72422.21	5464.43	734189.00	286383.16	4537.51	11030.26	2751.46
GCK4-7	1070.85	71551.32	7284.12	734781.69	312713.03	4310.90	5020.31	1475.85
GCK4-8	1072.13	74775.02	7484.72	731780.88	318666.56	4387.90	6596.80	1328.81
GCK4-9	1154.17	80981.62	8127.57	707384.00	319518.06	4808.51	7013.08	1571.57
GCK4-10	1331.93	82507.23	9024.49	680330.56	320007.75	5151.23	4891.67	1462.05
GCK4-11	1004.89	86757.93	7023.80	690459.94	317080.25	5130.39	5168.31	1072.01
GCK4-12	1118.21	90015.66	7423.32	692903.94	313922.94	5553.59	4974.03	1080.01
GCK4-13	1232.85	93585.29	9901.82	716213.94	311583.72	5764.39	4957.67	1394.37
GCK4-14	1201.41	91948.56	10021.38	680566.88	315618.63	5636.19	5360.31	1267.49
GCK4-15	1219.33	92888.13	9848.02	665016.50	316627.81	5602.15	5330.51	1267.61
GCK4-16	1073.69	92665.84	7242.12	586166.44	318668.06	5374.79	3928.18	1159.29
GCK4-17	1151.05	92960.45	8036.49	569933.38	323387.28	5269.63	4141.86	1149.81
GCK4-18	1166.17	92799.24	7698.12	553789.94	327336.03	5324.31	4018.54	1176.13
SRM614-11	2231.13	111878.19	23423.93	1740444.40	33712.07	8294.13	1234.53	3419.78
SRM612-11	22626.61	122432.17	36879.97	1262119.80	26817.83	11001.46	20434.28	15510.17
SRM610-11	175085.70	272178.88	193090.81	1304505.00	26806.67	44500.37	170351.52	107353.77
AP1-11	1474.37	105738.44	11992.71	919807.25	47435.47	6011.91	1088.89	1620.81
AP2-11	1685.21	110118.46	15952.93	878603.69	88335.18	6329.88	2858.10	3874.94
AP3-11	3704.54	148391.31	52856.58	1201996.80	168817.03	9620.61	15897.49	21676.32
AP4-11	6066.95	209881.02	103592.42	1830360.10	208074.86	15227.97	31333.50	47506.43
blank-11	1763.41	110033.54	28568.32	2074814.00	38147.97	8347.37	930.57	1830.25
blank average	1488.67	83922.73	18983.01	2336778.15	33856.37	5923.33	977.61	1510.35

blank subtraction								
SRM614-11	1187.91	-23586.07	-9053.75	-217997.65	-8713.07	-398.82	1168.09	6785.86
SRM612-11	45852.92	20339.06	41777.62	-462449.85	-10967.52	9379.79	46925.66	35768.58
SRM610-11	351464.89	313497.71	371669.87	-230943.85	-6754.74	73474.03	353801.70	217825.37
AP1-11	185.94	-20729.90	-7020.30	-843560.75	17607.84	-820.59	1386.29	1816.71
AP2-11	489.78	-12474.49	2044.23	-885042.25	65171.19	-308.94	4557.99	5836.05
AP3-11	4176.20	49071.25	80423.75	-123584.65	125530.69	5566.97	29921.17	43023.46
AP4-11	9897.72	270897.33	224303.37	1987492.85	205827.94	25953.85	71182.88	120550.58

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	-297.86	-15789.43	-10413.60	-1145113.75	188065.96	-1458.47	9021.61	1112.31
GCK4-2	-284.74	-14804.51	-13618.54	-1394669.40	202128.44	-1288.59	7949.00	1009.87
GCK4-3	-362.02	-12283.25	-13246.33	-1407074.90	218663.82	-1387.51	9538.85	928.83
GCK4-4	-115.46	-9325.27	-12828.53	-1504109.59	228744.47	-1017.23	10491.34	1359.15
GCK4-5	-289.74	-11076.01	-13434.06	-1568392.71	242189.57	-1427.83	9462.53	1232.59
GCK4-6	-225.82	-11500.52	-13518.58	-1602589.15	252526.79	-1385.83	10052.66	1241.11
GCK4-7	-417.82	-12371.41	-11698.89	-1601996.46	278856.66	-1612.43	4042.70	-34.50
GCK4-8	-416.54	-9147.71	-11498.28	-1604997.27	284810.19	-1535.43	5619.19	-181.54
GCK4-9	-334.50	-2941.12	-10855.44	-1629394.15	285661.69	-1114.83	6035.47	61.22
GCK4-10	-156.74	-1415.51	-9958.52	-1656447.59	286151.38	-772.10	3914.06	-48.30
GCK4-11	-483.78	2835.20	-11959.21	-1646318.21	283223.88	-792.94	4190.70	-438.34
GCK4-12	-370.46	6092.93	-11559.68	-1643874.21	280066.57	-369.74	3996.42	-430.34
GCK4-13	-255.82	9662.56	-9081.19	-1620564.21	277727.35	-158.94	3980.06	-115.98
GCK4-14	-287.26	8025.82	-8961.63	-1656211.27	281762.26	-287.14	4382.70	-242.86
GCK4-15	-269.34	8965.39	-9134.99	-1671761.65	282771.44	-321.18	4352.90	-242.74
GCK4-16	-414.98	8743.11	-11740.89	-1750611.71	284811.69	-548.54	2950.58	-351.06
GCK4-17	-337.62	9037.71	-10946.52	-1766844.77	289530.91	-653.70	3164.26	-360.54
GCK4-18	-322.50	8876.51	-11284.88	-1782988.21	293479.66	-599.02	3040.94	-334.22
SRM614-11	742.46	27955.46	4440.93	-596333.75	-144.30	2370.79	256.92	1909.43
SRM612-11	21137.94	38509.44	17896.96	-1074658.35	-7038.54	5078.13	19456.67	13999.82
SRM610-11	173597.03	188256.15	174107.80	-1032273.15	-7049.70	38577.04	169373.91	105843.42
AP1-11	-14.30	21815.71	-6990.30	-1416970.90	13579.10	88.58	111.28	110.46
AP2-11	196.54	26195.73	-3030.08	-1458174.46	54478.81	406.54	1880.49	2364.59
AP3-11	2215.87	64468.58	33873.57	-1134781.35	134960.66	3697.28	14919.88	20165.97
AP4-11	4578.29	125958.29	84609.41	-506418.05	174218.49	9304.63	30355.89	45996.08

zero correction

SRM614-11	1187.91	0.00	0.00	0.00	0.00	0.00	1168.09	6785.86
SRM612-11	45852.92	20339.06	41777.62	0.00	0.00	9379.79	46925.66	35768.58
SRM610-11	351464.89	313497.71	371669.87	0.00	0.00	73474.03	353801.70	217825.37
AP1-11	185.94	0.00	0.00	0.00	17607.84	0.00	1386.29	1816.71
AP2-11	489.78	0.00	2044.23	0.00	65171.19	0.00	4557.99	5836.05
AP3-11	4176.20	49071.25	80423.75	0.00	125530.69	5566.97	29921.17	43023.46
AP4-11	9897.72	270897.33	224303.37	1987492.85	205827.94	25953.85	71182.88	120550.58
GCK4-1	0.00	0.00	0.00	0.00	188065.96	0.00	9021.61	1112.31
GCK4-2	0.00	0.00	0.00	0.00	202128.44	0.00	7949.00	1009.87
GCK4-3	0.00	0.00	0.00	0.00	218663.82	0.00	9538.85	928.83
GCK4-4	0.00	0.00	0.00	0.00	228744.47	0.00	10491.34	1359.15
GCK4-5	0.00	0.00	0.00	0.00	242189.57	0.00	9462.53	1232.59
GCK4-6	0.00	0.00	0.00	0.00	252526.79	0.00	10052.66	1241.11
GCK4-7	0.00	0.00	0.00	0.00	278856.66	0.00	4042.70	0.00
GCK4-8	0.00	0.00	0.00	0.00	284810.19	0.00	5619.19	0.00
GCK4-9	0.00	0.00	0.00	0.00	285661.69	0.00	6035.47	61.22
GCK4-10	0.00	0.00	0.00	0.00	286151.38	0.00	3914.06	0.00
GCK4-11	0.00	2835.20	0.00	0.00	283223.88	0.00	4190.70	0.00
GCK4-12	0.00	6092.93	0.00	0.00	280066.57	0.00	3996.42	0.00
GCK4-13	0.00	9662.56	0.00	0.00	277727.35	0.00	3980.06	0.00
GCK4-14	0.00	8025.82	0.00	0.00	281762.26	0.00	4382.70	0.00
GCK4-15	0.00	8965.39	0.00	0.00	282771.44	0.00	4352.90	0.00
GCK4-16	0.00	8743.11	0.00	0.00	284811.69	0.00	2950.58	0.00
GCK4-17	0.00	9037.71	0.00	0.00	289530.91	0.00	3164.26	0.00
GCK4-18	0.00	8876.51	0.00	0.00	293479.66	0.00	3040.94	0.00
SRM614-11	742.46	27955.46	4440.93	0.00	0.00	2370.79	256.92	1909.43
SRM612-11	21137.94	38509.44	17896.96	0.00	0.00	5078.13	19456.67	13999.82
SRM610-11	173597.03	188256.15	174107.80	0.00	0.00	38577.04	169373.91	105843.42
AP1-11	0.00	21815.71	0.00	0.00	13579.10	88.58	111.28	110.46
AP2-11	196.54	26195.73	0.00	0.00	54478.81	406.54	1880.49	2364.59
AP3-11	2215.87	64468.58	33873.57	0.00	134960.66	3697.28	14919.88	20165.97
AP4-11	4578.29	125958.29	84609.41	0.00	174218.49	9304.63	30355.89	45996.08

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	0.000328	0.000000	0.000000	0.000000	0.000000	0.000000	0.000322	0.001872
SRM612-11	0.014508	0.006435	0.013219	0.000000	0.000000	0.002968	0.014848	0.011317
SRM610-11	0.215992	0.192659	0.228409	0.000000	0.000000	0.045153	0.217428	0.133864
AP1-11	0.000009	0.000000	0.000000	0.000000	0.000874	0.000000	0.000069	0.000090
AP2-11	0.000026	0.000000	0.000111	0.000000	0.003525	0.000000	0.000247	0.000316
AP3-11	0.000194	0.002282	0.003739	0.000000	0.005836	0.000259	0.001391	0.002000
AP4-11	0.000445	0.012177	0.010083	0.089342	0.009252	0.001167	0.003200	0.005419
GCK4-1	0.000000	0.000000	0.000000	0.000000	0.010464	0.000000	0.000502	0.000062
GCK4-2	0.000000	0.000000	0.000000	0.000000	0.011142	0.000000	0.000438	0.000056
GCK4-3	0.000000	0.000000	0.000000	0.000000	0.011099	0.000000	0.000484	0.000047
GCK4-4	0.000000	0.000000	0.000000	0.000000	0.008409	0.000000	0.000386	0.000050
GCK4-5	0.000000	0.000000	0.000000	0.000000	0.008946	0.000000	0.000350	0.000046
GCK4-6	0.000000	0.000000	0.000000	0.000000	0.009296	0.000000	0.000370	0.000046
GCK4-7	0.000000	0.000000	0.000000	0.000000	0.029218	0.000000	0.000424	0.000000
GCK4-8	0.000000	0.000000	0.000000	0.000000	0.036608	0.000000	0.000722	0.000000
GCK4-9	0.000000	0.000000	0.000000	0.000000	0.025074	0.000000	0.000530	0.000005
GCK4-10	0.000000	0.000000	0.000000	0.000000	0.026658	0.000000	0.000365	0.000000
GCK4-11	0.000000	0.000520	0.000000	0.000000	0.051993	0.000000	0.000769	0.000000
GCK4-12	0.000000	0.001010	0.000000	0.000000	0.046422	0.000000	0.000662	0.000000
GCK4-13	0.000000	0.000752	0.000000	0.000000	0.021619	0.000000	0.000310	0.000000
GCK4-14	0.000000	0.000627	0.000000	0.000000	0.022013	0.000000	0.000342	0.000000
GCK4-15	0.000000	0.000707	0.000000	0.000000	0.022291	0.000000	0.000343	0.000000
GCK4-16	0.000000	0.000534	0.000000	0.000000	0.017398	0.000000	0.000180	0.000000
GCK4-17	0.000000	0.000557	0.000000	0.000000	0.017860	0.000000	0.000195	0.000000
GCK4-18	0.000000	0.000565	0.000000	0.000000	0.018666	0.000000	0.000193	0.000000
SRM614-11	0.000775	0.029176	0.004635	0.000000	0.000000	0.002474	0.000268	0.001993
SRM612-11	0.016835	0.030670	0.014254	0.000000	0.000000	0.004044	0.015496	0.011150
SRM610-11	0.280207	0.303869	0.281032	0.000000	0.000000	0.062268	0.273391	0.170844
AP1-11	0.000000	0.001796	0.000000	0.000000	0.001118	0.000007	0.000009	0.000009
AP2-11	0.000017	0.002238	0.000000	0.000000	0.004654	0.000035	0.000161	0.000202
AP3-11	0.000167	0.004852	0.002549	0.000000	0.010157	0.000278	0.001123	0.001518
AP4-11	0.000351	0.009646	0.006480	0.000000	0.013342	0.000713	0.002325	0.003523
standardize signal averages AP								
AP1	0.000005	0.000898	0.000000	0.000000	0.000996	0.000004	0.000039	0.000050
AP2	0.000022	0.001119	0.000055	0.000000	0.004089	0.000017	0.000204	0.000259
AP3	0.000180	0.003567	0.003144	0.000000	0.007997	0.000269	0.001257	0.001759
AP4	0.000398	0.010912	0.008281	0.044671	0.011297	0.000940	0.002762	0.004471
linest from std sig ave								
	0.009709	0.004164	0.005274	0.052436	0.260530	0.060991	0.005684	0.007132
standardize signal averages SRM								
srm614-2	0.000551	0.014588	0.002317	0.000000	0.000000	0.001237	0.000295	0.001933
srm612-2	0.015672	0.018553	0.013736	0.000000	0.000000	0.003506	0.015172	0.011234
srm610-2	0.248100	0.248264	0.254720	0.000000	0.000000	0.053711	0.245409	0.152354
linest from std sig ave								
	0.020792	0.019008	0.019871	0.000000	0.000000	0.096453	0.019273	0.032956
concentration data								
SRM614-11	0.27	0.00	0.00	0.00	0.00	0.00	0.16	1.15
SRM612-11	12.08	2.30	5.98	0.00	0.00	15.52	7.24	6.92
SRM610-11	179.85	68.80	103.31	0.00	0.00	236.18	105.99	81.88
AP1-11	0.04	0.00	0.00	0.00	90.83	0.00	0.16	0.26
AP2-11	0.10	0.00	0.23	0.00	366.37	0.00	0.56	0.90
AP3-11	0.75	3.79	7.87	0.00	606.61	6.30	3.15	5.69
AP4-11	1.72	20.23	21.21	1868.91	961.65	28.39	7.26	15.42
GCK4-1	0.00	0.00	0.00	0.00	1087.55	0.00	1.14	0.18
GCK4-2	0.00	0.00	0.00	0.00	1158.08	0.00	0.99	0.16
GCK4-3	0.00	0.00	0.00	0.00	1153.55	0.00	1.10	0.13
GCK4-4	0.00	0.00	0.00	0.00	874.02	0.00	0.87	0.14
GCK4-5	0.00	0.00	0.00	0.00	929.83	0.00	0.79	0.13
GCK4-6	0.00	0.00	0.00	0.00	966.14	0.00	0.84	0.13
GCK4-7	0.00	0.00	0.00	0.00	3036.78	0.00	0.96	0.00
GCK4-8	0.00	0.00	0.00	0.00	3804.80	0.00	1.64	0.00
GCK4-9	0.00	0.00	0.00	0.00	2606.08	0.00	1.20	0.02
GCK4-10	0.00	0.00	0.00	0.00	2770.71	0.00	0.83	0.00
GCK4-11	0.00	0.86	0.00	0.00	5403.86	0.00	1.74	0.00
GCK4-12	0.00	1.68	0.00	0.00	4824.90	0.00	1.50	0.00
GCK4-13	0.00	1.25	0.00	0.00	2246.96	0.00	0.70	0.00
GCK4-14	0.00	1.04	0.00	0.00	2287.91	0.00	0.78	0.00
GCK4-15	0.00	1.17	0.00	0.00	2316.83	0.00	0.78	0.00
GCK4-16	0.00	0.89	0.00	0.00	1808.22	0.00	0.41	0.00
GCK4-17	0.00	0.93	0.00	0.00	1856.25	0.00	0.44	0.00
GCK4-18	0.00	0.94	0.00	0.00	1940.00	0.00	0.44	0.00
SRM614-11	0.65	10.42	2.10	0.00	0.00	12.94	0.13	1.22

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	14.02	10.95	6.45	0.00	0.00	21.16	7.55	6.82
SRM610-11	233.32	108.51	127.12	0.00	0.00	325.71	133.27	104.50
AP1-11	0.00	2.98	0.00	0.00	116.17	0.18	0.02	0.03
AP2-11	0.07	3.72	0.00	0.00	483.70	0.85	0.36	0.57
AP3-11	0.65	8.06	5.36	0.00	1055.70	6.77	2.55	4.32
AP4-11	1.36	16.02	13.63	0.00	1386.74	17.34	5.27	10.02

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-9	1211.25	64713.60	9839.70	3702388.00	31146.06	4198.70	1429.13	1250.05
SRM614-9	2413.53	66814.02	10105.02	3261888.00	29099.36	6459.80	2336.13	7345.12
SRM612-9	50498.77	113469.16	71097.28	2975028.50	25874.35	18062.38	56763.80	42516.68
SRM610-9	384194.53	460941.00	495947.59	3232785.00	30667.21	102821.06	462292.53	288712.34
AP1-9	1447.41	62496.87	14693.44	2554400.80	56478.88	6953.04	1973.45	2001.45
AP2-9	1800.21	69539.75	24482.70	2490767.80	93670.25	6903.76	5297.19	6327.36
AP3-9	6016.63	130889.70	107501.41	3221886.50	149525.20	14031.52	38770.66	43098.88
AP4-9	7213.92	207414.25	141197.83	3752122.80	199202.80	21587.40	42767.84	61116.43
GCK3-1	2100.21	59240.97	82290.63	2146654.30	232444.14	5753.07	5473.43	3930.58
GCK3-2	2880.02	64079.40	713731.38	5771808.50	313713.03	6279.80	8806.13	13588.52
GCK3-3	2542.93	64080.12	521385.59	4864512.00	318505.31	5779.99	7936.20	11038.26
GCK3-4	1448.37	59270.09	22371.97	1961304.30	276659.75	4731.67	4372.58	1916.05
GCK3-5	1263.69	61451.23	17098.22	1755595.60	281563.19	4840.07	4573.47	1529.01
GCK3-6	1311.61	63189.48	18773.47	1823243.30	290236.19	4825.43	4559.03	1729.45
GCK3-7	1764.69	65203.25	28414.52	1983219.50	303758.88	5266.91	4485.59	3221.90
GCK3-8	1487.65	65614.13	20655.56	1820001.60	310364.06	5214.63	4239.98	2806.86
GCK3-9	1541.49	65961.73	17836.62	1759626.00	315049.25	5263.23	4145.54	2681.14
GCK3-10	1428.21	67237.06	15068.97	1619851.50	320327.09	5240.55	4172.26	2333.33
GCK3-11	1277.01	68210.70	12345.55	1509628.40	324318.59	5222.63	4209.82	2117.09
GCK3-12	1223.25	68776.63	11471.98	1462213.40	329010.88	5108.59	3989.74	1864.89
GCK3-13	1394.77	69743.95	15037.05	1531556.50	334181.84	5326.31	4144.26	2034.29
GCK3-14	1312.21	70768.88	11875.75	1426500.40	335549.41	5145.55	3935.22	1780.05
GCK3-15	1153.37	70960.72	11853.31	1347937.30	334298.25	5446.55	4037.82	1816.01
GCK3-16	1391.97	73258.41	16796.93	1494384.30	340234.44	5404.67	4157.62	2491.33
GCK3-17	1214.41	73124.06	15313.29	1316025.00	339421.75	5523.15	4128.10	2634.58
GCK3-18	1207.89	72688.45	14932.92	1232098.60	344343.47	5531.43	4035.18	2217.89
SRM614-10	1630.45	79190.13	5461.43	979195.38	209151.17	5071.51	2836.66	4762.39
SRM612-10	35211.28	112046.63	41605.07	980390.06	139670.47	12760.67	35079.72	25819.79
SRM610-10	266017.38	338112.78	292650.63	1269128.80	126492.88	63859.44	272229.61	172233.48
AP1-10	1053.05	76573.56	7775.64	867683.19	194445.78	4869.43	2204.89	1661.17
AP2-10	1197.85	81503.86	11867.75	906807.94	251454.30	5252.47	4178.10	3447.26
AP3-10	4439.71	125425.71	70495.08	1513826.10	290741.84	9938.34	23550.61	28607.44
AP4-10	5468.63	183148.52	98581.99	2034311.60	327572.69	15831.69	31182.14	43731.48
blank-10	699.76	73783.85	4306.74	1015968.90	345126.03	4774.91	3392.74	801.80
blank average	955.51	69248.73	7073.22	2359178.45	188136.04	4486.81	2410.93	1025.93

blank subtraction								
SRM614-9	1458.03	-2434.71	3031.80	902709.55	-159036.68	1972.99	-74.80	6319.20
SRM612-9	49543.26	44220.43	64024.06	615850.05	-162261.70	13575.58	54352.87	41490.75
SRM610-9	383239.02	391692.27	488874.37	873606.55	-157468.83	98334.25	459881.60	287686.41
AP1-9	491.90	-6751.86	7620.22	195222.35	-131657.16	2466.23	-437.48	975.53
AP2-9	844.70	291.02	17409.48	131589.35	-94465.79	2416.95	2886.26	5301.43
AP3-9	5061.13	61640.97	100428.19	862708.05	-38610.84	9544.71	36359.72	42072.96
AP4-9	6258.42	138165.52	134124.61	1392944.35	11066.76	17100.60	40356.91	60090.50
GCK3-1	1144.71	-10007.75	75217.41	-212524.15	44308.10	1266.27	3062.50	2904.66
GCK3-2	1924.51	-5169.33	706658.16	3412630.05	125576.99	1792.99	6395.20	12562.59
GCK3-3	1587.43	-5168.61	514312.37	2505333.55	130369.27	1293.19	5525.27	10012.34
GCK3-4	492.86	-9978.63	15298.75	-397874.15	88523.71	244.86	1961.65	890.13
GCK3-5	308.18	-7797.50	10025.00	-603582.85	93427.15	353.26	2162.53	503.08
GCK3-6	356.10	-6059.25	11700.25	-535935.15	102100.15	338.62	2148.09	703.52
GCK3-7	809.18	-4045.48	21341.30	-375958.95	115622.84	780.10	2074.65	2195.97
GCK3-8	532.14	-3634.60	13582.34	-539176.85	122228.02	727.82	1829.05	1780.93
GCK3-9	585.98	-3286.99	10763.40	-599552.45	126913.21	776.42	1734.61	1655.21
GCK3-10	472.70	-2011.67	7995.75	-739326.95	132191.05	753.74	1761.33	1307.41
GCK3-11	321.50	-1038.02	5272.33	-849550.05	136182.55	735.82	1798.89	1091.17
GCK3-12	267.74	-472.10	4398.76	-896965.05	140874.84	621.78	1578.81	838.96
GCK3-13	439.26	495.23	7963.83	-827621.95	146045.80	839.50	1733.33	1008.37
GCK3-14	356.70	1520.16	4802.59	-932678.05	147413.37	658.74	1524.29	754.12
GCK3-15	197.86	1711.99	4780.09	-1011241.15	146162.21	959.75	1626.89	790.08
GCK3-16	436.46	4009.69	9723.71	-864794.15	152098.40	917.87	1746.69	1465.41

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	258.90	3875.33	8240.07	-1043153.45	151285.71	1036.35	1717.17	1608.65
GCK3-18	252.38	3439.73	7859.70	-1127079.85	156207.43	1044.63	1624.25	1191.97
SRM614-10	674.94	9941.40	-1611.79	-1379983.07	21015.13	584.70	425.72	3736.46
SRM612-10	34255.77	42797.90	34531.85	-1378788.39	-48465.57	8273.87	32668.79	24793.86
SRM610-10	265061.87	268864.05	285577.41	-1090049.65	-61643.16	59372.63	269818.88	171207.55
AP1-10	97.54	7324.83	702.42	-1491495.26	6309.74	382.62	-206.24	635.24
AP2-10	242.34	12255.13	4794.53	-1452370.51	63318.26	765.66	1767.17	2421.33
AP3-10	3484.20	56176.98	63421.86	-845352.35	102605.80	5451.53	21139.68	27581.52
AP4-10	4513.13	113899.79	91508.77	-324866.85	139436.65	11344.88	28771.20	42705.56

zero correction

SRM614-9	1458.03	0.00	3031.80	902709.55	0.00	1972.99	0.00	6319.20
SRM612-9	49543.26	44220.43	64024.06	615850.05	0.00	13575.58	54352.87	41490.75
SRM610-9	383239.02	391692.27	488874.37	873606.55	0.00	98334.25	459881.60	287686.41
AP1-9	491.90	0.00	7620.22	195222.35	0.00	2466.23	0.00	975.53
AP2-9	844.70	291.02	17409.48	131589.35	0.00	2416.95	2886.26	5301.43
AP3-9	5061.13	61640.97	100428.19	862708.05	0.00	9544.71	36359.72	42072.96
AP4-9	6258.42	138165.52	134124.61	1392944.35	11066.76	17100.60	40356.91	60090.50
GCK3-1	1144.71	0.00	75217.41	0.00	44308.10	1266.27	3062.50	2904.66
GCK3-2	1924.51	0.00	706658.16	3412630.05	125576.99	1792.99	6395.20	12562.59
GCK3-3	1587.43	0.00	514312.37	2505333.55	130369.27	1293.19	5525.27	10012.34
GCK3-4	492.86	0.00	15298.75	0.00	88523.71	244.86	1961.65	890.13
GCK3-5	308.18	0.00	10025.00	0.00	93427.15	353.26	2162.53	503.08
GCK3-6	356.10	0.00	11700.25	0.00	102100.15	338.62	2148.09	703.52
GCK3-7	809.18	0.00	21341.30	0.00	115622.84	780.10	2074.65	2195.97
GCK3-8	532.14	0.00	13582.34	0.00	122228.02	727.82	1829.05	1780.93
GCK3-9	585.98	0.00	10763.40	0.00	126913.21	776.42	1734.61	1655.21
GCK3-10	472.70	0.00	7995.75	0.00	132191.05	753.74	1761.33	1307.41
GCK3-11	321.50	0.00	5272.33	0.00	136182.55	735.82	1798.89	1091.17
GCK3-12	267.74	0.00	4398.76	0.00	140874.84	621.78	1578.81	838.96
GCK3-13	439.26	495.23	7963.83	0.00	146045.80	839.50	1733.33	1008.37
GCK3-14	356.70	1520.16	4802.53	0.00	147413.37	658.74	1524.29	754.12
GCK3-15	197.86	1711.99	4780.09	0.00	146162.21	959.75	1626.89	790.08
GCK3-16	436.46	4009.69	9723.71	0.00	152098.40	917.87	1746.69	1465.41
GCK3-17	258.90	3875.33	8240.07	0.00	151285.71	1036.35	1717.17	1608.65
GCK3-18	252.38	3439.73	7859.70	0.00	156207.43	1044.63	1624.25	1191.97
SRM614-10	674.94	9941.40	0.00	0.00	21015.13	584.70	425.72	3736.46
SRM612-10	34255.77	42797.90	34531.85	0.00	0.00	8273.87	32668.79	24793.86
SRM610-10	265061.87	268864.05	285577.41	0.00	0.00	59372.63	269818.88	171207.55
AP1-10	97.54	7324.83	702.42	0.00	6309.74	382.62	0.00	635.24
AP2-10	242.34	12255.13	4794.53	0.00	63318.26	765.66	1767.17	2421.33
AP3-10	3484.20	56176.98	63421.86	0.00	102605.80	5451.53	21139.68	27581.52
AP4-10	4513.13	113899.79	91508.77	0.00	139436.65	11344.88	28771.20	42705.56

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-9	0.000426	0.000000	0.000886	0.263669	0.000000	0.000576	0.000000	0.001846
SRM612-9	0.013328	0.011896	0.017223	0.165670	0.000000	0.003652	0.014621	0.011161
SRM610-9	0.212925	0.217622	0.271615	0.485370	0.000000	0.054634	0.255507	0.159837
AP1-9	0.000021	0.000000	0.000323	0.008263	0.000000	0.000104	0.000000	0.000041
AP2-9	0.000043	0.000015	0.000881	0.006662	0.000000	0.000122	0.000146	0.000268
AP3-9	0.000189	0.002307	0.003759	0.032294	0.000000	0.000357	0.001361	0.001575
AP4-9	0.000281	0.006195	0.006014	0.062456	0.000496	0.000767	0.001809	0.002694
GCK3-1	0.000051	0.000000	0.003356	0.000000	0.001977	0.000056	0.000137	0.000130
GCK3-2	0.000076	0.000000	0.028009	0.135262	0.004977	0.000071	0.000253	0.000498
GCK3-3	0.000069	0.000000	0.022403	0.109131	0.005679	0.000056	0.000241	0.000436
GCK3-4	0.000055	0.000000	0.001720	0.000000	0.009951	0.000028	0.000221	0.000100
GCK3-5	0.000033	0.000000	0.001062	0.000000	0.009899	0.000037	0.000229	0.000053
GCK3-6	0.000038	0.000000	0.001264	0.000000	0.011029	0.000037	0.000232	0.000076
GCK3-7	0.000051	0.000000	0.001335	0.000000	0.007233	0.000049	0.000130	0.000137
GCK3-8	0.000034	0.000000	0.000861	0.000000	0.007749	0.000046	0.000116	0.000113

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000037	0.000000	0.000686	0.000000	0.008085	0.000049	0.000110	0.000105
GCK3-10	0.000036	0.000000	0.000614	0.000000	0.010157	0.000058	0.000135	0.000100
GCK3-11	0.000024	0.000000	0.000386	0.000000	0.009961	0.000054	0.000132	0.000080
GCK3-12	0.000021	0.000000	0.000338	0.000000	0.010826	0.000048	0.000121	0.000064
GCK3-13	0.000030	0.000034	0.000544	0.000000	0.009975	0.000057	0.000118	0.000069
GCK3-14	0.000024	0.000102	0.000322	0.000000	0.009870	0.000044	0.000102	0.000050
GCK3-15	0.000013	0.000111	0.000311	0.000000	0.009513	0.000062	0.000106	0.000051
GCK3-16	0.000024	0.000218	0.000529	0.000000	0.008278	0.000050	0.000095	0.000080
GCK3-17	0.000014	0.000211	0.000449	0.000000	0.008244	0.000056	0.000094	0.000088
GCK3-18	0.000012	0.000169	0.000386	0.000000	0.007677	0.000051	0.000080	0.000059
SRM614-10	0.000355	0.005234	0.000000	0.000000	0.011064	0.000308	0.000224	0.001967
SRM612-10	0.016137	0.020161	0.016267	0.000000	0.000000	0.003898	0.015389	0.011680
SRM610-10	0.245414	0.248934	0.264408	0.000000	0.000000	0.054972	0.249818	0.158516
AP1-10	0.000006	0.000430	0.000041	0.000000	0.000370	0.000022	0.000000	0.000037
AP2-10	0.000020	0.001003	0.000393	0.000000	0.005184	0.000063	0.000145	0.000198
AP3-10	0.000175	0.002815	0.003178	0.000000	0.005141	0.000273	0.001059	0.001382
AP4-10	0.000265	0.006685	0.005371	0.000000	0.008184	0.000666	0.001689	0.002506

standardize signal averages AP

AP1	0.000013	0.000215	0.000182	0.004132	0.000185	0.000063	0.000000	0.000039
AP2	0.000031	0.000509	0.000637	0.003331	0.002592	0.000093	0.000145	0.000233
AP3	0.000182	0.002561	0.003469	0.016147	0.002571	0.000315	0.001210	0.001478
AP4	0.000273	0.006440	0.005692	0.031228	0.004340	0.000716	0.001749	0.002600

linest from std sig ave

0.012912	0.006961	0.007213	0.098033	0.672378	0.085396	0.008139	0.011550
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standardize signal averages SRM

srM614-2	0.000391	0.002617	0.000443	0.131834	0.005532	0.000442	0.000112	0.001906
srM612-2	0.014732	0.016028	0.016745	0.082835	0.000000	0.003775	0.015005	0.011421
srM610-2	0.229169	0.233278	0.268012	0.242685	0.000000	0.054803	0.252663	0.159177

linest from std sig ave

0.022509	0.020294	0.018882	0.016212	0.000000	0.094556	0.018721	0.031548
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concentration data

SRM614-9	0.47	0.00	0.55	2216.81	0.00	4.22	0.00	1.83
SRM612-9	14.76	7.10	10.65	1392.88	0.00	26.75	10.21	11.06
SRM610-9	235.78	129.92	168.02	4080.78	0.00	400.13	178.35	158.33
AP1-9	0.11	0.00	0.93	323.17	0.00	3.56	0.00	0.19
AP2-9	0.22	0.04	2.54	260.54	0.00	4.17	0.47	1.24
AP3-9	0.98	6.41	10.82	1262.98	0.00	12.17	4.42	7.26
AP4-9	1.45	17.20	17.30	2442.57	133.10	26.12	5.88	12.41
GCK3-1	0.26	0.00	9.66	0.00	530.30	1.92	0.44	0.60
GCK3-2	0.39	0.00	80.59	5289.94	1335.10	2.42	0.82	2.29
GCK3-3	0.36	0.00	64.46	4267.97	1523.26	1.92	0.78	2.01
GCK3-4	0.29	0.00	4.95	0.00	2669.13	0.94	0.72	0.46
GCK3-5	0.17	0.00	3.06	0.00	2655.20	1.28	0.74	0.25
GCK3-6	0.20	0.00	3.64	0.00	2958.34	1.25	0.75	0.35
GCK3-7	0.26	0.00	3.84	0.00	1940.03	1.66	0.42	0.63
GCK3-8	0.17	0.00	2.48	0.00	2078.68	1.57	0.38	0.52
GCK3-9	0.19	0.00	1.97	0.00	2168.59	1.68	0.36	0.49
GCK3-10	0.19	0.00	1.77	0.00	2724.37	1.97	0.44	0.46
GCK3-11	0.12	0.00	1.11	0.00	2671.89	1.83	0.43	0.37
GCK3-12	0.11	0.00	0.97	0.00	2903.96	1.63	0.39	0.30
GCK3-13	0.15	0.09	1.57	0.00	2675.59	1.95	0.38	0.32
GCK3-14	0.12	0.28	0.93	0.00	2647.54	1.50	0.33	0.23
GCK3-15	0.07	0.31	0.90	0.00	2551.68	2.13	0.34	0.24
GCK3-16	0.12	0.61	1.52	0.00	2220.40	1.70	0.31	0.37
GCK3-17	0.07	0.59	1.29	0.00	2211.29	1.92	0.30	0.40
GCK3-18	0.06	0.47	1.11	0.00	2059.25	1.75	0.26	0.27
SRM614-10	0.39	3.12	0.00	0.00	638.03	2.25	0.16	1.95
SRM612-10	17.87	12.04	10.06	0.00	0.00	28.54	10.74	11.57
SRM610-10	271.76	148.62	163.56	0.00	0.00	402.60	174.38	157.02
AP1-10	0.03	1.19	0.12	0.00	99.26	0.76	0.00	0.17
AP2-10	0.10	2.79	1.13	0.00	1390.47	2.14	0.47	0.91
AP3-10	0.90	7.82	9.14	0.00	1379.09	9.31	3.44	6.37
AP4-10	1.36	18.56	15.45	0.00	2195.17	22.68	5.48	11.55

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-7	1648.01	90991.51	20595.92	1846198.10	35381.16	6854.76	964.81	1618.85
SRM614-7	2970.34	89138.10	15986.09	1302628.10	26726.99	6384.52	1630.01	6375.72
SRM612-7	41592.79	124355.46	53128.22	1020655.10	21966.76	13588.56	37375.01	27548.96
SRM610-7	265059.69	335779.72	276972.16	1196583.00	24332.98	58978.37	250046.02	148849.20
AP1-7	1778.57	92543.00	14613.28	780597.00	50380.52	5085.71	1510.29	2562.49
AP2-7	2042.17	100732.93	19829.15	765972.25	100895.89	5809.15	3684.66	5691.51
AP3-7	5636.83	156957.08	83732.99	1388231.10	158079.45	10881.26	24157.98	32011.06
AP4-7	6241.56	209658.30	102154.38	1728558.90	209867.17	16047.33	29632.49	43716.21
GCK2-1	1455.41	105755.63	36566.33	744133.69	193584.69	5943.43	2254.05	5156.47
GCK2-2	1309.37	112549.55	29199.12	642901.56	189518.06	6333.44	2029.45	2087.85
GCK2-3	1401.01	117599.10	29645.37	650063.13	190866.31	6738.76	2187.53	2244.93
GCK2-4	1461.61	120631.76	12199.47	778602.63	198464.88	6907.32	2690.94	6023.03
GCK2-5	1501.57	123418.21	9397.61	622426.13	199241.92	7034.88	2637.33	2513.65
GCK2-6	1545.61	126155.79	9970.98	637755.00	204840.44	7367.80	2865.38	3099.62
GCK2-7	1660.69	129160.01	12748.91	825104.75	209082.34	7501.08	2737.94	5888.75
GCK2-8	1577.05	130293.54	11056.10	663087.44	209112.81	7474.96	3001.46	3381.34
GCK2-9	1629.81	131723.34	10628.50	678227.00	212048.39	7666.64	2887.14	2549.09
GCK2-10	1630.13	129313.09	14430.24	674411.88	218120.42	7224.12	4458.46	13249.27
GCK2-11	1500.77	124510.58	10507.02	572374.88	225788.64	7056.68	4545.59	9780.50
GCK2-12	1613.25	122768.73	10083.50	558936.06	231782.50	6638.52	4422.38	9567.73
GCK2-13	1467.33	121444.00	9559.77	538000.50	239448.67	6590.20	4037.42	17917.94
GCK2-14	1451.05	120883.92	8640.53	479708.41	245431.75	6437.24	4050.50	10061.54
GCK2-15	1540.21	121351.72	8327.77	466382.34	249476.20	6595.84	4629.51	15733.61
GCK2-16	1386.01	122446.93	9289.49	520816.69	250124.77	6887.60	4060.66	10919.78
GCK2-17	1544.73	123251.49	9148.45	499003.47	252115.02	6953.48	4208.98	8324.13
GCK2-18	1554.77	125770.59	9086.33	489195.75	249961.64	7119.32	3600.38	4231.90
SRM614-8	2168.85	133291.27	8161.37	493468.41	103448.74	7503.32	1905.77	4138.90
SRM612-8	29226.73	148782.88	33731.55	487412.63	60859.82	12438.83	23907.65	17901.66
SRM610-8	213814.64	315535.34	197737.03	680677.88	53673.02	47365.51	178058.36	111404.43
AP1-8	1538.49	117645.38	9728.65	459318.88	105352.35	6477.32	1460.53	1705.81
AP2-8	1802.29	119772.20	14063.08	498453.56	162983.03	6950.16	3145.62	3327.10
AP3-8	4949.03	166893.98	63297.00	1032184.60	210670.39	11108.38	18532.50	23784.17
AP4-8	4421.54	180886.98	57888.45	1063701.30	236189.69	12525.63	16788.61	22313.97
blank-8	1568.69	140598.67	7514.00	542303.06	228905.36	8302.29	2489.33	794.92
blank average	1608.35	115795.09	14054.96	1194250.58	132143.26	7578.52	1727.07	1206.89
blank subtraction								
SRM614-7	1361.99	-26656.99	1931.13	108377.52	-105416.27	-1194.01	-97.06	5168.83
SRM612-7	39984.44	8560.37	39073.26	-173595.48	-110176.50	6010.03	35647.94	26342.07
SRM610-7	263451.34	219984.63	262917.20	2332.42	-107810.28	51399.85	248318.95	147642.31
AP1-7	170.22	-23252.09	558.32	-413653.58	-81762.74	-2492.81	-216.78	1355.61
AP2-7	433.82	-15062.16	5774.19	-428278.33	-31247.37	-1769.37	1957.59	4484.63
AP3-7	4028.48	41161.99	69678.03	193980.52	25936.19	3302.74	22430.91	30804.17
AP4-7	4633.21	93863.21	88099.42	534308.32	77723.91	8468.81	27905.42	42509.32
GCK2-1	-152.94	-10039.46	22511.37	-450116.89	61441.43	-1635.09	526.98	3949.58
GCK2-2	-298.98	-3245.54	15144.16	-551349.02	57374.80	-1245.09	302.38	880.97
GCK2-3	-207.34	1804.01	15590.41	-544187.45	58723.05	-839.77	460.46	1038.05
GCK2-4	-146.74	4836.67	-1855.49	-415647.95	66321.62	-671.20	963.87	4816.15
GCK2-5	-106.78	7623.12	-4657.35	-571824.45	67098.66	-543.64	910.26	1306.77
GCK2-6	-62.74	10360.70	-4083.98	-556495.58	72697.18	-210.72	1138.31	1892.73
GCK2-7	52.34	13364.92	-1306.05	-369145.83	76939.08	-77.44	1010.87	4681.87
GCK2-8	-31.30	14498.45	-2998.86	-531163.14	76969.55	-103.56	1274.39	2174.45
GCK2-9	21.46	15928.25	-3426.46	-516023.58	79905.13	88.12	1160.07	1342.21
GCK2-10	21.78	13518.00	375.28	-519838.70	85977.16	-354.40	2731.40	12042.39
GCK2-11	-107.58	8715.49	-3547.94	-621875.70	93645.38	-521.84	2818.52	8573.61
GCK2-12	4.90	6973.64	-3971.46	-635314.52	99639.24	-940.01	2695.32	8360.85
GCK2-13	-141.02	5648.91	-4495.19	-656250.08	107305.41	-988.33	2310.35	16711.05
GCK2-14	-157.30	5088.83	-5414.43	-714542.17	113288.49	-1141.29	2323.43	8854.65
GCK2-15	-68.14	5556.63	-5727.19	-727868.24	117332.94	-982.69	2902.44	14526.72
GCK2-16	-222.34	6651.84	-4765.47	-673433.89	117981.51	-690.92	2333.59	9712.89
GCK2-17	-63.62	7456.40	-4906.51	-695247.11	119971.76	-625.04	2481.91	7117.24
GCK2-18	-53.58	9975.50	-4968.63	-705054.83	117818.38	-459.20	1873.31	3025.02
SRM614-8	560.50	17496.18	-5893.59	-700782.17	-28694.52	-75.20	178.70	2932.02
SRM612-8	27618.38	32987.79	19676.59	-706837.95	-71283.44	4860.31	22180.58	16694.17
SRM610-8	212206.29	199740.25	183682.07	-513572.70	-78470.24	39786.99	176331.29	110197.54
AP1-8	-69.86	1850.29	-4326.30	-734931.70	-26790.91	-1101.21	-266.54	498.92
AP2-8	193.94	3977.11	8.12	-695797.02	30839.77	-628.36	1418.55	2120.21
AP3-8	3340.68	51098.89	49242.04	-162065.98	78527.13	3529.86	16805.43	22577.29
AP4-8	2813.20	65091.89	43833.49	-130549.28	104046.43	4947.11	15061.54	21107.08
zero correction								
SRM614-7	1361.99	0.00	1931.13	108377.52	0.00	0.00	0.00	5168.83
SRM612-7	39984.44	8560.37	39073.26	0.00	0.00	6010.03	35647.94	26342.07
SRM610-7	263451.34	219984.63	262917.20	2332.42	0.00	51399.85	248318.95	147642.31
AP1-7	170.22	0.00	558.32	0.00	0.00	0.00	0.00	1355.61
AP2-7	433.82	0.00	5774.19	0.00	0.00	0.00	1957.59	4484.63

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	4028.48	41161.99	69678.03	193980.52	25936.19	3302.74	22430.91	30804.17
AP4-7	4633.21	93863.21	88099.42	534308.32	77723.91	8468.81	27905.42	42509.32
GCK2-1	0.00	0.00	22511.37	0.00	61441.43	0.00	526.98	3949.58
GCK2-2	0.00	0.00	15144.16	0.00	57374.80	0.00	302.38	880.97
GCK2-3	0.00	1804.01	15590.41	0.00	58723.05	0.00	460.46	1038.05
GCK2-4	0.00	4836.67	0.00	0.00	66321.62	0.00	963.87	4816.15
GCK2-5	0.00	7623.12	0.00	0.00	67098.66	0.00	910.26	1306.77
GCK2-6	0.00	10360.70	0.00	0.00	72697.18	0.00	1138.31	1892.73
GCK2-7	52.34	13364.92	0.00	0.00	76939.08	0.00	1010.87	4681.87
GCK2-8	0.00	14498.45	0.00	0.00	76969.55	0.00	1274.39	2174.45
GCK2-9	21.46	15928.25	0.00	0.00	79905.13	88.12	1160.07	1342.21
GCK2-10	21.78	13518.00	375.28	0.00	85977.16	0.00	2731.40	12042.39
GCK2-11	0.00	8715.49	0.00	0.00	93645.38	0.00	2818.52	8573.61
GCK2-12	4.90	6973.64	0.00	0.00	99639.24	0.00	2695.32	8360.85
GCK2-13	0.00	5648.91	0.00	0.00	107305.41	0.00	2310.35	16711.05
GCK2-14	0.00	5088.83	0.00	0.00	113288.49	0.00	2323.43	8854.65
GCK2-15	0.00	5556.63	0.00	0.00	117332.94	0.00	2902.44	14526.72
GCK2-16	0.00	6651.84	0.00	0.00	117981.51	0.00	2333.59	9712.89
GCK2-17	0.00	7456.40	0.00	0.00	119971.76	0.00	2481.91	7117.24
GCK2-18	0.00	9975.50	0.00	0.00	117818.38	0.00	1873.31	3025.02
SRM614-8	560.50	17496.18	0.00	0.00	0.00	0.00	178.70	2932.02
SRM612-8	27618.38	32987.79	19676.59	0.00	0.00	4860.31	22180.58	16694.17
SRM610-8	212206.29	199740.25	183682.07	0.00	0.00	39786.99	176331.29	110197.54
AP1-8	0.00	1850.29	0.00	0.00	0.00	0.00	0.00	498.92
AP2-8	193.94	3977.11	8.12	0.00	30839.77	0.00	1418.55	2120.21
AP3-8	3340.68	51098.89	49242.04	0.00	78527.13	3529.86	16805.43	22577.29
AP4-8	2813.20	65091.89	43833.49	0.00	104046.43	4947.11	15061.54	21107.08

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-7	0.000546	0.000000	0.000774	0.043459	0.000000	0.000000	0.000000	0.002073
SRM612-7	0.016821	0.003601	0.016438	0.000000	0.000000	0.002528	0.014997	0.011082
SRM610-7	0.272973	0.227935	0.272419	0.002417	0.000000	0.053258	0.257294	0.152978
AP1-7	0.000009	0.000000	0.000030	0.000000	0.000000	0.000000	0.000000	0.000074
AP2-7	0.000029	0.000000	0.000386	0.000000	0.000000	0.000000	0.000131	0.000300
AP3-7	0.000198	0.002022	0.003422	0.009527	0.001274	0.000162	0.001102	0.001513
AP4-7	0.000270	0.005472	0.005136	0.031148	0.004531	0.000494	0.001627	0.002478
GCK2-1	0.000000	0.000000	0.003982	0.000000	0.010869	0.000000	0.000093	0.000699
GCK2-2	0.000000	0.000000	0.002941	0.000000	0.011141	0.000000	0.000059	0.000171
GCK2-3	0.000000	0.000355	0.003068	0.000000	0.011557	0.000000	0.000091	0.000204
GCK2-4	0.000000	0.000834	0.000000	0.000000	0.011431	0.000000	0.000166	0.000830
GCK2-5	0.000000	0.001254	0.000000	0.000000	0.011035	0.000000	0.000150	0.000215
GCK2-6	0.000000	0.001502	0.000000	0.000000	0.010537	0.000000	0.000165	0.000274
GCK2-7	0.000009	0.002172	0.000000	0.000000	0.012505	0.000000	0.000164	0.000761
GCK2-8	0.000000	0.002103	0.000000	0.000000	0.011167	0.000000	0.000185	0.000315
GCK2-9	0.000003	0.002463	0.000000	0.000000	0.012357	0.000014	0.000179	0.000208
GCK2-10	0.000002	0.000993	0.000028	0.000000	0.006318	0.000000	0.000201	0.000885
GCK2-11	0.000000	0.000661	0.000000	0.000000	0.007101	0.000000	0.000214	0.000650
GCK2-12	0.000000	0.000537	0.000000	0.000000	0.007666	0.000000	0.000207	0.000643
GCK2-13	0.000000	0.000419	0.000000	0.000000	0.007953	0.000000	0.000171	0.001239
GCK2-14	0.000000	0.000403	0.000000	0.000000	0.008979	0.000000	0.000184	0.000702
GCK2-15	0.000000	0.000407	0.000000	0.000000	0.008590	0.000000	0.000213	0.001064
GCK2-16	0.000000	0.000592	0.000000	0.000000	0.010506	0.000000	0.000208	0.000865
GCK2-17	0.000000	0.000687	0.000000	0.000000	0.011061	0.000000	0.000229	0.000656
GCK2-18	0.000000	0.001170	0.000000	0.000000	0.013824	0.000000	0.000220	0.000355
SRM614-8	0.000414	0.012909	0.000000	0.000000	0.000000	0.000000	0.000132	0.002163
SRM612-8	0.018386	0.021961	0.013099	0.000000	0.000000	0.003236	0.014766	0.011114
SRM610-8	0.299212	0.281634	0.258992	0.000000	0.000000	0.056100	0.248628	0.155379
AP1-8	0.000000	0.000141	0.000000	0.000000	0.000000	0.000000	0.000000	0.000038
AP2-8	0.000018	0.000361	0.000001	0.000000	0.002798	0.000000	0.000129	0.000192
AP3-8	0.000203	0.003101	0.002989	0.000000	0.004766	0.000214	0.001020	0.001370

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.000227	0.005262	0.003543	0.000000	0.008410	0.000400	0.001217	0.001706
standardize signal averages AP								
AP1	0.000005	0.000070	0.000015	0.000000	0.000000	0.000000	0.000000	0.000056
AP2	0.000023	0.000180	0.000193	0.000000	0.001399	0.000000	0.000130	0.000246
AP3	0.000200	0.002561	0.003205	0.004763	0.003020	0.000188	0.001061	0.001442
AP4	0.000249	0.005367	0.004340	0.015574	0.006471	0.000447	0.001422	0.002092
linest from std sig ave								
	0.013136	0.008111	0.008813	0.175671	0.464547	0.126156	0.009733	0.013520
standardize signal averages SRM								
srM614-2	0.000480	0.006455	0.000387	0.021729	0.000000	0.000000	0.000066	0.002118
srM612-2	0.017603	0.012781	0.014768	0.000000	0.000000	0.002882	0.014881	0.011098
srM610-2	0.286092	0.254785	0.265706	0.001208	0.000000	0.054679	0.252961	0.154179
linest from std sig ave								
	0.018032	0.018580	0.019050	0.013598	0.000000	0.094829	0.018699	0.032569
concentration data								
SRM614-7	0.62	0.00	0.59	654.75	0.00	0.00	0.00	2.40
SRM612-7	18.95	2.51	12.42	0.00	0.00	27.36	12.52	12.85
SRM610-7	307.54	158.55	205.91	36.41	0.00	576.22	214.76	177.38
AP1-7	0.05	0.00	0.11	0.00	0.00	0.00	0.00	0.40
AP2-7	0.15	0.00	1.36	0.00	0.00	0.00	0.51	1.62
AP3-7	1.04	6.54	12.03	667.65	236.06	8.16	4.28	8.16
AP4-7	1.42	17.71	18.06	2182.92	839.71	24.85	6.32	13.37
GCK2-1	0.00	0.00	14.00	0.00	2014.31	0.00	0.36	3.77
GCK2-2	0.00	0.00	10.34	0.00	2064.68	0.00	0.23	0.92
GCK2-3	0.00	1.15	10.79	0.00	2141.84	0.00	0.35	1.10
GCK2-4	0.00	2.70	0.00	0.00	2118.41	0.00	0.65	4.48
GCK2-5	0.00	4.06	0.00	0.00	2045.08	0.00	0.58	1.16
GCK2-6	0.00	4.86	0.00	0.00	1952.69	0.00	0.64	1.48
GCK2-7	0.04	7.03	0.00	0.00	2317.56	0.00	0.64	4.10
GCK2-8	0.00	6.81	0.00	0.00	2069.51	0.00	0.72	1.70
GCK2-9	0.02	7.97	0.00	0.00	2289.97	0.69	0.70	1.12
GCK2-10	0.01	3.21	0.10	0.00	1170.92	0.00	0.78	4.77
GCK2-11	0.00	2.14	0.00	0.00	1315.96	0.00	0.83	3.51
GCK2-12	0.00	1.74	0.00	0.00	1420.73	0.00	0.81	3.47
GCK2-13	0.00	1.35	0.00	0.00	1473.97	0.00	0.66	6.68
GCK2-14	0.00	1.31	0.00	0.00	1664.08	0.00	0.72	3.79
GCK2-15	0.00	1.32	0.00	0.00	1592.03	0.00	0.83	5.74
GCK2-16	0.00	1.92	0.00	0.00	1947.04	0.00	0.81	4.66
GCK2-17	0.00	2.22	0.00	0.00	2049.81	0.00	0.89	3.54
GCK2-18	0.00	3.79	0.00	0.00	2561.91	0.00	0.85	1.91
SRM614-8	0.47	8.98	0.00	0.00	0.00	0.00	0.11	2.51
SRM612-8	20.71	15.28	9.90	0.00	0.00	35.01	12.33	12.89
SRM610-8	337.10	195.91	195.76	0.00	0.00	606.97	207.53	180.16
AP1-8	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.21
AP2-8	0.09	1.17	0.00	0.00	518.50	0.00	0.50	1.04
AP3-8	1.06	10.03	10.51	0.00	883.26	10.78	3.96	7.39
AP4-8	1.19	17.02	12.46	0.00	1558.64	20.13	4.73	9.20
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-5	3342.14	118753.75	50407.36	2571442.50	42948.08	8265.93	1008.61	1332.97
SRM614-5	3544.74	121961.93	33345.03	1615142.50	35982.92	8886.09	1994.29	7897.88
SRM612-5	42142.16	142846.36	60045.66	1142611.50	26672.35	14862.20	36070.92	27612.76
SRM610-5	293127.56	373238.66	297102.56	1289052.10	28249.64	63215.04	259894.22	156643.08
AP1-5	2102.73	112063.75	17971.90	777973.00	53801.82	6023.55	1441.01	2790.74
AP2-5	2193.77	118856.83	22590.17	776793.69	99076.40	6528.32	3746.98	5783.31
AP3-5	8502.77	229844.13	141494.88	2011818.90	163634.44	17157.34	41404.79	58821.45
AP4-5	10424.66	327053.94	191227.95	2762959.00	221102.28	24858.54	55652.79	88642.86
GCK1-1	2417.57	114916.41	30781.57	685432.44	213839.80	6128.55	7992.81	2096.65
GCK1-2	2392.21	113573.80	30854.45	573385.38	235986.20	5868.83	7043.12	2215.05
GCK1-3	2358.97	117716.98	24619.58	578754.38	244571.53	6032.43	6033.07	1850.97
GCK1-4	2544.25	119656.52	88422.70	1559032.00	266893.97	6495.08	8370.93	3281.38
GCK1-5	2524.17	118350.91	101633.21	967352.69	266231.41	6114.19	8035.81	2344.81
GCK1-6	2298.89	116948.38	25470.06	582884.81	266881.78	6348.60	5950.15	2146.45

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	2063.13	120644.84	13845.48	605970.31	264721.72	6731.92	3810.06	1717.01
GCK1-8	2009.37	126956.55	9183.45	507613.38	260114.27	6843.00	3761.06	1158.05
GCK1-9	2140.37	132976.14	10375.90	537498.81	253668.42	7683.52	4192.02	1232.53
GCK1-10	2252.17	128091.24	28900.60	677093.69	261549.44	7151.80	5932.19	1796.89
GCK1-11	1985.29	121868.69	19677.07	613759.81	272744.31	6818.28	5132.95	1645.33
GCK1-12	1866.33	120592.68	20656.32	619653.00	277523.56	6433.68	5278.87	1719.41
GCK1-13	2509.97	123266.65	15921.65	579170.31	273908.25	6953.96	3743.42	1309.45
GCK1-14	2443.13	126581.75	17691.62	537844.88	274025.78	7226.24	3813.70	1205.45
GCK1-15	2336.21	129237.77	17826.14	523158.19	273220.34	7356.28	3977.82	1122.97
GCK1-16	2176.97	135125.64	24525.90	1197408.00	274009.22	7985.13	3785.34	1953.37
GCK1-17	2143.45	136386.33	23610.61	1266996.10	273932.28	7843.24	3556.98	1591.97
GCK1-18	2201.65	137850.58	23090.81	1389200.30	275551.16	7984.25	3572.02	1644.85
SRM614-6	2386.01	139518.19	9093.13	503884.94	114276.80	8508.93	2126.57	4181.02
SRM612-6	27783.84	152253.06	33238.87	498360.75	68191.02	12702.23	22431.97	16708.69
SRM610-6	212162.11	318944.91	205611.11	707181.44	58000.77	48130.59	179478.45	105470.63
AP1-6	1724.09	124002.50	10520.54	462274.88	109319.62	7078.96	1551.33	1689.17
AP2-6	1866.85	127566.08	14592.28	507976.38	165814.50	7478.76	3208.94	3128.74
AP3-6	5673.19	182691.39	76744.43	1156971.90	214212.05	12442.67	22293.81	29294.65
AP4-6	5363.07	202578.50	75030.59	1266791.60	247697.67	14639.28	22505.69	31077.53
blank-6	1477.13	146623.42	7787.80	547495.31	243584.97	8960.49	2669.62	747.08
blank average	2409.63	132688.59	29097.58	1559468.91	143266.53	8613.21	1839.11	1040.03
blank subtraction								
SRM614-5	1135.11	-10726.66	4247.44	55673.59	-107283.60	272.88	155.18	6857.86
SRM612-5	39732.52	10157.78	30948.07	-416857.41	-116594.18	6248.99	34231.81	26572.73
SRM610-5	290717.93	240550.08	268004.98	-270416.81	-115016.89	54601.83	258055.11	155603.05
AP1-5	-306.90	-20624.84	-11125.68	-781495.91	-89464.70	-2589.65	-398.10	1750.71
AP2-5	-215.86	-13831.76	-6507.42	-782675.22	-44190.13	-2084.89	1907.87	4743.29
AP3-5	6093.13	97155.55	112397.30	452350.00	20367.91	8544.13	39565.68	57781.42
AP4-5	8015.02	194365.36	162130.37	1203490.10	77835.75	16245.33	53813.68	87602.83
GCK1-1	7.94	-17772.18	1683.99	-874036.47	70573.27	-2484.65	6153.69	1056.63
GCK1-2	-17.42	-19114.79	1756.87	-986083.53	92719.67	-2744.38	5204.01	1175.03
GCK1-3	-50.66	-14971.61	-4478.01	-980714.53	101305.00	-2580.77	4193.96	810.94
GCK1-4	134.62	-13032.07	59325.11	-436.91	123627.44	-2118.13	6531.82	2241.35
GCK1-5	114.54	-14337.68	72535.63	-592116.22	122964.88	-2499.01	6196.69	1304.79
GCK1-6	-110.74	-15740.21	-3627.52	-976584.10	123615.25	-2264.61	4111.04	1106.43
GCK1-7	-346.50	-12043.75	-15252.11	-953498.60	121455.19	-1881.29	1970.95	676.98
GCK1-8	-400.26	-5732.04	-19914.13	-1051855.53	116847.74	-1770.21	1921.95	118.02
GCK1-9	-269.26	287.55	-18721.69	-1021970.10	110401.89	-929.69	2352.91	192.50
GCK1-10	-157.46	-4597.35	-196.98	-882375.22	118282.91	-1461.41	4093.08	756.86
GCK1-11	-424.34	-10819.90	-9420.51	-945709.10	129477.78	-1794.93	3293.84	605.30
GCK1-12	-543.30	-12095.91	-8441.27	-939815.91	134257.03	-2179.53	3439.76	679.38
GCK1-13	100.34	-9421.94	-13175.93	-980298.60	130641.72	-1659.25	1904.31	269.42
GCK1-14	33.50	-6106.84	-11405.96	-1021624.03	130759.25	-1386.97	1974.59	165.42
GCK1-15	-73.42	-3450.82	-11271.44	-1036310.72	129953.81	-1256.93	2138.71	82.94
GCK1-16	-232.66	2437.05	-4571.69	-362060.91	130742.69	-628.08	1946.23	913.35
GCK1-17	-266.18	3697.74	-5486.97	-292472.81	130665.75	-769.96	1717.87	551.94
GCK1-18	-207.98	5161.99	-6006.77	-170268.61	132284.63	-628.96	1732.91	604.82
SRM614-6	-23.62	6829.60	-20004.45	-1055583.97	-28989.73	-104.28	287.46	3141.00
SRM612-6	25374.20	19564.48	4141.28	-1061108.16	-75075.50	4089.02	20592.86	15668.67
SRM610-6	209752.48	186256.33	176513.53	-852287.47	-85265.76	39517.38	177639.34	104430.60
AP1-6	-685.54	-8686.09	-18577.04	-1097194.03	-33946.91	-1534.25	-287.78	649.14
AP2-6	-542.78	-5122.51	-14505.30	-1051492.53	22547.97	-1134.45	1369.83	2088.71
AP3-6	3263.56	50002.81	47646.85	-402497.01	70945.52	3829.46	20454.69	28254.62
AP4-6	2953.44	69889.92	45933.00	-292677.31	104431.14	6026.07	20666.58	30037.51
zero correction								
SRM614-5	1135.11	0.00	4247.44	55673.59	0.00	272.88	155.18	6857.86
SRM612-5	39732.52	10157.78	30948.07	0.00	0.00	6248.99	34231.81	26572.73
SRM610-5	290717.93	240550.08	268004.98	0.00	0.00	54601.83	258055.11	155603.05
AP1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1750.71
AP2-5	0.00	0.00	0.00	0.00	0.00	0.00	1907.87	4743.29
AP3-5	6093.13	97155.55	112397.30	452350.00	20367.91	8544.13	39565.68	57781.42
AP4-5	8015.02	194365.36	162130.37	1203490.10	77835.75	16245.33	53813.68	87602.83
GCK1-1	7.94	0.00	1683.99	0.00	70573.27	0.00	6153.69	1056.63
GCK1-2	0.00	0.00	1756.87	0.00	92719.67	0.00	5204.01	1175.03
GCK1-3	0.00	0.00	0.00	0.00	101305.00	0.00	4193.96	810.94
GCK1-4	134.62	0.00	59325.11	0.00	123627.44	0.00	6531.82	2241.35
GCK1-5	114.54	0.00	72535.63	0.00	122964.88	0.00	6196.69	1304.79
GCK1-6	0.00	0.00	0.00	0.00	123615.25	0.00	4111.04	1106.43
GCK1-7	0.00	0.00	0.00	0.00	121455.19	0.00	1970.95	676.98
GCK1-8	0.00	0.00	0.00	0.00	116847.74	0.00	1921.95	118.02
GCK1-9	0.00	287.55	0.00	0.00	110401.89	0.00	2352.91	192.50
GCK1-10	0.00	0.00	0.00	0.00	118282.91	0.00	4093.08	756.86
GCK1-11	0.00	0.00	0.00	0.00	129477.78	0.00	3293.84	605.30
GCK1-12	0.00	0.00	0.00	0.00	134257.03	0.00	3439.76	679.38
GCK1-13	100.34	0.00	0.00	0.00	130641.72	0.00	1904.31	269.42
GCK1-14	33.50	0.00	0.00	0.00	130759.25	0.00	1974.59	165.42

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	0.00	0.00	0.00	0.00	129953.81	0.00	2138.71	82.94
GCK1-16	0.00	2437.05	0.00	0.00	130742.69	0.00	1946.23	913.35
GCK1-17	0.00	3697.74	0.00	0.00	130665.75	0.00	1717.87	551.94
GCK1-18	0.00	5161.99	0.00	0.00	132284.63	0.00	1732.91	604.82
SRM614-6	0.00	6829.60	0.00	0.00	0.00	0.00	287.46	3141.00
SRM612-6	25374.20	19564.48	4141.28	0.00	0.00	4089.02	20592.86	15668.67
SRM610-6	209752.48	186256.33	176513.53	0.00	0.00	39517.38	177639.34	104430.60
AP1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	649.14
AP2-6	0.00	0.00	0.00	0.00	22547.97	0.00	1369.83	2088.71
AP3-6	3263.56	50002.81	47646.85	0.00	70945.52	3829.46	20454.69	28254.62
AP4-6	2953.44	69889.92	45933.00	0.00	104431.14	6026.07	20666.58	30037.51

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-5	0.000460	0.000000	0.001723	0.022585	0.000000	0.000111	0.000063	0.002782
SRM612-5	0.017817	0.004555	0.013878	0.000000	0.000000	0.002802	0.015351	0.011916
SRM610-5	0.270315	0.223668	0.249196	0.000000	0.000000	0.050770	0.239944	0.144683
AP1-5	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000101
AP2-5	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000135	0.000335
AP3-5	0.000300	0.004788	0.005540	0.022294	0.001004	0.000421	0.001950	0.002848
AP4-5	0.000437	0.010604	0.008845	0.065658	0.004246	0.000886	0.002936	0.004779
GCK1-1	0.000000	0.000000	0.000094	0.000000	0.003944	0.000000	0.000344	0.000059
GCK1-2	0.000000	0.000000	0.000088	0.000000	0.004665	0.000000	0.000262	0.000059
GCK1-3	0.000000	0.000000	0.000000	0.000000	0.006728	0.000000	0.000279	0.000054
GCK1-4	0.000007	0.000000	0.003179	0.000000	0.006624	0.000000	0.000350	0.000120
GCK1-5	0.000006	0.000000	0.003812	0.000000	0.006463	0.000000	0.000326	0.000069
GCK1-6	0.000000	0.000000	0.000000	0.000000	0.007875	0.000000	0.000262	0.000070
GCK1-7	0.000000	0.000000	0.000000	0.000000	0.014625	0.000000	0.000237	0.000082
GCK1-8	0.000000	0.000000	0.000000	0.000000	0.014577	0.000000	0.000240	0.000015
GCK1-9	0.000000	0.000035	0.000000	0.000000	0.013261	0.000000	0.000283	0.000023
GCK1-10	0.000000	0.000000	0.000000	0.000000	0.006069	0.000000	0.000210	0.000039
GCK1-11	0.000000	0.000000	0.000000	0.000000	0.008011	0.000000	0.000204	0.000037
GCK1-12	0.000000	0.000000	0.000000	0.000000	0.008026	0.000000	0.000206	0.000041
GCK1-13	0.000009	0.000000	0.000000	0.000000	0.011708	0.000000	0.000171	0.000024
GCK1-14	0.000003	0.000000	0.000000	0.000000	0.011514	0.000000	0.000174	0.000015
GCK1-15	0.000000	0.000000	0.000000	0.000000	0.012223	0.000000	0.000201	0.000008
GCK1-16	0.000000	0.000299	0.000000	0.000000	0.016060	0.000000	0.000239	0.000112
GCK1-17	0.000000	0.000391	0.000000	0.000000	0.013829	0.000000	0.000182	0.000058
GCK1-18	0.000000	0.000654	0.000000	0.000000	0.016752	0.000000	0.000219	0.000077
SRM614-6	0.000000	0.005064	0.000000	0.000000	0.000000	0.000000	0.000213	0.002329
SRM612-6	0.017879	0.013785	0.002918	0.000000	0.000000	0.002881	0.014510	0.011040
SRM610-6	0.285805	0.253789	0.240514	0.000000	0.000000	0.053846	0.242048	0.142295
AP1-6	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000054
AP2-6	0.000000	0.000000	0.000000	0.000000	0.002202	0.000000	0.000134	0.000204
AP3-6	0.000214	0.003276	0.003122	0.000000	0.004648	0.000251	0.001340	0.001851
AP4-6	0.000267	0.006320	0.004154	0.000000	0.009444	0.000545	0.001869	0.002716

standardize signal averages AP								
AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000078
AP2	0.000000	0.000000	0.000000	0.000000	0.001101	0.000000	0.000134	0.000269
AP3	0.000257	0.004032	0.004331	0.011147	0.002826	0.000336	0.001645	0.002349
AP4	0.000352	0.008462	0.006500	0.032829	0.006845	0.000716	0.002402	0.003748

linest from std sig ave								
	0.009643	0.005117	0.006066	0.083668	0.435599	0.078084	0.005933	0.007798

standardize signal averages SRM								
srM614-2	0.000230	0.002532	0.000862	0.011292	0.000000	0.000055	0.000138	0.002556
srM612-2	0.017848	0.009170	0.008398	0.000000	0.000000	0.002842	0.014930	0.011478
srM610-2	0.278060	0.238729	0.244855	0.000000	0.000000	0.052308	0.240996	0.143489

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.018551	0.019836	0.020672	0.000000	0.000000	0.099124	0.019625	0.034972
concentration data								
SRM614-5	0.38	0.00	0.90	162.06	0.00	0.74	0.03	1.86
SRM612-5	14.74	2.00	7.22	0.00	0.00	18.77	7.81	7.97
SRM610-5	223.56	98.16	129.63	0.00	0.00	339.99	122.09	96.77
AP1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
AP2-5	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.04
AP3-5	1.16	9.78	13.40	744.14	174.44	13.12	4.62	8.86
AP4-5	1.68	21.65	21.40	2191.55	737.93	27.61	6.95	14.87
GCK1-1	0.00	0.00	0.23	0.00	685.39	0.00	0.81	0.18
GCK1-2	0.00	0.00	0.21	0.00	810.65	0.00	0.62	0.18
GCK1-3	0.00	0.00	0.00	0.00	1169.24	0.00	0.66	0.17
GCK1-4	0.03	0.00	7.69	0.00	1151.06	0.00	0.83	0.37
GCK1-5	0.02	0.00	9.23	0.00	1123.12	0.00	0.77	0.21
GCK1-6	0.00	0.00	0.00	0.00	1368.51	0.00	0.62	0.22
GCK1-7	0.00	0.00	0.00	0.00	2541.46	0.00	0.56	0.25
GCK1-8	0.00	0.00	0.00	0.00	2533.05	0.00	0.57	0.05
GCK1-9	0.00	0.07	0.00	0.00	2304.43	0.00	0.67	0.07
GCK1-10	0.00	0.00	0.00	0.00	1054.69	0.00	0.50	0.12
GCK1-11	0.00	0.00	0.00	0.00	1392.14	0.00	0.48	0.12
GCK1-12	0.00	0.00	0.00	0.00	1394.72	0.00	0.49	0.13
GCK1-13	0.03	0.00	0.00	0.00	2034.65	0.00	0.40	0.08
GCK1-14	0.01	0.00	0.00	0.00	2000.94	0.00	0.41	0.05
GCK1-15	0.00	0.00	0.00	0.00	2123.99	0.00	0.48	0.02
GCK1-16	0.00	0.61	0.00	0.00	2790.81	0.00	0.57	0.35
GCK1-17	0.00	0.80	0.00	0.00	2403.09	0.00	0.43	0.18
GCK1-18	0.00	1.33	0.00	0.00	2911.17	0.00	0.52	0.24
SRM614-6	0.00	2.22	0.00	0.00	0.00	0.00	0.11	1.56
SRM612-6	14.79	6.05	1.52	0.00	0.00	19.29	7.38	7.38
SRM610-6	236.37	111.38	125.12	0.00	0.00	360.59	123.16	95.17
AP1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
AP2-6	0.00	0.00	0.00	0.00	382.71	0.00	0.32	0.63
AP3-6	0.82	6.69	7.55	0.00	807.72	7.82	3.17	5.76
AP4-6	1.03	12.90	10.05	0.00	1641.11	16.98	4.42	8.45
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	2880.86	342492.63	37405.57	825203.63	36327.45	10247.22	672.00	1067.81
SRM614-1	3752.10	101151.45	40074.31	2308145.30	38465.78	10156.70	2419.53	9851.14
SRM612-1	39355.82	133897.56	65285.01	1583485.80	28732.60	15446.33	37160.13	28311.20
SRM610-1	278264.28	364579.34	314103.56	1730616.80	30283.05	67541.66	273436.34	156633.59
AP1-1	2118.69	107426.80	20104.51	1102309.50	45783.62	6482.44	1597.73	3126.82
AP2-1	2172.33	114689.88	28576.44	1060400.30	87117.77	6448.36	4085.90	6171.63
AP3-1	8561.89	228451.56	149581.64	2315735.50	144593.05	18399.78	42282.96	63260.32
AP4-1	8589.21	299507.41	150249.72	2687437.50	194006.30	24205.50	43663.89	68538.51
V2-1	1629.37	112214.91	39216.46	836662.69	173577.66	6023.27	2081.65	1447.81
V2-2	1400.37	117714.46	26814.83	805847.31	178561.44	6404.16	2115.17	1230.17
V2-3	1434.81	122604.21	23901.01	810987.63	179204.20	6444.24	2060.85	1323.49
V2-4	2476.41	126200.39	106289.23	1333295.50	193857.45	7119.96	2948.50	2241.97
V2-5	1992.81	125637.19	108020.33	1028805.10	193800.97	7025.56	3295.62	1522.77
V2-6	2151.85	127956.80	99831.64	1025207.50	198932.44	7304.20	3312.98	1804.53
V2-7	3920.70	130150.77	83211.39	1531396.90	210913.95	7657.88	3124.78	3247.46
V2-8	1892.41	129744.33	38992.82	1009858.10	196653.27	7346.96	3053.74	1684.69
V2-9	2037.49	133380.72	34739.04	1036556.20	195205.30	7621.12	3027.34	1556.25
V2-10	2356.85	136098.61	84535.52	1282089.90	196142.83	8079.01	3325.90	2103.97
V2-11	1688.25	137186.25	37629.09	957551.06	188968.11	7972.56	2932.50	1505.41
V2-12	2217.33	138961.19	32826.11	1015496.60	189165.30	8358.17	2899.82	1730.41
V2-13	3183.54	134002.44	195579.06	1614419.60	222512.22	7504.48	7068.96	2060.05
V2-14	1948.41	124303.86	188129.58	1151449.40	232295.39	6751.32	7225.04	1815.37
V2-15	2228.49	118827.91	180451.81	1094186.50	249424.77	6420.12	8197.37	1932.09
SRM614-2	2050.93	122925.61	7965.36	645137.94	107457.69	6785.04	2112.97	5082.75
SRM612-2	32614.30	149874.64	38708.18	657098.69	71169.00	13235.56	29459.61	22037.28
SRM610-2	251994.14	355997.13	263460.66	917408.31	60977.86	59645.90	242649.17	140900.84
AP1-2	1367.17	116475.62	9003.73	592432.56	100855.57	6390.20	1453.69	1902.85
AP2-2	1678.81	120163.52	14483.12	631283.50	156131.80	6840.00	3455.78	3681.86
AP3-2	4059.70	158190.94	54762.11	1050071.60	224324.58	10845.42	17058.62	21932.60
AP4-2	5524.35	232238.83	83646.15	1623271.50	258888.97	17591.82	25424.98	37995.97

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	1141.53	120486.96	6019.99	661130.19	233184.67	6922.40	2552.89	830.16
blank average	2011.19	231489.80	21712.78	743166.91	134756.06	8584.81	1612.45	948.99
blank subtraction								
SRM614-1	1740.91	-130338.35	18361.52	1564978.39	-96290.28	1571.89	807.08	8902.15
SRM612-1	37344.63	-97592.24	43572.23	840318.89	-106023.46	6861.52	35547.68	27362.21
SRM610-1	276253.09	133089.55	292390.78	987449.89	-104473.01	58956.86	271823.89	155684.60
AP1-1	107.50	-124063.00	-1608.27	359142.59	-88972.44	-2102.37	-14.72	2177.83
AP2-1	161.14	-116799.92	6863.66	317233.39	-47638.28	-2136.45	2473.45	5222.65
AP3-1	6550.70	-3038.24	127868.86	1572568.59	9836.99	9814.97	40670.51	62311.33
AP4-1	6578.02	68017.62	128536.94	1944270.59	59250.24	15620.69	42051.44	67589.52
V2-1	-381.82	-119274.89	17503.68	93495.78	38821.60	-2561.53	469.20	498.82
V2-2	-610.82	-113775.34	5102.05	62680.40	43805.38	-2180.65	502.72	281.18
V2-3	-576.38	-108885.59	2188.23	67820.72	44448.14	-2140.57	448.40	374.50
V2-4	465.22	-105289.41	84576.45	590128.59	59101.39	-1464.85	1336.05	1292.99
V2-5	-18.38	-105852.61	86307.55	285638.19	59044.91	-1559.25	1683.17	573.78
V2-6	140.66	-103533.00	78118.86	282040.59	64176.38	-1280.61	1700.53	855.54
V2-7	1909.51	-101339.03	61498.61	788229.99	76157.89	-926.93	1512.33	2298.47
V2-8	-118.78	-101745.47	17280.04	266691.19	61897.21	-1237.85	1441.29	735.70
V2-9	26.30	-98109.08	13026.25	293389.29	60449.24	-963.69	1414.89	607.26
V2-10	345.66	-95391.19	62822.73	538922.99	61386.77	-505.80	1713.45	1154.99
V2-11	-322.94	-94303.55	15916.31	214384.15	54212.05	-612.24	1320.05	556.42
V2-12	206.14	-92528.61	11113.32	272329.69	54409.24	-226.64	1287.37	781.42
V2-13	1172.35	-97487.36	173866.28	871252.69	87756.16	-1080.33	5456.51	1111.07
V2-14	-62.78	-107185.94	166416.80	408282.49	97539.33	-1833.49	5612.59	866.38
V2-15	217.30	-112661.89	158739.03	351019.59	114668.71	-2164.69	6584.92	983.11
SRM614-2	39.74	-108564.19	-13747.42	-98028.97	-27298.37	-1799.77	500.52	4133.76
SRM612-2	30603.11	-81615.16	16995.39	-86068.22	-63587.06	4650.75	27847.16	21088.30
SRM610-2	249982.95	124507.34	241747.88	174241.40	-73778.19	51061.09	241036.72	139951.85
AP1-2	-644.02	-115014.18	-12709.05	-150734.35	-33900.49	-2194.61	-158.76	953.87
AP2-2	-332.38	-111326.28	-7229.66	-111883.41	21375.74	-1744.81	1843.33	2732.88
AP3-2	2048.51	-73298.86	33049.33	306904.69	89568.52	2260.61	15446.17	20983.62
AP4-2	3513.16	749.03	61933.37	880104.59	124132.91	9007.01	23812.53	37046.99
zero correction								
SRM614-1	1740.91	0.00	18361.52	1564978.39	0.00	1571.89	807.08	8902.15
SRM612-1	37344.63	0.00	43572.23	840318.89	0.00	6861.52	35547.68	27362.21
SRM610-1	276253.09	133089.55	292390.78	987449.89	0.00	58956.86	271823.89	155684.60
AP1-1	107.50	0.00	0.00	359142.59	0.00	0.00	0.00	2177.83
AP2-1	161.14	0.00	6863.66	317233.39	0.00	0.00	2473.45	5222.65
AP3-1	6550.70	0.00	127868.86	1572568.59	9836.99	9814.97	40670.51	62311.33
AP4-1	6578.02	68017.62	128536.94	1944270.59	59250.24	15620.69	42051.44	67589.52
V2-1	0.00	0.00	17503.68	93495.78	38821.60	0.00	469.20	498.82
V2-2	0.00	0.00	5102.05	62680.40	43805.38	0.00	502.72	281.18
V2-3	0.00	0.00	2188.23	67820.72	44448.14	0.00	448.40	374.50
V2-4	465.22	0.00	84576.45	590128.59	59101.39	0.00	1336.05	1292.99
V2-5	0.00	0.00	86307.55	285638.19	59044.91	0.00	1683.17	573.78
V2-6	140.66	0.00	78118.86	282040.59	64176.38	0.00	1700.53	855.54
V2-7	1909.51	0.00	61498.61	788229.99	76157.89	0.00	1512.33	2298.47
V2-8	0.00	0.00	17280.04	266691.19	61897.21	0.00	1441.29	735.70
V2-9	26.30	0.00	13026.25	293389.29	60449.24	0.00	1414.89	607.26
V2-10	345.66	0.00	62822.73	538922.99	61386.77	0.00	1713.45	1154.99
V2-11	0.00	0.00	15916.31	214384.15	54212.05	0.00	1320.05	556.42
V2-12	206.14	0.00	11113.32	272329.69	54409.24	0.00	1287.37	781.42
V2-13	1172.35	0.00	173866.28	871252.69	87756.16	0.00	5456.51	1111.07
V2-14	0.00	0.00	166416.80	408282.49	97539.33	0.00	5612.59	866.38
V2-15	217.30	0.00	158739.03	351019.59	114668.71	0.00	6584.92	983.11
SRM614-2	39.74	0.00	0.00	0.00	0.00	0.00	500.52	4133.76
SRM612-2	30603.11	0.00	16995.39	0.00	0.00	4650.75	27847.16	21088.30
SRM610-2	249982.95	124507.34	241747.88	174241.40	0.00	51061.09	241036.72	139951.85
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	953.87
AP2-2	0.00	0.00	0.00	0.00	21375.74	0.00	1843.33	2732.88
AP3-2	2048.51	0.00	33049.33	306904.69	89568.52	2260.61	15446.17	20983.62
AP4-2	3513.16	749.03	61933.37	880104.59	124132.91	9007.01	23812.53	37046.99
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-1	0.000694	0.000000	0.007323	0.624109	0.000000	0.000627	0.000322	0.003550
SRM612-1	0.016709	0.000000	0.019496	0.375991	0.000000	0.003070	0.015905	0.012243
SRM610-1	0.264423	0.127390	0.279869	0.945163	0.000000	0.056432	0.260183	0.149017
AP1-1	0.000006	0.000000	0.000000	0.021108	0.000000	0.000000	0.000000	0.000128
AP2-1	0.000009	0.000000	0.000398	0.018383	0.000000	0.000000	0.000143	0.000303
AP3-1	0.000312	0.000000	0.006086	0.074852	0.000468	0.000467	0.001936	0.002966
AP4-1	0.000328	0.003388	0.006403	0.096852	0.002951	0.000778	0.002095	0.003367
V2-1	0.000000	0.000000	0.001939	0.010358	0.004301	0.000000	0.000052	0.000055
V2-2	0.000000	0.000000	0.000641	0.007869	0.005500	0.000000	0.000063	0.000035
V2-3	0.000000	0.000000	0.000331	0.010273	0.006733	0.000000	0.000068	0.000057
V2-4	0.000056	0.000000	0.010104	0.070502	0.007061	0.000000	0.000160	0.000154
V2-5	0.000000	0.000000	0.009572	0.031679	0.006548	0.000000	0.000187	0.000064
V2-6	0.000016	0.000000	0.008704	0.031424	0.007150	0.000000	0.000189	0.000095
V2-7	0.000310	0.000000	0.009968	0.127760	0.012344	0.000000	0.000245	0.000373
V2-8	0.000000	0.000000	0.002891	0.044612	0.010354	0.000000	0.000241	0.000123
V2-9	0.000005	0.000000	0.002460	0.055409	0.011416	0.000000	0.000267	0.000115
V2-10	0.000068	0.000000	0.012301	0.105526	0.012020	0.000000	0.000336	0.000226
V2-11	0.000000	0.000000	0.003426	0.046142	0.011668	0.000000	0.000284	0.000120
V2-12	0.000046	0.000000	0.002486	0.060911	0.012170	0.000000	0.000288	0.000175
V2-13	0.000066	0.000000	0.009730	0.048759	0.004911	0.000000	0.000305	0.000062
V2-14	0.000000	0.000000	0.009061	0.022229	0.005311	0.000000	0.000306	0.000047
V2-15	0.000011	0.000000	0.007967	0.017616	0.005755	0.000000	0.000330	0.000049
SRM614-2	0.000026	0.000000	0.000000	0.000000	0.000000	0.000000	0.000331	0.002733
SRM612-2	0.017831	0.000000	0.009902	0.000000	0.000000	0.002710	0.016225	0.012287
SRM610-2	0.279386	0.139152	0.270182	0.194736	0.000000	0.057067	0.269388	0.156413
AP1-2	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000078
AP2-2	0.000000	0.000000	0.000000	0.000000	0.001714	0.000000	0.000148	0.000219
AP3-2	0.000159	0.000000	0.002562	0.023790	0.006943	0.000175	0.001197	0.001627
AP4-2	0.000237	0.000050	0.004175	0.059322	0.008367	0.000607	0.001605	0.002497
standardize signal averages AP								
AP1	0.000003	0.000000	0.000000	0.010554	0.000000	0.000000	0.000000	0.000103
AP2	0.000005	0.000000	0.000199	0.009192	0.000857	0.000000	0.000146	0.000261
AP3	0.000235	0.000000	0.004324	0.049321	0.003706	0.000321	0.001567	0.002296
AP4	0.000282	0.001719	0.005289	0.078087	0.005659	0.000693	0.001850	0.002932
linest from std sig ave								
	0.011346	0.024889	0.006911	0.037959	0.494243	0.080775	0.007058	0.009156
standardize signal averages SRM								
srm614-2	0.000360	0.000000	0.003661	0.312054	0.000000	0.000313	0.000326	0.003142
srm612-2	0.017270	0.000000	0.014699	0.187996	0.000000	0.002890	0.016065	0.012265
srm610-2	0.271904	0.133271	0.275026	0.569949	0.000000	0.056749	0.264785	0.152715
linest from std sig ave								
	0.018972	0.035451	0.018403	0.006909	0.000000	0.091369	0.017863	0.032855
concentration data								
SRM614-1	0.68	0.00	4.34	2031.76	0.00	4.34	0.19	2.79
SRM612-1	16.26	0.00	11.56	1224.02	0.00	21.27	9.63	9.61
SRM610-1	257.29	271.92	165.88	3076.94	0.00	390.93	157.48	117.01
AP1-1	0.03	0.00	0.00	319.65	0.00	0.00	0.00	0.47
AP2-1	0.04	0.00	1.10	278.38	0.00	0.00	0.40	1.11
AP3-1	1.41	0.00	16.78	1133.50	92.32	15.05	5.45	10.83
AP4-1	1.48	33.64	17.65	1466.64	581.95	25.07	5.90	12.30
V2-1	0.00	0.00	5.35	156.86	848.04	0.00	0.15	0.20
V2-2	0.00	0.00	1.77	119.17	1084.39	0.00	0.18	0.13
V2-3	0.00	0.00	0.91	155.57	1327.54	0.00	0.19	0.21
V2-4	0.25	0.00	27.86	1067.61	1392.17	0.00	0.45	0.56
V2-5	0.00	0.00	26.39	479.72	1291.17	0.00	0.53	0.23
V2-6	0.07	0.00	24.00	475.86	1409.85	0.00	0.53	0.35
V2-7	1.40	0.00	27.48	1934.69	2433.89	0.00	0.69	1.36
V2-8	0.00	0.00	7.97	675.56	2041.52	0.00	0.68	0.45
V2-9	0.02	0.00	6.78	839.07	2250.99	0.00	0.75	0.42
V2-10	0.31	0.00	33.91	1597.99	2370.01	0.00	0.94	0.83
V2-11	0.00	0.00	9.44	698.74	2300.61	0.00	0.80	0.44
V2-12	0.21	0.00	6.85	922.39	2399.49	0.00	0.81	0.64
V2-13	0.30	0.00	26.83	738.37	968.35	0.00	0.86	0.23
V2-14	0.00	0.00	24.98	336.62	1047.09	0.00	0.86	0.17
V2-15	0.05	0.00	21.96	266.77	1134.68	0.00	0.93	0.18
SRM614-2	0.03	0.00	0.00	0.00	0.00	0.00	0.20	2.15
SRM612-2	17.35	0.00	5.87	0.00	0.00	18.77	9.82	9.65

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	271.85	297.02	160.14	633.95	0.00	395.33	163.06	122.82
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
AP2-2	0.00	0.00	0.00	0.00	337.88	0.00	0.42	0.80
AP3-2	0.72	0.00	7.06	360.26	1368.97	5.65	3.37	5.94
AP4-2	1.07	0.50	11.51	898.32	1649.73	19.56	4.52	9.12

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-23	1072.89	104282.95	8585.85	2255545.00	30474.77	4984.63	965.37	1019.85
SRM614-23	1787.13	99295.64	8379.49	1919256.00	26193.75	5176.51	1423.85	4627.99
SRM612-23	24915.22	124132.05	41871.52	1923434.90	25922.79	10570.70	27036.35	20428.44
SRM610-23	133148.72	239984.55	184401.00	1920325.50	27284.91	39501.70	156374.23	97419.75
AP1-23	1240.37	93605.41	9625.33	1594088.00	42880.76	5327.27	1312.69	1423.49
AP2-23	1486.53	100332.24	18154.94	1555927.60	87877.45	6135.67	4023.42	5306.75
AP3-23	3178.94	130299.53	51022.61	1873746.60	150717.33	8623.69	15995.45	21112.24
AP4-23	3668.66	195269.27	65378.09	2452623.50	198195.39	15509.93	18735.27	26022.43
34HP45-494-1	6603.04	90211.70	324748.50	3387340.50	225173.59	6896.48	7309.68	11166.42
34HP45-494-2	5042.03	88678.78	248895.69	2477415.30	229459.48	5639.67	6934.84	6668.48
34HP45-494-3	8514.61	92851.28	202398.06	4589689.00	287136.97	6016.71	8377.21	6546.40
34HP45-494-4	10283.74	99794.24	169016.47	9540770.00	391120.03	6891.04	5851.47	12869.75
34HP45-494-5	6267.00	94445.09	96863.59	5774238.00	343168.97	5599.55	5018.95	4716.19
34HP45-494-6	7390.60	95525.10	89501.78	7856503.50	403662.81	5790.03	4900.27	6014.23
34HP45-494-7	7577.40	98248.07	81464.10	4866535.00	352376.75	6512.80	5169.43	8457.49
34HP45-494-8	11014.82	103446.34	115139.33	9225252.00	432406.72	6926.40	5557.83	13595.32
34HP45-494-9	9284.33	102573.30	115983.57	7891156.50	409828.22	6399.68	5301.51	9124.97
34HP45-494-10	21522.24	104921.83	1891337.50	12689565.00	511760.22	7865.04	16546.93	14678.36
34HP45-494-11	20291.12	100900.25	1431991.60	7018492.50	416725.63	6733.92	15302.61	11197.82
34HP45-494-12	21942.04	102716.62	1688998.10	9304217.00	463447.19	7026.04	17586.18	17783.58
34HP45-494-13	17154.94	103042.66	1431535.80	10854837.00	501468.13	7342.96	9034.93	5557.27
34HP45-494-14	17663.70	103876.50	371597.09	11270221.00	513155.00	6363.96	9503.09	5902.87
34HP45-494-15	13665.68	102045.70	362844.88	7272239.00	446110.50	6223.23	7753.20	4215.54
34HP45-494-16	10799.22	100772.88	1715680.40	3158581.30	388038.63	7297.40	8121.81	5886.99
34HP45-494-17	13280.64	103822.34	2577580.50	4600946.50	418431.34	8606.41	9926.78	6845.32
34HP45-494-18	9914.46	103574.86	129968.81	3524535.50	406782.78	5891.51	5250.67	5231.15
SRM614-24	1427.61	106712.80	5602.71	609379.63	199344.44	5257.83	2598.05	3820.58
SRM612-24	21732.12	128068.44	27159.35	608908.69	138819.55	9768.05	20400.88	15377.97
SRM610-24	141293.08	248780.56	157444.08	775958.31	123021.85	35392.76	136157.64	85967.77
AP1-24	1013.93	107718.25	6364.56	587322.94	171146.77	5596.11	1966.73	1524.01
AP2-24	1252.29	113091.99	12619.35	618155.19	231837.50	6062.59	3994.62	3737.02
AP3-24	3062.54	144009.66	44491.65	1017291.00	272135.06	8517.49	14407.32	18061.82
AP4-24	3427.74	167505.39	53400.54	1985576.40	317237.84	11135.62	16245.29	20825.12
blank-24	767.20	104921.55	4658.83	652528.25	348885.13	5486.43	3352.74	599.80
blank average	920.05	104602.25	6622.34	1454036.63	189679.95	5235.53	2159.05	809.82

blank subtraction								
SRM614-23	867.08	-5306.61	1757.15	465219.38	-163486.20	-59.02	-735.20	3818.16
SRM612-23	23995.18	19529.80	35249.18	469398.28	-163757.17	5335.17	24877.30	19618.61
SRM610-23	132228.67	135382.30	177778.66	466288.88	-162395.04	34266.17	154215.18	96609.93
AP1-23	320.32	-10996.84	3003.00	140051.38	-146799.19	91.74	-846.36	613.66
AP2-23	566.48	-4270.01	11532.60	101890.98	-101802.50	900.15	1864.37	4496.93
AP3-23	2258.89	25697.28	44400.27	419709.98	-38962.62	3388.16	13836.40	20302.41
AP4-23	2748.62	90667.02	58755.75	998586.88	8515.44	10274.40	16576.21	25212.60
34HP45-494-1	5682.99	-14390.55	318126.16	1933303.88	35493.64	1660.95	5150.63	10356.60
34HP45-494-2	4121.98	-15923.47	242273.35	1023378.68	39779.53	404.14	4775.79	5858.65
34HP45-494-3	7594.56	-11750.97	195775.72	3135652.38	97457.02	781.18	6218.15	5736.57
34HP45-494-4	9363.69	-4808.01	162394.13	8086733.38	201440.08	1655.51	3692.42	12059.93
34HP45-494-5	5346.95	-10157.16	90241.25	4320201.38	153489.02	364.02	2859.90	3906.36
34HP45-494-6	6470.56	-9077.15	82879.44	6402466.88	213982.86	554.50	2741.22	5204.41
34HP45-494-7	6657.36	-6354.18	74841.76	3412498.38	162696.80	1277.27	3010.38	7647.66
34HP45-494-8	10094.78	-1155.91	108516.99	7771215.38	242726.77	1690.87	3398.78	12785.49
34HP45-494-9	8364.29	-2028.95	109361.23	6437119.88	220148.27	1164.15	3142.46	8315.15
34HP45-494-10	20602.19	319.58	1884715.16	11235528.38	322080.27	2629.51	14387.88	13868.54
34HP45-494-11	19371.07	-3702.00	1425369.26	5564455.88	227045.68	1498.39	13143.55	10388.00
34HP45-494-12	21022.00	-1885.63	1682375.76	7850180.38	273767.24	1790.51	15427.13	16973.76
34HP45-494-13	16234.89	-1559.59	1424913.46	9400800.38	311788.18	2107.43	6875.88	4747.45
34HP45-494-14	16743.65	-725.75	364974.75	9816184.38	323475.05	1128.43	7344.04	5093.05
34HP45-494-15	12745.63	-2556.55	356222.54	5818202.38	256430.55	987.71	5594.15	3405.72
34HP45-494-16	9879.18	-3829.37	1709058.06	1704544.68	198358.68	2061.87	5962.75	5077.17
34HP45-494-17	12360.59	-779.91	2570958.16	3146909.88	228751.39	3370.88	7767.72	6035.49

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	8994.41	-1027.39	123346.47	2070498.88	217102.83	655.98	3091.62	4421.32
SRM614-24	507.56	2110.55	-1019.63	-844657.00	9664.49	22.30	439.00	3010.76
SRM612-24	20812.08	23466.19	20537.02	-845127.94	-50860.40	4532.53	18241.82	14568.14
SRM610-24	140373.03	144178.31	150821.74	-678078.32	-66658.10	30157.23	133998.59	85157.94
AP1-24	93.88	3116.00	-257.78	-866713.69	-18533.18	360.58	-192.32	714.18
AP2-24	332.24	8489.74	5997.01	-835881.44	42157.55	827.06	1835.57	2927.20
AP3-24	2142.49	39407.41	37869.31	-436745.63	82455.11	3281.96	12248.27	17252.00
AP4-24	2507.69	62903.14	46778.20	531539.78	127557.89	5900.09	14086.24	20015.29

zero correction								
SRM614-23	867.08	0.00	1757.15	465219.38	0.00	0.00	0.00	3818.16
SRM612-23	23995.18	19529.80	35249.18	469398.28	0.00	5335.17	24877.30	19618.61
SRM610-23	132228.67	135382.30	177778.66	466288.88	0.00	34266.17	154215.18	96609.93
AP1-23	320.32	0.00	3003.00	140051.38	0.00	91.74	0.00	613.66
AP2-23	566.48	0.00	11532.60	101890.98	0.00	900.15	1864.37	4496.93
AP3-23	2258.89	25697.28	44400.27	419709.98	0.00	3388.16	13836.40	20302.41
AP4-23	2748.62	90667.02	58755.75	998586.88	8515.44	10274.40	16576.21	25212.60
34HP45-494-1	5682.99	0.00	318126.16	1933303.88	35493.64	1660.95	5150.63	10356.60
34HP45-494-2	4121.98	0.00	242273.35	1023378.68	39779.53	404.14	4775.79	5858.65
34HP45-494-3	7594.56	0.00	195775.72	3135652.38	97457.02	781.18	6218.15	5736.57
34HP45-494-4	9363.69	0.00	162394.13	8086733.38	201440.08	1655.51	3692.42	12059.93
34HP45-494-5	5346.95	0.00	90241.25	4320201.38	153489.02	364.02	2859.90	3906.36
34HP45-494-6	6470.56	0.00	82879.44	6402466.88	213982.86	554.50	2741.22	5204.41
34HP45-494-7	6657.36	0.00	74841.76	3412498.38	162696.80	1277.27	3010.38	7647.66
34HP45-494-8	10094.78	0.00	108516.99	7771215.38	242726.77	1690.87	3398.78	12785.49
34HP45-494-9	8364.29	0.00	109361.23	6437119.88	220148.27	1164.15	3142.46	8315.15
34HP45-494-10	20602.19	319.58	1884715.16	11235528.38	322080.27	2629.51	14387.88	13868.54
34HP45-494-11	19371.07	0.00	1425369.26	5564455.88	227045.68	1498.39	13143.55	10388.00
34HP45-494-12	21022.00	0.00	1682375.76	7850180.38	273767.24	1790.51	15427.13	16973.76
34HP45-494-13	16234.89	0.00	1424913.46	9400800.38	311788.18	2107.43	6875.88	4747.45
34HP45-494-14	16743.65	0.00	364974.75	9816184.38	323475.05	1128.43	7344.04	5093.05
34HP45-494-15	12745.63	0.00	356222.54	5818202.38	256430.55	987.71	5594.15	3405.72
34HP45-494-16	9879.18	0.00	1709058.06	1704544.68	198358.68	2061.87	5962.75	5077.17
34HP45-494-17	12360.59	0.00	2570958.16	3146909.88	228751.39	3370.88	7767.72	6035.49
34HP45-494-18	8994.41	0.00	123346.47	2070498.88	217102.83	655.98	3091.62	4421.32
SRM614-24	507.56	2110.55	0.00	0.00	9664.49	22.30	439.00	3010.76
SRM612-24	20812.08	23466.19	20537.02	0.00	0.00	4532.53	18241.82	14568.14
SRM610-24	140373.03	144178.31	150821.74	0.00	0.00	30157.23	133998.59	85157.94
AP1-24	93.88	3116.00	0.00	0.00	0.00	360.58	0.00	714.18
AP2-24	332.24	8489.74	5997.01	0.00	42157.55	827.06	1835.57	2927.20
AP3-24	2142.49	39407.41	37869.31	0.00	82455.11	3281.96	12248.27	17252.00
AP4-24	2507.69	62903.14	46778.20	531539.78	127557.89	5900.09	14086.24	20015.29

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-23	0.000417	0.000000	0.000845	0.223837	0.000000	0.000000	0.000000	0.001837
SRM612-23	0.012325	0.010031	0.018106	0.241107	0.000000	0.002740	0.012778	0.010077
SRM610-23	0.182464	0.186815	0.245319	0.643437	0.000000	0.047284	0.212803	0.133313
AP1-23	0.000032	0.000000	0.000297	0.013867	0.000000	0.000009	0.000000	0.000061
AP2-23	0.000042	0.000000	0.000850	0.007511	0.000000	0.000066	0.000137	0.000331
AP3-23	0.000150	0.001705	0.002946	0.027849	0.000000	0.000225	0.000918	0.001347
AP4-23	0.000184	0.006064	0.003930	0.066785	0.000570	0.000687	0.001109	0.001686
34HP45-494-1	0.000374	0.000000	0.020949	0.127310	0.002337	0.000109	0.000339	0.000682
34HP45-494-2	0.000310	0.000000	0.018242	0.077056	0.002995	0.000030	0.000360	0.000441
34HP45-494-3	0.000605	0.000000	0.015604	0.249929	0.007768	0.000062	0.000496	0.000457
34HP45-494-4	0.000666	0.000000	0.011553	0.575314	0.014331	0.000118	0.000263	0.000858
34HP45-494-5	0.000381	0.000000	0.006424	0.307550	0.010927	0.000026	0.000204	0.000278
34HP45-494-6	0.000518	0.000000	0.006630	0.512174	0.017118	0.000044	0.000219	0.000416
34HP45-494-7	0.000588	0.000000	0.006616	0.301648	0.014382	0.000113	0.000266	0.000676
34HP45-494-8	0.000991	0.000000	0.010651	0.762752	0.023824	0.000166	0.000334	0.001255
34HP45-494-9	0.000853	0.000000	0.011158	0.656764	0.022461	0.000119	0.000321	0.000848

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.001630	0.000025	0.149153	0.889162	0.025489	0.000208	0.001139	0.001098
34HP45-494-11	0.001418	0.000000	0.104319	0.407246	0.016617	0.000110	0.000962	0.000760
34HP45-494-12	0.001513	0.000000	0.121123	0.565174	0.019710	0.000129	0.001111	0.001222
34HP45-494-13	0.001320	0.000000	0.115874	0.764471	0.025355	0.000171	0.000559	0.000386
34HP45-494-14	0.001295	0.000000	0.028235	0.759405	0.025025	0.000087	0.000568	0.000394
34HP45-494-15	0.000953	0.000000	0.026634	0.435016	0.019173	0.000074	0.000418	0.000255
34HP45-494-16	0.000892	0.000000	0.154390	0.153982	0.017919	0.000186	0.000539	0.000459
34HP45-494-17	0.001026	0.000000	0.213356	0.261153	0.018983	0.000280	0.000645	0.000501
34HP45-494-18	0.000673	0.000000	0.009228	0.154898	0.016242	0.000049	0.000231	0.000331
SRM614-24	0.000381	0.001583	0.000000	0.000000	0.007249	0.000017	0.000329	0.002258
SRM612-24	0.016061	0.018109	0.015848	0.000000	0.000000	0.003498	0.014077	0.011242
SRM610-24	0.267089	0.274330	0.286970	0.000000	0.000000	0.057381	0.254961	0.162031
AP1-24	0.000011	0.000358	0.000000	0.000000	0.000000	0.000041	0.000000	0.000082
AP2-24	0.000029	0.000735	0.000519	0.000000	0.003651	0.000072	0.000159	0.000253
AP3-24	0.000165	0.003036	0.002918	0.000000	0.006353	0.000253	0.000944	0.001329
AP4-24	0.000195	0.004893	0.003639	0.041348	0.009923	0.000459	0.001096	0.001557

standardize signal averages AP

AP1	0.000021	0.000179	0.000149	0.006934	0.000000	0.000025	0.000000	0.000071
AP2	0.000035	0.000368	0.000685	0.003756	0.001825	0.000069	0.000148	0.000292
AP3	0.000157	0.002371	0.002932	0.013924	0.003177	0.000239	0.000931	0.001338
AP4	0.000189	0.005478	0.003784	0.054066	0.005246	0.000573	0.001102	0.001622

linest from std sig ave

0.016777	0.008095	0.009971	0.056588	0.561330	0.105349	0.011892	0.016063
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standardize signal averages SRM

srM614-2	0.000399	0.000791	0.000423	0.111919	0.003624	0.000008	0.000165	0.002048
srM612-2	0.014193	0.014070	0.016977	0.120553	0.000000	0.003119	0.013428	0.010660
srM610-2	0.224777	0.230573	0.266145	0.321719	0.000000	0.052332	0.233882	0.147672

linest from std sig ave

0.022950	0.020538	0.019013	0.013740	0.000000	0.099063	0.020225	0.034003
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concentration data

SRM614-23	0.60	0.00	0.72	1086.32	0.00	0.00	0.00	2.53
SRM612-23	17.73	6.96	15.48	1170.14	0.00	24.76	13.03	13.88
SRM610-23	262.53	129.70	209.79	3122.72	0.00	427.22	217.04	183.66
AP1-23	0.21	0.00	1.18	313.05	0.00	0.38	0.00	0.39
AP2-23	0.28	0.00	3.38	169.56	0.00	2.79	0.65	2.12
AP3-23	1.00	5.51	11.72	628.69	0.00	9.45	4.36	8.63
AP4-23	1.23	19.58	15.63	1507.68	127.53	28.88	5.26	10.81
34HP45-494-1	2.50	0.00	83.33	2874.04	523.40	4.60	1.61	4.37
34HP45-494-2	2.08	0.00	72.57	1739.55	670.74	1.28	1.71	2.83
34HP45-494-3	4.05	0.00	62.07	5642.17	1739.49	2.62	2.35	2.93
34HP45-494-4	4.46	0.00	45.96	12987.78	3209.22	4.95	1.25	5.50
34HP45-494-5	2.55	0.00	25.55	6942.96	2446.87	1.09	0.97	1.78
34HP45-494-6	3.46	0.00	26.37	11562.38	3833.28	1.86	1.04	2.67
34HP45-494-7	3.94	0.00	26.32	6809.73	3220.54	4.75	1.26	4.33
34HP45-494-8	6.63	0.00	42.37	17219.20	5334.99	6.97	1.58	8.04
34HP45-494-9	5.71	0.00	44.38	14826.53	5029.85	4.99	1.52	5.44
34HP45-494-10	10.91	0.08	593.32	20072.92	5707.86	8.75	5.40	7.03
34HP45-494-11	9.49	0.00	414.97	9193.63	3721.09	4.61	4.56	4.87
34HP45-494-12	10.13	0.00	481.81	12758.87	4413.73	5.42	5.27	7.83
34HP45-494-13	8.84	0.00	460.93	17258.01	5677.77	7.20	2.65	2.47
34HP45-494-14	8.67	0.00	112.32	17143.65	5603.94	3.67	2.70	2.52
34HP45-494-15	6.38	0.00	105.95	9820.53	4293.47	3.10	1.98	1.63
34HP45-494-16	5.97	0.00	614.15	3476.16	4012.68	7.83	2.56	2.94
34HP45-494-17	6.87	0.00	848.71	5895.55	4251.05	11.76	3.06	3.21
34HP45-494-18	4.50	0.00	36.71	3496.83	3637.11	2.06	1.10	2.12
SRM614-24	0.55	1.10	0.00	0.00	348.95	0.15	0.34	3.11
SRM612-24	23.11	12.57	13.55	0.00	0.00	31.60	14.36	15.49
SRM610-24	384.29	190.45	245.41	0.00	0.00	518.44	260.03	223.22
AP1-24	0.07	1.16	0.00	0.00	0.00	1.74	0.00	0.53
AP2-24	0.19	2.37	2.07	0.00	817.52	3.01	0.75	1.62
AP3-24	1.10	9.81	11.61	0.00	1422.75	10.63	4.48	8.52
AP4-24	1.31	15.80	14.47	933.43	2222.00	19.29	5.20	9.98

certified concentration

SRM614	1.09	3.30	2.20		0.90	0.71	1.30	
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

V Cr Mn Fe56 Fe57 Ni Co Cu63

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
blank-21	1207.45	108438.65	9802.34	2652090.30	32844.82	5288.87	1067.65	1058.33
SRM614-21	1495.89	104861.63	9244.49	2354645.30	29515.25	5389.03	1438.89	3714.22
SRM612-21	24506.18	126840.07	42670.68	2194615.00	28612.40	11417.19	27688.76	26018.39
SRM610-21	174820.83	289591.88	230125.02	2264706.30	29774.09	48262.99	198299.28	129771.33
AP1-21	1722.41	100175.84	15372.89	2045658.60	41996.56	5732.67	2540.01	2952.98
AP2-21	1502.01	101175.25	16575.61	1802625.90	81007.73	6204.84	3606.98	4344.98
AP3-21	1252.21	99481.00	12724.11	1610352.90	116540.45	5851.83	3343.82	3602.42
AP4-21	5657.11	192170.77	109930.70	2857188.50	177997.97	15387.13	33660.11	50076.92
34HP45-671-1	15234.05	96167.59	193883.02	3692670.50	234235.03	7887.48	13136.87	21952.04
34HP45-671-2	14357.92	93404.73	157822.53	2859451.80	254510.39	6651.04	12286.03	16395.45
34HP45-671-3	14418.56	92269.48	84037.31	2365808.80	273748.63	6281.16	11565.35	16093.13
34HP45-671-4	16450.65	99267.24	158576.09	4556271.00	333672.63	10006.66	27692.64	31308.50
34HP45-671-5	12304.79	91812.84	69757.15	2014130.50	300168.00	6322.76	18384.66	8691.09
34HP45-671-6	12153.03	94078.17	110353.73	3499762.50	343897.69	6692.04	12551.55	12600.79
34HP45-671-7	16641.37	101787.38	180003.81	3674468.80	372812.91	9765.62	19585.31	29439.69
34HP45-671-8	14715.76	91060.88	8734.06	1711516.80	334378.94	5944.35	14431.44	5713.07
34HP45-671-9	16541.93	94944.25	117439.87	2278792.00	362450.56	6856.52	13154.43	12931.59
34HP45-671-10	14683.60	126702.79	261151.86	4529795.00	432451.16	14562.64	13619.52	42391.20
34HP45-671-11	8820.37	95322.17	142198.59	2005962.30	371591.16	6404.48	8972.97	9864.38
34HP45-671-12	9024.77	99276.16	205252.64	2607183.50	388164.31	7215.44	9233.05	13694.40
34HP45-671-13	5820.39	95395.58	64114.84	2131536.50	391714.09	5476.63	7176.92	4123.42
34HP45-671-14	3273.46	94433.34	25670.55	1123330.60	366772.31	4812.71	5109.39	1509.41
34HP45-671-15	2749.42	96106.50	22872.85	1020778.00	366569.22	4937.03	4893.99	1323.01
34HP45-671-16	2661.49	99083.76	22560.33	1208816.30	367536.44	5480.87	4929.55	2461.17
34HP45-671-17	2808.50	100428.37	12167.55	988681.75	364001.53	5331.39	4599.31	1352.97
34HP45-671-18	2929.90	101845.21	12964.75	1025636.80	362546.81	5515.31	4868.47	1600.29
SRM614-22	1247.97	108637.93	5965.91	826848.44	238632.95	5534.83	2890.42	3598.98
SRM612-22	20344.07	127069.44	27112.35	816588.06	164347.08	9683.57	20195.72	15828.77
SRM610-22	171608.36	282628.16	197062.83	1025939.60	148660.88	43038.60	170771.77	109357.30
AP1-22	1006.33	105638.91	7085.88	763299.63	205156.92	5568.91	2344.73	1632.81
AP2-22	1153.53	107592.09	10886.46	774776.38	256827.20	5809.19	3841.78	3078.38
AP3-22	3344.34	140746.75	48840.31	1256134.80	293307.44	8767.53	15593.21	20204.15
AP4-22	3630.02	170820.97	62574.03	1450685.50	324663.59	11929.11	19695.27	26498.79
blank-22	753.48	106251.68	4774.43	838817.31	353694.50	5606.51	3443.78	673.28
blank average	980.47	107345.17	7288.38	1745453.81	193269.66	5447.69	2255.71	865.80

blank subtraction								
SRM614-21	515.42	-2483.53	1956.11	609191.50	-163754.42	-58.66	-816.82	2848.42
SRM612-21	23525.71	19494.91	35382.30	449161.20	-164657.26	5969.49	25433.04	25152.58
SRM610-21	173840.36	182246.72	222836.64	519252.50	-163495.57	42815.30	196043.57	128905.53
AP1-21	741.94	-7169.33	8084.51	300204.80	-151273.11	284.98	284.30	2087.17
AP2-21	521.54	-6169.91	9287.23	57172.09	-112261.93	757.14	1351.27	3479.18
AP3-21	271.74	-7864.16	5435.73	-135100.91	-76729.21	404.14	1088.11	2736.62
AP4-21	4676.65	84825.61	102642.32	1111734.70	-15271.69	9939.44	31404.40	49211.12
34HP45-671-1	14253.58	-11177.58	186594.64	1947216.70	40965.37	2439.79	10881.16	21086.24
34HP45-671-2	13377.46	-13940.44	150534.15	1113998.00	61240.73	1203.35	10030.32	15529.65
34HP45-671-3	13438.10	-15075.69	76748.93	620355.00	80478.97	833.46	9309.63	15227.33
34HP45-671-4	15470.19	-8077.92	151287.71	2810817.20	140402.97	4558.97	25436.92	30442.69
34HP45-671-5	11324.32	-15532.33	62468.77	268676.70	106898.34	875.07	16128.95	7825.28
34HP45-671-6	11172.56	-13266.99	103065.35	1754308.70	150628.03	1244.35	10295.84	11734.99
34HP45-671-7	15660.91	-5557.78	172715.43	1929015.00	179543.25	4317.92	17329.60	28573.88
34HP45-671-8	13735.30	-16284.29	81445.67	-33937.00	141109.28	496.66	12175.73	4847.27
34HP45-671-9	15561.47	-12400.92	110151.49	533338.20	169180.90	1408.83	10898.72	12065.79
34HP45-671-10	13703.14	19357.63	253863.48	2784341.20	239181.50	9114.95	11363.80	41525.39
34HP45-671-11	7839.90	-12022.99	134910.21	260508.50	178321.50	956.79	6717.26	8998.57
34HP45-671-12	8044.30	-8069.01	197964.26	861729.70	194894.65	1767.75	6977.34	12828.59
34HP45-671-13	4839.93	-11949.59	56826.46	386082.70	198444.43	28.94	4921.21	3257.62
34HP45-671-14	2292.99	-12911.83	18382.16	-622123.21	173502.65	-634.98	2853.68	643.60
34HP45-671-15	1768.95	-11238.67	15584.47	-724675.81	173299.56	-510.66	2638.27	457.20
34HP45-671-16	1681.03	-8261.41	15271.95	-536637.51	174266.78	33.18	2673.84	1595.37
34HP45-671-17	1828.03	-6916.80	4879.17	-756772.06	170731.87	-116.30	2343.59	487.16
34HP45-671-18	1949.43	-5499.95	5676.37	-719817.01	169277.15	67.62	2612.75	734.48
SRM614-22	267.50	1292.77	-1322.47	-918605.37	45363.29	87.14	634.70	2733.18
SRM612-22	19363.61	19724.28	19823.97	-928865.75	-28922.58	4235.88	17940.00	14962.96
SRM610-22	170627.89	175283.00	189774.45	-719514.21	-44608.78	37590.91	168516.06	108491.50
AP1-22	25.86	-1706.25	-202.50	-982154.18	11887.26	121.22	89.02	767.00
AP2-22	173.06	246.93	3598.08	-970677.43	63557.54	361.50	1586.07	2212.57
AP3-22	2363.87	33401.59	41551.93	-489319.01	100037.78	3319.84	13337.50	19338.35
AP4-22	2649.55	63475.81	55285.65	-294768.31	131393.93	6481.42	17439.56	25632.98

zero correction								
SRM614-21	515.42	0.00	1956.11	609191.50	0.00	0.00	0.00	2848.42
SRM612-21	23525.71	19494.91	35382.30	449161.20	0.00	5969.49	25433.04	25152.58
SRM610-21	173840.36	182246.72	222836.64	519252.50	0.00	42815.30	196043.57	128905.53
AP1-21	741.94	0.00	8084.51	300204.80	0.00	284.98	284.30	2087.17
AP2-21	521.54	0.00	9287.23	57172.09	0.00	757.14	1351.27	3479.18
AP3-21	271.74	0.00	5435.73	0.00	0.00	404.14	1088.11	2736.62

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	4676.65	84825.61	102642.32	1111734.70	0.00	9939.44	31404.40	49211.12
34HP45-671-1	14253.58	0.00	186594.64	1947216.70	40965.37	2439.79	10881.16	21086.24
34HP45-671-2	13377.46	0.00	150534.15	1113998.00	61240.73	1203.35	10030.32	15529.65
34HP45-671-3	13438.10	0.00	76748.93	620355.00	80478.97	833.46	9309.63	15227.33
34HP45-671-4	15470.19	0.00	151287.71	2810817.20	140402.97	4558.97	25436.92	30442.69
34HP45-671-5	11324.32	0.00	62468.77	268676.70	106898.34	875.07	16128.95	7825.28
34HP45-671-6	11172.56	0.00	103065.35	1754308.70	150628.03	1244.35	10295.84	11734.99
34HP45-671-7	15660.91	0.00	172715.43	1929015.00	179543.25	4317.92	17329.60	28573.88
34HP45-671-8	13735.30	0.00	81445.67	0.00	141109.28	496.66	12175.73	4847.27
34HP45-671-9	15561.47	0.00	110151.49	533338.20	169180.90	1408.83	10898.72	12065.79
34HP45-671-10	13703.14	19357.63	253863.48	2784341.20	239181.50	9114.95	11363.80	41525.39
34HP45-671-11	7839.90	0.00	134910.21	260508.50	178321.50	956.79	6717.26	8998.57
34HP45-671-12	8044.30	0.00	197964.26	861729.70	194894.65	1767.75	6977.34	12828.59
34HP45-671-13	4839.93	0.00	56826.46	386082.70	198444.43	28.94	4921.21	3257.62
34HP45-671-14	2292.99	0.00	18382.16	0.00	173502.65	0.00	2853.68	643.60
34HP45-671-15	1768.95	0.00	15584.47	0.00	173299.56	0.00	2638.27	457.20
34HP45-671-16	1681.03	0.00	15271.95	0.00	174266.78	33.18	2673.84	1595.37
34HP45-671-17	1828.03	0.00	4879.17	0.00	170731.87	0.00	2343.59	487.16
34HP45-671-18	1949.43	0.00	5676.37	0.00	169277.15	67.62	2612.75	734.48
SRM614-22	267.50	1292.77	0.00	0.00	45363.29	87.14	634.70	2733.18
SRM612-22	19363.61	19724.28	19823.97	0.00	0.00	4235.88	17940.00	14962.96
SRM610-22	170627.89	175283.00	189774.45	0.00	0.00	37590.91	168516.06	108491.50
AP1-22	25.86	0.00	0.00	0.00	11887.26	121.22	89.02	767.00
AP2-22	173.06	246.93	3598.08	0.00	63557.54	361.50	1586.07	2212.57
AP3-22	2363.87	33401.59	41551.93	0.00	100037.78	3319.84	13337.50	19338.35
AP4-22	2649.55	63475.81	55285.65	0.00	131393.93	6481.42	17439.56	25632.98

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-21	0.000384	0.000000	0.001458	0.454165	0.000000	0.000000	0.000000	0.002124
SRM612-21	0.011922	0.009880	0.017931	0.227625	0.000000	0.003025	0.012889	0.012747
SRM610-21	0.169292	0.177479	0.217007	0.505668	0.000000	0.041695	0.190915	0.125533
AP1-21	0.000071	0.000000	0.000778	0.028886	0.000000	0.000027	0.000027	0.000201
AP2-21	0.000040	0.000000	0.000704	0.004333	0.000000	0.000005	0.000102	0.000264
AP3-21	0.000022	0.000000	0.000445	0.000000	0.000000	0.000033	0.000089	0.000224
AP4-21	0.000275	0.004988	0.006035	0.065369	0.000000	0.000584	0.001847	0.002894
34HP45-671-1	0.000741	0.000000	0.009701	0.101233	0.002130	0.000127	0.000566	0.001096
34HP45-671-2	0.000765	0.000000	0.008604	0.063671	0.003500	0.000069	0.000573	0.000888
34HP45-671-3	0.000807	0.000000	0.004611	0.037273	0.004835	0.000050	0.000559	0.000915
34HP45-671-4	0.000836	0.000000	0.008174	0.151872	0.007586	0.000246	0.001374	0.001645
34HP45-671-5	0.000680	0.000000	0.003750	0.016127	0.006416	0.000053	0.000968	0.000470
34HP45-671-6	0.000792	0.000000	0.007306	0.124360	0.010678	0.000088	0.000730	0.000832
34HP45-671-7	0.000855	0.000000	0.009424	0.105256	0.009797	0.000236	0.000946	0.001559
34HP45-671-8	0.000779	0.000000	0.004618	0.000000	0.008001	0.000028	0.000690	0.000275
34HP45-671-9	0.000859	0.000000	0.006079	0.029434	0.009337	0.000078	0.000601	0.000666
34HP45-671-10	0.000896	0.001266	0.016599	0.182051	0.015639	0.000596	0.000743	0.002715
34HP45-671-11	0.000543	0.000000	0.009352	0.018059	0.012362	0.000066	0.000466	0.000624
34HP45-671-12	0.000576	0.000000	0.014167	0.061670	0.013948	0.000127	0.000499	0.000918
34HP45-671-13	0.000755	0.000000	0.008865	0.060229	0.030958	0.000005	0.000768	0.000508
34HP45-671-14	0.000436	0.000000	0.003496	0.000000	0.032999	0.000000	0.000543	0.000122
34HP45-671-15	0.000349	0.000000	0.003074	0.000000	0.034178	0.000000	0.000520	0.000090
34HP45-671-16	0.000352	0.000000	0.003195	0.000000	0.036452	0.000007	0.000559	0.000334
34HP45-671-17	0.000306	0.000000	0.000818	0.000000	0.028616	0.000000	0.000393	0.000082
34HP45-671-18	0.000308	0.000000	0.000898	0.000000	0.026769	0.000011	0.000413	0.000116
SRM614-22	0.000259	0.001252	0.000000	0.000000	0.043942	0.000084	0.000615	0.002648
SRM612-22	0.016052	0.016351	0.016433	0.000000	0.000000	0.003511	0.014872	0.012404
SRM610-22	0.253976	0.260905	0.282475	0.000000	0.000000	0.055953	0.250832	0.161487
AP1-22	0.000003	0.000000	0.000000	0.000000	0.001203	0.000012	0.000009	0.000078
AP2-22	0.000017	0.000024	0.000349	0.000000	0.006162	0.000035	0.000154	0.000215
AP3-22	0.000180	0.002544	0.003165	0.000000	0.007621	0.000253	0.001016	0.001473
AP4-22	0.000202	0.004840	0.004215	0.000000	0.010018	0.000494	0.001330	0.001954

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP								
AP1	0.000037	0.000000	0.000389	0.014443	0.000601	0.000020	0.000018	0.000139
AP2	0.000028	0.000012	0.000526	0.002167	0.003081	0.000046	0.000128	0.000239
AP3	0.000101	0.001272	0.001805	0.000000	0.003810	0.000143	0.000553	0.000849
AP4	0.000238	0.004914	0.005125	0.032684	0.005009	0.000539	0.001588	0.002424
linest from std sig ave								
	0.015994	0.009238	0.008664	0.088703	0.562853	0.111114	0.010117	0.013225
standardize signal averages SRM								
srm614-2	0.000322	0.000626	0.000729	0.227082	0.021971	0.000042	0.000307	0.002386
srm612-2	0.013987	0.013115	0.017182	0.113813	0.000000	0.003268	0.013880	0.012575
srm610-2	0.211634	0.219192	0.249741	0.252834	0.000000	0.048824	0.220874	0.143510
linest from std sig ave								
	0.024372	0.021605	0.020258	0.011073	0.000000	0.106150	0.021413	0.034947
concentration data								
SRM614-21	0.53	0.00	1.08	3455.04	0.00	0.00	0.00	2.41
SRM612-21	16.35	7.83	13.32	1731.65	0.00	28.83	11.18	14.46
SRM610-21	232.21	140.61	161.25	3846.85	0.00	397.33	165.64	142.38
AP1-21	0.46	0.00	2.69	1022.17	0.00	1.22	0.11	1.06
AP2-21	0.25	0.00	2.43	153.33	0.00	2.54	0.41	1.39
AP3-21	0.14	0.00	1.54	0.00	0.00	1.47	0.36	1.18
AP4-21	1.75	18.38	20.86	2313.21	0.00	25.91	7.45	15.27
34HP45-671-1	4.73	0.00	33.53	3582.33	478.22	5.62	2.28	5.78
34HP45-671-2	4.88	0.00	29.74	2253.12	785.95	3.05	2.31	4.68
34HP45-671-3	5.15	0.00	15.94	1318.98	1085.76	2.22	2.26	4.83
34HP45-671-4	5.33	0.00	28.25	5374.27	1703.41	10.92	5.55	8.68
34HP45-671-5	4.34	0.00	12.96	570.69	1440.78	2.33	3.91	2.48
34HP45-671-6	5.05	0.00	25.25	4400.71	2397.61	3.91	2.95	4.39
34HP45-671-7	5.45	0.00	32.57	3724.71	2199.79	10.44	3.82	8.23
34HP45-671-8	4.97	0.00	15.96	0.00	1796.64	1.25	2.79	1.45
34HP45-671-9	5.48	0.00	21.01	1041.56	2096.47	3.45	2.43	3.51
34HP45-671-10	5.72	4.66	57.37	6442.22	3511.52	26.42	3.00	14.32
34HP45-671-11	3.47	0.00	32.33	639.05	2775.70	2.94	1.88	3.29
34HP45-671-12	3.67	0.00	48.97	2182.31	3131.85	5.61	2.02	4.84
34HP45-671-13	4.82	0.00	30.64	2131.34	6951.30	0.20	3.10	2.68
34HP45-671-14	2.78	0.00	12.08	0.00	7409.60	0.00	2.19	0.65
34HP45-671-15	2.23	0.00	10.62	0.00	7674.45	0.00	2.10	0.48
34HP45-671-16	2.24	0.00	11.04	0.00	8185.12	0.31	2.26	1.76
34HP45-671-17	1.95	0.00	2.83	0.00	6425.41	0.00	1.59	0.43
34HP45-671-18	1.97	0.00	3.10	0.00	6010.69	0.47	1.67	0.61
SRM614-22	0.36	0.99	0.00	0.00	2121.18	0.80	0.53	3.00
SRM612-22	22.02	12.95	12.21	0.00	0.00	33.46	12.90	14.07
SRM610-22	348.37	206.71	209.90	0.00	0.00	533.21	217.63	183.16
AP1-22	0.02	0.00	0.00	0.00	270.08	0.54	0.04	0.41
AP2-22	0.11	0.09	1.21	0.00	1383.59	1.55	0.62	1.13
AP3-22	1.15	9.38	10.94	0.00	1711.13	11.21	4.10	7.77
AP4-22	1.29	17.84	14.57	0.00	2249.52	21.91	5.37	10.31
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-19	1159.93	125505.55	8917.93	2353099.80	26918.19	7042.76	1014.33	1006.45
SRM614-19	1920.73	111898.23	9109.05	2179376.00	24680.46	6811.76	1724.29	6276.92
SRM612-19	23857.06	129015.65	43284.97	2153490.80	24100.70	12202.95	27530.04	25124.86
SRM610-19	174413.83	287363.13	238988.34	2182374.00	24243.78	49716.64	202359.78	123675.30
AP1-19	1056.49	97804.63	9606.29	1830074.60	38915.98	6041.75	1352.93	1519.69
AP2-19	2047.89	111776.11	29064.52	2165097.50	84362.23	8781.33	5267.47	11778.83
AP3-19	5884.67	186354.53	111310.95	3179860.30	140496.03	14678.72	33507.35	52298.09
AP4-19	7493.24	258747.66	165282.92	3762681.00	194161.33	22650.77	49307.16	77808.64
34HP60-102-1	15237.01	87718.33	150947.81	1877220.00	195005.63	5893.55	10367.10	3579.78
34HP60-102-2	8572.01	87077.57	75331.95	1521644.90	192320.44	5275.55	9260.77	2098.45
34HP60-102-3	6510.84	87067.21	67687.66	1500042.60	199732.08	4869.19	6894.64	1690.73
34HP60-102-4	2004.77	88710.06	43529.73	1477893.00	203690.30	4800.87	4616.43	1256.97
34HP60-102-5	5079.11	89587.10	53195.46	1512734.60	214728.66	5081.83	6108.19	1769.93
34HP60-102-6	12850.91	90796.31	113259.48	2189522.30	237674.02	6015.43	19236.27	3094.26
34HP60-102-7	3443.62	89903.79	33251.83	1386060.50	230685.81	4932.79	5660.75	1318.57

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	8143.09	91846.80	128861.02	1468787.40	238288.34	5287.23	10870.78	2327.21
34HP60-102-9	11386.30	92694.80	140747.55	1868191.80	250229.69	5590.83	11949.67	2685.50
34HP60-102-10	24034.02	93240.29	729589.38	1552263.40	257644.53	6776.00	17806.54	2854.66
34HP60-102-11	18866.11	92167.28	456539.75	1529300.60	269649.50	6190.11	13836.32	2264.37
34HP60-102-12	26855.79	92164.00	1371763.50	1634960.90	279296.50	7262.60	18780.43	2802.82
34HP60-102-13	31653.70	92960.96	143453.69	1335796.10	286720.56	5924.35	19829.55	3220.34
34HP60-102-14	32259.26	93430.69	127272.31	1224604.10	291452.53	5996.15	18954.51	3097.58
34HP60-102-15	28114.36	93169.16	113915.52	1169346.80	301479.56	5758.35	16884.62	2873.86
34HP60-102-16	14162.68	93724.25	55356.15	1425901.30	315029.72	5498.91	12755.71	2679.38
34HP60-102-17	13676.92	93779.33	57896.93	1189081.60	312545.16	5688.67	11075.78	2222.17
34HP60-102-18	6038.07	94683.49	40616.11	1115161.00	318294.06	5499.35	8903.25	1506.05
SRM614-20	1406.05	100092.45	6039.79	1019578.30	189358.34	5493.35	2850.38	4282.94
SRM612-20	22365.77	121365.64	30891.09	1012803.40	133403.03	10444.82	23318.45	18213.70
SRM610-20	181443.45	286105.72	209702.83	1217763.60	124371.62	46312.06	185674.97	118945.75
AP1-20	926.21	97922.27	6643.52	926697.50	168058.11	5310.43	2213.93	1620.33
AP2-20	1101.53	100463.13	11480.39	939319.44	231027.30	5782.15	3818.10	3557.34
AP3-20	2951.50	134295.72	47722.11	1383220.40	266257.25	8665.09	15905.33	20958.44
AP4-20	4881.95	194720.53	91120.07	2013728.80	305931.63	15287.25	28921.92	41205.19
blank-20	735.44	97909.75	4670.23	1025744.40	307743.00	5520.31	3279.70	750.40
blank average	947.69	111707.65	6794.08	1689422.10	167330.60	6281.54	2147.01	878.42
blank subtraction								
SRM614-19	973.05	190.58	2314.97	489953.90	-142650.14	530.22	-422.72	5398.49
SRM612-19	22909.37	17308.00	36490.89	464068.70	-143229.90	5921.41	25383.02	24246.44
SRM610-19	173466.14	175655.48	232194.26	492951.90	-143086.82	43435.11	200212.77	122796.88
AP1-19	108.80	-13903.02	2812.22	140652.50	-128414.62	-239.78	-794.08	641.26
AP2-19	1100.21	68.46	22270.44	475675.40	-82968.36	2499.79	3120.46	10900.40
AP3-19	4936.99	74646.88	104516.87	1490438.20	-26834.57	8397.19	31360.34	51419.67
AP4-19	6545.56	147040.01	158488.84	2073258.90	26830.73	16369.23	47160.14	76930.22
34HP60-102-1	14289.32	-23989.32	144153.73	187797.90	27675.03	-387.98	8220.09	2701.36
34HP60-102-2	7624.32	-24630.08	68537.87	-167777.20	24989.84	-1005.99	7113.76	1220.03
34HP60-102-3	5563.15	-24640.44	60893.58	-189379.50	32401.48	-1412.35	4747.63	812.30
34HP60-102-4	1057.09	-22997.60	36735.65	-211529.10	36359.70	-1480.67	2469.41	378.54
34HP60-102-5	4131.42	-22120.55	46401.38	-176687.50	47398.06	-1199.71	3961.18	891.50
34HP60-102-6	11903.23	-20911.34	106465.40	500100.20	70343.42	-266.10	17089.26	2215.83
34HP60-102-7	2495.93	-21803.86	26457.75	-303361.60	63355.21	-1348.75	3513.74	440.14
34HP60-102-8	7195.40	-19860.85	122066.94	-220634.70	70957.74	-994.31	8723.77	1448.79
34HP60-102-9	10438.62	-19012.85	133953.47	178769.70	82899.09	-690.70	9802.65	1807.07
34HP60-102-10	23086.33	-18467.36	722795.30	-137158.70	90313.93	494.46	15659.53	1976.23
34HP60-102-11	17918.42	-19540.37	449745.67	-160121.50	102318.90	-91.42	11689.30	1385.95
34HP60-102-12	25908.11	-19543.65	1364969.42	-54461.20	111965.90	981.07	16633.41	1924.39
34HP60-102-13	30706.01	-18746.69	136659.61	-353626.00	119389.96	-357.18	17682.54	2341.91
34HP60-102-14	31311.58	-18276.96	120478.23	-464818.00	124121.93	-285.38	16807.49	2219.15
34HP60-102-15	27166.67	-18538.49	107121.44	-520075.30	134148.96	-523.18	14737.60	1995.43
34HP60-102-16	13214.99	-17983.40	48562.07	-263520.80	147699.12	-782.62	10728.70	1800.95
34HP60-102-17	12729.23	-17928.32	51102.85	-500340.50	145214.56	-592.86	8928.77	1343.75
34HP60-102-18	5090.39	-17024.16	33822.03	-574261.10	150963.46	-782.18	6756.24	627.62
SRM614-20	458.36	-11615.20	-754.28	-669843.80	22027.74	-788.18	703.36	3404.52
SRM612-20	21418.08	9657.99	24097.02	-676618.70	-33927.57	4163.28	21171.44	17335.28
SRM610-20	180495.76	174398.07	202908.75	-471658.50	-42958.98	40030.52	183527.96	118067.33
AP1-20	-21.48	-13785.38	-150.56	-762724.60	727.51	-971.11	66.92	741.90
AP2-20	153.84	-11244.52	4686.31	-750102.66	63696.70	-499.38	1671.09	2678.92
AP3-20	2003.81	22588.07	40928.03	-306201.70	98926.65	2383.55	13758.32	20080.01
AP4-20	3934.26	83012.88	84325.99	324306.70	138601.03	9005.71	26774.91	40326.77
zero correction								
SRM614-19	973.05	190.58	2314.97	489953.90	0.00	530.22	0.00	5398.49
SRM612-19	22909.37	17308.00	36490.89	464068.70	0.00	5921.41	25383.02	24246.44
SRM610-19	173466.14	175655.48	232194.26	492951.90	0.00	43435.11	200212.77	122796.88
AP1-19	108.80	0.00	2812.22	140652.50	0.00	0.00	0.00	641.26
AP2-19	1100.21	68.46	22270.44	475675.40	0.00	2499.79	3120.46	10900.40
AP3-19	4936.99	74646.88	104516.87	1490438.20	0.00	8397.19	31360.34	51419.67
AP4-19	6545.56	147040.01	158488.84	2073258.90	26830.73	16369.23	47160.14	76930.22
34HP60-102-1	14289.32	0.00	144153.73	187797.90	27675.03	0.00	8220.09	2701.36
34HP60-102-2	7624.32	0.00	68537.87	0.00	24989.84	0.00	7113.76	1220.03
34HP60-102-3	5563.15	0.00	60893.58	0.00	32401.48	0.00	4747.63	812.30
34HP60-102-4	1057.09	0.00	36735.65	0.00	36359.70	0.00	2469.41	378.54
34HP60-102-5	4131.42	0.00	46401.38	0.00	47398.06	0.00	3961.18	891.50
34HP60-102-6	11903.23	0.00	106465.40	500100.20	70343.42	0.00	17089.26	2215.83
34HP60-102-7	2495.93	0.00	26457.75	0.00	63355.21	0.00	3513.74	440.14
34HP60-102-8	7195.40	0.00	122066.94	0.00	70957.74	0.00	8723.77	1448.79
34HP60-102-9	10438.62	0.00	133953.47	178769.70	82899.09	0.00	9802.65	1807.07
34HP60-102-10	23086.33	0.00	722795.30	0.00	90313.93	494.46	15659.53	1976.23
34HP60-102-11	17918.42	0.00	449745.67	0.00	102318.90	0.00	11689.30	1385.95
34HP60-102-12	25908.11	0.00	1364969.42	0.00	111965.90	981.07	16633.41	1924.39
34HP60-102-13	30706.01	0.00	136659.61	0.00	119389.96	0.00	17682.54	2341.91
34HP60-102-14	31311.58	0.00	120478.23	0.00	124121.93	0.00	16807.49	2219.15
34HP60-102-15	27166.67	0.00	107121.44	0.00	134148.96	0.00	14737.60	1995.43

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	13214.99	0.00	48562.07	0.00	147699.12	0.00	10728.70	1800.95
34HP60-102-17	12729.23	0.00	51102.85	0.00	145214.56	0.00	8928.77	1343.75
34HP60-102-18	5090.39	0.00	33822.03	0.00	150963.46	0.00	6756.24	627.62
SRM614-20	458.36	0.00	0.00	0.00	22027.74	0.00	703.36	3404.52
SRM612-20	21418.08	9657.99	24097.02	0.00	0.00	4163.28	21171.44	17335.28
SRM610-20	180495.76	174398.07	202908.75	0.00	0.00	40030.52	183527.96	118067.33
AP1-20	0.00	0.00	0.00	0.00	727.51	0.00	66.92	741.90
AP2-20	153.84	0.00	4686.31	0.00	63696.70	0.00	1671.09	2678.92
AP3-20	2003.81	22588.07	40928.03	0.00	98926.65	2383.55	13758.32	20080.01
AP4-20	3934.26	83012.88	84325.99	324306.70	138601.03	9005.71	26774.91	40326.77

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-19	0.000411	0.000080	0.000977	0.206751	0.000000	0.000224	0.000000	0.002278
SRM612-19	0.012170	0.009194	0.019384	0.246519	0.000000	0.003146	0.013484	0.012880
SRM610-19	0.180460	0.182738	0.241556	0.512828	0.000000	0.045186	0.208285	0.127748
AP1-19	0.000009	0.000000	0.000243	0.012143	0.000000	0.000000	0.000000	0.000055
AP2-19	0.000068	0.000004	0.001372	0.029300	0.000000	0.000154	0.000192	0.000671
AP3-19	0.000238	0.003606	0.005049	0.071996	0.000000	0.000406	0.001515	0.002484
AP4-19	0.000320	0.007177	0.007736	0.101202	0.001310	0.000799	0.002302	0.003755
34HP60-102-1	0.001191	0.000000	0.012017	0.015656	0.002307	0.000000	0.000685	0.000225
34HP60-102-2	0.000950	0.000000	0.008539	0.000000	0.003113	0.000000	0.000886	0.000152
34HP60-102-3	0.000965	0.000000	0.010558	0.000000	0.005618	0.000000	0.000823	0.000141
34HP60-102-4	0.000278	0.000000	0.009648	0.000000	0.009550	0.000000	0.000649	0.000099
34HP60-102-5	0.000735	0.000000	0.008251	0.000000	0.008428	0.000000	0.000704	0.000159
34HP60-102-6	0.001009	0.000000	0.009028	0.042408	0.005965	0.000000	0.001449	0.000188
34HP60-102-7	0.000597	0.000000	0.006326	0.000000	0.015149	0.000000	0.000840	0.000105
34HP60-102-8	0.001244	0.000000	0.021104	0.000000	0.012268	0.000000	0.001508	0.000250
34HP60-102-9	0.001570	0.000000	0.020142	0.026881	0.012465	0.000000	0.001474	0.000272
34HP60-102-10	0.001994	0.000000	0.062433	0.000000	0.007801	0.000043	0.001353	0.000171
34HP60-102-11	0.001691	0.000000	0.042444	0.000000	0.009656	0.000000	0.001103	0.000131
34HP60-102-12	0.002261	0.000000	0.119101	0.000000	0.009770	0.000086	0.001451	0.000168
34HP60-102-13	0.002438	0.000000	0.010850	0.000000	0.009479	0.000000	0.001404	0.000186
34HP60-102-14	0.002443	0.000000	0.009399	0.000000	0.009684	0.000000	0.001311	0.000173
34HP60-102-15	0.002281	0.000000	0.008993	0.000000	0.011262	0.000000	0.001237	0.000168
34HP60-102-16	0.001583	0.000000	0.005818	0.000000	0.017694	0.000000	0.001285	0.000216
34HP60-102-17	0.001448	0.000000	0.005813	0.000000	0.016517	0.000000	0.001016	0.000153
34HP60-102-18	0.000767	0.000000	0.005097	0.000000	0.022751	0.000000	0.001018	0.000095
SRM614-20	0.000318	0.000000	0.000000	0.000000	0.015271	0.000000	0.000488	0.002360
SRM612-20	0.014361	0.006476	0.016157	0.000000	0.000000	0.002792	0.014196	0.011623
SRM610-20	0.228707	0.220981	0.257107	0.000000	0.000000	0.050723	0.232549	0.149604
AP1-20	0.000000	0.000000	0.000000	0.000000	0.000071	0.000000	0.000007	0.000073
AP2-20	0.000014	0.000000	0.000431	0.000000	0.005857	0.000000	0.000154	0.000246
AP3-20	0.000143	0.001612	0.002920	0.000000	0.007058	0.000170	0.000982	0.001433
AP4-20	0.000252	0.005311	0.005395	0.020749	0.008867	0.000576	0.001713	0.002580

standardize signal averages AP								
AP1	0.000005	0.000000	0.000121	0.006071	0.000036	0.000000	0.000003	0.000064
AP2	0.000041	0.000002	0.000901	0.014650	0.002928	0.000077	0.000173	0.000459
AP3	0.000191	0.002609	0.003984	0.035998	0.003529	0.000288	0.001248	0.001958
AP4	0.000286	0.006244	0.006566	0.060975	0.005089	0.000688	0.002008	0.003168

linest from std sig ave								
	0.012324	0.007072	0.006258	0.050253	0.550437	0.085904	0.007341	0.009239

standardize signal averages SRM								
srm614-2	0.000364	0.000040	0.000488	0.103376	0.007635	0.000112	0.000244	0.002319
srm612-2	0.013265	0.007835	0.017771	0.123259	0.000000	0.002969	0.013840	0.012252
srm610-2	0.204584	0.201859	0.249332	0.256414	0.000000	0.047955	0.220417	0.138676

linest from std sig ave								
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Appendix A. Raw trace element datasheets from laser ablation.

	0.025213	0.023460	0.020289	0.015799	0.000000	0.108097	0.021457	0.036162
concentration data								
SRM614-19	0.43	0.05	0.52	891.07	0.00	1.65	0.00	1.81
SRM612-19	12.86	5.58	10.40	1062.46	0.00	23.17	8.49	10.21
SRM610-19	190.73	110.83	129.65	2210.22	0.00	332.91	131.13	101.23
AP1-19	0.05	0.00	0.61	243.44	0.00	0.00	0.00	0.20
AP2-19	0.33	0.01	3.42	587.40	0.00	5.28	0.56	2.47
AP3-19	1.17	10.17	12.61	1443.36	0.00	13.90	4.44	9.16
AP4-19	1.57	20.25	19.32	2028.87	287.59	27.38	6.74	13.84
34HP60-102-1	5.86	0.00	30.00	313.86	506.62	0.00	2.01	0.83
34HP60-102-2	4.67	0.00	21.32	0.00	683.66	0.00	2.60	0.56
34HP60-102-3	4.74	0.00	26.36	0.00	1233.68	0.00	2.41	0.52
34HP60-102-4	1.36	0.00	24.09	0.00	2097.00	0.00	1.90	0.37
34HP60-102-5	3.61	0.00	20.60	0.00	1850.77	0.00	2.06	0.58
34HP60-102-6	4.96	0.00	22.54	850.20	1309.87	0.00	4.24	0.69
34HP60-102-7	2.93	0.00	15.79	0.00	3326.53	0.00	2.46	0.39
34HP60-102-8	6.12	0.00	52.69	0.00	2693.85	0.00	4.42	0.92
34HP60-102-9	7.72	0.00	50.29	538.91	2737.24	0.00	4.32	1.00
34HP60-102-10	9.80	0.00	155.88	0.00	1713.03	1.46	3.96	0.63
34HP60-102-11	8.31	0.00	105.97	0.00	2120.40	0.00	3.23	0.48
34HP60-102-12	11.11	0.00	297.36	0.00	2145.30	2.93	4.25	0.62
34HP60-102-13	11.99	0.00	27.09	0.00	2081.47	0.00	4.11	0.69
34HP60-102-14	12.01	0.00	23.47	0.00	2126.42	0.00	3.84	0.64
34HP60-102-15	11.21	0.00	22.45	0.00	2472.98	0.00	3.62	0.62
34HP60-102-16	7.78	0.00	14.53	0.00	3885.51	0.00	3.76	0.80
34HP60-102-17	7.12	0.00	14.51	0.00	3627.00	0.00	2.97	0.56
34HP60-102-18	3.77	0.00	12.73	0.00	4995.83	0.00	2.98	0.35
SRM614-20	0.34	0.00	0.00	0.00	720.89	0.00	0.31	1.87
SRM612-20	15.18	3.93	8.67	0.00	0.00	20.57	8.94	9.21
SRM610-20	241.72	134.02	138.00	0.00	0.00	373.70	146.41	118.54
AP1-20	0.00	0.00	0.00	0.00	15.64	0.00	0.02	0.27
AP2-20	0.07	0.00	1.08	0.00	1286.05	0.00	0.45	0.91
AP3-20	0.70	4.55	7.29	0.00	1549.89	5.83	2.87	5.28
AP4-20	1.24	14.98	13.47	415.96	1947.20	19.75	5.02	9.51
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-17	910.09	60128.82	6603.28	3215332.80	34836.48	3293.10	1128.65	817.72
SRM614-17	1573.21	61352.82	8959.93	3007152.80	33301.75	6034.99	1807.13	5475.59
SRM612-17	22154.32	88608.22	45600.98	3079945.80	34354.83	13399.40	27689.56	34485.56
SRM610-17	206928.41	296416.44	291621.00	3202895.00	33529.39	59121.45	257378.17	175742.34
AP1-17	1281.21	77838.64	13362.72	2822302.30	56735.00	9732.85	2364.17	5918.71
AP2-17	2013.17	76950.75	35256.08	2610893.30	87819.21	9261.37	6258.27	11581.67
AP3-17	3890.74	113834.20	74530.42	2928067.30	122128.17	12193.07	21103.16	33116.43
AP4-17	7697.12	236346.22	175439.86	4281162.00	182628.55	23265.77	47011.07	75535.23
34HP60-24-1	3017.58	63005.64	33927.55	1933111.50	160179.17	4381.02	7583.12	2368.13
34HP60-24-2	3086.54	64583.13	19054.71	1776586.10	162420.59	4329.34	6754.32	2094.93
34HP60-24-3	3101.18	66457.98	17839.46	1784256.40	174240.06	4460.19	5294.75	2213.57
34HP60-24-4	11390.26	68805.47	65597.13	1899335.90	186506.77	5139.27	9321.85	2372.97
34HP60-24-5	27901.04	70455.80	159850.58	2190876.00	211085.44	5431.43	16160.37	3110.54
34HP60-24-6	30359.97	70736.76	190276.52	2274394.00	228496.97	5485.91	16354.85	3215.18
34HP60-24-7	15743.09	70733.12	63906.28	1863104.90	234643.88	5047.15	15085.21	2205.61
34HP60-24-8	12986.59	70973.08	65229.68	1692170.10	247153.23	5116.99	18137.50	2229.61
34HP60-24-9	15992.57	72499.45	79962.09	1750905.40	256821.36	5419.39	22644.37	2614.69
34HP60-24-10	28919.92	73739.70	158486.17	2973918.80	292542.53	5335.67	13499.08	3133.82
34HP60-24-11	32335.90	76187.55	145911.63	2845304.50	289817.16	5768.43	14172.28	3056.30
34HP60-24-12	35866.40	77644.80	286991.78	3721948.50	316428.47	6285.72	12380.87	3312.22
SRM614-18	1335.53	82850.82	6280.84	1113043.40	160203.47	4785.43	2593.65	3883.98
SRM612-18	23830.29	107188.52	32445.02	1111761.30	119312.55	10592.62	24375.78	20683.88
SRM610-18	180053.94	267325.31	213711.52	1313054.50	107954.56	44988.69	185346.25	116601.41
AP1-18	983.73	85822.09	6986.64	992480.13	151946.17	5135.71	2090.45	2274.65
AP2-18	1215.17	88330.02	13330.12	1013144.90	205590.67	5513.27	4126.62	4391.54
AP3-18	2959.42	117898.59	43087.40	1391367.50	242825.28	8162.09	13968.96	19370.99
AP4-18	5493.03	181930.94	97889.03	2173689.00	288383.88	14238.08	30636.01	45554.73
blank-18	741.52	80178.41	4467.71	1141086.90	271871.25	4975.67	3002.62	806.32
blank average	825.80	70153.62	5535.49	2178209.85	153353.86	4134.38	2065.63	812.02
blank subtraction								

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	747.40	-8800.79	3424.44	828942.95	-120052.12	1900.61	-258.50	4663.57
SRM612-17	21328.52	18454.60	40065.49	901735.95	-118999.03	9265.01	25623.93	33673.53
SRM610-17	206102.61	226262.83	286085.51	1024685.15	-119824.48	54987.07	255312.54	174930.32
AP1-17	455.40	7685.03	7827.22	644092.45	-96618.86	5598.47	298.54	5106.69
AP2-17	1187.37	6797.13	29720.59	432683.45	-65534.65	5126.99	4192.64	10769.64
AP3-17	3064.94	43680.59	68994.93	749857.45	-31225.69	8058.69	19037.53	32304.40
AP4-17	6871.32	166192.61	169904.37	2102952.15	29274.69	19131.39	44945.43	74723.20
34HP60-24-1	2191.77	-7147.98	28392.06	-245098.35	6825.31	246.64	5517.49	1556.11
34HP60-24-2	2260.73	-5570.49	13519.22	-401623.75	9066.73	194.96	4688.69	1282.91
34HP60-24-3	2275.37	-3695.64	12303.97	-393953.45	20886.20	325.80	3229.12	1401.55
34HP60-24-4	10564.46	-1348.15	60061.63	-278873.95	33152.91	1004.89	7256.22	1560.95
34HP60-24-5	27075.23	302.18	154315.09	12666.15	57731.58	1297.05	14094.74	2298.51
34HP60-24-6	29534.17	583.14	184741.03	96184.15	75143.11	1351.53	14289.22	2403.15
34HP60-24-7	14917.28	579.50	58370.79	-315104.95	81290.02	912.77	13019.57	1393.59
34HP60-24-8	12160.79	819.46	50694.18	-486039.75	93799.37	982.61	16071.87	1417.59
34HP60-24-9	15166.77	2345.84	74426.59	-427304.45	103467.50	1285.01	20578.74	1802.67
34HP60-24-10	28094.12	3586.08	152950.68	795708.95	139188.67	1201.29	11433.44	2321.79
34HP60-24-11	31510.10	6033.93	140376.14	667094.65	136463.30	1634.05	12106.65	2244.27
34HP60-24-12	35040.60	7491.18	281456.29	1543738.65	163074.61	2151.33	10315.24	2500.19
SRM614-18	509.72	12697.21	745.34	-1065166.45	6849.61	651.04	528.02	3071.96
SRM612-18	23004.49	37034.91	26909.53	-1066448.55	-34041.31	6458.24	22310.15	19871.85
SRM610-18	179228.14	197171.70	208176.03	-865155.35	-45399.30	40854.31	183280.62	115789.39
AP1-18	157.92	15668.47	1451.15	-1185729.72	-1407.69	1001.33	24.82	1462.63
AP2-18	389.36	18176.40	7794.62	-1165064.95	52236.81	1378.89	2060.99	3579.52
AP3-18	2133.61	47744.98	37551.91	-786842.35	89471.42	4027.70	11903.33	18558.97
AP4-18	4667.23	111777.33	92353.54	-4520.85	135030.02	10103.70	28570.38	44742.71

zero correction

SRM614-17	747.40	0.00	3424.44	828942.95	0.00	1900.61	0.00	4663.57
SRM612-17	21328.52	18454.60	40065.49	901735.95	0.00	9265.01	25623.93	33673.53
SRM610-17	206102.61	226262.83	286085.51	1024685.15	0.00	54987.07	255312.54	174930.32
AP1-17	455.40	7685.03	7827.22	644092.45	0.00	5598.47	298.54	5106.69
AP2-17	1187.37	6797.13	29720.59	432683.45	0.00	5126.99	4192.64	10769.64
AP3-17	3064.94	43680.59	68994.93	749857.45	0.00	8058.69	19037.53	32304.40
AP4-17	6871.32	166192.61	169904.37	2102952.15	29274.69	19131.39	44945.43	74723.20
34HP60-24-1	2191.77	0.00	28392.06	0.00	6825.31	246.64	5517.49	1556.11
34HP60-24-2	2260.73	0.00	13519.22	0.00	9066.73	194.96	4688.69	1282.91
34HP60-24-3	2275.37	0.00	12303.97	0.00	20886.20	325.80	3229.12	1401.55
34HP60-24-4	10564.46	0.00	60061.63	0.00	33152.91	1004.89	7256.22	1560.95
34HP60-24-5	27075.23	302.18	154315.09	12666.15	57731.58	1297.05	14094.74	2298.51
34HP60-24-6	29534.17	583.14	184741.03	96184.15	75143.11	1351.53	14289.22	2403.15
34HP60-24-7	14917.28	579.50	58370.79	0.00	81290.02	912.77	13019.57	1393.59
34HP60-24-8	12160.79	819.46	50694.18	0.00	93799.37	982.61	16071.87	1417.59
34HP60-24-9	15166.77	2345.84	74426.59	0.00	103467.50	1285.01	20578.74	1802.67
34HP60-24-10	28094.12	3586.08	152950.68	795708.95	139188.67	1201.29	11433.44	2321.79
34HP60-24-11	31510.10	6033.93	140376.14	667094.65	136463.30	1634.05	12106.65	2244.27
34HP60-24-12	35040.60	7491.18	281456.29	1543738.65	163074.61	2151.33	10315.24	2500.19
SRM614-18	509.72	12697.21	745.34	0.00	6849.61	651.04	528.02	3071.96
SRM612-18	23004.49	37034.91	26909.53	0.00	0.00	6458.24	22310.15	19871.85
SRM610-18	179228.14	197171.70	208176.03	0.00	0.00	40854.31	183280.62	115789.39
AP1-18	157.92	15668.47	1451.15	0.00	0.00	1001.33	24.82	1462.63
AP2-18	389.36	18176.40	7794.62	0.00	52236.81	1378.89	2060.99	3579.52
AP3-18	2133.61	47744.98	37551.91	0.00	89471.42	4027.70	11903.33	18558.97
AP4-18	4667.23	111777.33	92353.54	0.00	135030.02	10103.70	28570.38	44742.71

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-17	0.000348	0.000000	0.001592	0.385424	0.000000	0.000884	0.000000	0.002168
SRM612-17	0.010889	0.009422	0.020454	0.460357	0.000000	0.004730	0.013082	0.017191
SRM610-17	0.159659	0.175276	0.221619	0.793781	0.000000	0.042596	0.197780	0.135511
AP1-17	0.000029	0.000482	0.000491	0.040381	0.000000	0.000351	0.000019	0.000320

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000077	0.000443	0.001936	0.028192	0.000000	0.000334	0.000273	0.000702
AP3-17	0.000185	0.002632	0.004157	0.045176	0.000000	0.000486	0.001147	0.001946
AP4-17	0.000337	0.008141	0.008323	0.103013	0.001434	0.000937	0.002202	0.003660
34HP60-24-1	0.000457	0.000000	0.005917	0.000000	0.001422	0.000051	0.001150	0.000324
34HP60-24-2	0.000436	0.000000	0.002604	0.000000	0.001747	0.000038	0.000903	0.000247
34HP60-24-3	0.000404	0.000000	0.002184	0.000000	0.003708	0.000058	0.000573	0.000249
34HP60-24-4	0.001296	0.000000	0.007366	0.000000	0.004066	0.000123	0.000890	0.000191
34HP60-24-5	0.002402	0.000027	0.013688	0.001123	0.005121	0.000115	0.001250	0.000204
34HP60-24-6	0.002543	0.000050	0.015908	0.008283	0.006471	0.000116	0.001230	0.000207
34HP60-24-7	0.001532	0.000060	0.005995	0.000000	0.008349	0.000094	0.001337	0.000143
34HP60-24-8	0.001194	0.000080	0.004976	0.000000	0.009206	0.000096	0.001577	0.000139
34HP60-24-9	0.001338	0.000207	0.006566	0.000000	0.009129	0.000113	0.001816	0.000159
34HP60-24-10	0.002643	0.000337	0.014392	0.074872	0.013097	0.000113	0.001076	0.000218
34HP60-24-11	0.002681	0.000513	0.011944	0.056759	0.011611	0.000139	0.001030	0.000191
34HP60-24-12	0.002714	0.000580	0.021799	0.119565	0.012630	0.000167	0.000799	0.000194
SRM614-18	0.000415	0.010342	0.000607	0.000000	0.005579	0.000530	0.000430	0.002502
SRM612-18	0.015181	0.024439	0.017757	0.000000	0.000000	0.004262	0.014722	0.013113
SRM610-18	0.220561	0.242643	0.256185	0.000000	0.000000	0.050276	0.225548	0.142493
AP1-18	0.000014	0.001385	0.000128	0.000000	0.000000	0.000088	0.000002	0.000129
AP2-18	0.000031	0.001436	0.000616	0.000000	0.004128	0.000109	0.000163	0.000283
AP3-18	0.000153	0.003425	0.002693	0.000000	0.006417	0.000289	0.000854	0.001331
AP4-18	0.000288	0.006890	0.005693	0.000000	0.008324	0.000623	0.001761	0.002758

standardize signal averages AP

AP1	0.000021	0.000933	0.000309	0.020191	0.000000	0.000220	0.000010	0.000225
AP2	0.000054	0.000940	0.001276	0.014096	0.002064	0.000222	0.000218	0.000492
AP3	0.000169	0.003028	0.003425	0.022588	0.003209	0.000387	0.001000	0.001639
AP4	0.000312	0.007516	0.007008	0.051506	0.004879	0.000780	0.001981	0.003209

linest from std sig ave

0.011873	0.005915	0.006127	0.064850	0.591972	0.080634	0.007811	0.009507
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standardize signal averages SRM

srms614-2	0.000381	0.005171	0.001100	0.192712	0.002789	0.000707	0.000215	0.002335
srms612-2	0.013035	0.016930	0.019106	0.230179	0.000000	0.004496	0.013902	0.015152
srms610-2	0.190110	0.208960	0.238902	0.396891	0.000000	0.046436	0.211664	0.139002

linest from std sig ave

0.027128	0.022633	0.021163	0.009152	0.000000	0.111331	0.022342	0.035995
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concentration data

SRM614-17	0.35	0.00	0.84	2143.61	0.00	6.11	0.00	1.77
SRM612-17	11.09	4.78	10.75	2560.37	0.00	32.71	8.76	14.02
SRM610-17	162.58	88.92	116.46	4414.78	0.00	294.57	132.48	110.48
AP1-17	0.14	1.14	1.20	1044.70	0.00	11.29	0.06	1.21
AP2-17	0.37	1.05	4.73	729.35	0.00	10.75	0.85	2.66
AP3-17	0.87	6.21	10.16	1168.73	0.00	15.62	3.57	7.38
AP4-17	1.59	19.21	20.34	2665.03	338.66	30.15	6.86	13.88
34HP60-24-1	2.16	0.00	14.46	0.00	335.90	1.65	3.58	1.23
34HP60-24-2	2.06	0.00	6.37	0.00	412.47	1.21	2.81	0.94
34HP60-24-3	1.91	0.00	5.34	0.00	875.70	1.86	1.79	0.94
34HP60-24-4	6.14	0.00	18.00	0.00	960.18	3.96	2.77	0.73
34HP60-24-5	11.38	0.06	33.46	29.07	1209.31	3.70	3.90	0.77
34HP60-24-6	12.05	0.12	38.89	214.28	1528.12	3.74	3.83	0.78
34HP60-24-7	7.26	0.14	14.65	0.00	1971.64	3.02	4.17	0.54
34HP60-24-8	5.65	0.19	12.16	0.00	2174.15	3.10	4.92	0.53
34HP60-24-9	6.34	0.49	16.05	0.00	2155.79	3.65	5.66	0.60
34HP60-24-10	12.52	0.80	35.18	1937.00	3092.94	3.64	3.35	0.83
34HP60-24-11	12.70	1.21	29.19	1468.41	2742.01	4.47	3.21	0.72
34HP60-24-12	12.86	1.37	53.28	3093.26	2982.78	5.36	2.49	0.73
SRM614-18	0.42	5.25	0.32	0.00	283.23	3.67	0.29	2.04
SRM612-18	15.46	12.40	9.33	0.00	0.00	29.47	9.86	10.69
SRM610-18	224.60	123.10	134.62	0.00	0.00	347.68	151.08	116.18
AP1-18	0.07	3.27	0.31	0.00	0.00	2.85	0.01	0.49
AP2-18	0.15	3.39	1.51	0.00	974.81	3.51	0.51	1.07
AP3-18	0.72	8.08	6.58	0.00	1515.51	9.29	2.66	5.05
AP4-18	1.36	16.26	13.92	0.00	1965.70	20.03	5.49	10.46

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

V Cr Mn Fe56 Fe57 Ni Co Cu63

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
blank-15	823.80	50576.93	6371.20	2423082.80	25640.31	2826.06	906.61	822.76
SRM614-15	1953.17	52418.41	8122.69	2173070.00	24965.82	4912.83	1779.93	6676.96
SRM612-15	39187.46	96626.95	61676.75	2392294.50	28281.36	16778.81	42036.68	46387.90
SRM610-15	374446.94	437440.22	446049.97	2652114.00	30232.21	87882.17	393347.19	275304.47
AP1-15	1030.17	52343.41	7487.80	1803854.40	36059.64	5036.35	1249.49	1532.33
AP2-15	1333.73	58394.33	14680.56	1761157.90	68281.91	5460.71	3473.98	4802.31
AP3-15	3983.66	101673.02	65982.25	2356052.80	112156.91	9770.97	19674.35	27652.04
AP4-15	4225.66	127853.84	80590.57	2506108.80	153722.67	12340.15	24031.41	33473.43
34BV166-1	845.72	54479.23	8163.41	1438477.80	143626.66	3572.90	2056.25	1587.57
34BV166-2	854.44	57689.84	7023.08	1395895.90	143198.20	3716.02	2119.81	1623.61
34BV166-3	818.08	59745.50	5487.99	1352384.50	146394.50	3981.30	1944.73	1323.69
34BV166-4	883.72	63737.44	8231.65	1355632.80	146941.47	4125.06	2421.97	1637.65
34BV166-5	1046.89	65458.77	8716.25	1341200.90	149579.36	4247.38	2574.37	1495.17
34BV166-6	1253.17	68551.83	9835.34	1321720.40	154032.47	4607.63	2750.54	1453.53
SRM614-16	1544.45	74367.77	5947.63	1156915.30	57966.13	4745.83	1522.09	4719.55
SRM612-16	33218.71	106623.56	43148.96	1172738.80	42291.80	12427.43	32756.58	26482.87
SRM610-16	233144.70	304977.59	277515.72	1425465.30	42010.48	55463.07	239789.27	149991.73
AP1-16	1071.21	74104.86	7101.12	1022492.30	69293.83	4955.23	1215.65	1833.21
AP2-16	1264.85	77475.31	12095.99	1013960.70	130466.30	5078.07	3143.58	3808.02
AP3-16	3221.90	109544.02	50368.44	1437422.40	180798.27	8187.77	15114.09	19677.19
AP4-16	3402.50	129384.01	57848.00	1592941.30	216860.66	10503.42	17332.42	22625.01
blank-16	837.56	73281.73	5155.07	1284912.30	144523.38	4930.43	1739.93	1204.85
blank average	830.68	61929.33	5763.13	1853997.55	85081.84	3878.24	1323.27	1013.81
blank subtraction								
SRM614-15	1122.49	-9510.92	2359.55	319072.45	-60116.02	1034.59	456.66	5663.15
SRM612-15	38356.78	34697.62	55913.61	538296.95	-56800.48	12900.57	40713.41	45374.10
SRM610-15	373616.26	375510.89	440286.84	798116.45	-54849.63	84003.93	392023.92	274290.66
AP1-15	199.48	-9585.92	1724.67	-50143.15	-49022.20	1158.11	-73.78	518.52
AP2-15	503.04	-3535.00	8917.43	-92839.65	-16799.94	1582.47	2150.71	3788.50
AP3-15	3152.98	39743.69	60219.12	502055.25	27075.07	5892.73	18351.08	26638.23
AP4-15	3394.98	65924.51	74827.44	652111.25	68640.83	8461.91	22708.15	32459.62
34BV166-1	15.04	-7450.10	2400.27	-415519.75	58544.82	-305.34	732.98	573.76
34BV166-2	23.76	-4239.49	1259.95	-458101.65	58116.36	-162.22	796.54	609.80
34BV166-3	-12.60	-2183.83	-275.14	-501613.05	61312.66	103.06	621.46	309.88
34BV166-4	53.04	1808.11	2468.51	-498364.75	61859.63	246.82	1098.71	623.84
34BV166-5	216.20	3529.44	2953.12	-512796.65	64497.52	369.14	1251.11	481.36
34BV166-6	422.48	6622.50	4072.20	-532277.15	68950.63	729.38	1427.27	439.72
SRM614-16	713.76	12438.44	184.50	-697082.25	-27115.72	867.58	198.82	3705.74
SRM612-16	32388.02	44694.23	37385.83	-681258.75	-42790.05	8549.19	31433.32	25469.06
SRM610-16	232314.02	243048.26	271752.59	-428532.25	-43071.37	51584.83	238466.00	148977.92
AP1-16	240.52	12175.53	1337.99	-831505.25	-15788.01	1076.99	-107.62	819.40
AP2-16	434.16	15545.98	6332.86	-840036.85	45384.46	1199.83	1820.31	2794.22
AP3-16	2391.21	47614.69	44605.31	-416575.15	95716.43	4309.52	13790.82	18663.39
AP4-16	2571.81	67454.68	52084.87	-261056.25	131778.82	6625.18	16009.15	21611.20
zero correction								
SRM614-15	1122.49	0.00	2359.55	319072.45	0.00	1034.59	456.66	5663.15
SRM612-15	38356.78	34697.62	55913.61	538296.95	0.00	12900.57	40713.41	45374.10
SRM610-15	373616.26	375510.89	440286.84	798116.45	0.00	84003.93	392023.92	274290.66
AP1-15	199.48	0.00	1724.67	0.00	0.00	1158.11	0.00	518.52
AP2-15	503.04	0.00	8917.43	0.00	0.00	1582.47	2150.71	3788.50
AP3-15	3152.98	39743.69	60219.12	502055.25	27075.07	5892.73	18351.08	26638.23
AP4-15	3394.98	65924.51	74827.44	652111.25	68640.83	8461.91	22708.15	32459.62
34BV166-1	15.04	0.00	2400.27	0.00	58544.82	0.00	732.98	573.76
34BV166-2	23.76	0.00	1259.95	0.00	58116.36	0.00	796.54	609.80
34BV166-3	0.00	0.00	0.00	0.00	61312.66	103.06	621.46	309.88
34BV166-4	53.04	1808.11	2468.51	0.00	61859.63	246.82	1098.71	623.84
34BV166-5	216.20	3529.44	2953.12	0.00	64497.52	369.14	1251.11	481.36
34BV166-6	422.48	6622.50	4072.20	0.00	68950.63	729.38	1427.27	439.72
SRM614-16	713.76	12438.44	184.50	0.00	0.00	867.58	198.82	3705.74
SRM612-16	32388.02	44694.23	37385.83	0.00	0.00	8549.19	31433.32	25469.06
SRM610-16	232314.02	243048.26	271752.59	0.00	0.00	51584.83	238466.00	148977.92
AP1-16	240.52	12175.53	1337.99	0.00	0.00	1076.99	0.00	819.40
AP2-16	434.16	15545.98	6332.86	0.00	45384.46	1199.83	1820.31	2794.22
AP3-16	2391.21	47614.69	44605.31	0.00	95716.43	4309.52	13790.82	18663.39
AP4-16	2571.81	67454.68	52084.87	0.00	131778.82	6625.18	16009.15	21611.20
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-15	0.000394	0.000000	0.000829	0.112039	0.000000	0.000363	0.000160	0.001989
SRM612-15	0.012571	0.011371	0.018325	0.176416	0.000000	0.004228	0.013343	0.014870
SRM610-15	0.200679	0.201697	0.236490	0.428690	0.000000	0.045121	0.210567	0.147329
AP1-15	0.000015	0.000000	0.000128	0.000000	0.000000	0.000086	0.000000	0.000039
AP2-15	0.000035	0.000000	0.000629	0.000000	0.000000	0.000112	0.000152	0.000267
AP3-15	0.000169	0.002128	0.003224	0.026882	0.001450	0.000316	0.000983	0.001426
AP4-15	0.000200	0.003884	0.004409	0.038423	0.004044	0.000499	0.001338	0.001913
34BV166-1	0.000004	0.000000	0.000577	0.000000	0.014078	0.000000	0.000176	0.000138
34BV166-2	0.000007	0.000000	0.000355	0.000000	0.016387	0.000000	0.000225	0.000172
34BV166-3	0.000000	0.000000	0.000000	0.000000	0.018877	0.000032	0.000191	0.000095
34BV166-4	0.000018	0.000621	0.000848	0.000000	0.021244	0.000085	0.000377	0.000214
34BV166-5	0.000070	0.001148	0.000960	0.000000	0.020977	0.000120	0.000407	0.000157
34BV166-6	0.000100	0.001561	0.000960	0.000000	0.016254	0.000172	0.000336	0.000104
SRM614-16	0.000415	0.007224	0.000107	0.000000	0.000000	0.000504	0.000115	0.002152
SRM612-16	0.013983	0.019296	0.016141	0.000000	0.000000	0.003691	0.013571	0.010996
SRM610-16	0.208411	0.218041	0.243792	0.000000	0.000000	0.046277	0.213930	0.133650
AP1-16	0.000020	0.001016	0.000112	0.000000	0.000000	0.000090	0.000000	0.000068
AP2-16	0.000036	0.001298	0.000529	0.000000	0.003788	0.000100	0.000152	0.000233
AP3-16	0.000147	0.002922	0.002737	0.000000	0.005874	0.000264	0.000846	0.001145
AP4-16	0.000177	0.004643	0.003585	0.000000	0.009071	0.000456	0.001102	0.001488
standardize signal averages AP								
AP1	0.000017	0.000508	0.000120	0.000000	0.000000	0.000088	0.000000	0.000054
AP2	0.000036	0.000649	0.000579	0.000000	0.001894	0.000106	0.000152	0.000250
AP3	0.000158	0.002525	0.002981	0.013441	0.003662	0.000290	0.000914	0.001286
AP4	0.000189	0.004264	0.003997	0.019211	0.006558	0.000477	0.001220	0.001700
linest from std sig ave								
	0.016834	0.009698	0.009599	0.133777	0.453917	0.125891	0.011338	0.016003
standardize signal averages SRM								
srm614-2	0.000404	0.003612	0.000468	0.056020	0.000000	0.000434	0.000138	0.002070
srm612-2	0.013277	0.015334	0.017233	0.088208	0.000000	0.003959	0.013457	0.012933
srm610-2	0.204545	0.209869	0.240141	0.214345	0.000000	0.045699	0.212249	0.140489
linest from std sig ave								
	0.025218	0.022550	0.021064	0.021110	0.000000	0.113252	0.022282	0.035685
concentration data								
SRM614-15	0.57	0.00	0.68	1285.44	0.00	3.92	0.16	2.73
SRM612-15	18.15	9.46	15.09	2024.05	0.00	45.65	12.97	20.41
SRM610-15	289.73	167.76	194.68	4918.42	0.00	487.16	204.75	202.20
AP1-15	0.10	0.00	0.49	0.00	0.00	4.33	0.00	0.25
AP2-15	0.24	0.00	2.41	0.00	0.00	5.61	0.69	1.71
AP3-15	1.13	8.23	12.35	1434.67	262.52	15.85	4.44	9.11
AP4-15	1.34	15.03	16.88	2050.57	732.37	25.04	6.05	12.21
34BV166-1	0.02	0.00	2.21	0.00	2549.26	0.00	0.80	0.88
34BV166-2	0.04	0.00	1.36	0.00	2967.38	0.00	1.02	1.10
34BV166-3	0.00	0.00	0.00	0.00	3418.29	1.59	0.87	0.61
34BV166-4	0.12	2.40	3.25	0.00	3847.03	4.26	1.71	1.37
34BV166-5	0.47	4.44	3.68	0.00	3798.53	6.03	1.84	1.00
34BV166-6	0.67	6.04	3.68	0.00	2943.25	8.64	1.52	0.66
SRM614-16	0.60	6.01	0.09	0.00	0.00	5.44	0.11	2.95
SRM612-16	20.19	16.05	13.29	0.00	0.00	39.85	13.20	15.09
SRM610-16	300.90	181.36	200.69	0.00	0.00	499.65	208.02	183.42
AP1-16	0.13	3.93	0.43	0.00	0.00	4.51	0.00	0.44
AP2-16	0.24	5.02	2.02	0.00	685.95	5.03	0.69	1.49
AP3-16	0.99	11.30	10.48	0.00	1063.60	13.28	3.83	7.31
AP4-16	1.19	17.96	13.73	0.00	1642.58	22.90	4.98	9.50
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-13	1018.57	46566.18	7434.00	2461360.30	27499.91	3276.42	986.13	945.01
SRM614-13	1953.41	47119.07	7400.60	2069045.40	23438.81	4738.35	1839.37	6261.31
SRM612-13	37497.33	84862.04	50704.00	1947758.10	21281.72	13086.91	40712.23	30742.45
SRM610-13	240862.92	298845.03	306667.91	2141736.00	23944.41	61962.79	274902.22	177587.59
AP1-13	1361.61	50927.25	10271.50	1722608.40	38137.06	5063.47	1431.85	1746.37
AP2-13	1608.65	56978.12	18081.22	1666930.80	79120.81	5469.27	3990.54	5050.55
AP3-13	3506.42	91760.20	56760.80	2087861.50	118552.23	9109.21	16979.02	23323.97
AP4-13	3979.22	119669.03	76958.08	2302771.50	160816.22	12122.07	22955.21	31901.26
W3-1	1377.49	54253.86	49227.28	1677733.60	166788.09	4086.18	4870.03	5839.99
W3-2	943.85	54029.98	46712.66	1355016.30	163311.03	4146.14	2426.01	2427.37
W3-3	980.45	55695.52	43656.73	1338617.50	171531.28	4213.74	2802.30	2494.41
W3-4	1070.33	61013.26	59186.13	1348250.30	173695.53	4508.11	2680.98	3611.86
W3-5	1047.25	63487.20	68345.51	1318298.50	180821.89	4534.71	2744.42	3811.54
W3-6	1029.53	65526.73	59774.18	1269678.10	185583.16	4892.39	2615.73	2871.14
W3-7	1318.13	68230.98	75716.34	1559356.40	196990.63	5303.75	3513.66	6727.56
W3-8	1199.33	70050.43	84549.20	1443494.60	203123.11	5102.75	2948.78	5119.39
W3-9	1192.77	72025.60	82578.31	1385207.30	208846.02	5269.67	2839.38	3553.26
W3-10	1986.81	74506.50	120717.68	1965670.90	229139.41	5572.79	3526.82	4192.26
W3-11	2098.73	75564.91	114931.77	2161001.30	243212.22	5446.11	3811.62	4696.71
W3-12	1367.21	75376.70	108474.33	1416664.80	241700.52	5393.19	3294.14	3304.42
SRM614-14	1894.53	81073.26	6344.88	930531.75	108653.61	5400.35	2096.97	5924.63
SRM612-14	39630.82	117219.38	45669.78	920582.38	63584.96	13444.36	37400.49	29568.45
SRM610-14	217490.83	293461.25	250274.41	1149374.60	59889.46	52386.09	223111.17	145188.42
AP1-14	1100.57	78146.44	7520.84	816777.06	104775.23	4947.67	1529.81	1813.69
AP2-14	1343.93	82216.10	12815.07	830460.81	169494.55	5420.83	3535.90	3699.30
AP3-14	3249.70	112819.59	47433.83	1247980.40	211254.39	8399.65	14719.68	19158.71
AP4-14	3674.14	133587.52	61973.23	1412532.90	247135.52	10298.26	18935.59	24399.38
blank-14	796.28	79443.65	5045.83	1018679.20	227558.20	5519.07	2369.93	1038.69
blank average	907.43	63004.92	6239.92	1740019.75	127529.06	4397.74	1678.03	991.85
blank subtraction								
SRM614-13	1045.99	-15885.85	1160.69	329025.65	-104090.24	340.60	161.34	5269.47
SRM612-13	36589.91	21857.12	44464.09	207738.35	-106247.34	8689.17	39034.20	29750.61
SRM610-13	239955.49	235840.11	300427.99	401716.25	-103584.64	57565.04	273224.19	176595.74
AP1-13	454.18	-12077.67	4031.58	-17411.35	-89392.00	665.72	-246.18	754.52
AP2-13	701.22	-6026.80	11841.31	-73088.95	-48408.25	1071.53	2312.51	4058.70
AP3-13	2598.99	28755.28	50520.89	347841.75	-8976.83	4711.47	15300.99	22332.13
AP4-13	3071.80	56664.11	70718.16	562751.75	33287.16	7724.32	21277.18	30909.41
W3-1	470.06	-8751.05	42987.36	-62286.15	39259.03	-311.56	3192.00	4848.15
W3-2	36.42	-8974.93	40472.74	-385003.45	35781.97	-251.60	747.98	1435.53
W3-3	73.02	-7309.40	37416.81	-401402.25	44002.22	-184.00	1124.27	1502.57
W3-4	162.90	-1991.65	52946.22	-391769.45	46166.47	110.36	1002.95	2620.01
W3-5	139.82	482.28	62105.59	-421721.25	53292.83	136.96	1066.39	2819.70
W3-6	122.10	2521.81	53534.26	-470341.65	58054.10	494.64	937.71	1879.29
W3-7	410.70	5226.07	69476.43	-180663.35	69461.57	905.32	1835.63	5735.71
W3-8	291.90	7045.51	78309.28	-296525.15	75594.05	705.00	1270.75	4127.54
W3-9	285.34	9020.69	76338.39	-354812.45	81316.96	871.92	1161.35	2561.41
W3-10	1079.39	11501.58	114477.76	225651.15	101610.35	1175.05	1848.79	3200.42
W3-11	1191.31	12559.99	108691.85	420981.55	115683.16	1048.37	2133.59	3704.86
W3-12	459.78	12371.79	102234.41	-323354.95	114171.46	995.45	1616.11	2312.57
SRM614-14	987.11	18068.34	104.96	-809488.00	-18875.45	1002.61	418.94	4932.79
SRM612-14	38723.40	54214.46	39429.86	-819437.37	-63944.10	9046.61	35726.46	28576.60
SRM610-14	216583.40	230456.33	244034.49	-590645.15	-67639.60	47988.35	221433.14	144196.57
AP1-14	193.14	15141.52	1280.93	-923242.69	-22753.83	549.92	-148.22	821.84
AP2-14	436.50	19211.19	6575.16	-909558.94	41965.49	1023.09	1857.87	2707.46
AP3-14	2342.27	49814.67	41193.91	-492039.35	83725.33	4001.90	13041.65	18166.86
AP4-14	2766.72	70582.60	55733.31	-327486.85	119606.46	5900.51	17257.56	23407.53
zero correction								
SRM614-13	1045.99	0.00	1160.69	329025.65	0.00	340.60	161.34	5269.47
SRM612-13	36589.91	21857.12	44464.09	207738.35	0.00	8689.17	39034.20	29750.61
SRM610-13	239955.49	235840.11	300427.99	401716.25	0.00	57565.04	273224.19	176595.74
AP1-13	454.18	0.00	4031.58	0.00	0.00	665.72	0.00	754.52
AP2-13	701.22	0.00	11841.31	0.00	0.00	1071.53	2312.51	4058.70
AP3-13	2598.99	28755.28	50520.89	347841.75	0.00	4711.47	15300.99	22332.13
AP4-13	3071.80	56664.11	70718.16	562751.75	33287.16	7724.32	21277.18	30909.41
W3-1	470.06	0.00	42987.36	0.00	39259.03	0.00	3192.00	4848.15
W3-2	36.42	0.00	40472.74	0.00	35781.97	0.00	747.98	1435.53
W3-3	73.02	0.00	37416.81	0.00	44002.22	0.00	1124.27	1502.57
W3-4	162.90	0.00	52946.22	0.00	46166.47	110.36	1002.95	2620.01
W3-5	139.82	482.28	62105.59	0.00	53292.83	136.96	1066.39	2819.70
W3-6	122.10	2521.81	53534.26	0.00	58054.10	494.64	937.71	1879.29
W3-7	410.70	5226.07	69476.43	0.00	69461.57	905.32	1835.63	5735.71
W3-8	291.90	7045.51	78309.28	0.00	75594.05	705.00	1270.75	4127.54
W3-9	285.34	9020.69	76338.39	0.00	81316.96	871.92	1161.35	2561.41

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	1079.39	11501.58	114477.76	225651.15	101610.35	1175.05	1848.79	3200.42
W3-11	1191.31	12559.99	108691.85	420981.55	115683.16	1048.37	2133.59	3704.86
W3-12	459.78	12371.79	102234.41	0.00	114171.46	995.45	1616.11	2312.57
SRM614-14	987.11	18068.34	104.96	0.00	0.00	1002.61	418.94	4932.79
SRM612-14	38723.40	54214.46	39429.86	0.00	0.00	9046.61	35726.46	28576.60
SRM610-14	216583.40	230456.33	244034.49	0.00	0.00	47988.35	221433.14	144196.57
AP1-14	193.14	15141.52	1280.93	0.00	0.00	549.92	0.00	821.84
AP2-14	436.50	19211.19	6575.16	0.00	41965.49	1023.09	1857.87	2707.46
AP3-14	2342.27	49814.67	41193.91	0.00	83725.33	4001.90	13041.65	18166.86
AP4-14	2766.72	70582.60	55733.31	0.00	119606.46	5900.51	17257.56	23407.53
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000000	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-13	0.000359	0.000000	0.000398	0.112895	0.000000	0.000117	0.000055	0.001808
SRM612-13	0.012564	0.007505	0.015267	0.071330	0.000000	0.002984	0.013403	0.010215
SRM610-13	0.202735	0.199258	0.253828	0.339405	0.000000	0.048636	0.230844	0.149203
AP1-13	0.000029	0.000000	0.000258	0.000000	0.000000	0.000043	0.000000	0.000048
AP2-13	0.000043	0.000000	0.000723	0.000000	0.000000	0.000065	0.000141	0.000248
AP3-13	0.000150	0.001662	0.002921	0.020110	0.000000	0.000272	0.000885	0.001291
AP4-13	0.000176	0.003241	0.004044	0.032183	0.001904	0.000442	0.001217	0.001768
W3-1	0.000078	0.000000	0.007132	0.000000	0.000000	0.006513	0.000530	0.000804
W3-2	0.000006	0.000000	0.006264	0.000000	0.005538	0.000000	0.000116	0.000222
W3-3	0.000012	0.000000	0.005965	0.000000	0.007015	0.000000	0.000179	0.000240
W3-4	0.000028	0.000000	0.009164	0.000000	0.007990	0.000019	0.000174	0.000453
W3-5	0.000022	0.000077	0.009856	0.000000	0.008458	0.000022	0.000169	0.000447
W3-6	0.000019	0.000393	0.008342	0.000000	0.009046	0.000077	0.000146	0.000293
W3-7	0.000078	0.000993	0.013196	0.000000	0.013193	0.000172	0.000349	0.001089
W3-8	0.000049	0.001172	0.013030	0.000000	0.012578	0.000117	0.000211	0.000687
W3-9	0.000046	0.001449	0.012260	0.000000	0.013059	0.000140	0.000187	0.000411
W3-10	0.000123	0.001315	0.013085	0.025793	0.011615	0.000134	0.000211	0.000366
W3-11	0.000136	0.001431	0.012381	0.047953	0.013177	0.000119	0.000243	0.000422
W3-12	0.000051	0.001386	0.011451	0.000000	0.012788	0.000111	0.000181	0.000259
SRM614-14	0.000418	0.007655	0.000044	0.000000	0.000000	0.000425	0.000177	0.002090
SRM612-14	0.015439	0.021615	0.015720	0.000000	0.000000	0.003607	0.014244	0.011393
SRM610-14	0.232074	0.246939	0.261488	0.000000	0.000000	0.051421	0.237270	0.154510
AP1-14	0.000015	0.001181	0.000100	0.000000	0.000000	0.000043	0.000000	0.000064
AP2-14	0.000033	0.001435	0.000491	0.000000	0.003135	0.000076	0.000139	0.000202
AP3-14	0.000161	0.003423	0.002830	0.000000	0.005752	0.000275	0.000896	0.001248
AP4-14	0.000188	0.004802	0.003792	0.000000	0.008138	0.000401	0.001174	0.001593
standardize signal averages AP								
AP1	0.000022	0.000590	0.000179	0.000000	0.000000	0.000043	0.000000	0.000056
AP2	0.000038	0.000718	0.000607	0.000000	0.001567	0.000071	0.000140	0.000225
AP3	0.000156	0.002542	0.002876	0.010055	0.002876	0.000274	0.000890	0.001270
AP4	0.000182	0.004021	0.003918	0.016092	0.005021	0.000422	0.001195	0.001680
linest from std sig ave								
	0.017163	0.010026	0.009856	0.163993	0.591575	0.136822	0.011598	0.016211
standardize signal averages SRM								
srm614-2	0.000389	0.003827	0.000221	0.056448	0.000000	0.000271	0.000116	0.001949
srm612-2	0.014001	0.014560	0.015494	0.035665	0.000000	0.003295	0.013823	0.010804
srm610-2	0.217405	0.223099	0.257658	0.169702	0.000000	0.050028	0.234057	0.151857
linest from std sig ave								
	0.023727	0.021220	0.019642	0.027901	0.000000	0.103598	0.020209	0.033069
concentration data								
SRM614-13	0.53	0.00	0.34	1587.82	0.00	1.37	0.06	2.51
SRM612-13	18.49	6.45	12.91	1003.22	0.00	35.01	13.33	14.20
SRM610-13	298.41	171.34	214.56	4773.57	0.00	570.71	229.62	207.44

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.20	0.00	1.01	0.00	0.00	2.32	0.00	0.31
AP2-13	0.29	0.00	2.84	0.00	0.00	3.57	0.65	1.60
AP3-13	1.03	6.65	11.48	1315.67	0.00	14.87	4.09	8.35
AP4-13	1.20	12.96	15.90	2105.52	449.27	24.11	5.63	11.43
W3-1	0.53	0.00	28.04	0.00	1537.18	0.00	2.45	5.20
W3-2	0.04	0.00	24.63	0.00	1306.89	0.00	0.54	1.44
W3-3	0.08	0.00	23.46	0.00	1655.63	0.00	0.83	1.55
W3-4	0.19	0.00	36.03	0.00	1885.75	1.04	0.80	2.93
W3-5	0.15	0.31	38.75	0.00	1996.02	1.19	0.78	2.89
W3-6	0.13	1.57	32.80	0.00	2134.96	4.21	0.68	1.89
W3-7	0.53	3.97	51.88	0.00	3113.49	9.39	1.61	7.05
W3-8	0.33	4.69	51.23	0.00	2968.49	6.40	0.98	4.44
W3-9	0.31	5.79	48.21	0.00	3082.01	7.64	0.86	2.66
W3-10	0.84	5.26	51.45	1687.46	2741.06	7.33	0.98	2.37
W3-11	0.93	5.72	48.68	3137.20	3109.81	6.52	1.12	2.73
W3-12	0.35	5.54	45.02	0.00	3017.99	6.09	0.84	1.68
SRM614-14	0.62	6.58	0.04	0.00	0.00	4.98	0.18	2.91
SRM612-14	22.72	18.59	13.29	0.00	0.00	42.32	14.17	15.84
SRM610-14	341.59	212.34	221.03	0.00	0.00	603.38	236.01	214.82
AP1-14	0.10	4.72	0.39	0.00	0.00	2.34	0.00	0.41
AP2-14	0.22	5.74	1.93	0.00	739.86	4.17	0.64	1.31
AP3-14	1.10	13.69	11.13	0.00	1357.56	15.01	4.15	8.07
AP4-14	1.29	19.21	14.91	0.00	1920.50	21.91	5.43	10.30

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-11	1091.21	56373.40	9169.37	1972063.10	26906.55	3634.58	963.49	1107.33
SRM614-11	2386.77	57470.28	9106.13	1599412.60	22198.05	4472.43	1787.69	7244.16
SRM612-11	39811.26	93793.25	100443.41	1606866.00	23102.01	12638.19	39933.15	29749.85
SRM610-11	261702.03	317692.31	355290.97	1786702.00	25535.34	63194.31	285062.16	169671.84
AP1-11	1625.81	60243.10	119128.68	1509362.10	52123.93	4390.22	1891.21	2621.57
AP2-11	1953.81	67226.98	140550.19	1522936.10	104993.07	5054.75	4888.99	6452.04
AP3-11	5151.67	124751.02	158838.22	2149664.80	156443.13	10601.82	27498.91	40624.63
AP4-11	4466.42	142737.44	111530.55	1955292.80	191423.31	12354.83	22463.81	31725.30
W1-1	1881.21	65322.41	90367.35	975405.25	189096.75	4054.54	3137.22	3062.18
W1-2	1716.13	65761.09	53684.82	904966.50	200024.33	4077.22	2975.42	2377.53
W1-3	1481.29	68114.10	40531.99	869646.25	209711.94	4191.78	3978.94	2987.58
W1-4	2643.49	75069.63	170897.36	1055139.40	226310.59	4725.15	3852.06	4199.58
W1-5	1956.97	74253.46	87065.57	809154.69	242435.36	4544.71	3591.34	3027.06
W1-6	2035.73	75550.87	82837.83	745993.38	257345.38	4455.43	3387.54	2534.01
W1-7	2711.14	77114.23	146290.94	1458280.80	283850.31	4801.99	6112.27	4525.19
W1-8	1972.49	76688.63	51645.53	887615.38	285030.41	4371.58	4572.03	2626.17
W1-9	2635.97	77727.48	71541.20	1058894.10	297845.34	4596.99	5168.63	3245.94
W1-10	3029.66	79508.89	110721.18	1139517.30	306752.69	4724.71	4989.59	3909.22
W1-11	2762.82	77517.20	66699.26	832724.94	308818.75	4519.51	4749.95	2663.73
W1-12	2921.06	78296.52	69154.47	906161.19	318610.38	4606.67	4785.91	3045.90
W1-13	1945.65	79472.45	55431.63	898936.50	322059.88	4478.19	4609.31	3064.06
W1-14	2109.05	79619.53	18354.86	708456.25	323042.09	4414.86	4199.38	2563.17
W1-15	2028.57	80119.17	15401.57	682611.38	327298.97	4483.03	4394.59	2350.09
W1-16	1708.01	80768.41	35963.20	844255.25	335099.63	4644.15	4210.10	3269.78
W1-17	1581.21	82098.86	11080.10	626890.06	332554.22	4698.67	4046.22	2339.49
W1-18	1640.25	82938.19	10303.02	626777.06	333367.16	4672.55	4024.22	2095.17
SRM614-12	1807.57	87891.41	5446.75	521091.97	169079.80	4824.51	2477.49	5792.63
SRM612-12	35384.60	119294.47	39281.14	542879.06	107606.05	11677.55	31500.06	24383.02
SRM610-12	230904.14	307261.66	243854.17	788405.06	97316.71	50891.45	213367.20	133832.56
AP1-12	1077.77	86730.29	8941.65	505340.00	155168.44	4755.15	1763.49	1994.57
AP2-12	1196.81	90393.71	12726.67	536319.38	223908.81	5170.87	3752.58	3821.54
AP3-12	3117.18	117685.58	45189.90	910412.69	261951.44	7716.60	14114.48	18564.02
AP4-12	4138.90	160426.02	69542.75	1254846.90	284409.28	12138.39	21671.80	28448.52
blank-12	731.04	85509.84	4222.30	561165.69	333346.41	5081.71	3017.54	904.05
blank average	911.13	70941.62	6695.84	1266614.40	180126.48	4358.14	1990.51	1005.69

blank subtraction								
SRM614-11	1475.65	-13471.34	2410.29	332798.21	-157928.44	114.28	-202.82	6238.47
SRM612-11	38900.14	22851.63	93747.57	340251.61	-157024.47	8280.05	37942.63	28744.16
SRM610-11	260790.90	246750.69	348595.13	520087.61	-154591.14	58836.17	283071.65	168666.15
AP1-11	714.68	-10698.52	112432.84	242747.71	-128002.55	32.08	-99.30	1615.89
AP2-11	1042.69	-3714.64	133854.35	256321.71	-75133.41	696.60	2898.48	5446.35
AP3-11	4240.54	53809.40	152142.38	883050.41	-23683.35	6243.67	25508.40	39618.94

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	3555.30	71795.82	104834.71	688678.41	11296.83	7996.69	20473.30	30719.61
W1-1	970.09	-5619.22	83671.51	-291209.15	8970.27	-303.60	1146.71	2056.49
W1-2	805.00	-5180.54	46988.98	-361647.90	19897.85	-280.92	984.91	1371.85
W1-3	570.16	-2827.52	33836.15	-396968.15	29585.46	-166.36	1988.43	1981.89
W1-4	1732.37	4128.00	164201.52	-211475.00	46184.11	367.00	1861.55	3193.90
W1-5	1045.85	3311.84	80369.73	-457459.71	62308.88	186.56	1600.83	2021.37
W1-6	1124.61	4609.25	76141.99	-520621.02	77218.90	97.28	1397.03	1528.33
W1-7	1800.01	6172.61	139595.10	191666.41	103723.83	443.84	4121.76	3519.50
W1-8	1061.37	5747.01	44949.69	-378999.02	104903.93	13.44	2581.51	1620.49
W1-9	1724.85	6785.86	64845.37	-207720.30	117718.86	238.84	3178.12	2240.25
W1-10	2118.53	8567.27	104025.34	-127097.10	126626.21	366.56	2999.08	2903.54
W1-11	1851.69	6575.57	60003.42	-433889.46	128692.27	161.36	2759.44	1658.05
W1-12	2009.93	7354.90	62458.63	-360453.21	138483.90	248.52	2795.40	2040.21
W1-13	1034.53	8530.82	48735.80	-367677.90	141933.40	120.04	2618.79	2058.37
W1-14	1197.93	8677.91	11659.03	-558158.15	142915.61	56.72	2208.87	1557.49
W1-15	1117.45	9177.55	8705.73	-584003.02	147172.49	124.88	2404.07	1344.41
W1-16	796.88	9826.79	29267.37	-422359.15	154973.15	286.00	2219.59	2264.09
W1-17	670.08	11157.24	4384.27	-639724.34	152427.74	340.52	2055.71	1333.81
W1-18	729.12	11996.57	3607.18	-639837.34	153240.68	314.40	2033.71	1089.49
SRM614-12	896.45	16949.79	-1249.09	-745522.43	-11046.68	466.36	486.98	4786.95
SRM612-12	34473.47	48352.85	32585.30	-723735.34	-72520.43	7319.40	29509.55	23377.33
SRM610-12	229993.01	236320.04	237158.33	-478209.34	-82809.77	46533.30	211376.69	132826.87
AP1-12	166.64	15788.67	2245.81	-761274.40	-24958.04	397.00	-227.02	988.89
AP2-12	285.68	19452.09	6030.83	-730295.02	43782.33	812.72	1762.07	2815.86
AP3-12	2206.05	46743.96	38494.06	-356201.71	81824.96	3358.46	12123.97	17558.34
AP4-12	3227.78	89484.40	62846.91	-11767.50	104282.80	7780.24	19681.29	27442.83

zero correction

SRM614-11	1475.65	0.00	2410.29	332798.21	0.00	114.28	0.00	6238.47
SRM612-11	38900.14	22851.63	93747.57	340251.61	0.00	8280.05	37942.63	28744.16
SRM610-11	260790.90	246750.69	348595.13	520087.61	0.00	58836.17	283071.65	168666.15
AP1-11	714.68	0.00	112432.84	242747.71	0.00	32.08	0.00	1615.89
AP2-11	1042.69	0.00	133854.35	256321.71	0.00	696.60	2898.48	5446.35
AP3-11	4240.54	53809.40	152142.38	883050.41	0.00	6243.67	25508.40	39618.94
AP4-11	3555.30	71795.82	104834.71	688678.41	11296.83	7996.69	20473.30	30719.61
W1-1	970.09	0.00	83671.51	0.00	8970.27	0.00	1146.71	2056.49
W1-2	805.00	0.00	46988.98	0.00	19897.85	0.00	984.91	1371.85
W1-3	570.16	0.00	33836.15	0.00	29585.46	0.00	1988.43	1981.89
W1-4	1732.37	4128.00	164201.52	0.00	46184.11	367.00	1861.55	3193.90
W1-5	1045.85	3311.84	80369.73	0.00	62308.88	186.56	1600.83	2021.37
W1-6	1124.61	4609.25	76141.99	0.00	77218.90	97.28	1397.03	1528.33
W1-7	1800.01	6172.61	139595.10	191666.41	103723.83	443.84	4121.76	3519.50
W1-8	1061.37	5747.01	44949.69	0.00	104903.93	13.44	2581.51	1620.49
W1-9	1724.85	6785.86	64845.37	0.00	117718.86	238.84	3178.12	2240.25
W1-10	2118.53	8567.27	104025.34	0.00	126626.21	366.56	2999.08	2903.54
W1-11	1851.69	6575.57	60003.42	0.00	128692.27	161.36	2759.44	1658.05
W1-12	2009.93	7354.90	62458.63	0.00	138483.90	248.52	2795.40	2040.21
W1-13	1034.53	8530.82	48735.80	0.00	141933.40	120.04	2618.79	2058.37
W1-14	1197.93	8677.91	11659.03	0.00	142915.61	56.72	2208.87	1557.49
W1-15	1117.45	9177.55	8705.73	0.00	147172.49	124.88	2404.07	1344.41
W1-16	796.88	9826.79	29267.37	0.00	154973.15	286.00	2219.59	2264.09
W1-17	670.08	11157.24	4384.27	0.00	152427.74	340.52	2055.71	1333.81
W1-18	729.12	11996.57	3607.18	0.00	153240.68	314.40	2033.71	1089.49
SRM614-12	896.45	16949.79	0.00	0.00	0.00	466.36	486.98	4786.95
SRM612-12	34473.47	48352.85	32585.30	0.00	0.00	7319.40	29509.55	23377.33
SRM610-12	229993.01	236320.04	237158.33	0.00	0.00	46533.30	211376.69	132826.87
AP1-12	166.64	15788.67	2245.81	0.00	0.00	397.00	0.00	988.89
AP2-12	285.68	19452.09	6030.83	0.00	43782.33	812.72	1762.07	2815.86
AP3-12	2206.05	46743.96	38494.06	0.00	81824.96	3358.46	12123.97	17558.34
AP4-12	3227.78	89484.40	62846.91	0.00	104282.80	7780.24	19681.29	27442.83

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
SRM614-11	0.000422	0.000000	0.000690	0.095249	0.000000	0.000033	0.000000	0.001785
SRM612-11	0.012674	0.007445	0.030544	0.110860	0.000000	0.002698	0.012362	0.009365
SRM610-11	0.196199	0.185636	0.262256	0.391273	0.000000	0.044264	0.212961	0.126891
AP1-11	0.000039	0.000000	0.006121	0.013216	0.000000	0.000002	0.000000	0.000088
AP2-11	0.000059	0.000000	0.007618	0.014588	0.000000	0.000040	0.000165	0.000310
AP3-11	0.000230	0.002913	0.008237	0.047810	0.000000	0.000338	0.001381	0.002145
AP4-11	0.000219	0.004424	0.006459	0.042431	0.000696	0.000493	0.001261	0.001893
W1-1	0.000075	0.000000	0.006458	0.000000	0.000692	0.000000	0.000089	0.000159
W1-2	0.000078	0.000000	0.004578	0.000000	0.001939	0.000000	0.000096	0.000134
W1-3	0.000067	0.000000	0.003996	0.000000	0.003494	0.000000	0.000235	0.000234
W1-4	0.000095	0.000226	0.008993	0.000000	0.002530	0.000020	0.000102	0.000175
W1-5	0.000063	0.000199	0.004840	0.000000	0.003753	0.000011	0.000096	0.000122
W1-6	0.000067	0.000273	0.004517	0.000000	0.004581	0.000006	0.000083	0.000091
W1-7	0.000097	0.000334	0.007548	0.010364	0.005608	0.000024	0.000223	0.000190
W1-8	0.000062	0.000334	0.002611	0.000000	0.006094	0.000001	0.000150	0.000094
W1-9	0.000099	0.000389	0.003714	0.000000	0.006742	0.000014	0.000182	0.000128
W1-10	0.000103	0.000415	0.005044	0.000000	0.006140	0.000018	0.000145	0.000141
W1-11	0.000089	0.000315	0.002876	0.000000	0.006167	0.000008	0.000132	0.000079
W1-12	0.000103	0.000379	0.003214	0.000000	0.007127	0.000013	0.000144	0.000105
W1-13	0.000055	0.000455	0.002597	0.000000	0.007563	0.000006	0.000140	0.000110
W1-14	0.000062	0.000446	0.000599	0.000000	0.007338	0.000003	0.000113	0.000080
W1-15	0.000059	0.000486	0.000461	0.000000	0.007801	0.000007	0.000127	0.000071
W1-16	0.000058	0.000711	0.002118	0.000000	0.011216	0.000021	0.000161	0.000164
W1-17	0.000049	0.000808	0.000317	0.000000	0.011034	0.000025	0.000149	0.000097
W1-18	0.000054	0.000893	0.000268	0.000000	0.011401	0.000023	0.000151	0.000081
SRM614-12	0.000389	0.007358	0.000000	0.000000	0.000000	0.000202	0.000211	0.002078
SRM612-12	0.015647	0.021946	0.014790	0.000000	0.000000	0.003322	0.013394	0.010610
SRM610-12	0.234225	0.240668	0.241522	0.000000	0.000000	0.047390	0.215266	0.135271
AP1-12	0.000013	0.001209	0.000172	0.000000	0.000000	0.000030	0.000000	0.000076
AP2-12	0.000023	0.001592	0.000494	0.000000	0.0003584	0.000067	0.000144	0.000230
AP3-12	0.000169	0.003580	0.002948	0.000000	0.006267	0.000257	0.000929	0.001345
AP4-12	0.000237	0.006558	0.004606	0.000000	0.007643	0.000570	0.001442	0.002011
standardize signal averages AP								
AP1	0.000026	0.000604	0.003147	0.006608	0.000000	0.000016	0.000000	0.000082
AP2	0.000041	0.000796	0.004056	0.007294	0.001792	0.000053	0.000155	0.000270
AP3	0.000199	0.003247	0.005593	0.023905	0.003134	0.000298	0.001155	0.001745
AP4	0.000228	0.005491	0.005533	0.021216	0.004169	0.000531	0.001352	0.001952
linest from std sig ave								
	0.013602	0.007545	0.004736	0.117198	0.667362	0.108109	0.009635	0.012844
standardize signal averages SRM								
srM614-2	0.000406	0.003679	0.000345	0.047625	0.000000	0.000118	0.000106	0.001932
srM612-2	0.014161	0.014696	0.022667	0.055430	0.000000	0.003010	0.012878	0.009988
srM610-2	0.215212	0.213152	0.251889	0.195637	0.000000	0.045827	0.214113	0.131081
linest from std sig ave								
	0.023967	0.022207	0.020055	0.024742	0.000000	0.113099	0.022091	0.038296
concentration data								
SRM614-11	0.49	0.00	0.28	957.38	0.00	0.30	0.00	1.97
SRM612-11	14.78	4.82	12.41	1114.28	0.00	25.01	10.22	10.32
SRM610-11	228.87	120.12	106.53	3932.80	0.00	410.40	175.98	139.77
AP1-11	0.21	0.00	11.57	617.92	0.00	0.08	0.00	0.45
AP2-11	0.32	0.00	14.39	682.06	0.00	1.71	0.63	1.59
AP3-11	1.25	8.77	15.56	2235.36	0.00	14.58	5.31	10.99
AP4-11	1.19	13.31	12.20	1983.85	185.31	21.25	4.85	9.70
W1-1	0.41	0.00	12.20	0.00	184.32	0.00	0.34	0.81
W1-2	0.43	0.00	8.65	0.00	516.17	0.00	0.37	0.68
W1-3	0.37	0.00	7.55	0.00	930.14	0.00	0.90	1.20
W1-4	0.51	0.68	16.99	0.00	673.44	0.87	0.39	0.90
W1-5	0.34	0.60	9.15	0.00	999.09	0.48	0.37	0.62
W1-6	0.36	0.82	8.53	0.00	1219.52	0.25	0.32	0.46
W1-7	0.53	1.00	14.26	484.54	1493.16	1.04	0.86	0.98
W1-8	0.33	1.00	4.93	0.00	1622.42	0.03	0.58	0.48
W1-9	0.54	1.17	7.02	0.00	1794.98	0.59	0.70	0.66
W1-10	0.56	1.25	9.53	0.00	1634.73	0.77	0.56	0.72
W1-11	0.48	0.95	5.43	0.00	1641.97	0.33	0.51	0.41
W1-12	0.56	1.14	6.07	0.00	1897.50	0.55	0.55	0.54
W1-13	0.30	1.37	4.91	0.00	2013.57	0.28	0.54	0.56
W1-14	0.33	1.34	1.13	0.00	1953.64	0.13	0.44	0.41
W1-15	0.32	1.46	0.87	0.00	2076.80	0.29	0.49	0.37
W1-16	0.31	2.14	4.00	0.00	2986.03	0.89	0.62	0.84
W1-17	0.26	2.43	0.60	0.00	2937.61	1.06	0.57	0.49
W1-18	0.29	2.69	0.51	0.00	3035.26	1.01	0.58	0.42

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.45	4.76	0.00	0.00	0.00	1.88	0.17	2.29
SRM612-12	18.25	14.20	6.01	0.00	0.00	30.80	11.07	11.69
SRM610-12	273.23	155.73	98.11	0.00	0.00	439.38	177.89	149.00
AP1-12	0.07	3.64	0.32	0.00	0.00	1.31	0.00	0.39
AP2-12	0.13	4.79	0.93	0.00	954.11	2.87	0.55	1.18
AP3-12	0.92	10.78	5.57	0.00	1668.54	11.09	3.57	6.89
AP4-12	1.28	19.74	8.70	0.00	2034.78	24.59	5.54	10.31

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-9	1236.09	64221.52	10714.10	2526042.00	31022.30	4907.47	1041.29	1208.49
SRM614-9	2089.81	62616.19	9855.22	2073268.50	26159.35	5157.19	1628.05	5669.19
SRM612-9	40737.07	99685.81	54333.59	1838546.60	22987.97	13779.88	41764.88	31463.02
SRM610-9	249674.20	310338.19	322119.69	2040919.10	26046.55	61835.07	278173.81	160964.47
AP1-9	1569.61	62956.16	11296.78	1502179.30	47789.31	4732.07	1628.93	1971.21
AP2-9	1821.61	69738.31	21588.44	1460378.30	107494.73	5310.87	4796.27	6082.95
AP3-9	4507.51	113442.00	71340.72	2008458.90	155274.23	10165.86	21538.88	30394.13
AP4-9	5449.39	144925.09	91957.48	2249444.80	200102.25	12799.43	28406.88	40011.34
T2-1	1344.17	79483.53	7884.84	1206936.60	198446.00	5131.07	4695.15	4488.87
T2-2	1138.49	70222.16	5930.71	1073868.50	215601.53	4563.63	4341.94	2685.90
T2-3	1075.53	75344.42	6227.04	1172213.60	228801.73	4291.14	3874.34	2966.66
T2-4	1089.49	74674.02	7923.24	1638021.00	228952.69	4334.74	5022.03	4981.71
T2-5	892.77	72792.97	5957.55	1757152.80	221816.41	3741.98	4498.75	5146.15
T2-6	1024.13	73921.14	5534.79	1934340.00	226917.28	3835.82	3841.82	5361.67
T2-7	971.97	67386.54	6583.36	1264113.00	244055.69	3989.14	3844.34	3359.66
T2-8	1036.13	69955.80	6696.56	1493590.40	263830.72	4070.14	3971.54	3803.66
T2-9	954.53	69253.43	6914.16	1385785.60	272562.50	4018.34	4035.54	3029.34
T2-10	976.37	68548.02	5905.03	885178.63	282515.66	4411.59	3129.10	3719.74
T2-11	938.89	70352.59	6159.71	895200.63	292593.28	4619.99	3231.98	3536.14
T2-12	903.41	71773.96	6235.96	920063.81	302653.50	4348.98	3164.58	1907.25
T2-13	1165.33	74061.94	7449.04	847407.81	306931.97	5680.35	3461.58	5371.55
T2-14	925.05	75780.79	6837.96	811677.75	310641.38	5444.07	3331.30	4189.50
T2-15	1029.37	76430.63	6635.16	787674.38	315673.22	5775.39	3371.82	4553.43
T2-16	1129.65	77534.44	8712.21	770044.13	315995.84	5341.19	3718.62	7376.72
T2-17	1054.93	76424.23	8991.25	737383.81	320767.16	5290.87	3556.42	6887.28
T2-18	989.17	77168.59	9098.17	707704.13	327441.44	5426.03	3664.38	9315.61
SRM614-10	1624.45	84665.59	5331.39	651290.31	193790.66	5072.43	2634.65	4581.19
SRM612-10	33628.47	115841.45	38688.42	666129.94	126581.76	11795.71	31399.54	23966.14
SRM610-10	234615.88	310330.50	257523.00	926004.44	111689.75	53300.86	227101.11	141740.52
AP1-10	1064.21	84296.80	7051.84	614438.63	170412.36	4887.59	1950.17	1985.81
AP2-10	1317.05	87744.34	13933.28	657509.44	233114.95	5271.43	4257.94	4312.82
AP3-10	3396.66	123759.73	50691.84	1114860.50	267723.63	8930.69	16191.21	20724.24
AP4-10	4201.62	148258.52	71196.16	1351678.10	295897.63	11625.67	22029.92	29859.17
blank-10	777.84	80969.70	4374.78	682759.13	328700.38	5006.95	2936.90	968.73
blank average	1006.97	72595.61	7544.44	1604400.57	179861.34	4957.21	1989.09	1088.61

blank subtraction								
SRM614-9	1082.85	-9979.42	2310.77	468867.94	-153701.99	199.98	-361.04	4580.59
SRM612-9	39730.10	27090.20	46789.14	234146.04	-156873.37	8822.67	39775.78	30374.41
SRM610-9	248667.23	237742.58	314575.25	436518.54	-153814.79	56877.86	276184.72	159875.86
AP1-9	562.64	-9639.45	3752.34	-102221.27	-132072.03	-225.14	-360.16	882.61
AP2-9	814.64	-2857.29	14044.00	-144022.27	-72366.61	353.66	2807.18	4994.35
AP3-9	3500.54	40846.39	63796.28	404058.34	-24587.11	5208.65	19549.79	29305.52
AP4-9	4442.42	72329.48	84413.03	645044.24	20240.91	7842.22	26417.79	38922.74
T2-1	337.20	6887.92	340.40	-397463.97	18584.66	173.86	2706.06	3400.26
T2-2	131.52	-2373.45	-1613.73	-530532.07	35740.19	-393.58	2352.85	1597.29
T2-3	68.56	2748.81	-1317.41	-432186.97	48940.39	-666.06	1885.25	1878.05
T2-4	82.52	2078.42	378.80	33620.44	49091.35	-622.46	3032.94	3893.10
T2-5	-114.20	197.36	-1586.89	152752.24	41955.07	-1215.23	2509.65	4057.54
T2-6	17.16	1325.53	-2009.65	329939.44	47055.94	-1121.39	1852.73	4273.06
T2-7	-35.00	-5209.07	-961.09	-340287.57	64194.35	-968.07	1855.25	2271.05
T2-8	29.16	-2639.81	-847.89	-110810.17	83969.38	-887.07	1982.45	2715.06
T2-9	-52.44	-3342.18	-630.28	-218614.97	92701.16	-938.87	2046.45	1940.73
T2-10	-30.60	-4047.58	-1639.41	-719221.94	102654.32	-545.62	1140.01	2631.13
T2-11	-68.08	-2243.01	-1384.73	-709199.94	112731.94	-337.22	1242.89	2447.53
T2-12	-103.56	-821.65	-1308.49	-684336.76	122792.16	-608.22	1175.49	818.64
T2-13	158.36	1466.33	-95.40	-756992.76	127070.63	723.14	1472.49	4282.94
T2-14	-81.92	3185.18	-706.48	-792722.82	130780.04	486.86	1342.21	3100.90
T2-15	22.40	3835.03	-909.29	-816726.19	135811.88	818.18	1382.73	3464.82

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	122.68	4938.83	1167.77	-834356.44	136134.50	383.98	1729.53	6288.12
T2-17	47.96	3828.62	1446.81	-867016.76	140905.82	333.66	1567.33	5798.67
T2-18	-17.80	4572.99	1553.73	-896696.44	147580.10	468.82	1675.29	8227.01
SRM614-10	617.48	12069.99	-2213.05	-953110.26	13929.32	115.22	645.56	3492.58
SRM612-10	32621.50	43245.84	31143.98	-938270.63	-53279.58	6838.50	29410.45	22877.53
SRM610-10	233608.91	237734.89	249978.56	-678396.13	-68171.59	48343.65	225112.02	140651.91
AP1-10	57.24	11701.19	-492.60	-989961.94	-9448.98	-69.62	-38.92	897.21
AP2-10	310.08	15148.73	6388.84	-946891.13	53253.61	314.22	2268.85	3224.22
AP3-10	2389.69	51164.12	43147.40	-489540.07	87862.29	3973.48	14202.12	19635.63
AP4-10	3194.66	75662.91	63651.72	-252722.47	116036.29	6668.46	20040.83	28770.56
zero correction								
SRM614-9	1082.85	0.00	2310.77	468867.94	0.00	199.98	0.00	4580.59
SRM612-9	39730.10	27090.20	46789.14	234146.04	0.00	8822.67	39775.78	30374.41
SRM610-9	248667.23	237742.58	314575.25	436518.54	0.00	56877.86	276184.72	159875.86
AP1-9	562.64	0.00	3752.34	0.00	0.00	0.00	0.00	882.61
AP2-9	814.64	0.00	14044.00	0.00	0.00	353.66	2807.18	4994.35
AP3-9	3500.54	40846.39	63796.28	404058.34	0.00	5208.65	19549.79	29305.52
AP4-9	4442.42	72329.48	84413.03	645044.24	20240.91	7842.22	26417.79	38922.74
T2-1	337.20	6887.92	340.40	0.00	18584.66	173.86	2706.06	3400.26
T2-2	131.52	0.00	0.00	0.00	35740.19	0.00	2352.85	1597.29
T2-3	68.56	2748.81	0.00	0.00	48940.39	0.00	1885.25	1878.05
T2-4	82.52	2078.42	378.80	33620.44	49091.35	0.00	3032.94	3893.10
T2-5	0.00	197.36	0.00	152752.24	41955.07	0.00	2509.65	4057.54
T2-6	17.16	1325.53	0.00	329939.44	47055.94	0.00	1852.73	4273.06
T2-7	0.00	0.00	0.00	0.00	64194.35	0.00	1855.25	2271.05
T2-8	29.16	0.00	0.00	0.00	83969.38	0.00	1982.45	2715.06
T2-9	0.00	0.00	0.00	0.00	92701.16	0.00	2046.45	1940.73
T2-10	0.00	0.00	0.00	0.00	102654.32	0.00	1140.01	2631.13
T2-11	0.00	0.00	0.00	0.00	112731.94	0.00	1242.89	2447.53
T2-12	0.00	0.00	0.00	0.00	122792.16	0.00	1175.49	818.64
T2-13	158.36	1466.33	0.00	0.00	127070.63	723.14	1472.48	4282.94
T2-14	0.00	3185.18	0.00	0.00	130780.04	486.86	1342.21	3100.90
T2-15	22.40	3835.03	0.00	0.00	135811.88	818.18	1382.73	3464.82
T2-16	122.68	4938.83	1167.77	0.00	136134.50	383.98	1729.53	6288.12
T2-17	47.96	3828.62	1446.81	0.00	140905.82	333.66	1567.33	5798.67
T2-18	0.00	4572.99	1553.73	0.00	147580.10	468.82	1675.29	8227.01
SRM614-10	617.48	12069.99	0.00	0.00	13929.32	115.22	645.56	3492.58
SRM612-10	32621.50	43245.84	31143.98	0.00	0.00	6838.50	29410.45	22877.53
SRM610-10	233608.91	237734.89	249978.56	0.00	0.00	48343.65	225112.02	140651.91
AP1-10	57.24	11701.19	0.00	0.00	0.00	0.00	0.00	897.21
AP2-10	310.08	15148.73	6388.84	0.00	53253.61	314.22	2268.85	3224.22
AP3-10	2389.69	51164.12	43147.40	0.00	87862.29	3973.48	14202.12	19635.63
AP4-10	3194.66	75662.91	63651.72	0.00	116036.29	6668.46	20040.83	28770.56
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-9	0.000403	0.000000	0.000861	0.174646	0.000000	0.000074	0.000000	0.001706
SRM612-9	0.013131	0.008953	0.015464	0.077386	0.000000	0.002916	0.013146	0.010039
SRM610-9	0.187290	0.179062	0.236931	0.328776	0.000000	0.042839	0.208016	0.120415
AP1-9	0.000031	0.000000	0.000205	0.000000	0.000000	0.000000	0.000000	0.000048
AP2-9	0.000044	0.000000	0.000756	0.000000	0.000000	0.000019	0.000151	0.000269
AP3-9	0.000190	0.002214	0.003458	0.021901	0.000000	0.000282	0.001060	0.001588
AP4-9	0.000239	0.003899	0.004551	0.034774	0.001091	0.000423	0.001424	0.002098
T2-1	0.000015	0.000312	0.000015	0.000000	0.000841	0.000008	0.000122	0.000154
T2-2	0.000007	0.000000	0.000000	0.000000	0.001838	0.000000	0.000121	0.000082
T2-3	0.000004	0.000169	0.000000	0.000000	0.003004	0.000000	0.000116	0.000115
T2-4	0.000005	0.000117	0.000021	0.001895	0.002767	0.000000	0.000171	0.000219
T2-5	0.000000	0.000012	0.000000	0.009616	0.002641	0.000000	0.000158	0.000255
T2-6	0.000001	0.000094	0.000000	0.023424	0.003341	0.000000	0.000132	0.000303
T2-7	0.000000	0.000000	0.000000	0.000000	0.003912	0.000000	0.000113	0.000138

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000002	0.000000	0.000000	0.000000	0.004989	0.000000	0.000118	0.000161
T2-9	0.000000	0.000000	0.000000	0.000000	0.005708	0.000000	0.000126	0.000120
T2-10	0.000000	0.000000	0.000000	0.000000	0.013639	0.000000	0.000151	0.000350
T2-11	0.000000	0.000000	0.000000	0.000000	0.013127	0.000000	0.000145	0.000285
T2-12	0.000000	0.000000	0.000000	0.000000	0.013325	0.000000	0.000128	0.000089
T2-13	0.000016	0.000148	0.000000	0.000000	0.012793	0.000073	0.000148	0.000431
T2-14	0.000000	0.000297	0.000000	0.000000	0.012177	0.000045	0.000125	0.000289
T2-15	0.000002	0.000335	0.000000	0.000000	0.011849	0.000071	0.000121	0.000302
T2-16	0.000009	0.000346	0.000082	0.000000	0.009540	0.000027	0.000121	0.000441
T2-17	0.000003	0.000243	0.000092	0.000000	0.008958	0.000021	0.000100	0.000369
T2-18	0.000000	0.000269	0.000091	0.000000	0.008665	0.000028	0.000098	0.000483
SRM614-10	0.000331	0.006468	0.000000	0.000000	0.007464	0.000062	0.000346	0.001872
SRM612-10	0.015344	0.020342	0.014649	0.000000	0.000000	0.003217	0.013834	0.010761
SRM610-10	0.226368	0.230366	0.242230	0.000000	0.000000	0.046845	0.218134	0.136292
AP1-10	0.000004	0.000848	0.000000	0.000000	0.000000	0.000000	0.000000	0.000065
AP2-10	0.000022	0.001062	0.000448	0.000000	0.003734	0.000022	0.000159	0.000226
AP3-10	0.000171	0.003662	0.003089	0.000000	0.006289	0.000284	0.001017	0.001406
AP4-10	0.000227	0.005375	0.004521	0.000000	0.008243	0.000474	0.001424	0.002044
standardize signal averages AP								
AP1	0.000017	0.000424	0.000102	0.000000	0.000000	0.000000	0.000000	0.000057
AP2	0.000033	0.000531	0.000602	0.000000	0.001867	0.000021	0.000155	0.000247
AP3	0.000180	0.002938	0.003273	0.010951	0.003145	0.000283	0.001038	0.001497
AP4	0.000233	0.004637	0.004536	0.017387	0.004667	0.000448	0.001424	0.002071
linest from std sig ave								
	0.014204	0.008770	0.008566	0.151533	0.615815	0.120876	0.009818	0.013409
standardize signal averages SRM								
srM614-2	0.000367	0.003234	0.000430	0.087323	0.003732	0.000068	0.000173	0.001789
srM612-2	0.014238	0.014648	0.015057	0.038693	0.000000	0.003066	0.013490	0.010400
srM610-2	0.206829	0.204714	0.239581	0.164388	0.000000	0.044842	0.213075	0.128354
linest from std sig ave								
	0.024935	0.023121	0.021122	0.024943	0.000000	0.115568	0.022196	0.039097
concentration data								
SRM614-9	0.49	0.00	0.63	2269.69	0.00	0.77	0.00	1.96
SRM612-9	16.00	6.73	11.36	1005.70	0.00	30.23	11.07	11.54
SRM610-9	228.16	134.68	174.05	4272.76	0.00	444.10	175.15	138.47
AP1-9	0.17	0.00	0.70	0.00	0.00	0.00	0.00	0.26
AP2-9	0.25	0.00	2.58	0.00	0.00	0.92	0.59	1.44
AP3-9	1.08	7.75	11.82	1323.97	0.00	13.61	4.15	8.50
AP4-9	1.36	13.64	15.55	2102.16	268.07	20.39	5.58	11.22
T2-1	0.09	1.09	0.05	0.00	206.59	0.38	0.48	0.82
T2-2	0.04	0.00	0.00	0.00	451.57	0.00	0.47	0.44
T2-3	0.02	0.59	0.00	0.00	738.09	0.00	0.45	0.62
T2-4	0.03	0.41	0.07	114.58	679.89	0.00	0.67	1.17
T2-5	0.00	0.04	0.00	581.30	648.84	0.00	0.62	1.37
T2-6	0.01	0.33	0.00	1416.03	820.72	0.00	0.52	1.62
T2-7	0.00	0.00	0.00	0.00	960.99	0.00	0.44	0.74
T2-8	0.01	0.00	0.00	0.00	1225.56	0.00	0.46	0.86
T2-9	0.00	0.00	0.00	0.00	1402.39	0.00	0.49	0.64
T2-10	0.00	0.00	0.00	0.00	3350.79	0.00	0.59	1.87
T2-11	0.00	0.00	0.00	0.00	3224.89	0.00	0.57	1.52
T2-12	0.00	0.00	0.00	0.00	3273.60	0.00	0.50	0.48
T2-13	0.09	0.52	0.00	0.00	3142.82	3.51	0.58	2.31
T2-14	0.00	1.04	0.00	0.00	2991.46	2.19	0.49	1.54
T2-15	0.01	1.17	0.00	0.00	2910.92	3.44	0.47	1.62
T2-16	0.05	1.21	0.28	0.00	2343.79	1.30	0.47	2.36
T2-17	0.02	0.85	0.31	0.00	2200.71	1.02	0.39	1.97
T2-18	0.00	0.94	0.31	0.00	2128.86	1.33	0.39	2.58
SRM614-10	0.40	4.86	0.00	0.00	394.21	0.64	0.29	2.15
SRM612-10	18.69	15.30	10.76	0.00	0.00	33.35	11.65	12.37
SRM610-10	275.77	173.27	177.95	0.00	0.00	485.63	183.67	156.73
AP1-10	0.02	2.97	0.00	0.00	0.00	0.00	0.00	0.35
AP2-10	0.12	3.72	1.53	0.00	917.28	1.06	0.62	1.21
AP3-10	0.97	12.81	10.55	0.00	1545.13	13.72	3.98	7.52
AP4-10	1.29	18.80	15.45	0.00	2024.96	22.84	5.58	10.93
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-1	653.12	47765.67	4122.58	2850451.50	36124.40	1932.25	1084.29	654.40
SRM614-1	1508.37	48388.47	5460.79	2750589.30	39410.58	7747.28	2113.61	6325.56
SRM612-1	28390.80	80886.45	56333.36	2915692.00	39792.63	15576.33	36936.57	30229.17
SRM610-1	166478.14	259598.86	312126.25	3352654.50	40238.79	59893.58	262398.00	161252.95
AP1-1	1537.81	52490.46	10368.82	3268043.50	57952.45	10658.66	2666.42	2490.57
AP2-1	2795.42	58431.69	28307.28	3521586.80	82539.42	14641.88	6685.60	6569.12
AP3-1	7001.76	147811.27	150596.20	4963630.00	133536.27	27577.84	46018.22	68025.63
AP4-1	4437.90	118895.07	73461.21	3985639.80	136755.73	19722.43	23287.45	32469.66
41LU1-REDO-1	38087.06	46904.66	57075.84	2885653.50	115976.66	5671.63	9964.62	2293.85
41LU1-REDO-2	45531.10	46913.86	47759.75	2828694.00	122758.81	6152.03	11236.86	1906.37
41LU1-REDO-3	53983.06	46540.34	46728.42	2779018.50	130834.58	6566.56	10621.74	1979.61
41LU1-REDO-4	31206.22	47408.07	31836.90	2635884.50	133402.39	4951.47	8549.09	2569.29
41LU1-REDO-5	39021.18	47809.71	34350.03	2617336.00	140728.16	5413.11	13830.24	2122.01
41LU1-REDO-6	32310.10	47509.59	23978.94	2533014.50	144828.53	5113.43	11145.98	1781.81
41LU1-REDO-7	27443.83	48358.83	24386.94	2517625.00	147246.86	4592.35	7171.20	2267.17
41LU1REDO-8	29395.81	48600.19	17188.90	2434591.30	150796.69	4550.63	8403.53	2526.45
41LU1-REDO-9	27580.83	49394.32	15287.77	2427627.30	154911.98	4756.07	8632.05	2905.94
41LU1REDO-10	39123.14	49938.60	16471.17	2511007.50	162805.28	5592.87	7646.32	2643.73
41LU1REDO-11	36358.29	50590.29	15588.69	2485477.80	167092.94	5399.03	10051.58	2646.38
41LU1REDO-12	28240.20	50813.41	12562.15	2402196.30	170083.80	4945.67	9226.69	2348.85
41LU1-REDO-13	26384.27	51396.21	9191.33	2394696.30	174631.86	4884.63	7050.88	4518.15
41LU1-REDO-14	29199.84	51734.29	9281.69	2398577.00	180772.50	4841.07	7967.44	3053.14
41LU1-REDO-15	28341.40	51863.57	8462.97	2364091.80	188570.06	5191.67	6409.52	1583.29
SRM614-2	1505.17	53971.79	5058.19	2143309.30	101470.17	4927.83	2622.25	6745.64
SRM612-2	32206.78	87701.17	45968.54	2139171.80	71040.12	13211.87	37233.81	29449.45
SRM610-2	208967.38	285216.75	308875.31	2467500.50	69804.56	62249.11	271768.63	171046.61
AP1-2	823.16	52000.89	5621.07	2110786.80	100556.65	5688.39	1920.29	2387.85
AP2-2	1141.93	57476.84	14525.68	2176861.30	142687.44	7558.20	4879.59	5075.51
AP3-2	4568.67	113504.64	91245.43	3092571.30	190765.72	14688.68	28729.20	40859.99
AP4-2	3327.58	106195.88	62277.79	2792917.50	209461.38	13191.79	20399.64	27589.84
blank-2	572.76	52232.69	3219.34	2188002.00	182768.80	3214.34	2344.73	1040.89
blank average	612.94	49999.18	3670.96	2519226.75	109446.60	2573.29	1714.51	847.64
blank subtraction								
SRM614-1	895.43	-1610.71	1789.83	231362.55	-70036.02	5173.99	399.10	5477.91
SRM612-1	27777.86	30887.27	52662.39	396465.25	-69653.98	13003.03	35222.06	29381.53
SRM610-1	165865.20	209599.68	308455.29	833427.75	-69207.82	57320.28	260683.49	160405.31
AP1-1	924.87	2491.28	6697.86	748816.75	-51494.16	8085.37	951.91	1642.93
AP2-1	2182.47	8432.51	24636.32	1002360.05	-26907.18	12068.59	4971.09	5721.47
AP3-1	6388.82	97812.09	146925.24	2444403.25	24089.67	25004.54	44303.71	67177.98
AP4-1	3824.96	68895.89	69790.25	1466413.05	27309.13	17149.14	21572.94	31622.02
41LU1-REDO-1	37474.11	-3094.52	53404.88	366426.75	6530.06	3098.34	8250.11	1446.21
41LU1-REDO-2	44918.15	-3085.32	44088.79	309467.25	13312.21	3578.74	9522.35	1058.73
41LU1-REDO-3	53370.12	-3458.84	43057.46	259791.75	21387.98	3993.26	8907.23	1131.97
41LU1-REDO-4	30593.27	-2591.11	28165.94	116657.75	23955.79	2378.17	6834.58	1721.65
41LU1-REDO-5	38408.24	-2189.47	30679.07	98109.25	31281.56	2839.82	12115.73	1274.37
41LU1-REDO-6	31697.16	-2489.59	20307.98	13787.75	35381.93	2540.13	9431.47	934.17
41LU1-REDO-7	26830.89	-1640.35	20715.98	-1601.75	37800.26	2019.05	5456.69	1419.53
41LU1REDO-8	28782.86	-1398.99	13517.94	-84635.45	41350.09	1977.33	6689.02	1678.81
41LU1-REDO-9	26967.89	-604.86	11616.81	-91599.45	45465.38	2182.77	6917.54	2058.29
41LU1REDO-10	38510.20	-60.58	12800.21	-8219.25	53358.68	3019.58	5931.81	1796.09
41LU1-REDO-11	35745.34	591.11	11917.73	-33748.95	57646.34	2825.74	8337.07	1798.73
41LU1REDO-12	27627.26	814.23	8891.19	-117030.45	60637.20	2372.37	7512.18	1501.21
41LU1-REDO-13	25771.32	1397.03	5520.37	-124530.45	65185.26	2311.33	5336.37	3670.50
41LU1-REDO-14	28586.90	1735.11	5610.73	-120649.75	71325.90	2267.77	6252.94	2205.49
41LU1-REDO-15	27728.45	1864.39	4792.01	-155134.95	79123.46	2618.37	4695.01	735.64
SRM614-2	892.23	3972.61	1387.23	-375917.45	-7976.43	2354.53	907.74	5897.99
SRM612-2	31593.84	37701.99	42297.58	-380054.95	-38406.48	10638.58	35519.30	28601.80
SRM610-2	208354.44	235217.57	305204.35	-51726.25	-39642.05	59675.81	270054.12	170198.97
AP1-2	210.22	2001.71	1950.11	-408439.95	-8889.95	3115.10	205.78	1540.21
AP2-2	528.98	7477.66	10854.72	-342365.45	33240.84	4984.91	3165.08	4227.86
AP3-2	3955.72	63505.46	87574.47	573344.55	81319.12	12115.39	27014.69	40012.35
AP4-2	2714.64	56196.70	58606.83	273690.75	100014.78	10618.50	18685.13	26742.19
zero correction								
SRM614-1	895.43	78737.96	1789.83	2418732.30	24190.50	5173.99	399.10	5477.91
SRM612-1	27777.86	98290.23	52662.39	2045371.10	20946.56	13003.03	35222.06	29381.53
SRM610-1	165865.20	236988.38	308455.29	1951190.80	21739.44	57320.28	260683.49	160405.31
AP1-1	924.87	117126.58	6697.86	1451349.40	37493.05	8085.37	951.91	1642.93
AP2-1	2182.47	92334.24	24636.32	1252933.10	52376.25	12068.59	4971.09	5721.47
AP3-1	6388.82	142094.59	146925.24	1784311.50	89552.98	25004.54	44303.71	67177.98
AP4-1	3824.96	229243.77	69790.25	2441099.30	123853.81	17149.14	21572.94	31622.02
41LU1-REDO-1	37474.11	84222.75	53404.88	1100127.00	110971.70	3098.34	8250.11	1446.21
41LU1-REDO-2	44918.15	84665.00	44088.79	1059454.50	119738.07	3578.74	9522.35	1058.73
41LU1-REDO-3	53370.12	89014.34	43057.46	980571.19	124442.02	3993.26	8907.23	1131.97

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	30593.27	89119.10	28165.94	1451190.30	149483.33	2378.17	6834.58	1721.65
41LU1-REDO-5	38408.24	89358.66	30679.07	1308256.00	154723.67	2839.82	12115.73	1274.37
41LU1-REDO-6	31697.16	92897.60	20307.98	1378534.60	161408.23	2540.13	9431.47	934.17
41LU1-REDO-7	26830.89	94425.01	20715.98	1249673.00	163045.84	2019.05	5456.69	1419.53
41LU1REDO-8	28782.86	100838.53	13517.94	1223222.90	157646.77	1977.33	6689.02	1678.81
41LU1-REDO-9	26967.89	101544.41	11616.81	1140509.60	163000.67	2182.77	6917.54	2058.29
41LU1REDO-10	38510.20	103082.86	12800.21	1031154.90	164902.38	3019.58	5931.81	1796.09
41LU1-REDO-11	35745.34	102564.90	11917.73	1033477.00	167228.50	2825.74	8337.07	1798.73
41LU1REDO-12	27627.26	102840.22	8891.19	1054930.60	168927.42	2372.37	7512.18	1501.21
41LU1-REDO-13	25771.32	105075.88	5520.37	1958944.80	189742.95	2311.33	5336.37	3670.50
41LU1-REDO-14	28586.90	103728.34	5610.73	2121016.50	197953.28	2267.77	6252.94	2205.49
41LU1-REDO-15	27728.45	102510.18	4792.01	2065038.80	203360.86	2618.37	4695.01	735.64
SRM614-2	892.23	106143.67	1387.23	991322.06	189270.78	2354.53	907.74	5897.99
SRM612-2	31593.84	105374.23	42297.58	886733.13	189761.98	10638.58	35519.30	28601.80
SRM610-2	208354.44	108088.25	305204.35	1266223.80	198158.19	59675.81	270054.12	170198.97
AP1-2	210.22	103512.30	1950.11	814415.75	200681.48	3115.10	205.78	1540.21
AP2-2	528.98	100688.80	10854.72	746672.88	205565.52	4984.91	3165.08	4227.86
AP3-2	3955.72	100204.48	87574.47	732617.75	211009.75	12115.39	27014.69	40012.35
AP4-2	2714.64	105379.31	58606.83	638737.44	84045.11	10618.50	18685.13	26742.19

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-1	0.000279	0.024517	0.000557	0.753140	0.007532	0.001611	0.000124	0.001706
SRM612-1	0.009364	0.033134	0.017753	0.689505	0.007061	0.004383	0.011874	0.009905
SRM610-1	0.115370	0.164841	0.214551	1.357180	0.015121	0.039870	0.181322	0.111572
AP1-1	0.000102	0.012869	0.000736	0.159459	0.004119	0.000888	0.000105	0.000181
AP2-1	0.000144	0.006072	0.001620	0.082393	0.003444	0.000794	0.000327	0.000376
AP3-1	0.000291	0.006481	0.006702	0.081388	0.004085	0.001141	0.002021	0.003064
AP4-1	0.000256	0.015333	0.004668	0.163273	0.008284	0.001147	0.001443	0.002115
41LU1-REDO-1	0.006680	0.015014	0.009520	0.196108	0.019782	0.000552	0.001471	0.000258
41LU1-REDO-2	0.006610	0.012459	0.006488	0.155909	0.017621	0.000527	0.001401	0.000156
41LU1-REDO-3	0.006705	0.011182	0.005409	0.123184	0.015633	0.000502	0.001119	0.000142
41LU1-REDO-4	0.006195	0.018047	0.005704	0.293879	0.030272	0.000482	0.001384	0.000349
41LU1-REDO-5	0.006516	0.015161	0.005205	0.221960	0.026251	0.000462	0.002056	0.000216
41LU1-REDO-6	0.005909	0.017318	0.003786	0.256984	0.030089	0.000474	0.001758	0.000174
41LU1-REDO-7	0.006570	0.023123	0.005073	0.306020	0.039927	0.000494	0.001336	0.000348
41LU1REDO-8	0.006570	0.023016	0.003085	0.279195	0.035982	0.000451	0.001527	0.000383
41LU1-REDO-9	0.006366	0.023972	0.002742	0.269245	0.038480	0.000515	0.001633	0.000486
41LU1REDO-10	0.008132	0.021768	0.002703	0.217752	0.034823	0.000638	0.001253	0.000379
41LU1-REDO-11	0.007755	0.022252	0.002586	0.224219	0.036281	0.000613	0.001809	0.000390
41LU1REDO-12	0.006555	0.024399	0.002109	0.250281	0.040078	0.000563	0.001782	0.000356
41LU1-REDO-13	0.005984	0.024397	0.001282	0.454844	0.044056	0.000537	0.001239	0.000852
41LU1-REDO-14	0.005961	0.021629	0.001170	0.442260	0.041276	0.000473	0.001304	0.000460
41LU1-REDO-15	0.004618	0.017072	0.000798	0.343912	0.033868	0.000436	0.000782	0.000123
SRM614-2	0.000307	0.036548	0.000478	0.341335	0.065170	0.000811	0.000313	0.002031
SRM612-2	0.011176	0.037275	0.014962	0.313671	0.067126	0.003763	0.012565	0.010118
SRM610-2	0.154246	0.080018	0.225944	0.937391	0.146697	0.044178	0.199922	0.125999
AP1-2	0.000021	0.010354	0.000195	0.081465	0.020074	0.000312	0.000021	0.000154
AP2-2	0.000033	0.006319	0.000681	0.046861	0.012901	0.000313	0.000199	0.000265
AP3-2	0.000182	0.004622	0.004039	0.033790	0.009732	0.000559	0.001246	0.001845
AP4-2	0.000166	0.006435	0.003579	0.039003	0.005132	0.000648	0.001141	0.001633

standardize signal averages AP								
AP1	0.000061	0.011611	0.000465	0.120462	0.012097	0.000600	0.000063	0.000167
AP2	0.000088	0.006196	0.001151	0.064627	0.008173	0.000553	0.000263	0.000321
AP3	0.000237	0.005552	0.005370	0.057589	0.006909	0.000850	0.001633	0.002455
AP4	0.000211	0.010884	0.004123	0.101138	0.006708	0.000898	0.001292	0.001874

linest from std sig ave								
	0.011779	0.002101	0.006610	0.023874	0.245967	0.053158	0.007829	0.010214

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	0.000293	0.030533	0.000517	0.547238	0.036351	0.001211	0.000218	0.001868
srM612-2	0.010270	0.035204	0.016358	0.501588	0.037094	0.004073	0.012219	0.010011
srM610-2	0.134808	0.122429	0.220247	1.147285	0.080909	0.042024	0.190622	0.118786

linest from std sig ave								
	0.038241	0.034730	0.022964	0.003451	0.049287	0.122949	0.024809	0.042234

concentration data								
SRM614-1	0.28	4.42	0.32	1542.03	158.89	7.34	0.08	1.49
SRM612-1	9.46	5.97	10.06	1411.74	148.95	19.98	7.97	8.68
SRM610-1	116.54	29.70	121.63	2778.78	318.98	181.77	121.75	97.73
AP1-1	0.48	10.78	1.94	1518.69	404.21	18.84	0.33	0.74
AP2-1	0.67	5.09	4.27	784.71	337.97	16.83	1.02	1.53
AP3-1	1.37	5.43	17.67	775.14	400.82	24.19	6.31	12.49
AP4-1	1.20	12.85	12.31	1555.01	812.86	24.32	4.51	8.62
41LU1-REDO-1	31.39	12.58	25.10	1867.74	1941.09	11.71	4.59	1.05
41LU1-REDO-2	31.06	10.44	17.11	1484.88	1729.03	11.17	4.38	0.63
41LU1-REDO-3	31.50	9.37	14.26	1173.20	1533.98	10.64	3.49	0.58
41LU1-REDO-4	29.11	15.12	15.04	2798.91	2970.41	10.21	4.32	1.42
41LU1-REDO-5	30.62	12.71	13.73	2113.96	2575.84	10.22	6.42	0.88
41LU1-REDO-6	27.77	14.51	9.98	2447.52	2952.53	10.04	5.49	0.71
41LU1-REDO-7	30.87	19.38	13.38	2914.54	3917.81	10.49	4.17	1.42
41LU1REDO-8	30.87	19.29	8.14	2659.06	3530.75	9.57	4.77	1.56
41LU1-REDO-9	29.92	20.09	7.23	2564.29	3775.87	10.93	5.10	1.98
41LU1REDO-10	38.21	18.24	7.13	2073.88	3417.01	13.52	3.91	1.55
41LU1-REDO-11	36.44	18.65	6.82	2135.47	3560.10	13.00	5.65	1.59
41LU1REDO-12	30.80	20.45	5.56	2383.68	3932.64	11.94	5.57	1.45
41LU1-REDO-13	28.12	20.45	3.38	4331.95	4323.01	11.38	3.87	3.47
41LU1-REDO-14	28.01	18.13	3.08	4212.10	4050.20	10.03	4.07	1.87
41LU1-REDO-15	21.70	14.31	2.10	3275.43	3323.28	9.25	2.44	0.50
SRM614-2	0.31	6.58	0.27	698.87	1374.76	3.70	0.21	1.78
SRM612-2	11.29	6.72	8.48	642.23	1416.01	17.16	8.44	8.86
SRM610-2	155.81	14.42	128.08	1919.28	3094.56	201.41	134.24	110.37
AP1-2	0.10	8.68	0.51	775.88	1969.77	6.61	0.06	0.63
AP2-2	0.16	5.30	1.80	446.31	1265.94	6.63	0.62	1.08
AP3-2	0.86	3.87	10.65	321.82	954.98	11.85	3.89	7.52
AP4-2	0.78	5.39	9.44	371.47	503.58	13.75	3.56	6.65

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-17								
SRM614-17	808.20	46250.14	5092.79	2422109.50	32626.82	2245.37	912.97	703.00
SRM612-17	1274.45	44580.09	4909.43	2197795.50	32616.42	5637.99	1443.69	3998.46
SRM610-17	26543.87	73641.41	38181.29	2031498.40	28324.16	13880.36	32866.98	26845.63
AP1-17	155254.83	225873.55	250128.20	2194228.30	27576.96	50647.81	218694.16	137473.50
AP2-17	2065.41	43578.52	7202.16	2276101.80	59168.38	11105.18	3027.10	2222.61
AP3-17	1707.09	47231.43	13407.92	2182980.80	90616.83	10238.74	6914.72	4844.07
AP4-17	3376.30	67458.82	43396.77	2534935.50	119991.72	11334.14	14459.80	17735.18
41LU1-1	2701.74	79548.33	42068.60	2371905.50	141884.20	11870.87	14365.32	18686.23
41LU1-2	39998.74	42428.04	32880.34	2131036.80	144427.45	5362.63	6168.99	2770.26
41LU1-3	47227.98	43327.84	35514.48	2352246.50	155810.28	5341.87	9369.29	3242.90
41LU1-4	26246.83	42715.44	20580.04	1824132.40	154904.47	4833.79	5117.19	2037.53
41LU1-5	29540.17	43314.00	28218.48	1615119.80	160655.14	4763.11	10134.58	3411.82
41LU1-6	24588.42	44174.49	22350.48	1565976.30	166304.89	4350.46	6288.00	2471.37
41LU1-7	26444.91	44708.69	20507.72	1553930.60	170868.20	4091.10	7718.80	2586.57
41LU1-8	140230.83	49639.92	183694.52	1910304.60	199862.84	8800.21	77661.64	15890.41
41LU1-9	90574.15	46506.10	85181.63	1600014.90	241352.31	5819.71	30642.01	3899.58
41LU1-10	94481.06	47659.43	79773.09	1558924.50	266408.22	5549.47	37254.45	4599.23
41LU1-11	170994.64	49538.72	110019.54	1823700.40	284856.75	6984.08	69345.91	7313.12
41LU1-12	218396.34	52248.61	183486.95	1745812.30	286526.00	8753.21	119777.59	19863.47
SRM614-18	209437.06	51566.89	166946.53	1736508.50	292719.13	8013.48	99768.92	14115.92
SRM612-18	1258.29	49637.68	3795.98	1136192.00	184115.59	3735.90	3355.62	4716.95
SRM610-18	32817.86	84649.59	38849.18	1157509.30	127422.76	12035.19	34914.52	29005.24
AP1-18	229566.05	289791.50	310880.22	1513115.60	124399.98	59315.33	266977.22	165577.84
AP2-18	765.84	51471.17	5831.07	1118628.90	172328.02	5037.59	2976.46	2064.97
AP3-18	889.04	54845.91	10408.34	1135563.90	222648.48	5128.99	4447.31	3543.26
AP4-18	2306.17	76588.95	37778.93	1458121.60	255844.25	7121.16	12964.63	16419.53
blank-18	2204.61	82799.34	36127.92	1475542.00	274693.81	7648.72	12676.39	14439.20
blank-18	552.28	46466.02	2785.58	1093530.30	292828.13	2715.62	3666.74	715.88

Appendix A. Raw trace element datasheets from laser ablation.

blank average	680.24	46358.08	3939.18	1757819.90	162727.48	2480.49	2289.85	709.44
blank subtraction								
SRM614-17	594.20	-1777.99	970.25	439975.60	-130111.05	3157.50	-846.16	3289.02
SRM612-17	25863.63	27283.33	34242.11	273678.50	-134403.32	11399.86	30577.13	26136.19
SRM610-17	154574.59	179515.47	246189.02	436408.40	-135150.52	48167.31	216404.31	136764.06
AP1-17	1385.17	-2779.56	3262.98	518281.90	-103559.10	8624.69	737.24	1513.17
AP2-17	1026.85	873.35	9468.73	425160.90	-72110.65	7758.24	4624.87	4134.62
AP3-17	2696.06	21100.74	39457.58	777115.60	-42735.76	8853.65	12169.95	17025.74
AP4-17	2021.49	33190.25	38129.42	614085.60	-20843.28	9390.37	12075.47	17976.78
41LU1-1	39318.50	-3930.04	28941.16	373216.90	-18300.03	2882.14	3879.14	2060.81
41LU1-2	46547.74	-3030.24	31575.29	594426.60	-6917.20	2861.38	7079.44	2533.45
41LU1-3	25566.58	-3642.64	16640.85	66312.50	-7823.01	2353.29	2827.34	1328.09
41LU1-4	28859.92	-3044.08	24279.30	-142700.10	-2072.34	2282.61	7844.72	2702.38
41LU1-5	23908.17	-2183.59	18411.30	-191843.60	3577.41	1869.97	3998.14	1761.93
41LU1-6	25764.66	-1649.39	16568.53	-203889.30	8140.72	1610.61	5428.95	1877.13
41LU1-7	139550.59	3281.84	179755.34	152484.70	37135.36	6319.72	75371.79	15180.97
41LU1-8	98993.90	148.02	81242.45	-157805.00	78624.83	3339.22	28352.16	3190.14
41LU1-9	93800.81	1301.35	75833.90	-198895.40	103680.74	3068.98	34964.60	3889.78
41LU1-10	170314.40	3180.64	106080.36	65880.50	122129.27	4503.59	67056.05	6603.68
41LU1-11	217716.10	5890.53	179547.77	-12007.60	123798.52	6272.72	117487.74	19154.03
41LU1-12	208756.82	5208.81	163007.35	-21311.40	129991.65	5532.99	97479.07	13406.48
SRM614-18	578.04	3279.60	-143.20	-621627.90	21388.11	1255.41	1065.77	4007.50
SRM612-18	32137.62	38291.51	34910.00	-600310.60	-35304.72	9554.69	32624.66	28295.80
SRM610-18	228885.81	243433.42	306941.04	-244704.30	-38327.50	56834.84	264687.37	164868.40
AP1-18	85.60	5113.09	1891.89	-639191.00	9600.54	2557.09	686.60	1355.53
AP2-18	208.80	8487.83	6469.16	-622256.00	59921.00	2648.49	2157.45	2833.82
AP3-18	1625.93	30230.87	33839.75	-299698.30	93116.77	4640.67	10674.78	15710.09
AP4-18	1524.37	36441.26	32188.74	-282277.90	111966.33	5168.23	10386.54	13729.76
zero correction								
SRM614-17	594.20	0.00	970.25	439975.60	0.00	3157.50	0.00	3289.02
SRM612-17	25863.63	27283.33	34242.11	273678.50	0.00	11399.86	30577.13	26136.19
SRM610-17	154574.59	179515.47	246189.02	436408.40	0.00	48167.31	216404.31	136764.06
AP1-17	1385.17	0.00	3262.98	518281.90	0.00	8624.69	737.24	1513.17
AP2-17	1026.85	873.35	9468.73	425160.90	0.00	7758.24	4624.87	4134.62
AP3-17	2696.06	21100.74	39457.58	777115.60	0.00	8853.65	12169.95	17025.74
AP4-17	2021.49	33190.25	38129.42	614085.60	0.00	9390.37	12075.47	17976.78
41LU1-1	39318.50	0.00	28941.16	373216.90	0.00	2882.14	3879.14	2060.81
41LU1-2	46547.74	0.00	31575.29	594426.60	0.00	2861.38	7079.44	2533.45
41LU1-3	25566.58	0.00	16640.85	66312.50	0.00	2353.29	2827.34	1328.09
41LU1-4	28859.92	0.00	24279.30	0.00	0.00	2282.61	7844.72	2702.38
41LU1-5	23908.17	0.00	18411.30	0.00	3577.41	1869.97	3998.14	1761.93
41LU1-6	25764.66	0.00	16568.53	0.00	8140.72	1610.61	5428.95	1877.13
41LU1-7	139550.59	3281.84	179755.34	152484.70	37135.36	6319.72	75371.79	15180.97
41LU1-8	98993.90	148.02	81242.45	0.00	78624.83	3339.22	28352.16	3190.14
41LU1-9	93800.81	1301.35	75833.90	0.00	103680.74	3068.98	34964.60	3889.78
41LU1-10	170314.40	3180.64	106080.36	65880.50	122129.27	4503.59	67056.05	6603.68
41LU1-11	217716.10	5890.53	179547.77	0.00	123798.52	6272.72	117487.74	19154.03
41LU1-12	208756.82	5208.81	163007.35	0.00	129991.65	5532.99	97479.07	13406.48
SRM614-18	578.04	3279.60	0.00	0.00	21388.11	1255.41	1065.77	4007.50
SRM612-18	32137.62	38291.51	34910.00	0.00	0.00	9554.69	32624.66	28295.80
SRM610-18	228885.81	243433.42	306941.04	0.00	0.00	56834.84	264687.37	164868.40
AP1-18	85.60	5113.09	1891.89	0.00	9600.54	2557.09	686.60	1355.53
AP2-18	208.80	8487.83	6469.16	0.00	59921.00	2648.49	2157.45	2833.82
AP3-18	1625.93	30230.87	33839.75	0.00	93116.77	4640.67	10674.78	15710.09
AP4-18	1524.37	36441.26	32188.74	0.00	111966.33	5168.23	10386.54	13729.76
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-17	0.000314	0.000000	0.000513	0.232646	0.000000	0.001670	0.000000	0.001739

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.010679	0.011265	0.014138	0.112997	0.000000	0.004707	0.012625	0.010791
SRM610-17	0.130877	0.151994	0.208446	0.369503	0.000000	0.040783	0.183228	0.115797
AP1-17	0.000104	0.000000	0.000245	0.038953	0.000000	0.000648	0.000055	0.000114
AP2-17	0.000082	0.000069	0.000752	0.033788	0.000000	0.000617	0.000368	0.000329
AP3-17	0.000233	0.001826	0.003414	0.067246	0.000000	0.000766	0.001053	0.001473
AP4-17	0.000186	0.003052	0.003506	0.056467	0.000000	0.000863	0.001110	0.001653
41LU1-1	0.005899	0.000000	0.004342	0.055992	0.000000	0.000432	0.000582	0.000309
41LU1-2	0.007302	0.000000	0.004953	0.093247	0.000000	0.000449	0.001111	0.000397
41LU1-3	0.004766	0.000000	0.003102	0.012362	0.000000	0.000439	0.000527	0.000248
41LU1-4	0.005230	0.000000	0.004400	0.000000	0.000000	0.000414	0.001422	0.000490
41LU1-5	0.005549	0.000000	0.004273	0.000000	0.000830	0.000434	0.000928	0.000409
41LU1-6	0.006545	0.000000	0.004209	0.000000	0.002068	0.000409	0.001379	0.000477
41LU1-7	0.009526	0.000224	0.012271	0.010409	0.002535	0.000431	0.005145	0.001036
41LU1-8	0.008632	0.000014	0.007802	0.000000	0.007550	0.000321	0.002723	0.000306
41LU1-9	0.008971	0.000124	0.007253	0.000000	0.009916	0.000294	0.003344	0.000372
41LU1-10	0.011607	0.000217	0.007229	0.004490	0.008323	0.000307	0.004570	0.000450
41LU1-11	0.010819	0.000293	0.008922	0.000000	0.006152	0.000312	0.005838	0.000952
41LU1-12	0.011014	0.000275	0.008600	0.000000	0.006858	0.000292	0.005143	0.000707
SRM614-18	0.000340	0.001929	0.000000	0.000000	0.012580	0.000738	0.000627	0.002357
SRM612-18	0.014555	0.017342	0.015811	0.000000	0.000000	0.004327	0.014776	0.012815
SRM610-18	0.173671	0.184709	0.232897	0.000000	0.000000	0.043124	0.200836	0.125097
AP1-18	0.000006	0.000342	0.000127	0.000000	0.000643	0.000171	0.000046	0.000091
AP2-18	0.000015	0.000622	0.000474	0.000000	0.004389	0.000194	0.000158	0.000208
AP3-18	0.000122	0.002262	0.002532	0.000000	0.006969	0.000347	0.000799	0.001176
AP4-18	0.000123	0.002947	0.002603	0.000000	0.009054	0.000418	0.000840	0.001110
standardize signal averages AP								
AP1	0.000055	0.000171	0.000186	0.019476	0.000321	0.000410	0.000051	0.000102
AP2	0.000048	0.000346	0.000613	0.016894	0.002195	0.000405	0.000263	0.000268
AP3	0.000177	0.002044	0.002973	0.033623	0.003484	0.000557	0.000926	0.001324
AP4	0.000155	0.002999	0.003054	0.028234	0.004527	0.000641	0.000975	0.001382
linest from std sig ave								
	0.015909	0.013240	0.010988	0.084023	0.625072	0.077049	0.012556	0.017325
standardize signal averages SRM								
srm614-2	0.000327	0.000964	0.000257	0.116323	0.006290	0.001204	0.000313	0.002048
srm612-2	0.012617	0.014303	0.014974	0.056499	0.000000	0.004517	0.013700	0.011803
srm610-2	0.152274	0.168352	0.220671	0.184752	0.000000	0.041954	0.192032	0.120447
linest from std sig ave								
	0.033839	0.028096	0.022927	0.020092	0.000000	0.123002	0.024619	0.041595
concentration data								
SRM614-17	0.43	0.00	0.48	1676.46	0.00	11.03	0.00	2.58
SRM612-17	14.57	12.79	13.32	814.26	0.00	31.10	13.59	16.03
SRM610-17	178.56	172.60	196.44	2662.66	0.00	269.49	197.30	172.06
AP1-17	0.66	0.00	1.08	1305.69	0.00	19.92	0.28	0.79
AP2-17	0.52	0.37	3.30	1132.55	0.00	18.95	1.84	2.27
AP3-17	1.48	9.64	14.97	2254.06	0.00	23.55	5.27	10.18
AP4-17	1.18	16.12	15.37	1892.77	0.00	26.54	5.56	11.43
41LU1-1	37.44	0.00	19.03	1876.82	0.00	13.29	2.91	2.14
41LU1-2	46.34	0.00	21.71	3125.63	0.00	13.80	5.56	2.75
41LU1-3	30.25	0.00	13.60	414.37	0.00	13.48	2.64	1.71
41LU1-4	33.19	0.00	19.29	0.00	0.00	12.71	7.12	3.38
41LU1-5	35.22	0.00	18.73	0.00	207.06	13.34	4.65	2.83
41LU1-6	41.54	0.00	18.45	0.00	515.69	12.58	6.91	3.30
41LU1-7	60.46	1.18	53.79	348.91	632.14	13.26	25.77	7.16
41LU1-8	54.79	0.08	34.20	0.00	1882.73	9.86	13.64	2.12
41LU1-9	56.94	0.66	31.80	0.00	2472.78	9.02	16.75	2.57
41LU1-10	73.66	1.14	31.69	150.50	2075.52	9.43	22.89	3.11
41LU1-11	68.66	1.55	39.11	0.00	1534.04	9.58	29.24	6.58
41LU1-12	69.90	1.45	37.70	0.00	1710.22	8.97	25.76	4.89
SRM614-18	0.46	2.19	0.00	0.00	674.37	4.88	0.67	3.50
SRM612-18	19.86	19.69	14.90	0.00	0.00	28.59	15.91	19.04
SRM610-18	236.95	209.74	219.48	0.00	0.00	284.97	216.26	185.88
AP1-18	0.04	1.81	0.56	0.00	160.32	5.26	0.23	0.63
AP2-18	0.10	3.28	2.08	0.00	1094.48	5.96	0.79	1.43
AP3-18	0.77	11.95	11.10	0.00	1737.69	10.67	4.00	8.13
AP4-18	0.78	15.56	11.41	0.00	2257.62	12.85	4.21	7.67
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-19	1408.77	72616.57	14130.80	1419262.50	29078.52	5039.39	912.09	1124.61
SRM614-19	1973.69	72090.73	11562.55	1119284.00	23945.70	4949.43	1243.53	4468.47
SRM612-19	28398.64	98346.27	39557.58	988983.56	21518.12	10136.30	26367.67	20579.08
SRM610-19	208026.69	280386.50	252467.63	1189111.80	24155.42	49149.32	212506.92	129263.41
AP1-19	1334.49	78857.64	9925.58	785118.38	46743.63	4346.94	1125.01	1693.13
AP2-19	1431.05	87779.45	15000.36	826177.69	85674.13	4861.43	3025.14	4027.18
AP3-19	2702.42	105456.52	33664.23	991697.13	119652.79	6490.04	8830.01	11977.03
AP4-19	2925.74	119506.11	37937.41	1046995.30	156789.33	7904.32	10472.46	13592.88
THEO-1	5004.63	92447.72	56225.32	2232619.00	185458.72	4988.63	4612.99	3200.50
THEO-2	6749.20	96485.55	102886.50	2634876.00	202685.83	5128.67	7387.64	2270.61
THEO-2	5677.47	96588.38	76117.55	1940784.10	204276.70	5320.51	6193.71	2178.69
THEO-3	13733.68	103810.78	96971.86	3595725.00	237982.58	5649.99	12517.63	3540.58
THEO-4	20677.40	108080.05	280573.06	6838510.00	293111.41	6245.40	14109.36	4028.74
THEO-5	10173.54	100867.37	240609.55	1778887.80	226576.83	5387.59	11874.67	2545.01
THEO-6	14897.48	112021.11	441405.97	6659548.50	307370.44	6328.68	11748.51	4087.58
THEO-7	14847.36	106469.44	553177.88	4902269.00	284860.69	5841.75	12474.39	2757.38
THEO-8	8473.57	104395.55	285724.53	900048.31	226648.08	5721.87	9086.65	1607.73
THEO-9	11274.62	106010.44	639376.94	2516512.00	258730.45	5994.47	13845.56	2257.97
THEO-10	11427.31	107568.13	862849.00	1432183.90	248226.84	6112.83	9767.25	2444.33
THEO-11	12907.71	111535.79	573315.75	3287109.30	281183.06	6218.31	16441.73	2980.94
THEO-12	15994.41	121439.09	602987.81	6622107.50	330765.88	6900.48	13626.40	4141.98
THEO-13	8514.53	112628.52	326795.59	961007.44	248552.67	6282.24	14743.12	2026.97
THEO-14	9181.85	117003.30	470546.06	2002794.30	264712.72	6405.44	11555.59	2326.13
THEO-15	10226.82	123687.86	463358.16	2593754.00	273239.53	6917.24	14207.96	2847.66
THEO-16	13728.04	126885.55	756850.25	5537193.00	313085.00	6790.44	9925.14	4210.02
THEO-17	13329.68	122069.93	703590.69	4738929.00	304592.72	6536.00	16912.94	3358.74
THEO-18	12768.59	117857.10	995227.69	3420110.00	291736.63	6340.92	11526.87	2795.42
SRM614-20	1733.77	112969.52	6803.32	546071.38	106430.84	5956.47	2162.57	4122.94
SRM612-20	23076.17	128734.56	28378.72	529543.44	62590.55	10160.10	20688.84	16503.89
SRM610-20	178257.36	281239.59	199634.23	734652.38	56756.84	41942.04	166519.58	104116.70
AP1-20	1068.49	102293.30	7556.68	497488.22	103174.66	5317.35	1556.05	1602.97
AP2-20	1166.21	105648.12	10210.62	526182.63	157379.25	5480.95	2840.94	2837.10
AP3-20	2780.62	127715.40	37744.25	825653.19	197371.47	7670.88	11297.98	14172.20
AP4-20	2429.77	127295.23	30562.13	771913.63	229390.97	7710.64	9091.69	10649.86
blank-20	989.17	116531.70	6291.44	604737.63	235760.00	6667.16	2903.50	722.40
blank average	1198.97	94574.14	10211.12	1012000.07	132419.26	5853.27	1907.79	923.51
blank subtraction								
SRM614-19	774.72	-22483.41	1351.43	107283.94	-108473.57	-903.85	-664.26	3544.96
SRM612-19	27199.67	3772.14	29346.46	-23016.50	-110901.14	4283.02	24459.88	19655.57
SRM610-19	206827.72	185812.37	242256.51	177111.74	-108263.85	43296.04	210599.13	128339.90
AP1-19	135.52	-15716.49	-285.54	-226881.69	-85675.64	-1506.33	-782.78	769.62
AP2-19	232.08	-6794.68	4789.25	-185822.38	-46745.14	-991.85	1117.35	3103.68
AP3-19	1503.45	10882.39	23453.11	-20302.93	-12766.47	636.76	6922.22	11053.52
AP4-19	1726.77	24931.98	27726.30	34995.24	24370.07	2051.05	8564.67	12669.37
THEO-1	3805.66	-2126.42	46014.20	1220618.94	53039.46	-864.65	2705.20	2276.99
THEO-2	5550.23	1911.41	92675.38	1622875.94	70266.57	-724.60	5479.85	1347.11
THEO-2	4478.51	2014.25	65906.43	928784.04	71857.44	-532.76	4285.92	1255.19
THEO-3	12534.71	9236.64	86760.74	2583724.94	105563.32	-203.28	10609.84	2617.07
THEO-4	19478.43	13505.92	270361.94	5826509.94	160692.15	392.12	12201.57	3105.24
THEO-5	8974.57	6293.23	230398.43	766887.74	94157.57	-465.68	9966.88	1621.51
THEO-6	13698.52	17446.98	431194.85	5647548.44	174951.18	475.40	9840.72	3164.08
THEO-7	13648.40	11895.31	542966.76	3890268.94	152441.43	-11.52	10566.60	1833.87
THEO-8	7274.60	9821.41	275513.41	-111951.76	94228.82	-131.40	7178.86	684.22
THEO-9	10075.66	11436.31	629165.82	1504511.94	126311.19	141.20	11937.77	1334.47
THEO-10	10228.34	12994.00	852637.88	420183.84	115807.58	259.56	7859.46	1520.83
THEO-11	11708.75	16961.66	563104.63	2275109.24	148763.80	365.04	14533.94	2057.43
THEO-12	14795.44	26864.96	592776.69	5610107.44	198346.62	1047.21	11718.61	3218.48
THEO-13	7315.56	18054.39	316584.47	-50992.63	116133.41	428.96	12835.33	1103.47
THEO-14	7982.88	22429.17	460334.94	990794.24	132293.46	552.16	9647.79	1402.63
THEO-15	9027.85	29113.73	453147.04	1581753.94	140820.27	1063.97	12300.17	1924.15
THEO-16	12529.07	32311.42	746639.13	4525192.94	180665.74	937.17	8017.34	3286.52
THEO-17	12130.71	27495.80	693379.57	3726928.94	172173.46	682.72	15005.15	2435.23
THEO-18	11569.63	23282.97	985016.57	2408109.94	159317.37	487.64	9619.07	1871.91
SRM614-20	534.80	18395.39	-3407.80	-465928.69	-25988.42	103.20	254.78	3199.44
SRM612-20	21877.20	34160.43	18167.60	-482456.63	-69828.71	4306.83	18781.05	15580.39
SRM610-20	177058.39	186665.46	189423.11	-277347.69	-75662.42	36088.76	164611.79	103193.19
AP1-20	-130.48	7719.16	-2654.44	-514511.85	-29244.60	-535.92	-351.74	679.46
AP2-20	-32.76	11073.99	-0.50	-485817.44	24959.99	-372.32	933.15	1913.59
AP3-20	1581.65	33141.27	27533.14	-186346.88	64952.21	1817.61	9390.19	13248.69
AP4-20	1230.81	32721.10	20351.02	-240086.44	96971.71	1857.37	7183.90	9726.35
zero correction								
SRM614-19	774.72	0.00	1351.43	107283.94	0.00	0.00	0.00	3544.96

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	27199.67	3772.14	29346.46	0.00	0.00	4283.02	24459.88	19655.57
SRM610-19	206827.72	185812.37	242256.51	177111.74	0.00	43296.04	210599.13	128339.90
AP1-19	135.52	0.00	0.00	0.00	0.00	0.00	0.00	769.62
AP2-19	232.08	0.00	4789.25	0.00	0.00	0.00	1117.35	3103.68
AP3-19	1503.45	10882.39	23453.11	0.00	0.00	636.76	6922.22	11053.52
AP4-19	1726.77	24931.98	27726.30	34995.24	24370.07	2051.05	8564.67	12669.37
THEO-1	3805.66	0.00	46014.20	1220618.94	53039.46	0.00	2705.20	2276.99
THEO-2	5550.23	1911.41	92675.38	1622875.94	70266.57	0.00	5479.85	1347.11
THEO-2	4478.51	2014.25	65906.43	928784.04	71857.44	0.00	4285.92	1255.19
THEO-3	12534.71	9236.64	86760.74	2583724.94	105563.32	0.00	10609.84	2617.07
THEO-4	19478.43	13505.92	270361.94	5826509.94	160692.15	392.12	12201.57	3105.24
THEO-5	8974.57	6293.23	230398.43	766887.74	94157.57	0.00	9966.88	1621.51
THEO-6	13698.52	17446.98	431194.85	5647548.44	174951.18	475.40	9840.72	3164.08
THEO-7	13648.40	11895.31	542966.76	3890268.94	152441.43	0.00	10566.60	1833.87
THEO-8	7274.60	9821.41	275513.41	0.00	94228.82	0.00	7178.86	684.22
THEO-9	10075.66	11436.31	629165.82	1504511.94	126311.19	141.20	11937.77	1334.47
THEO-10	10228.34	12994.00	852637.88	420183.84	115807.58	259.56	7859.46	1520.83
THEO-11	11708.75	16961.66	563104.63	2275109.24	148763.80	365.04	14533.94	2057.43
THEO-12	14795.44	26864.96	592776.69	5610107.44	198346.62	1047.21	11718.61	3218.48
THEO-13	7315.56	18054.39	316584.47	0.00	116133.41	428.96	12835.33	1103.47
THEO-14	7982.88	22429.17	460334.94	990794.24	132293.46	552.16	9647.79	1402.63
THEO-15	9027.85	29113.73	453147.04	1581753.94	140820.27	1063.97	12300.17	1924.15
THEO-16	12529.07	32311.42	746639.13	4525192.94	180665.74	937.17	8017.34	3286.52
THEO-17	12130.71	27495.80	693379.57	3726928.94	172173.46	682.72	15005.15	2435.23
THEO-18	11569.63	23282.97	985016.57	2408109.94	159317.37	487.64	9619.07	1718.91
SRM614-20	534.80	18395.39	0.00	0.00	0.00	103.20	254.78	3199.44
SRM612-20	21877.20	34160.43	18167.60	0.00	0.00	4306.83	18781.05	15580.39
SRM610-20	177058.39	186665.46	189423.11	0.00	0.00	36088.76	164611.79	103193.19
AP1-20	0.00	7719.16	0.00	0.00	0.00	0.00	0.00	679.46
AP2-20	0.00	11073.99	0.00	0.00	24959.99	0.00	933.15	1913.59
AP3-20	1581.65	33141.27	27533.14	0.00	64952.21	1817.61	9390.19	13248.69
AP4-20	1230.81	32721.10	20351.02	0.00	96971.71	1857.37	7183.90	9726.35

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-19	0.000431	0.000000	0.000752	0.059710	0.000000	0.000000	0.000000	0.001973
SRM612-19	0.015161	0.002103	0.016357	0.000000	0.000000	0.002387	0.013634	0.010956
SRM610-19	0.223817	0.201076	0.262157	0.191660	0.000000	0.046853	0.227899	0.138882
AP1-19	0.000011	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000061
AP2-19	0.000024	0.000000	0.000499	0.000000	0.000000	0.000000	0.000116	0.000323
AP3-19	0.000112	0.000814	0.001754	0.000000	0.000000	0.000048	0.000518	0.000826
AP4-19	0.000134	0.001932	0.002149	0.002712	0.001889	0.000159	0.000664	0.000982
THEO-1	0.000831	0.000000	0.010052	0.266639	0.011586	0.000000	0.000591	0.000497
THEO-2	0.000876	0.000302	0.014622	0.256048	0.011086	0.000000	0.000865	0.000213
THEO-2	0.000592	0.000266	0.008708	0.122723	0.009495	0.000000	0.000566	0.000166
THEO-3	0.002212	0.001630	0.015309	0.455907	0.018627	0.000000	0.001872	0.000462
THEO-4	0.003149	0.002183	0.043707	0.941918	0.025978	0.000063	0.001973	0.000502
THEO-5	0.001153	0.000808	0.029593	0.098502	0.012094	0.000000	0.001280	0.000208
THEO-6	0.002649	0.003374	0.083394	1.092249	0.033836	0.000092	0.001903	0.000612
THEO-7	0.002087	0.001819	0.083010	0.594754	0.023306	0.000000	0.001615	0.000280
THEO-8	0.001331	0.001797	0.050400	0.000000	0.017237	0.000000	0.001313	0.000125
THEO-9	0.001565	0.001776	0.097734	0.233708	0.019621	0.000022	0.001854	0.000207
THEO-10	0.001453	0.001846	0.121146	0.059701	0.016454	0.000037	0.001117	0.000216
THEO-11	0.001764	0.002556	0.084849	0.342815	0.022416	0.000055	0.002190	0.000310
THEO-12	0.002783	0.005054	0.111520	1.055437	0.037315	0.000197	0.002205	0.000605
THEO-13	0.001220	0.003010	0.052775	0.000000	0.019359	0.000072	0.002140	0.000184
THEO-14	0.001433	0.004026	0.082627	0.177842	0.023746	0.000099	0.001732	0.000252
THEO-15	0.001567	0.005052	0.078632	0.274473	0.024436	0.000185	0.002134	0.000334
THEO-16	0.002337	0.006027	0.139273	0.844100	0.033700	0.000175	0.001496	0.000613
THEO-17	0.001737	0.003937	0.099283	0.533647	0.024653	0.000098	0.002149	0.000349
THEO-18	0.001701	0.003424	0.144837	0.354088	0.023426	0.000072	0.001414	0.000275

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000356	0.012254	0.000000	0.000000	0.000000	0.000069	0.000170	0.002131
SRM612-20	0.015912	0.024846	0.013214	0.000000	0.000000	0.003132	0.013660	0.011332
SRM610-20	0.229521	0.241975	0.245549	0.000000	0.000000	0.046782	0.213386	0.133769
AP1-20	0.000000	0.000719	0.000000	0.000000	0.000000	0.000000	0.000000	0.000063
AP2-20	0.000000	0.001426	0.000000	0.000000	0.003214	0.000000	0.000120	0.000246
AP3-20	0.000126	0.002650	0.002202	0.000000	0.0005194	0.000145	0.000751	0.001059
AP4-20	0.000114	0.003031	0.001885	0.000000	0.008982	0.000172	0.000665	0.000901

standardize signal averages AP

AP1	0.000005	0.000359	0.000000	0.000000	0.000000	0.000000	0.000000	0.000062
AP2	0.000012	0.000713	0.000250	0.000000	0.001607	0.000000	0.000118	0.000285
AP3	0.000119	0.001732	0.001978	0.000000	0.002597	0.000096	0.000634	0.000943
AP4	0.000124	0.002482	0.002017	0.001356	0.005435	0.000165	0.000665	0.000941

linest from std sig ave

	0.023894	0.015457	0.016541	1.727385	0.558865	0.326928	0.018460	0.024388
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standardize signal averages SRM

srm614-2	0.000394	0.006127	0.000376	0.029855	0.000000	0.000034	0.000085	0.002052
srm612-2	0.015536	0.013474	0.014786	0.000000	0.000000	0.002760	0.013647	0.011144
srm610-2	0.226669	0.221525	0.253853	0.095830	0.000000	0.046817	0.220643	0.136326

linest from std sig ave

	0.022753	0.021365	0.019938	0.050697	0.000000	0.110735	0.021436	0.036808
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concentration data

SRM614-19	0.88	0.00	1.07	8845.79	0.00	0.00	0.00	4.13
SRM612-19	31.07	2.79	23.20	0.00	0.00	66.94	21.58	22.92
SRM610-19	458.65	266.56	371.90	28393.68	0.00	1313.67	360.82	290.49
AP1-19	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.59
AP2-19	0.23	0.00	3.29	0.00	0.00	0.00	0.86	3.15
AP3-19	1.07	5.02	11.57	0.00	0.00	6.21	3.81	8.04
AP4-19	1.28	11.91	14.18	1868.91	421.07	20.73	4.89	9.55
THEO-1	7.92	0.00	66.33	183745.36	2583.17	0.00	4.35	4.84
THEO-2	8.35	1.86	96.49	176446.93	2471.70	0.00	6.37	2.07
THEO-2	5.64	1.64	57.47	84570.68	2116.87	0.00	4.17	1.61
THEO-3	21.08	10.05	101.02	314172.61	4152.91	0.00	13.79	4.49
THEO-4	30.02	13.46	288.41	649090.55	5791.74	8.27	14.53	4.88
THEO-5	10.99	4.98	195.28	67879.65	2696.38	0.00	9.43	2.03
THEO-6	25.25	20.81	550.30	752686.37	7543.77	11.99	14.02	5.95
THEO-7	19.89	11.21	547.77	409854.86	5196.02	0.00	11.90	2.73
THEO-8	12.68	11.08	332.58	0.00	3843.06	0.00	9.67	1.22
THEO-9	14.92	10.95	644.93	161052.09	4374.52	2.86	13.66	2.02
THEO-10	13.85	11.38	799.42	41141.04	3668.52	4.81	8.22	2.10
THEO-11	16.82	15.76	559.91	236239.63	4997.65	7.17	16.13	3.02
THEO-12	26.53	31.17	735.90	727318.49	8319.48	25.69	16.24	5.89
THEO-13	11.62	18.56	348.25	0.00	4316.21	9.33	15.76	1.79
THEO-14	13.66	24.83	545.25	122553.69	5294.18	12.93	12.75	2.45
THEO-15	14.93	31.15	518.88	189143.44	5447.98	24.08	15.72	3.25
THEO-16	22.28	37.17	919.04	581682.87	7513.51	22.80	11.01	5.96
THEO-17	16.56	24.28	655.15	367744.99	5496.42	12.75	15.82	3.39
THEO-18	16.22	21.11	955.75	244007.61	5222.85	9.35	10.42	2.68
SRM614-20	0.73	16.24	0.00	0.00	0.00	1.93	0.27	4.46
SRM612-20	32.61	32.94	18.75	0.00	0.00	87.83	21.63	23.70
SRM610-20	470.34	320.77	348.34	0.00	0.00	1311.68	337.84	279.79
AP1-20	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.62
AP2-20	0.00	8.79	0.00	0.00	716.57	0.00	0.88	2.40
AP3-20	1.21	16.34	14.53	0.00	1157.92	18.96	5.53	10.31
AP4-20	1.09	18.69	12.44	0.00	2002.61	22.44	4.90	8.77

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-15	1172.53	60276.02	9817.82	1879030.90	28733.68	4773.47	855.08	1023.69
SRM614-15	1531.65	59916.10	9247.85	1591104.80	24992.38	4706.51	1107.85	3501.94
SRM612-15	20997.60	78599.96	32287.10	1415282.40	22118.24	9017.53	21290.04	17895.30
SRM610-15	163103.92	231458.31	209462.50	1505595.50	23156.01	43687.89	182235.19	115670.93
AP1-15	1240.77	61931.71	8564.65	1189072.50	43452.25	4775.63	1278.17	1492.57
AP2-15	1568.81	66364.77	14747.04	1191478.90	84532.88	5089.79	3433.18	4012.34
AP3-15	3686.94	101654.45	56716.84	1626546.50	145053.89	8649.21	17743.90	23450.17

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	3135.02	105276.95	48945.88	1529041.30	184812.88	8656.53	14715.20	19339.83
LA3324-2-1	1753.33	63857.28	33381.79	1001682.70	185790.33	4133.78	4070.54	1833.21
LA3324-2-2	2207.69	66616.62	20641.08	965925.38	186119.36	4298.98	3850.06	1566.65
LA3324-2-3	3321.30	69629.75	15282.13	992781.56	191822.95	4616.51	4625.51	2253.41
LA3324-2-4	3137.94	72552.77	15907.33	948263.31	201097.09	4805.31	4629.71	1725.05
LA3324-2-5	3050.86	73043.53	16622.85	909182.25	210723.67	4887.91	4512.67	1381.21
LA3324-2-6	3599.02	74435.54	17492.06	903915.50	221939.77	4995.79	4717.71	1813.97
LA3324-2-7	3818.66	77228.76	22903.21	1117063.30	232420.91	4969.67	6685.24	2468.45
LA3324-2-8	3653.82	79901.85	16820.98	1060731.50	236738.81	5326.99	6867.96	1826.97
LA3324-2-9	3643.26	81269.26	16029.37	1050738.60	240034.67	5294.55	7099.08	1907.81
LA3324-2-10	5808.03	83074.55	23685.45	1021150.90	242302.33	5473.43	7572.04	1900.81
LA3324-2-11	6661.76	85399.56	24202.18	944898.69	244486.34	5709.31	8421.01	1485.85
LA3324-2-12	14596.16	87052.41	78332.00	1139550.80	260399.58	6206.07	17925.38	3373.14
SRM614-16	1409.89	90864.75	6038.15	746975.13	136187.33	5474.55	2170.17	3789.58
SRM612-16	22065.24	110783.82	28305.28	730874.75	88409.50	9890.74	20798.44	16362.09
SRM610-16	186515.84	276478.03	214544.61	944799.63	76911.71	44982.41	182292.95	117292.42
AP1-16	1024.61	89221.06	7167.00	659752.50	125975.31	5481.83	1745.93	1817.89
AP2-16	1226.21	92804.88	11534.15	678253.38	183701.23	5455.87	3309.38	3398.54
AP3-16	3533.70	126421.79	53128.38	1142948.50	229541.73	8906.01	16002.25	20534.76
AP4-16	3198.14	135428.59	47397.19	1138684.40	266471.44	9621.65	14415.28	17968.82
blank-16	845.20	89724.78	5135.47	799740.94	250420.45	5607.75	2677.62	780.28
blank average	1008.87	75000.40	7476.64	1339385.92	139577.07	5190.61	1766.35	901.99
blank subtraction								
SRM614-15	522.78	-15084.30	1771.21	251718.88	-114584.69	-484.10	-658.50	2599.95
SRM612-15	19988.73	3599.56	24810.46	75896.48	-117458.82	3826.92	19523.69	16993.32
SRM610-15	162095.05	156457.91	201985.86	166209.58	-116421.06	38497.28	180468.84	114768.94
AP1-15	231.90	-13068.69	1088.01	-150313.42	-96124.82	-414.98	-488.18	590.58
AP2-15	559.94	-8635.63	7270.40	-147907.02	-55044.19	-100.82	1666.83	3110.36
AP3-15	2678.08	26654.05	49240.20	287160.58	5476.82	3458.60	15977.55	22548.19
AP4-15	2126.15	30276.55	41469.23	189655.38	45235.81	3465.92	12948.85	18437.84
LA3324-2-1	744.46	-11143.12	25905.15	-337703.22	46213.26	-1056.83	2304.19	931.23
LA3324-2-2	1198.83	-8383.78	13164.43	-373460.54	46542.29	-891.62	2083.71	664.66
LA3324-2-3	2312.43	-5370.65	7805.48	-346604.36	52245.88	-574.10	2859.16	1351.43
LA3324-2-4	2129.07	-2447.63	8430.69	-391122.61	61520.02	-385.30	2863.36	823.06
LA3324-2-5	2041.99	-1956.87	9146.21	-430203.67	71146.60	-302.70	2746.32	479.22
LA3324-2-6	2590.15	-564.86	10015.42	-435470.42	82362.70	-194.82	2951.36	911.99
LA3324-2-7	2809.80	2228.36	15426.57	-222322.62	92843.84	-220.94	4918.89	1566.47
LA3324-2-8	2644.95	4901.45	9344.33	-278654.42	97161.74	136.38	5101.61	924.99
LA3324-2-9	2634.39	6268.86	8552.73	-288647.32	100457.60	103.94	5332.73	1005.83
LA3324-2-10	4799.17	8074.15	16208.81	-318235.02	102725.26	282.82	5805.69	998.83
LA3324-2-11	5652.89	10399.16	16725.53	-394487.23	104909.27	518.70	6654.66	583.86
LA3324-2-12	13587.30	12052.01	70855.36	-199835.12	120822.51	1015.47	16159.03	2471.15
SRM614-16	401.02	15864.35	-1438.49	-592410.79	-3389.74	283.94	403.82	2887.60
SRM612-16	21056.38	35783.42	20828.64	-608511.17	-51167.57	4700.13	19032.09	15460.11
SRM610-16	185506.97	201477.63	207067.97	-394586.29	-62665.36	39791.80	180526.60	116390.43
AP1-16	15.74	14220.66	-309.64	-679633.42	-13601.76	291.22	-20.42	915.91
AP2-16	217.34	17804.48	4057.50	-661132.54	44124.16	265.26	1543.03	2496.55
AP3-16	2524.83	51421.39	45651.74	-196437.42	89964.66	3715.40	14235.90	19632.77
AP4-16	2189.27	60428.19	39920.55	-200701.52	126894.37	4431.05	12648.93	17066.83
zero correction								
SRM614-15	522.78	0.00	1771.21	251718.88	0.00	0.00	0.00	2599.95
SRM612-15	19988.73	3599.56	24810.46	75896.48	0.00	3826.92	19523.69	16993.32
SRM610-15	162095.05	156457.91	201985.86	166209.58	0.00	38497.28	180468.84	114768.94
AP1-15	231.90	0.00	1088.01	0.00	0.00	0.00	0.00	590.58
AP2-15	559.94	0.00	7270.40	0.00	0.00	0.00	1666.83	3110.36
AP3-15	2678.08	26654.05	49240.20	287160.58	5476.82	3458.60	15977.55	22548.19
AP4-15	2126.15	30276.55	41469.23	189655.38	45235.81	3465.92	12948.85	18437.84
LA3324-2-1	744.46	0.00	25905.15	0.00	46213.26	0.00	2304.19	931.23
LA3324-2-2	1198.83	0.00	13164.43	0.00	46542.29	0.00	2083.71	664.66
LA3324-2-3	2312.43	0.00	7805.48	0.00	52245.88	0.00	2859.16	1351.43
LA3324-2-4	2129.07	0.00	8430.69	0.00	61520.02	0.00	2863.36	823.06
LA3324-2-5	2041.99	0.00	9146.21	0.00	71146.60	0.00	2746.32	479.22
LA3324-2-6	2590.15	0.00	10015.42	0.00	82362.70	0.00	2951.36	911.99
LA3324-2-7	2809.80	2228.36	15426.57	0.00	92843.84	0.00	4918.89	1566.47
LA3324-2-8	2644.95	4901.45	9344.33	0.00	97161.74	136.38	5101.61	924.99
LA3324-2-9	2634.39	6268.86	8552.73	0.00	100457.60	103.94	5332.73	1005.83
LA3324-2-10	4799.17	8074.15	16208.81	0.00	102725.26	282.82	5805.69	998.83
LA3324-2-11	5652.89	10399.16	16725.53	0.00	104909.27	518.70	6654.66	583.86
LA3324-2-12	13587.30	12052.01	70855.36	0.00	120822.51	1015.47	16159.03	2471.15
SRM614-16	401.02	15864.35	0.00	0.00	0.00	283.94	403.82	2887.60
SRM612-16	21056.38	35783.42	20828.64	0.00	0.00	4700.13	19032.09	15460.11
SRM610-16	185506.97	201477.63	207067.97	0.00	0.00	39791.80	180526.60	116390.43
AP1-16	15.74	14220.66	0.00	0.00	0.00	291.22	0.00	915.91
AP2-16	217.34	17804.48	4057.50	0.00	44124.16	265.26	1543.03	2496.55
AP3-16	2524.83	51421.39	45651.74	0.00	89964.66	3715.40	14235.90	19632.77
AP4-16	2189.27	60428.19	39920.55	0.00	126894.37	4431.05	12648.93	17066.83

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-15	0.000384	0.000000	0.001302	0.185033	0.000000	0.000000	0.000000	0.001911
SRM612-15	0.013941	0.002510	0.017304	0.052933	0.000000	0.002669	0.013616	0.011852
SRM610-15	0.208832	0.201570	0.260225	0.214133	0.000000	0.049597	0.232504	0.147861
AP1-15	0.000020	0.000000	0.000094	0.000000	0.000000	0.000000	0.000000	0.000051
AP2-15	0.000045	0.000000	0.000590	0.000000	0.000000	0.000000	0.000135	0.000253
AP3-15	0.000160	0.001597	0.002951	0.017209	0.000328	0.000207	0.000958	0.001351
AP4-15	0.000141	0.002007	0.002749	0.012574	0.002999	0.000230	0.000859	0.001222
LA3324-2-1	0.000194	0.000000	0.006750	0.000000	0.012042	0.000000	0.000600	0.000243
LA3324-2-2	0.000257	0.000000	0.002823	0.000000	0.009979	0.000000	0.000447	0.000143
LA3324-2-3	0.000439	0.000000	0.001481	0.000000	0.009912	0.000000	0.000542	0.000256
LA3324-2-4	0.000300	0.000000	0.001190	0.000000	0.008682	0.000000	0.000404	0.000116
LA3324-2-5	0.000282	0.000000	0.001262	0.000000	0.009815	0.000000	0.000379	0.000066
LA3324-2-6	0.000359	0.000000	0.001388	0.000000	0.011415	0.000000	0.000409	0.000126
LA3324-2-7	0.000587	0.000465	0.003222	0.000000	0.019390	0.000000	0.001027	0.000327
LA3324-2-8	0.000494	0.000915	0.001744	0.000000	0.018130	0.000025	0.000952	0.000173
LA3324-2-9	0.000481	0.001144	0.001561	0.000000	0.018334	0.000019	0.000973	0.000184
LA3324-2-10	0.000873	0.001469	0.002950	0.000000	0.018695	0.000051	0.001057	0.000182
LA3324-2-11	0.000834	0.001534	0.002467	0.000000	0.015471	0.000076	0.000981	0.000086
LA3324-2-12	0.001400	0.001242	0.007302	0.000000	0.012451	0.000105	0.001665	0.000255
SRM614-16	0.000297	0.011741	0.000000	0.000000	0.000000	0.000210	0.000299	0.002137
SRM612-16	0.014890	0.025303	0.014728	0.000000	0.000000	0.003324	0.013458	0.010932
SRM610-16	0.223951	0.243232	0.249981	0.000000	0.000000	0.048038	0.217939	0.140511
AP1-16	0.000001	0.001317	0.000000	0.000000	0.000000	0.000027	0.000000	0.000085
AP2-16	0.000019	0.001542	0.000351	0.000000	0.003822	0.000023	0.000134	0.000216
AP3-16	0.000159	0.003241	0.002877	0.000000	0.005670	0.000234	0.000897	0.001237
AP4-16	0.000151	0.004161	0.002749	0.000000	0.008738	0.000305	0.000871	0.001175
standardize signal averages AP								
AP1	0.000011	0.000658	0.000047	0.000000	0.000000	0.000013	0.000000	0.000068
AP2	0.000032	0.000771	0.000471	0.000000	0.001911	0.000011	0.000135	0.000234
AP3	0.000160	0.002419	0.002914	0.008605	0.002999	0.000221	0.000927	0.001294
AP4	0.000146	0.003084	0.002749	0.006287	0.005869	0.000267	0.000865	0.001199
linest from std sig ave								
	0.018519	0.011806	0.011567	0.290564	0.514988	0.188200	0.013183	0.018513
standardize signal averages SRM								
srm614-2	0.000341	0.005870	0.000651	0.092516	0.000000	0.000105	0.000149	0.002024
srm612-2	0.014415	0.013907	0.016016	0.026466	0.000000	0.002996	0.013537	0.011392
srm610-2	0.216392	0.222401	0.255103	0.107067	0.000000	0.048818	0.225221	0.144186
linest from std sig ave								
	0.023836	0.021281	0.019837	0.028376	0.000000	0.106188	0.021001	0.034809
concentration data								
SRM614-15	0.61	0.00	1.29	4610.95	0.00	0.00	0.00	3.03
SRM612-15	22.14	2.54	17.17	1319.06	0.00	43.08	15.39	18.82
SRM610-15	331.67	204.09	258.15	5336.12	0.00	800.53	262.87	234.77
AP1-15	0.15	0.00	0.44	0.00	0.00	0.00	0.00	0.38
AP2-15	0.34	0.00	2.72	0.00	0.00	0.00	0.71	1.87
AP3-15	1.19	7.52	13.62	1994.86	67.43	15.56	5.04	9.98
AP4-15	1.04	9.45	12.69	1457.58	616.18	17.25	4.52	9.03
LA3324-2-1	1.43	0.00	31.15	0.00	2473.94	0.00	3.16	1.79
LA3324-2-2	1.90	0.00	13.03	0.00	2050.25	0.00	2.35	1.05
LA3324-2-3	3.24	0.00	6.83	0.00	2036.34	0.00	2.85	1.89
LA3324-2-4	2.22	0.00	5.49	0.00	1783.66	0.00	2.13	0.86
LA3324-2-5	2.08	0.00	5.82	0.00	2016.39	0.00	1.99	0.49
LA3324-2-6	2.65	0.00	6.41	0.00	2345.13	0.00	2.15	0.93

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	4.34	2.19	14.87	0.00	3983.69	0.00	5.40	2.42
LA3324-2-8	3.65	4.31	8.05	0.00	3724.85	1.91	5.01	1.27
LA3324-2-9	3.55	5.39	7.20	0.00	3766.66	1.42	5.12	1.36
LA3324-2-10	6.45	6.92	13.61	0.00	3840.87	3.86	5.56	1.34
LA3324-2-11	6.16	7.22	11.38	0.00	3178.46	5.74	5.16	0.64
LA3324-2-12	10.34	5.85	33.70	0.00	2558.12	7.86	8.76	1.88
SRM614-16	0.47	11.89	0.00	0.00	0.00	3.39	0.34	3.39
SRM612-16	23.65	25.62	14.61	0.00	0.00	53.64	15.22	17.36
SRM610-16	355.68	246.27	247.99	0.00	0.00	775.37	246.40	223.10
AP1-16	0.01	6.20	0.00	0.00	0.00	2.02	0.00	0.63
AP2-16	0.14	7.26	1.62	0.00	785.15	1.72	0.70	1.60
AP3-16	1.18	15.26	13.28	0.00	1164.87	17.58	4.72	9.14
AP4-16	1.11	19.60	12.69	0.00	1795.23	22.91	4.58	8.68

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-13	1178.89	70755.40	9007.93	1655026.50	24054.50	4357.78	767.80	1086.69
SRM614-13	1732.93	67245.38	8457.09	1370812.00	20611.20	4592.71	1212.77	4302.94
SRM612-13	24339.58	90089.11	33221.23	1112642.10	17165.98	8963.53	23364.89	18453.30
SRM610-13	194270.25	269876.28	252063.86	1386588.30	21013.24	48623.40	213426.36	130967.02
AP1-13	1692.89	70408.56	10720.06	1037465.20	40890.27	4289.46	2255.25	1777.49
AP2-13	1693.45	74264.38	14254.56	1008658.70	79117.92	4461.35	3551.26	3987.58
AP3-13	3404.78	102193.13	42773.16	1303971.80	125866.11	6987.44	12454.03	16154.45
AP4-13	4217.38	154502.78	69180.99	1759234.30	175700.78	12335.51	20071.51	28790.72
LA3324-1-1	16974.22	74151.66	39610.22	1268749.10	187878.91	4141.94	10346.98	3853.10
LA3324-1-2	13345.80	76905.71	27820.40	1005002.90	193538.02	4176.38	8402.45	2690.02
LA3324-1-3	11040.30	79610.33	24965.34	937371.38	201724.66	4549.59	7930.92	2873.50
LA3324-1-4	44541.45	82385.19	311814.16	1631309.50	229487.45	5005.15	26532.75	7701.24
LA3324-1-5	31552.82	82326.74	170914.69	1103403.40	244136.53	5073.15	19346.71	5034.51
LA3324-1-6	35307.96	83246.23	208813.34	1181560.80	261186.88	5211.51	23101.81	5556.87
LA3324-1-7	36768.77	83449.55	127019.20	1583650.80	285191.53	5020.55	22910.69	5980.31
LA3324-1-8	49742.72	84925.52	186546.84	2200337.30	310001.59	5378.39	29708.81	7928.40
LA3324-1-9	56671.16	88564.10	211582.78	4290846.00	351963.38	5320.03	31730.38	8764.45
LA3324-1-10	21670.04	88945.18	27628.75	1083829.40	300762.69	5014.15	6297.00	4965.31
LA3324-1-11	12492.83	88706.42	14958.08	872300.25	297327.22	5135.47	6170.19	4143.42
LA3324-1-12	16523.25	92169.80	20620.60	1031633.40	300126.84	5433.11	5593.55	3371.30
LA3324-1-13	19536.83	93921.05	28433.16	1765088.30	310218.28	5489.51	6033.15	4342.98
LA3324-1-14	16185.61	93766.49	18755.63	1360259.30	305630.72	5432.23	5675.19	4089.22
LA3324-1-15	16677.33	94627.21	25528.10	1243632.30	306184.53	5579.79	5690.95	4113.02
LA3324-1-16	13805.84	95469.66	32154.58	1200482.40	305873.03	5753.43	5323.07	2831.06
LA3324-1-17	16909.54	96528.02	64296.84	1126055.40	309219.69	5847.55	6212.48	2917.98
LA3324-1-18	13170.59	97440.51	20921.08	932563.50	309225.75	5726.23	5808.31	2758.30
SRM614-14	1518.65	101773.70	5782.31	548337.56	153059.42	5703.99	2361.25	3718.66
SRM612-14	22574.49	119683.67	27436.36	550326.69	103309.18	9781.90	20164.59	15823.09
SRM610-14	192153.13	286580.16	213029.92	761644.06	86632.16	44089.61	180158.53	112632.27
AP1-14	1085.85	95767.54	7285.40	499811.84	145475.81	5379.87	1888.93	1772.53
AP2-14	1275.85	96735.46	10204.78	522117.56	200280.61	5541.27	3258.38	2861.18
AP3-14	2834.82	119800.91	35367.20	805225.19	241191.00	7382.44	11109.06	12940.31
AP4-14	2847.46	142310.69	40534.47	985007.06	272636.56	9683.97	12591.79	16197.21
blank-14	869.92	103221.74	5078.39	600381.44	292692.31	6200.27	3002.82	680.28
blank average	1024.41	86988.57	7043.16	1127703.97	158373.40	5279.03	1885.31	883.49

blank subtraction								
SRM614-13	708.52	-19743.19	1413.93	243108.03	-137762.21	-686.32	-672.54	3419.46
SRM612-13	23315.17	3100.54	26178.07	-15061.87	-141207.43	3684.50	21479.58	17569.82
SRM610-13	193245.84	182887.71	245020.70	258884.33	-137360.17	43344.37	211541.05	130083.53
AP1-13	668.48	-16580.01	3676.90	-90238.77	-117483.13	-989.57	369.94	894.00
AP2-13	669.04	-12724.19	7211.40	-119045.27	-79255.48	-817.68	1665.95	3104.10
AP3-13	2380.37	15204.56	35730.00	176267.83	-32507.29	1708.41	10568.72	15270.96
AP4-13	3192.98	67514.21	62137.83	631530.33	17327.38	7056.48	18186.20	27907.24
LA3324-1-1	15949.81	-12836.91	32567.06	141045.13	29505.51	-1137.09	8461.67	2969.62
LA3324-1-2	12321.39	-10082.86	20777.24	-122701.07	35164.62	-1102.65	6517.14	1806.53
LA3324-1-3	10015.90	-7378.24	17922.18	-190332.59	43351.26	-729.44	6045.61	1990.01
LA3324-1-4	43517.04	-4603.38	304771.00	503605.53	71114.05	-273.88	24647.44	6817.76
LA3324-1-5	30528.41	-4661.83	163871.53	-24300.57	85763.13	-205.88	17461.40	4151.02
LA3324-1-6	34283.55	-3742.34	201770.18	53856.83	102813.48	-67.52	21216.50	4673.39
LA3324-1-7	35744.36	-3539.02	119976.04	455946.83	126818.13	-258.48	21025.38	5096.83
LA3324-1-8	48718.31	-2063.05	179503.68	1072633.33	151628.19	99.36	27823.50	7044.92
LA3324-1-9	55646.75	1575.53	204539.62	3163142.03	193589.98	41.00	29845.07	7880.96

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	20645.64	1956.61	20585.59	-43874.57	142389.29	-264.88	4411.68	4081.82
LA3324-1-11	11468.42	1717.85	7914.92	-255403.72	138953.82	-143.56	4284.88	3259.94
LA3324-1-12	15498.85	5181.23	13577.44	-96070.57	141753.44	154.08	3708.24	2487.81
LA3324-1-13	18512.42	6932.48	21390.00	637384.33	151844.88	210.48	4147.84	3459.50
LA3324-1-14	15161.21	6777.92	11712.47	232555.33	147257.32	153.20	3789.88	3205.74
LA3324-1-15	15652.93	7638.64	18484.94	115928.33	147811.13	300.76	3805.64	3229.54
LA3324-1-16	12781.43	8481.09	25111.42	72778.43	147499.63	474.40	3437.76	1947.57
LA3324-1-17	15885.13	9539.45	57253.68	-1648.57	150846.29	568.52	4327.16	2034.49
LA3324-1-18	12146.19	10451.94	13877.92	-195140.47	150852.35	447.20	3923.00	1874.81
SRM614-14	494.24	14785.13	-1260.85	-579366.41	-5313.98	424.96	475.94	2835.18
SRM612-14	21550.08	32695.10	20393.20	-577377.28	-55064.22	4502.87	18279.28	14939.60
SRM610-14	191128.72	199591.59	205986.76	-366059.91	-71741.24	38810.58	178273.22	111748.78
AP1-14	61.44	8778.97	242.24	-627892.13	-12897.59	100.84	3.62	889.04
AP2-14	251.44	9746.89	3161.62	-605586.41	41907.21	262.24	1373.07	1977.69
AP3-14	1810.41	32812.34	28324.04	-322478.78	82817.60	2103.41	9223.75	12056.83
AP4-14	1823.05	55322.12	33491.31	-142696.91	114263.16	4404.94	10706.48	15313.73

zero correction								
SRM614-13	708.52	0.00	1413.93	243108.03	0.00	0.00	0.00	3419.46
SRM612-13	23315.17	3100.54	26178.07	0.00	0.00	3684.50	21479.58	17569.82
SRM610-13	193245.84	182887.71	245020.70	258884.33	0.00	43344.37	211541.05	130083.53
AP1-13	668.48	0.00	3676.90	0.00	0.00	0.00	369.94	899.00
AP2-13	669.04	0.00	7211.40	0.00	0.00	0.00	1665.95	3104.10
AP3-13	2380.37	15204.56	35730.00	176267.83	0.00	1708.41	10568.72	15270.96
AP4-13	3192.98	67514.21	62137.83	631530.33	17327.38	7056.48	18186.20	27907.24
LA3324-1-1	15949.81	0.00	32567.06	141045.13	29505.51	0.00	8461.67	2969.62
LA3324-1-2	12321.39	0.00	20777.24	0.00	35164.62	0.00	6517.14	1806.53
LA3324-1-3	10015.90	0.00	17922.18	0.00	43351.26	0.00	6045.61	1990.01
LA3324-1-4	43517.04	0.00	304771.00	503605.53	71114.05	0.00	24647.44	6817.76
LA3324-1-5	30528.41	0.00	163871.53	0.00	85763.13	0.00	17461.40	4151.02
LA3324-1-6	34283.55	0.00	201770.18	53856.83	102813.48	0.00	21216.50	4673.39
LA3324-1-7	35744.36	0.00	119976.04	455946.83	126818.13	0.00	21025.38	5096.83
LA3324-1-8	48718.31	0.00	179503.68	1072633.33	151628.19	99.36	27823.50	7044.92
LA3324-1-9	55646.75	1575.53	204539.62	3163142.03	193589.98	41.00	29845.07	7880.96
LA3324-1-10	20645.64	1956.61	20585.59	0.00	142389.29	0.00	4411.68	4081.82
LA3324-1-11	11468.42	1717.85	7914.92	0.00	138953.82	0.00	4284.88	3259.94
LA3324-1-12	15498.85	5181.23	13577.44	0.00	141753.44	154.08	3708.24	2487.81
LA3324-1-13	18512.42	6932.48	21390.00	637384.33	151844.88	210.48	4147.84	3459.50
LA3324-1-14	15161.21	6777.92	11712.47	232555.33	147257.32	153.20	3789.88	3205.74
LA3324-1-15	15652.93	7638.64	18484.94	115928.33	147811.13	300.76	3805.64	3229.54
LA3324-1-16	12781.43	8481.09	25111.42	72778.43	147499.63	474.40	3437.76	1947.57
LA3324-1-17	15885.13	9539.45	57253.68	0.00	150846.29	568.52	4327.16	2034.49
LA3324-1-18	12146.19	10451.94	13877.92	0.00	150852.35	447.20	3923.00	1874.81
SRM614-14	494.24	14785.13	0.00	0.00	0.00	424.96	475.94	2835.18
SRM612-14	21550.08	32695.10	20393.20	0.00	0.00	4502.87	18279.28	14939.60
SRM610-14	191128.72	199591.59	205986.76	0.00	0.00	38810.58	178273.22	111748.78
AP1-14	61.44	8778.97	242.24	0.00	0.00	100.84	3.62	889.04
AP2-14	251.44	9746.89	3161.62	0.00	41907.21	262.24	1373.07	1977.69
AP3-14	1810.41	32812.34	28324.04	0.00	82817.60	2103.41	9223.75	12056.83
AP4-14	1823.05	55322.12	33491.31	0.00	114263.16	4404.94	10706.48	15313.73

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-13	0.000366	0.000000	0.000730	0.125538	0.000000	0.000000	0.000000	0.001766
SRM612-13	0.013488	0.001794	0.015144	0.000000	0.000000	0.002132	0.012426	0.010164
SRM610-13	0.200303	0.189567	0.253969	0.268339	0.000000	0.044927	0.219267	0.134834
AP1-13	0.000045	0.000000	0.000245	0.000000	0.000000	0.000000	0.000025	0.000060
AP2-13	0.000055	0.000000	0.000594	0.000000	0.000000	0.000000	0.000137	0.000256
AP3-13	0.000133	0.000847	0.001990	0.009815	0.000000	0.000095	0.000588	0.000850
AP4-13	0.000201	0.004245	0.003907	0.039706	0.001089	0.000444	0.001143	0.001755
LA3324-1-1	0.001938	0.000000	0.003956	0.017134	0.003584	0.000000	0.001028	0.000361

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.001755	0.000000	0.002960	0.000000	0.005010	0.000000	0.000929	0.000257
LA3324-1-3	0.001725	0.000000	0.003087	0.000000	0.007467	0.000000	0.001041	0.000343
LA3324-1-4	0.003752	0.000000	0.026278	0.043422	0.006132	0.000000	0.002125	0.000588
LA3324-1-5	0.003123	0.000000	0.016766	0.000000	0.008775	0.000000	0.001787	0.000425
LA3324-1-6	0.003212	0.000000	0.018905	0.005046	0.009633	0.000000	0.001988	0.000438
LA3324-1-7	0.003204	0.000000	0.010753	0.040863	0.011366	0.000000	0.001884	0.000457
LA3324-1-8	0.003832	0.000000	0.014121	0.084379	0.011928	0.000008	0.002189	0.000554
LA3324-1-9	0.004498	0.000127	0.016535	0.255701	0.015649	0.000003	0.002413	0.000637
LA3324-1-10	0.003634	0.000344	0.003623	0.000000	0.025063	0.000000	0.000777	0.000718
LA3324-1-11	0.002333	0.000349	0.001610	0.000000	0.028267	0.000000	0.000872	0.000663
LA3324-1-12	0.003096	0.001035	0.002712	0.000000	0.028318	0.000031	0.000741	0.000497
LA3324-1-13	0.002578	0.000965	0.002979	0.088767	0.021147	0.000029	0.000578	0.000482
LA3324-1-14	0.002099	0.000938	0.001621	0.032191	0.020384	0.000021	0.000525	0.000444
LA3324-1-15	0.002198	0.001073	0.002596	0.016280	0.020758	0.000042	0.000534	0.000454
LA3324-1-16	0.002006	0.001331	0.003940	0.011420	0.023144	0.000074	0.000539	0.000306
LA3324-1-17	0.002222	0.001334	0.008007	0.000000	0.021097	0.000080	0.000605	0.000285
LA3324-1-18	0.001668	0.001435	0.001906	0.000000	0.020718	0.000061	0.000539	0.000257
SRM614-14	0.000374	0.011185	0.000000	0.000000	0.000000	0.000321	0.000360	0.002145
SRM612-14	0.015931	0.024170	0.015076	0.000000	0.000000	0.003329	0.013513	0.011044
SRM610-14	0.233427	0.243763	0.251573	0.000000	0.000000	0.047400	0.217726	0.136480
AP1-14	0.000005	0.000705	0.000019	0.000000	0.000000	0.000008	0.000000	0.000071
AP2-14	0.000027	0.001032	0.000335	0.000000	0.004439	0.000028	0.000145	0.000209
AP3-14	0.000124	0.002250	0.001942	0.000000	0.005679	0.000144	0.000633	0.000827
AP4-14	0.000146	0.004423	0.002678	0.000000	0.009136	0.000352	0.000856	0.001224

standardize signal averages AP

AP1	0.000025	0.000352	0.000132	0.000000	0.000000	0.000004	0.000012	0.000066
AP2	0.000041	0.000516	0.000465	0.000000	0.002219	0.000014	0.000141	0.000233
AP3	0.000128	0.001548	0.001966	0.004908	0.002840	0.000120	0.000611	0.000839
AP4	0.000173	0.004334	0.003292	0.019853	0.005113	0.000398	0.001000	0.001490

linest from std sig ave

	0.019067	0.010423	0.012542	0.136109	0.582865	0.145829	0.014843	0.020098
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standardize signal averages SRM

srm614-2	0.000370	0.005592	0.000365	0.062769	0.000000	0.000161	0.000180	0.001955
srm612-2	0.014710	0.012982	0.015110	0.000000	0.000000	0.002730	0.012970	0.010604
srm610-2	0.216865	0.216665	0.252771	0.134170	0.000000	0.046163	0.218497	0.135657

linest from std sig ave

	0.023782	0.021846	0.020022	0.032591	0.000000	0.112302	0.021648	0.037000
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concentration data

SRM614-13	0.60	0.00	0.79	1465.42	0.00	0.00	0.00	3.04
SRM612-13	22.06	1.60	16.29	0.00	0.00	26.66	15.82	17.52
SRM610-13	327.54	169.46	273.17	3132.35	0.00	561.89	279.12	232.41
AP1-13	0.34	0.00	1.23	0.00	0.00	0.00	0.15	0.48
AP2-13	0.42	0.00	2.97	0.00	0.00	0.00	0.81	2.05
AP3-13	1.01	3.52	9.95	532.94	0.00	5.53	3.48	6.82
AP4-13	1.53	17.65	19.55	2155.99	253.32	25.81	6.77	14.07
LA3324-1-1	14.74	0.00	19.79	930.37	833.45	0.00	6.09	2.89
LA3324-1-2	13.35	0.00	14.81	0.00	1164.96	0.00	5.50	2.06
LA3324-1-3	13.12	0.00	15.45	0.00	1736.29	0.00	6.17	2.75
LA3324-1-4	28.54	0.00	131.48	2357.73	1425.74	0.00	12.58	4.71
LA3324-1-5	23.76	0.00	83.89	0.00	2040.32	0.00	10.58	3.41
LA3324-1-6	24.43	0.00	94.59	273.99	2239.91	0.00	11.77	3.51
LA3324-1-7	24.37	0.00	53.80	2218.82	2642.84	0.00	11.16	3.66
LA3324-1-8	29.15	0.00	70.65	4581.69	2773.55	0.45	12.96	4.44
LA3324-1-9	34.22	0.53	82.73	13884.26	3638.89	0.19	14.29	5.11
LA3324-1-10	27.64	1.43	18.13	0.00	5827.75	0.00	4.60	5.76
LA3324-1-11	17.75	1.45	8.06	0.00	6572.79	0.00	5.16	5.32
LA3324-1-12	23.55	4.30	13.57	0.00	6584.78	1.79	4.39	3.98
LA3324-1-13	19.61	4.01	14.90	4819.93	4917.24	1.71	3.42	3.86
LA3324-1-14	15.96	3.90	8.11	1747.93	4739.75	1.23	3.11	3.56
LA3324-1-15	16.72	4.46	12.99	883.99	4826.68	2.46	3.16	3.64
LA3324-1-16	15.26	5.53	19.71	620.08	5381.64	4.33	3.19	2.45
LA3324-1-17	16.90	5.55	40.06	0.00	4905.51	4.63	3.58	2.28
LA3324-1-18	12.69	5.97	9.54	0.00	4817.55	3.57	3.19	2.06
SRM614-14	0.61	10.00	0.00	0.00	0.00	4.02	0.46	3.70
SRM612-14	26.05	21.61	16.22	0.00	0.00	41.63	17.20	19.04
SRM610-14	381.71	217.91	270.60	0.00	0.00	592.81	277.16	235.25
AP1-14	0.04	2.93	0.10	0.00	0.00	0.47	0.00	0.57
AP2-14	0.20	4.29	1.68	0.00	1032.12	1.62	0.86	1.68
AP3-14	0.94	9.36	9.72	0.00	1320.60	8.39	3.75	6.63
AP4-14	1.11	18.39	13.40	0.00	2124.43	20.49	5.07	9.82

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-11	783.28	62338.47	5203.35	2643863.00	31664.18	2405.81	918.33	724.44
SRM614-11	1218.13	60360.26	5235.75	2372636.00	29596.97	4524.71	1626.89	3708.18
SRM612-11	18753.71	80662.30	30727.13	2222886.30	26247.39	9582.57	24922.50	18250.82
SRM610-11	135609.97	224437.55	219127.91	2382789.00	26027.75	44812.13	192477.77	119104.27
AP1-11	942.09	59680.18	7478.12	2261286.30	49667.76	8289.61	2416.81	1705.41
AP2-11	1030.89	61589.43	10388.38	2167767.50	86022.28	7998.96	4252.14	3619.94
AP3-11	2508.69	85241.00	43051.52	2525225.30	125250.98	11666.43	14660.16	18720.55
AP4-11	2457.17	110370.10	46619.94	2582872.30	158814.06	13796.72	15135.21	19671.39
M17-24-141-1	700.16	56827.40	7800.16	1719134.30	145774.09	3124.50	3250.34	1212.37
M17-24-141-2	568.60	59095.61	6895.48	1661408.30	141427.44	3513.86	2925.78	1148.89
M17-24-141-3	617.36	60987.15	7112.88	1654916.00	146682.63	3697.26	2974.34	1156.81
M17-24-141-4	725.60	61465.79	9609.21	1661252.00	151546.97	3931.58	3203.18	1117.13
M17-24-141-5	630.48	62529.79	9731.89	1627605.50	155686.95	3893.70	2845.50	1031.05
M17-24-141-6	698.60	63765.36	9351.09	1619458.80	160324.47	4073.46	3030.30	1066.21
M17-24-141-7	1026.89	65667.09	11026.54	1688727.40	164478.89	4038.42	5345.07	1261.77
M17-24-141-8	671.88	65553.53	9487.13	1585083.80	165752.33	4126.38	3304.50	994.65
M17-24-141-9	695.16	67437.34	9877.34	1582589.40	169503.55	4171.42	3464.66	1067.61
M17-24-141-10	1673.29	69779.35	24349.78	1883014.80	179503.09	4982.07	14596.00	1851.25
M17-24-141-11	1248.53	70133.08	20364.23	1777100.60	185840.92	5245.31	12220.95	2050.33
M17-24-141-12	1640.45	70185.48	27951.68	1878928.60	196734.47	5495.03	18476.63	2704.82
M17-24-141-13	10770.42	73008.53	48419.55	4403013.50	252506.81	8369.13	65276.73	7699.84
M17-24-141-14	7362.04	69903.91	33403.91	3576607.80	253012.03	8045.61	47898.95	6836.56
M17-24-141-15	5672.15	68225.42	34823.12	2875620.80	256386.81	7607.36	46590.06	6429.44
M17-24-141-16	9714.54	71575.01	170818.28	4044197.50	290027.94	9126.25	92664.32	12925.79
M17-24-141-17	4086.86	67742.74	66895.26	2331625.30	269595.69	8016.17	87223.33	11690.39
M17-24-141-18	4746.35	67096.98	63843.76	2487798.80	280920.25	7969.88	50509.41	12510.23
SRM614-12	1021.41	67037.90	3903.74	1276352.60	172188.97	3487.78	2868.66	3980.38
SRM612-12	24325.22	94039.29	33089.98	1307711.00	131105.02	9860.62	27312.55	21361.28
SRM610-12	190122.31	275247.19	256871.08	1600200.80	120344.28	51432.57	224686.19	140747.75
AP1-12	702.88	67151.86	5448.63	1251361.80	163214.23	4692.59	2264.21	1726.33
AP2-12	922.69	70227.95	10286.82	1253980.50	207282.61	4959.55	4079.46	3504.34
AP3-12	2639.41	95955.74	42445.20	1646003.90	240230.95	8136.13	14871.12	17123.14
AP4-12	3246.82	139802.50	60783.06	2043273.00	271367.00	12607.71	19446.75	24938.22
blank-12	477.92	62277.83	2911.34	1227940.80	268061.56	3029.22	3037.74	684.44
blank average	630.60	62308.15	4057.34	1935901.90	149862.87	2717.52	1978.03	704.44
blank subtraction								
SRM614-11	587.52	-1947.89	1178.41	436734.10	-120265.90	1807.19	-351.14	3003.74
SRM612-11	18123.10	18354.14	26669.79	286984.40	-123615.48	6865.06	22944.47	17546.38
SRM610-11	134979.37	162129.40	215070.57	446887.10	-123835.12	42094.62	190499.74	118399.83
AP1-11	311.48	-2627.98	3420.78	325384.40	-100195.11	5572.09	438.78	1000.97
AP2-11	400.28	-718.73	6331.04	231865.60	-63840.59	5281.45	2274.11	2915.50
AP3-11	1878.09	22932.85	38994.18	589323.40	-24611.89	8948.91	12682.13	18016.10
AP4-11	1826.57	48061.95	42562.60	646970.40	8951.19	11079.20	13157.17	18966.95
M17-24-141-1	69.56	-5480.75	3742.82	-216767.60	-4088.78	406.98	1272.31	507.92
M17-24-141-2	-62.00	-3212.54	2838.14	-274493.60	-8435.43	796.34	947.75	444.44
M17-24-141-3	-13.24	-1321.01	3055.54	-280985.90	-3180.24	979.75	996.31	452.36
M17-24-141-4	95.00	-842.37	5551.87	-274649.90	1684.10	1214.07	1225.15	412.68
M17-24-141-5	-0.12	221.64	5674.55	-308296.40	5824.08	1176.19	867.46	326.60
M17-24-141-6	68.00	1457.21	5293.75	-316443.10	10461.60	1355.95	1052.27	361.76
M17-24-141-7	396.28	3358.93	6969.20	-247174.50	14616.02	1320.91	3367.04	557.32
M17-24-141-8	41.28	3245.38	5429.79	-350818.10	15889.46	1408.87	1326.47	290.20
M17-24-141-9	64.56	5129.19	5819.99	-353312.50	19640.68	1453.91	1486.63	363.16
M17-24-141-10	1042.69	7471.20	20292.43	-52887.10	29640.22	2264.55	12617.97	1146.81
M17-24-141-11	617.92	7824.93	16306.89	-158801.30	35978.05	2527.79	10242.92	1345.89
M17-24-141-12	1009.85	7877.32	23894.33	-56973.30	46871.60	2777.52	16498.59	2000.37
M17-24-141-13	10139.82	10700.38	44362.21	2467111.60	102643.94	5651.61	63298.70	6995.40
M17-24-141-14	6731.44	7595.76	29346.57	1640705.90	103149.16	5328.09	45920.92	6132.11
M17-24-141-15	5041.55	5917.27	30765.77	939718.90	106523.94	4889.85	44612.03	5724.99
M17-24-141-16	9083.93	9266.86	166760.94	2108295.60	140165.07	6408.74	90686.29	12221.35
M17-24-141-17	3456.26	5434.59	62837.92	395723.40	119732.82	5298.65	85245.30	10985.94
M17-24-141-18	4115.74	4788.82	59786.42	551896.90	131057.38	5252.37	78531.38	11805.79
SRM614-12	390.80	4729.75	-153.60	-659549.30	22326.10	770.26	890.62	3275.94
SRM612-12	23694.61	31731.14	29032.64	-628190.90	-18757.85	7143.10	25334.52	20656.84
SRM610-12	189491.71	212939.04	252813.74	-335701.10	-29518.59	48715.05	222708.16	140043.31
AP1-12	72.28	4843.71	1391.29	-684540.10	13351.36	1975.07	286.18	1021.89
AP2-12	292.08	7919.80	6229.47	-681921.40	57419.74	2242.03	2101.43	2799.90
AP3-12	2008.81	33647.59	38387.86	-289898.00	90368.08	5418.61	12893.09	16418.69
AP4-12	2616.21	77494.35	56725.72	107371.10	121504.13	9890.20	17468.72	24233.78

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
SRM614-11	587.52	0.00	1178.41	436734.10	0.00	1807.19	0.00	3003.74
SRM612-11	18123.10	18354.14	26669.79	286984.40	0.00	6865.06	22944.47	17546.38
SRM610-11	134979.37	162129.40	215070.57	446887.10	0.00	42094.62	190499.74	118399.83
AP1-11	311.48	0.00	3420.78	325384.40	0.00	5572.09	438.78	1000.97
AP2-11	400.28	0.00	6331.04	231865.60	0.00	5281.45	2274.11	2915.50
AP3-11	1878.09	22932.85	38994.18	589323.40	0.00	8948.91	12682.13	18016.10
AP4-11	1826.57	48061.95	42562.60	646970.40	8951.19	11079.20	13157.17	18966.95
M17-24-141-1	69.56	0.00	3742.82	0.00	0.00	406.98	1272.31	507.92
M17-24-141-2	0.00	0.00	2838.14	0.00	0.00	796.34	947.75	444.44
M17-24-141-3	0.00	0.00	3055.54	0.00	0.00	979.75	996.31	452.36
M17-24-141-4	95.00	0.00	5551.87	0.00	1684.10	1214.07	1225.15	412.68
M17-24-141-5	0.00	221.64	5674.55	0.00	5824.08	1176.19	867.46	326.60
M17-24-141-6	68.00	1457.21	5293.75	0.00	10461.60	1355.95	1052.27	361.76
M17-24-141-7	396.28	3358.93	6969.20	0.00	14616.02	1320.91	3367.04	557.32
M17-24-141-8	41.28	3245.38	5429.79	0.00	15889.46	1408.87	1326.47	290.20
M17-24-141-9	64.56	5129.19	5819.99	0.00	19640.68	1453.91	1486.63	363.16
M17-24-141-10	1042.69	7471.20	20292.43	0.00	29640.22	2264.55	12617.97	1146.81
M17-24-141-11	617.92	7824.93	16306.89	0.00	35978.05	2527.79	10242.92	1345.89
M17-24-141-12	1009.85	7877.32	23894.33	0.00	46871.60	2777.52	16498.59	2000.37
M17-24-141-13	10139.82	10700.38	44362.21	2467111.60	102643.94	5651.61	63298.70	6995.40
M17-24-141-14	6731.44	7595.76	29346.57	1640705.90	103149.16	5328.09	45920.92	6132.11
M17-24-141-15	5041.55	5917.27	30765.77	939718.90	106523.94	4889.85	44612.03	5724.99
M17-24-141-16	9083.93	9266.86	166760.94	2108295.60	140165.07	6408.74	90686.29	12221.35
M17-24-141-17	3456.26	5434.59	62837.92	395723.40	119732.82	5298.65	85245.30	10985.94
M17-24-141-18	4115.74	4788.82	59786.42	551896.90	131057.38	5252.37	78531.38	11805.79
SRM614-12	390.80	4729.75	0.00	0.00	22326.10	770.26	890.62	3275.94
SRM612-12	23694.61	31731.14	29032.64	0.00	0.00	7143.10	25334.52	20656.84
SRM610-12	189491.71	212939.04	252813.74	0.00	0.00	48715.05	222708.16	140043.31
AP1-12	72.28	4843.71	1391.29	0.00	13351.36	1975.07	286.18	1021.89
AP2-12	292.08	7919.80	6229.47	0.00	57419.74	2242.03	2101.43	2799.90
AP3-12	2008.81	33647.59	38387.86	0.00	90368.08	5418.61	12893.09	16418.69
AP4-12	2616.21	77494.35	56725.72	107371.10	121504.13	9890.20	17468.72	24233.78
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-11	0.000316	0.000000	0.000633	0.234762	0.000000	0.000971	0.000000	0.001615
SRM612-11	0.009371	0.009491	0.013791	0.148396	0.000000	0.003550	0.011864	0.009073
SRM610-11	0.132055	0.158617	0.210411	0.437205	0.000000	0.041183	0.186372	0.115835
AP1-11	0.000027	0.000000	0.000298	0.028366	0.000000	0.000486	0.000038	0.000087
AP2-11	0.000037	0.000000	0.000590	0.021597	0.000000	0.000492	0.000212	0.000272
AP3-11	0.000132	0.001611	0.002740	0.041407	0.000000	0.000629	0.000891	0.001266
AP4-11	0.000134	0.003539	0.003134	0.047639	0.000659	0.000816	0.000969	0.001397
M17-24-141-1	0.000032	0.000000	0.001704	0.000000	0.000000	0.000185	0.000579	0.000231
M17-24-141-2	0.000000	0.000000	0.001160	0.000000	0.000000	0.000325	0.000387	0.000182
M17-24-141-3	0.000000	0.000000	0.001137	0.000000	0.000000	0.000365	0.000371	0.000168
M17-24-141-4	0.000028	0.000000	0.001647	0.000000	0.000500	0.000360	0.000363	0.000122
M17-24-141-5	0.000000	0.000069	0.001777	0.000000	0.001824	0.000368	0.000272	0.000102
M17-24-141-6	0.000022	0.000462	0.001680	0.000000	0.003319	0.000430	0.000334	0.000115
M17-24-141-7	0.000134	0.001138	0.002361	0.000000	0.004952	0.000448	0.001141	0.000189
M17-24-141-8	0.000015	0.001145	0.001915	0.000000	0.005605	0.000497	0.000468	0.000102
M17-24-141-9	0.000021	0.001692	0.001920	0.000000	0.006479	0.000480	0.000490	0.000120
M17-24-141-10	0.000224	0.001608	0.004368	0.000000	0.006380	0.000487	0.002716	0.000247
M17-24-141-11	0.000097	0.001224	0.002551	0.000000	0.005629	0.000395	0.001602	0.000211
M17-24-141-12	0.000136	0.001064	0.003227	0.000000	0.006331	0.000375	0.002228	0.000270
M17-24-141-13	0.000606	0.000640	0.002652	0.147481	0.006136	0.000338	0.003784	0.000418
M17-24-141-14	0.000400	0.000452	0.001746	0.097588	0.006135	0.000317	0.002731	0.000365
M17-24-141-15	0.000297	0.000349	0.001813	0.055381	0.006278	0.000288	0.002629	0.000337
M17-24-141-16	0.000509	0.000519	0.009339	0.118064	0.007849	0.000359	0.005078	0.000684
M17-24-141-17	0.000188	0.000296	0.003418	0.021522	0.006512	0.000288	0.004636	0.000597

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000222	0.000258	0.003222	0.029741	0.007062	0.000283	0.004232	0.000636
SRM614-12	0.000265	0.003213	0.000000	0.000000	0.015165	0.000523	0.000605	0.002225
SRM612-12	0.012538	0.016790	0.015362	0.000000	0.000000	0.003780	0.013406	0.010930
SRM610-12	0.187976	0.211235	0.250791	0.000000	0.000000	0.048325	0.220926	0.138923
AP1-12	0.000006	0.000402	0.000115	0.000000	0.001107	0.000164	0.000024	0.000085
AP2-12	0.000024	0.000650	0.000512	0.000000	0.004715	0.000184	0.000173	0.000230
AP3-12	0.000121	0.002030	0.002316	0.000000	0.005451	0.000327	0.000778	0.000990
AP4-12	0.000162	0.004799	0.003513	0.006649	0.007524	0.000612	0.001082	0.001501

standardize signal averages AP

AP1	0.000017	0.000201	0.000207	0.014183	0.000554	0.000325	0.000031	0.000086
AP2	0.000031	0.000325	0.000551	0.010799	0.002358	0.000338	0.000192	0.000251
AP3	0.000127	0.001821	0.002528	0.020703	0.002726	0.000478	0.000834	0.001128
AP4	0.000148	0.004169	0.003323	0.027144	0.004092	0.000714	0.001025	0.001449

linest from std sig ave

	0.021109	0.010628	0.011451	0.109735	0.723014	0.080007	0.013016	0.018470
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standardize signal averages SRM

srm614-2	0.000291	0.001606	0.000317	0.117381	0.007582	0.000747	0.000302	0.001920
srm612-2	0.010955	0.013140	0.014576	0.074198	0.000000	0.003665	0.012635	0.010002
srm610-2	0.160015	0.184926	0.230601	0.218602	0.000000	0.044754	0.203649	0.127379

linest from std sig ave

	0.032231	0.025598	0.021945	0.018098	0.000000	0.115668	0.023224	0.039403
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concentration data

SRM614-11	0.57	0.00	0.62	2209.39	0.00	6.67	0.00	2.56
SRM612-11	16.97	8.65	13.54	1396.58	0.00	24.36	13.24	14.37
SRM610-11	239.07	144.58	206.63	4114.63	0.00	282.58	208.04	183.49
AP1-11	0.23	0.00	1.36	1241.79	0.00	15.50	0.20	0.64
AP2-11	0.31	0.00	2.69	945.46	0.00	15.70	1.10	2.00
AP3-11	1.11	6.83	12.52	1812.67	0.00	20.07	4.63	9.33
AP4-11	1.13	15.01	14.32	2085.48	190.11	26.04	5.03	10.29
M17-24-141-1	0.27	0.00	7.78	0.00	0.00	5.91	3.01	1.70
M17-24-141-2	0.00	0.00	5.30	0.00	0.00	10.39	2.01	1.34
M17-24-141-3	0.00	0.00	5.20	0.00	0.00	11.64	1.93	1.24
M17-24-141-4	0.24	0.00	7.52	0.00	144.10	11.50	1.89	0.90
M17-24-141-5	0.00	0.29	8.12	0.00	526.11	11.76	1.41	0.75
M17-24-141-6	0.18	1.96	7.67	0.00	957.38	13.73	1.73	0.85
M17-24-141-7	1.13	4.83	10.79	0.00	1428.39	14.28	5.92	1.39
M17-24-141-8	0.12	4.85	8.75	0.00	1616.62	15.86	2.43	0.75
M17-24-141-9	0.18	7.17	8.77	0.00	1868.88	15.31	2.55	0.88
M17-24-141-10	1.89	6.82	19.95	0.00	1840.23	15.56	14.10	1.82
M17-24-141-11	0.81	5.19	11.65	0.00	1623.50	12.62	8.32	1.55
M17-24-141-12	1.15	4.51	14.74	0.00	1826.09	11.97	11.57	1.99
M17-24-141-13	5.10	2.71	12.11	6456.30	1769.82	10.78	19.65	3.08
M17-24-141-14	3.37	1.92	7.97	4272.14	1769.63	10.12	14.18	2.69
M17-24-141-15	2.50	1.48	8.28	2424.43	1810.76	9.20	13.65	2.49
M17-24-141-16	4.28	2.20	42.66	5168.54	2264.00	11.45	26.37	5.04
M17-24-141-17	1.58	1.25	15.61	942.17	1878.24	9.20	24.07	4.40
M17-24-141-18	1.87	1.09	14.72	1301.97	2037.08	9.03	21.97	4.69
SRM614-12	0.48	2.93	0.00	0.00	940.33	3.59	0.68	3.52
SRM612-12	22.70	15.30	15.09	0.00	0.00	25.93	14.96	17.31
SRM610-12	340.31	192.55	246.29	0.00	0.00	331.59	246.61	220.06
AP1-12	0.05	1.70	0.53	0.00	319.39	5.23	0.12	0.62
AP2-12	0.20	2.76	2.34	0.00	1359.99	5.88	0.90	1.69
AP3-12	1.02	8.61	10.58	0.00	1572.38	10.43	4.04	7.30
AP4-12	1.36	20.35	16.05	291.07	2170.25	19.55	5.62	11.06

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-9	1291.01	70165.23	11469.23	1912711.00	27655.84	4907.95	861.80	1069.81
SRM614-9	2031.33	66165.41	8971.57	1484189.40	22720.17	4506.83	1352.21	5080.27
SRM612-9	25530.54	86595.09	37442.61	1470143.10	23185.25	8883.37	24034.74	18249.22
SRM610-9	209817.14	278072.44	268361.25	1605053.90	24879.90	51958.93	230353.33	141262.28
AP1-9	2359.69	66583.94	10939.38	1197143.40	40260.23	4082.70	1152.09	1534.93
AP2-9	2125.37	71074.60	14980.85	1112194.50	79921.45	4283.62	3099.02	3911.22
AP3-9	3783.82	96398.87	43630.45	1392199.40	127583.44	6831.00	11703.79	15724.85

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	4597.43	144149.97	70162.16	1815359.00	182857.06	11705.55	20179.04	29184.73
M17-24-97-1	6971.16	71292.84	52075.45	2373799.80	214931.77	4668.39	4855.63	2724.54
M17-24-97-2	2250.61	72464.37	39997.02	1223669.50	202826.02	4282.50	5546.03	1919.89
M17-24-97-3	2893.38	75053.38	52690.86	1197801.00	215455.61	4431.23	5310.47	2077.89
M17-24-97-4	9074.09	80442.73	101591.81	2585098.00	246170.95	5777.19	5078.67	2711.58
M17-24-97-5	2011.01	80975.53	41176.03	1176014.10	225975.08	4856.39	5360.15	1785.53
M17-24-97-6	3119.74	84350.27	45096.30	1325444.60	233909.08	5154.11	5875.71	1924.45
M17-24-97-7	5131.51	87015.81	125831.11	1841380.00	247114.75	6642.12	4852.47	2123.49
M17-24-97-8	2973.66	89378.74	44578.81	1321605.90	244140.89	5594.07	5496.07	1810.57
M17-24-97-9	2036.97	90047.15	27288.11	994386.50	243989.73	5466.79	5098.67	1676.25
M17-24-97-10	4043.98	93987.73	37736.01	1567292.30	251925.81	5965.83	4059.98	1682.69
M17-24-97-11	2674.70	96419.66	26101.67	1232083.40	247325.52	5680.71	5002.43	1525.29
M17-24-97-12	2885.10	97782.15	26141.19	1210076.90	251495.77	5944.39	5192.43	1623.69
M17-24-97-13	17958.50	105309.84	65204.69	4348821.50	299360.78	7596.24	4380.78	2724.42
M17-24-97-14	4988.35	100997.97	33269.11	1764932.00	257539.13	6358.76	4563.75	1624.89
M17-24-97-15	3408.66	101728.89	31761.46	1271177.30	254399.39	6395.48	4971.03	1457.77
M17-24-97-16	13622.36	106719.40	84987.84	3418094.00	297369.41	7897.48	5277.75	2451.29
M17-24-97-17	5187.63	104725.51	37697.25	1755484.80	266368.66	6388.68	4816.43	1612.41
M17-24-97-18	9441.05	107352.45	43608.20	2913315.00	288944.03	6592.48	4859.83	2020.53
SRM614-10	1863.65	105643.20	6705.36	581345.44	103684.58	5954.83	1964.93	4922.91
SRM612-10	22853.45	122029.45	27804.00	575047.88	63772.60	9775.97	19747.23	15787.65
SRM610-10	186000.28	282915.72	209226.94	783639.44	58965.81	43684.29	175882.39	107112.72
AP1-10	1192.25	99938.64	7520.88	525943.44	104457.38	5532.59	1469.21	1738.17
AP2-10	1359.13	100314.88	11215.90	568387.31	169759.56	5650.79	3231.70	2949.86
AP3-10	3079.82	125967.07	40796.03	888611.44	214335.45	7622.08	11969.63	15100.81
AP4-10	3723.50	159398.45	56808.08	1190412.80	252867.91	10987.38	16953.58	23123.17
blank-10	969.69	109931.82	6049.87	683053.31	237410.66	6654.88	2533.09	811.20
blank average	1130.35	90048.53	8759.55	1297882.16	132533.25	5781.41	1697.45	940.51

blank subtraction								
SRM614-9	900.99	-23883.11	212.02	186307.25	-109813.08	-1274.59	-345.24	4139.76
SRM612-9	24400.20	-3453.44	28683.06	172260.95	-109348.00	3101.96	22337.29	17308.72
SRM610-9	208686.79	188023.91	259601.70	307171.75	-107653.35	46177.52	228655.88	140321.77
AP1-9	1229.35	-23464.59	2179.83	-100738.76	-92273.02	-1698.71	-545.36	594.42
AP2-9	995.03	-18973.93	6221.30	-185687.66	-52611.80	-1497.79	1401.57	2970.72
AP3-9	2653.47	6350.34	34870.90	94317.24	-4949.81	1049.59	10006.34	14784.34
AP4-9	3467.08	54101.44	61402.61	517476.85	50323.81	5924.13	18481.59	28244.22
M17-24-97-1	5840.81	-18755.68	43315.90	1075917.65	82398.52	-1113.03	3158.18	1784.03
M17-24-97-2	1120.27	-17584.16	31237.47	-74212.66	70292.77	-1498.91	3848.58	979.39
M17-24-97-3	1763.03	-14995.14	43931.31	-100081.16	82922.36	-1350.19	3613.02	1137.39
M17-24-97-4	7943.74	-9605.79	92832.26	1287215.85	113637.70	-4.22	3381.22	1771.07
M17-24-97-5	880.66	-9073.00	32416.48	-121868.06	93441.83	-925.03	3662.70	845.02
M17-24-97-6	1989.39	-5698.25	36336.75	27562.45	101375.83	-627.30	4178.26	983.95
M17-24-97-7	4001.16	-3032.71	117071.56	543497.85	114581.50	860.70	3155.02	1182.99
M17-24-97-8	1843.31	-669.79	35819.26	23723.74	111607.64	-187.34	3798.62	870.06
M17-24-97-9	906.63	-1.38	18528.56	-303495.66	111456.48	-314.62	3401.22	735.74
M17-24-97-10	2913.64	3939.20	28976.46	269410.15	119392.56	184.42	2362.53	742.18
M17-24-97-11	1544.35	6371.14	17342.12	-65798.76	114792.27	-100.70	3304.98	584.78
M17-24-97-12	1754.75	7733.62	17381.64	-87805.26	118962.52	162.98	3494.98	683.18
M17-24-97-13	16828.16	15261.31	56445.14	3050939.35	166827.53	1814.83	2683.34	1783.91
M17-24-97-14	3858.00	10949.44	24509.56	467049.85	125005.88	577.34	2866.30	684.38
M17-24-97-15	2278.31	11680.36	23001.91	-26704.85	121866.14	614.06	3273.58	517.26
M17-24-97-16	12492.01	16670.87	76228.29	2120211.85	164836.16	2116.07	3580.30	1510.79
M17-24-97-17	4057.28	14676.98	28937.70	457602.65	133835.41	607.26	3118.98	671.90
M17-24-97-18	8310.71	17303.92	34848.65	1615432.85	156410.78	811.06	3162.38	1080.03
SRM614-10	733.30	15594.67	-2054.19	-716536.72	-28848.67	173.42	267.48	3982.40
SRM612-10	21723.10	31980.92	19044.45	-722834.28	-68760.65	3994.56	18049.78	14847.14
SRM610-10	184869.93	192867.19	200467.39	-514242.72	-73567.44	37902.87	174184.94	106172.21
AP1-10	61.90	9890.11	-1238.67	-771938.72	-28075.87	-248.82	-228.24	797.66
AP2-10	228.78	10266.35	2456.35	-729494.85	37226.31	-130.62	1534.25	2009.35
AP3-10	1949.47	35918.54	32036.48	-409270.72	81802.20	1840.67	10272.18	14160.30
AP4-10	2593.15	69349.92	48048.53	-107469.36	120334.66	5205.97	15256.13	22182.66

zero correction								
SRM614-9	900.99	0.00	212.02	186307.25	0.00	0.00	0.00	4139.76
SRM612-9	24400.20	0.00	28683.06	172260.95	0.00	3101.96	22337.29	17308.72
SRM610-9	208686.79	188023.91	259601.70	307171.75	0.00	46177.52	228655.88	140321.77
AP1-9	1229.35	0.00	2179.83	0.00	0.00	0.00	0.00	594.42
AP2-9	995.03	0.00	6221.30	0.00	0.00	0.00	1401.57	2970.72
AP3-9	2653.47	6350.34	34870.90	94317.24	0.00	1049.59	10006.34	14784.34
AP4-9	3467.08	54101.44	61402.61	517476.85	50323.81	5924.13	18481.59	28244.22
M17-24-97-1	5840.81	0.00	43315.90	1075917.65	82398.52	0.00	3158.18	1784.03
M17-24-97-2	1120.27	0.00	31237.47	0.00	70292.77	0.00	3848.58	979.39
M17-24-97-3	1763.03	0.00	43931.31	0.00	82922.36	0.00	3613.02	1137.39
M17-24-97-4	7943.74	0.00	92832.26	1287215.85	113637.70	0.00	3381.22	1771.07
M17-24-97-5	880.66	0.00	32416.48	0.00	93441.83	0.00	3662.70	845.02
M17-24-97-6	1989.39	0.00	36336.75	27562.45	101375.83	0.00	4178.26	983.95
M17-24-97-7	4001.16	0.00	117071.56	543497.85	114581.50	860.70	3155.02	1182.99

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	1843.31	0.00	35819.26	23723.74	111607.64	0.00	3798.62	870.06
M17-24-97-9	906.63	0.00	18528.56	0.00	111456.48	0.00	3401.22	735.74
M17-24-97-10	2913.64	3939.20	28976.46	269410.15	119392.56	184.42	2362.53	742.18
M17-24-97-11	1544.35	6371.14	17342.12	0.00	114792.27	0.00	3304.98	584.78
M17-24-97-12	1754.75	7733.62	17381.64	0.00	118962.52	162.98	3494.98	683.18
M17-24-97-13	16828.16	15261.31	56445.14	3050939.35	166827.53	1814.83	2683.34	1783.91
M17-24-97-14	3858.00	10949.44	24509.56	467049.85	125005.88	577.34	2866.30	684.38
M17-24-97-15	2278.31	11680.36	23001.91	0.00	121866.14	614.06	3273.58	517.26
M17-24-97-16	12492.01	16670.87	76228.29	2120211.85	164836.16	2116.07	3580.30	1510.79
M17-24-97-17	4057.28	14676.98	28937.70	457602.65	133835.41	607.26	3118.98	671.90
M17-24-97-18	8310.71	17303.92	34848.65	1615432.85	156410.78	811.06	3162.38	1080.03
SRM614-10	733.30	15594.67	0.00	0.00	0.00	173.42	267.48	3982.40
SRM612-10	21723.10	31980.92	19044.45	0.00	0.00	3994.56	18049.78	14847.14
SRM610-10	184869.93	192867.19	200467.39	0.00	0.00	37902.87	174184.94	106172.21
AP1-10	61.90	9890.11	0.00	0.00	0.00	0.00	0.00	797.66
AP2-10	228.78	10266.35	2456.35	0.00	37226.31	0.00	1534.25	2009.35
AP3-10	1949.47	35918.54	32036.48	0.00	81802.20	1840.67	10272.18	14160.30
AP4-10	2593.15	69349.92	48048.53	0.00	120334.66	5205.97	15256.13	22182.66

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-9	0.000383	0.000000	0.000090	0.079252	0.000000	0.000000	0.000000	0.001761
SRM612-9	0.013488	0.000000	0.015856	0.095225	0.000000	0.001715	0.012348	0.009568
SRM610-9	0.207929	0.187341	0.258659	0.306056	0.000000	0.046010	0.227825	0.139812
AP1-9	0.000097	0.000000	0.000171	0.000000	0.000000	0.000000	0.000000	0.000047
AP2-9	0.000074	0.000000	0.000464	0.000000	0.000000	0.000000	0.000104	0.000221
AP3-9	0.000148	0.000355	0.001951	0.005278	0.000000	0.000059	0.000560	0.000827
AP4-9	0.000214	0.003334	0.003783	0.031885	0.003101	0.000365	0.001139	0.001740
M17-24-97-1	0.000778	0.000000	0.005769	0.143295	0.010974	0.000000	0.000421	0.000238
M17-24-97-2	0.000162	0.000000	0.004510	0.000000	0.010148	0.000000	0.000556	0.000141
M17-24-97-3	0.000229	0.000000	0.005708	0.000000	0.010775	0.000000	0.000469	0.000148
M17-24-97-4	0.001474	0.000000	0.017228	0.238884	0.021089	0.000000	0.000627	0.000329
M17-24-97-5	0.000163	0.000000	0.005985	0.000000	0.017251	0.000000	0.000676	0.000156
M17-24-97-6	0.000346	0.000000	0.006326	0.004799	0.017650	0.000000	0.000727	0.000171
M17-24-97-7	0.000808	0.000000	0.023640	0.109749	0.023138	0.000174	0.000637	0.000239
M17-24-97-8	0.000404	0.000000	0.007846	0.005197	0.024447	0.000000	0.000832	0.000191
M17-24-97-9	0.000175	0.000000	0.003582	0.000000	0.021546	0.000000	0.000657	0.000142
M17-24-97-10	0.000723	0.000978	0.007193	0.066879	0.029638	0.000046	0.000586	0.000184
M17-24-97-11	0.000333	0.001373	0.003738	0.000000	0.024741	0.000000	0.000712	0.000126
M17-24-97-12	0.000354	0.001560	0.003506	0.000000	0.023995	0.000033	0.000705	0.000138
M17-24-97-13	0.003862	0.003503	0.012955	0.700258	0.038291	0.000417	0.000616	0.000409
M17-24-97-14	0.000816	0.002317	0.005186	0.098816	0.026448	0.000122	0.000606	0.000145
M17-24-97-15	0.000489	0.002506	0.004935	0.000000	0.026144	0.000132	0.000702	0.000111
M17-24-97-16	0.002322	0.003099	0.014172	0.394169	0.030645	0.000393	0.000666	0.000281
M17-24-97-17	0.000685	0.002478	0.004886	0.077257	0.022595	0.000103	0.000527	0.000113
M17-24-97-18	0.001385	0.002884	0.005809	0.269266	0.026071	0.000135	0.000527	0.000180
SRM614-10	0.000371	0.007889	0.000000	0.000000	0.000000	0.000008	0.000135	0.002015
SRM612-10	0.015906	0.023417	0.013945	0.000000	0.000000	0.002925	0.013217	0.010872
SRM610-10	0.230449	0.240418	0.249892	0.000000	0.000000	0.047248	0.217130	0.132349
AP1-10	0.000006	0.000951	0.000000	0.000000	0.000000	0.000000	0.000000	0.000077
AP2-10	0.000021	0.000950	0.000227	0.000000	0.003445	0.000000	0.000142	0.000186
AP3-10	0.000133	0.002457	0.002192	0.000000	0.005596	0.000126	0.000703	0.000969
AP4-10	0.000189	0.005048	0.003498	0.000000	0.008760	0.000379	0.001111	0.001615

standardize signal averages AP								
AP1	0.000051	0.000475	0.000086	0.000000	0.000000	0.000000	0.000000	0.000062
AP2	0.000048	0.000475	0.000346	0.000000	0.001722	0.000000	0.000123	0.000204
AP3	0.000141	0.001406	0.002072	0.002639	0.002798	0.000092	0.000631	0.000898
AP4	0.000201	0.004191	0.003641	0.015943	0.005930	0.000372	0.001125	0.001678

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.016300	0.010785	0.011465	0.164468	0.512552	0.151464	0.013465	0.018116
standardize signal averages SRM								
srm614-2	0.000377	0.003944	0.000045	0.039626	0.000000	0.000044	0.000068	0.001888
srm612-2	0.014697	0.011709	0.014900	0.047612	0.000000	0.002320	0.012782	0.010220
srm610-2	0.219189	0.213880	0.254275	0.153028	0.000000	0.046629	0.222478	0.136080

linest from std sig ave								
	0.023531	0.022139	0.019904	0.031073	0.000000	0.111205	0.021262	0.036893

concentration data								
SRM614-9	0.54	0.00	0.09	1117.87	0.00	0.00	0.00	2.74
SRM612-9	18.86	0.00	15.59	1343.17	0.00	22.27	14.26	14.87
SRM610-9	290.66	173.29	254.33	4317.01	0.00	597.67	263.10	217.23
AP1-9	0.63	0.00	0.78	0.00	0.00	0.00	0.00	0.34
AP2-9	0.48	0.00	2.12	0.00	0.00	0.00	0.56	1.60
AP3-9	0.97	1.53	8.93	346.31	0.00	3.55	3.01	5.98
AP4-9	1.39	14.34	17.30	2092.06	634.03	22.06	6.12	12.58
M17-24-97-1	5.06	0.00	26.39	9401.90	2243.94	0.00	2.26	1.72
M17-24-97-2	1.05	0.00	20.63	0.00	2075.00	0.00	2.98	1.02
M17-24-97-3	1.49	0.00	26.11	0.00	2203.18	0.00	2.52	1.07
M17-24-97-4	9.59	0.00	78.80	15673.75	4312.21	0.00	3.37	2.38
M17-24-97-5	1.06	0.00	27.37	0.00	3527.40	0.00	3.63	1.13
M17-24-97-6	2.25	0.00	28.94	314.86	3608.98	0.00	3.91	1.24
M17-24-97-7	5.25	0.00	108.13	7200.91	4731.08	10.50	3.42	1.73
M17-24-97-8	2.63	0.00	35.89	340.96	4998.83	0.00	4.47	1.38
M17-24-97-9	1.14	0.00	16.38	0.00	4405.57	0.00	3.53	1.03
M17-24-97-10	4.70	4.21	32.90	4388.10	6060.32	2.77	3.15	1.33
M17-24-97-11	2.16	5.91	17.10	0.00	5058.94	0.00	3.83	0.91
M17-24-97-12	2.30	6.71	16.04	0.00	4906.37	1.99	3.79	1.00
M17-24-97-13	25.12	15.07	59.26	45945.58	7829.50	25.17	3.31	2.96
M17-24-97-14	5.31	9.97	23.72	6483.56	5408.00	7.38	3.26	1.05
M17-24-97-15	3.18	10.78	22.57	0.00	5345.77	7.96	3.77	0.80
M17-24-97-16	15.10	13.34	64.82	25862.32	6266.09	23.77	3.58	2.03
M17-24-97-17	4.45	10.66	22.35	5069.00	4620.20	6.19	2.83	0.82
M17-24-97-18	9.01	12.41	26.57	17667.18	5330.91	8.17	2.83	1.30
SRM614-10	0.52	7.30	0.00	0.00	0.00	1.14	0.16	3.13
SRM612-10	22.24	21.66	13.71	0.00	0.00	37.99	15.26	16.89
SRM610-10	322.14	222.38	245.71	0.00	0.00	613.75	250.75	205.63
AP1-10	0.04	4.09	0.00	0.00	0.00	0.00	0.00	0.55
AP2-10	0.14	4.09	1.04	0.00	704.41	0.00	0.76	1.34
AP3-10	0.87	10.57	10.02	0.00	1144.31	7.61	3.78	7.00
AP4-10	1.23	21.72	16.00	0.00	1791.17	22.90	5.97	11.67

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-7	822.60	82916.14	4831.19	2581110.50	34749.00	1845.57	886.16	602.80
SRM614-7	1185.05	77488.44	4896.79	2327536.30	33574.99	4978.35	1478.57	4101.02
SRM612-7	16954.90	94476.01	29595.21	2208114.50	28681.84	8791.13	21671.68	16099.89
SRM610-7	117660.50	219824.36	191989.36	2339444.00	28640.76	39348.14	164692.09	100124.60
AP1-7	877.80	71743.88	7097.88	2227521.80	52751.62	7697.60	1607.73	1528.17
AP2-7	997.13	74663.82	11828.67	2149968.80	85699.09	8295.29	3539.70	3916.86
AP3-7	3170.74	112826.52	61123.82	2759106.50	132355.27	13170.71	19567.91	27301.07
AP4-7	3067.50	136193.73	60375.70	2746713.00	164128.77	14297.16	19440.03	27114.27
34HP45-837-1	1746.81	68324.83	47502.43	2245129.80	161410.11	4012.06	2254.13	1495.41
34HP45-837-2	1820.17	69383.35	39848.34	2120293.50	165701.02	3697.94	2325.13	1689.73
34HP45-837-3	1531.93	70556.27	30991.81	2090604.60	169168.83	3649.14	2384.65	1734.21
34HP45-837-4	3064.14	70487.76	39555.79	2410285.00	186599.81	4967.55	3202.26	2663.01
34HP45-837-5	2673.70	71393.40	60001.62	2087156.00	191770.64	4755.07	3283.26	2315.85
34HP45-837-6	2861.46	71178.88	40517.55	2211278.00	204523.59	4548.63	3131.70	2098.61
34HP45-837-7	4433.15	72944.93	133983.23	3667059.80	242667.45	4738.55	4034.86	3585.10
34HP45-837-8	3618.82	72788.13	78801.56	2886219.80	233333.56	4543.87	3646.38	2544.57
34HP45-837-9	3152.22	74172.66	50913.61	2600465.80	235048.28	4398.06	3338.26	2587.73
34HP45-837-10	3272.70	76037.38	66894.54	3341239.80	251661.78	4156.54	3314.18	1837.37
34HP45-837-11	3117.58	76479.31	57007.36	3115883.30	247551.28	4116.58	3323.90	1692.73
34HP45-837-12	3519.58	77698.96	61955.75	3364594.50	256759.56	4344.02	3268.90	1896.73
34HP45-837-13	4524.63	81488.22	149793.88	4319568.00	303954.50	4410.94	4351.62	3605.34
34HP45-837-14	3299.14	81729.70	57300.52	2613331.80	264959.22	4400.59	3557.94	2054.81
34HP45-837-15	3501.38	83502.75	60345.78	2611651.00	267805.03	4242.14	3440.58	2065.09

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	1385.01	86351.28	5182.95	1234662.40	129974.25	4300.38	2196.85	5029.71
SRM612-8	23645.73	109558.82	31948.86	1210588.40	76951.71	9542.85	24874.42	19535.79
SRM610-8	223916.94	324308.75	290219.69	1531550.80	75248.14	56853.48	250479.81	152557.30
AP1-8	969.25	83268.07	6628.56	1109844.00	121102.12	4623.63	1833.81	1894.77
AP2-8	1185.69	86628.65	13200.23	1115192.00	181906.30	5087.67	4116.98	4282.14
AP3-8	3717.94	126125.87	62735.87	1718269.80	229837.33	8823.97	19157.23	25927.59
AP4-8	3536.46	157600.56	66747.34	1905646.50	266499.06	12220.35	21154.88	28409.56
blank-8	634.08	84689.68	4000.38	1286003.50	233585.64	4141.94	2365.81	745.08
blank average	728.34	83802.91	4415.78	1933557.00	134167.32	2993.76	1625.99	673.94
blank subtraction								
SRM614-7	456.70	-6314.47	481.00	393979.30	-100592.33	1984.59	-147.42	3427.08
SRM612-7	16226.55	10673.10	25179.42	274557.50	-105485.48	5797.37	20045.69	15425.95
SRM610-7	116932.16	136021.45	187573.58	405887.00	-105526.56	36354.38	163066.10	99450.66
AP1-7	149.46	-12059.03	2682.10	293964.80	-81415.70	4703.85	-18.26	854.22
AP2-7	268.78	-9139.09	7412.88	216411.80	-48468.23	5301.53	1913.71	3242.92
AP3-7	2442.39	29023.61	56708.04	825549.50	-1812.05	10176.96	17941.92	26627.13
AP4-7	2339.15	52390.82	55959.91	813156.00	29961.45	11303.40	17814.04	26440.33
34HP45-837-1	1018.47	-15478.08	43086.64	311572.80	27242.79	1018.31	628.14	821.46
34HP45-837-2	1091.83	-14419.56	35432.56	186736.50	31533.70	704.18	699.14	1015.79
34HP45-837-3	803.58	-13246.64	26576.03	157047.60	35001.51	655.38	758.66	1060.27
34HP45-837-4	2335.79	-13315.15	35140.00	476728.00	52432.49	1973.79	1576.27	1989.07
34HP45-837-5	1945.35	-12409.51	55585.83	153599.00	57603.32	1761.31	1657.27	1641.91
34HP45-837-6	2133.11	-12624.03	36101.76	277721.00	70356.27	1554.87	1505.71	1424.67
34HP45-837-7	3704.80	-10857.98	129567.45	1733502.80	108500.13	1744.79	2408.87	2911.16
34HP45-837-8	2890.48	-11014.79	74385.78	952662.80	99166.24	1550.11	2020.39	1870.63
34HP45-837-9	2423.87	-9630.25	46497.82	666908.80	100880.96	1404.31	1712.27	1913.79
34HP45-837-10	2544.35	-7765.53	62478.75	1407682.80	117494.46	1162.79	1688.19	1163.43
34HP45-837-11	2389.23	-7323.60	52591.57	1182326.30	113383.96	1122.83	1697.91	1018.79
34HP45-837-12	2791.24	-6103.95	57539.96	1431037.50	122592.24	1350.27	1642.91	1222.79
34HP45-837-13	3796.28	-2314.69	145378.10	2386011.00	169787.18	1417.19	2725.64	2931.40
34HP45-837-14	2570.79	-2073.22	52884.74	679774.80	130791.90	1406.83	1931.95	1380.87
34HP45-837-15	2773.04	-300.16	55930.00	678094.00	133637.71	1248.39	1814.59	1391.15
SRM614-8	656.66	2548.37	767.16	-698894.60	-4193.07	1306.63	570.86	4355.76
SRM612-8	22917.39	25755.91	27533.07	-722968.60	-57215.61	6549.10	23248.43	18861.85
SRM610-8	223188.60	240505.84	285803.91	-402006.20	-58919.18	53859.72	248853.82	151883.36
AP1-8	240.90	-534.84	2212.77	-823713.00	-13065.20	1629.87	207.82	1220.83
AP2-8	457.34	2825.74	8784.45	-818365.00	47738.98	2093.91	2490.99	3608.20
AP3-8	2989.60	42322.96	58320.09	-215287.20	95670.01	5830.21	17531.24	25253.64
AP4-8	2808.12	73797.65	62331.55	-27910.50	132331.74	9226.59	19528.89	27735.62
zero correction								
SRM614-7	456.70	0.00	481.00	393979.30	0.00	1984.59	0.00	3427.08
SRM612-7	16226.55	10673.10	25179.42	274557.50	0.00	5797.37	20045.69	15425.95
SRM610-7	116932.16	136021.45	187573.58	405887.00	0.00	36354.38	163066.10	99450.66
AP1-7	149.46	0.00	2682.10	293964.80	0.00	4703.85	0.00	854.22
AP2-7	268.78	0.00	7412.88	216411.80	0.00	5301.53	1913.71	3242.92
AP3-7	2442.39	29023.61	56708.04	825549.50	0.00	10176.96	17941.92	26627.13
AP4-7	2339.15	52390.82	55959.91	813156.00	29961.45	11303.40	17814.04	26440.33
34HP45-837-1	1018.47	0.00	43086.64	311572.80	27242.79	1018.31	628.14	821.46
34HP45-837-2	1091.83	0.00	35432.56	186736.50	31533.70	704.18	699.14	1015.79
34HP45-837-3	803.58	0.00	26576.03	157047.60	35001.51	655.38	758.66	1060.27
34HP45-837-4	2335.79	0.00	35140.00	476728.00	52432.49	1973.79	1576.27	1989.07
34HP45-837-5	1945.35	0.00	55585.83	153599.00	57603.32	1761.31	1657.27	1641.91
34HP45-837-6	2133.11	0.00	36101.76	277721.00	70356.27	1554.87	1505.71	1424.67
34HP45-837-7	3704.80	0.00	129567.45	1733502.80	108500.13	1744.79	2408.87	2911.16
34HP45-837-8	2890.48	0.00	74385.78	952662.80	99166.24	1550.11	2020.39	1870.63
34HP45-837-9	2423.87	0.00	46497.82	666908.80	100880.96	1404.31	1712.27	1913.79
34HP45-837-10	2544.35	0.00	62478.75	1407682.80	117494.46	1162.79	1688.19	1163.43
34HP45-837-11	2389.23	0.00	52591.57	1182326.30	113383.96	1122.83	1697.91	1018.79
34HP45-837-12	2791.24	0.00	57539.96	1431037.50	122592.24	1350.27	1642.91	1222.79
34HP45-837-13	3796.28	0.00	145378.10	2386011.00	169787.18	1417.19	2725.64	2931.40
34HP45-837-14	2570.79	0.00	52884.74	679774.80	130791.90	1406.83	1931.95	1380.87
34HP45-837-15	2773.04	0.00	55930.00	678094.00	133637.71	1248.39	1814.59	1391.15
SRM614-8	656.66	2548.37	767.16	0.00	0.00	1306.63	570.86	4355.76
SRM612-8	22917.39	25755.91	27533.07	0.00	0.00	6549.10	23248.43	18861.85
SRM610-8	223188.60	240505.84	285803.91	0.00	0.00	53859.72	248853.82	151883.36
AP1-8	240.90	0.00	2212.77	0.00	0.00	1629.87	207.82	1220.83
AP2-8	457.34	2825.74	8784.45	0.00	47738.98	2093.91	2490.99	3608.20
AP3-8	2989.60	42322.96	58320.09	0.00	95670.01	5830.21	17531.24	25253.64
AP4-8	2808.12	73797.65	62331.55	0.00	132331.74	9226.59	19528.89	27735.62
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-7	0.000206	0.000000	0.000217	0.177526	0.000000	0.000894	0.000000	0.001544
SRM612-7	0.008728	0.005741	0.013544	0.147685	0.000000	0.003118	0.010783	0.008298
SRM610-7	0.120767	0.140482	0.193725	0.419197	0.000000	0.037547	0.168414	0.102712
AP1-7	0.000014	0.000000	0.000257	0.028203	0.000000	0.000451	0.000000	0.000082
AP2-7	0.000022	0.000000	0.000615	0.017945	0.000000	0.000440	0.000159	0.000269
AP3-7	0.000148	0.001763	0.003445	0.050157	0.000000	0.000618	0.001090	0.001618
AP4-7	0.000162	0.003621	0.003867	0.056194	0.002071	0.000781	0.001231	0.001827
34HP45-837-1	0.000250	0.000000	0.010572	0.076447	0.006684	0.000250	0.000154	0.000202
34HP45-837-2	0.000275	0.000000	0.008913	0.046975	0.007933	0.000177	0.000176	0.000256
34HP45-837-3	0.000243	0.000000	0.008025	0.047425	0.010570	0.000198	0.000229	0.000320
34HP45-837-4	0.000254	0.000000	0.003818	0.051792	0.005696	0.000214	0.000171	0.000216
34HP45-837-5	0.000228	0.000000	0.006516	0.018006	0.006753	0.000206	0.000194	0.000192
34HP45-837-6	0.000269	0.000000	0.004555	0.035043	0.008878	0.000196	0.000190	0.000180
34HP45-837-7	0.000468	0.000000	0.016358	0.218859	0.013698	0.000220	0.000304	0.000368
34HP45-837-8	0.000361	0.000000	0.009279	0.118832	0.012370	0.000193	0.000252	0.000233
34HP45-837-9	0.000376	0.000000	0.007211	0.103421	0.015644	0.000218	0.000266	0.000297
34HP45-837-10	0.000524	0.000000	0.012860	0.289741	0.024184	0.000239	0.000347	0.000239
34HP45-837-11	0.000450	0.000000	0.009901	0.222582	0.021345	0.000211	0.000320	0.000192
34HP45-837-12	0.000488	0.000000	0.010065	0.250320	0.021444	0.000236	0.000287	0.000214
34HP45-837-13	0.001051	0.000000	0.040256	0.660698	0.047015	0.000392	0.000755	0.000812
34HP45-837-14	0.000697	0.000000	0.014346	0.184398	0.035479	0.000382	0.000524	0.000375
34HP45-837-15	0.000694	0.000000	0.013993	0.169648	0.033434	0.000312	0.000454	0.000348
SRM614-8	0.000367	0.001423	0.000428	0.000000	0.000000	0.000729	0.000319	0.002431
SRM612-8	0.014042	0.015781	0.016870	0.000000	0.000000	0.004013	0.014245	0.011557
SRM610-8	0.225390	0.242878	0.288623	0.000000	0.000000	0.054391	0.251308	0.153381
AP1-8	0.000018	0.000000	0.000167	0.000000	0.000000	0.000123	0.000016	0.000092
AP2-8	0.000029	0.000181	0.000564	0.000000	0.003062	0.000134	0.000160	0.000231
AP3-8	0.000154	0.002173	0.002995	0.000000	0.004913	0.000299	0.000900	0.001297
AP4-8	0.000166	0.004373	0.003694	0.000000	0.007842	0.000547	0.001157	0.001644
standardize signal averages AP								
AP1	0.000016	0.000000	0.000212	0.014101	0.000000	0.000287	0.000008	0.000087
AP2	0.000026	0.000091	0.000589	0.008972	0.001531	0.000287	0.000159	0.000250
AP3	0.000151	0.001968	0.003220	0.025079	0.002456	0.000459	0.000995	0.001457
AP4	0.000164	0.003997	0.003780	0.028097	0.004956	0.000664	0.001194	0.001735
linest from std sig ave								
	0.018440	0.010807	0.009562	0.100220	0.611323	0.086228	0.011052	0.014921
standardize signal averages SRM								
srM614-2	0.000286	0.000711	0.000322	0.088763	0.000000	0.000812	0.000159	0.001988
srM612-2	0.011385	0.010761	0.015207	0.073842	0.000000	0.003566	0.012514	0.009927
srM610-2	0.173078	0.191680	0.241174	0.209599	0.000000	0.045969	0.209861	0.128047
linest from std sig ave								
	0.029802	0.024707	0.020983	0.020356	0.000000	0.112643	0.022539	0.039199
concentration data								
SRM614-7	0.33	0.00	0.18	1525.87	0.00	6.61	0.00	1.98
SRM612-7	13.80	5.32	11.11	1269.38	0.00	23.06	10.22	10.62
SRM610-7	190.99	130.20	158.87	3603.08	0.00	277.66	159.64	131.44
AP1-7	0.11	0.00	0.98	1127.58	0.00	15.52	0.00	0.49
AP2-7	0.16	0.00	2.34	717.45	0.00	15.12	0.70	1.60
AP3-7	1.09	7.60	13.14	2005.35	0.00	21.27	4.81	9.63
AP4-7	1.19	15.61	14.75	2246.71	504.95	26.87	5.43	10.88
34HP45-837-1	1.84	0.00	40.33	3056.45	1630.14	8.59	0.68	1.20
34HP45-837-2	2.02	0.00	34.00	1878.15	1934.60	6.09	0.78	1.52
34HP45-837-3	1.79	0.00	30.61	1896.14	2577.75	6.81	1.01	1.91
34HP45-837-4	1.87	0.00	14.56	2070.73	1389.21	7.38	0.76	1.29
34HP45-837-5	1.68	0.00	24.86	719.92	1646.86	7.10	0.86	1.15
34HP45-837-6	1.98	0.00	17.38	1401.07	2165.05	6.75	0.84	1.07
34HP45-837-7	3.44	0.00	62.40	8750.32	3340.76	7.58	1.34	2.19
34HP45-837-8	2.65	0.00	35.39	4751.06	3016.69	6.65	1.11	1.39
34HP45-837-9	2.77	0.00	27.51	4134.92	3815.27	7.49	1.17	1.77
34HP45-837-10	3.85	0.00	49.06	11584.25	5897.88	8.23	1.53	1.43

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	3.31	0.00	37.77	8899.14	5205.68	7.27	1.41	1.14
34HP45-837-12	3.59	0.00	38.39	10008.16	5229.75	8.12	1.27	1.27
34HP45-837-13	7.73	0.00	153.56	26415.66	11465.92	13.50	3.33	4.83
34HP45-837-14	5.13	0.00	54.72	7372.49	8652.57	13.13	2.31	2.23
34HP45-837-15	5.10	0.00	53.38	6782.76	8153.81	10.74	2.00	2.07
SRM614-8	0.58	1.32	0.35	0.00	0.00	5.39	0.30	3.11
SRM612-8	22.21	14.63	13.83	0.00	0.00	29.68	13.50	14.79
SRM610-8	356.46	225.11	236.69	0.00	0.00	402.23	238.21	196.28
AP1-8	0.13	0.00	0.64	0.00	0.00	4.22	0.07	0.55
AP2-8	0.22	0.78	2.15	0.00	746.85	4.62	0.70	1.38
AP3-8	1.13	9.37	11.42	0.00	1198.06	10.30	3.97	7.72
AP4-8	1.22	18.85	14.09	0.00	1912.46	18.81	5.10	9.78

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-5	1003.73	75658.55	6730.08	2922647.30	37336.69	2760.90	1102.21	809.12
SRM614-5	1247.85	73458.25	6369.92	2673885.30	35003.23	4413.26	1446.05	3036.90
SRM612-5	17443.50	90562.71	38002.29	2652622.50	34057.59	9351.37	22431.37	17117.34
SRM610-5	144462.50	244959.30	238424.58	2708111.50	32657.31	48356.59	207659.09	124907.30
AP1-5	1109.97	71065.04	13831.00	2506932.80	64290.88	8683.13	2019.17	2060.21
AP2-5	1301.21	74211.06	21676.76	2418592.50	107761.13	8497.77	4194.82	4834.31
AP3-5	3900.98	118583.23	76174.91	3006548.80	154362.67	13271.08	23059.73	31721.82
AP4-5	3145.86	117526.18	56191.72	2698281.30	186783.48	12994.03	16827.33	22269.93
34HP45-718-1	7829.60	69783.63	197696.98	5730449.00	251173.73	5618.23	7216.44	5133.99
34HP45-718-2	10560.06	68283.38	300425.41	4535620.00	241501.56	6390.96	7816.20	3320.58
34HP45-718-3	12862.55	71835.16	302388.91	7639213.50	309147.09	7224.20	10151.58	5277.79
34HP45-718-4	37785.41	71055.16	2282881.00	13778214.00	432618.59	8545.33	41835.72	8945.09
34HP45-718-5	31240.90	70418.04	1568489.90	11543862.00	411754.53	6834.88	33155.15	6968.16
34HP45-718-6	37371.45	71542.48	2598789.00	15142468.00	496868.59	6902.68	36329.13	9044.97
34HP45-718-7	27852.68	74792.46	893842.25	14033882.00	478459.72	6710.20	27565.12	8010.36
34HP45-718-8	27504.99	74392.46	756387.19	13422599.00	473697.25	6363.76	25748.63	7103.32
34HP45-718-9	29212.48	76322.11	904146.13	15084798.00	513591.13	6918.00	28360.96	8056.61
34HP45-718-10	24171.62	78381.96	638532.25	15319404.00	537099.25	6649.72	29649.89	11094.82
34HP45-718-11	23906.30	77519.72	647236.38	13628682.00	504271.53	6108.35	27547.40	8286.49
34HP45-718-12	25474.98	78254.88	680528.88	12993728.00	503080.19	6330.72	30758.33	10526.38
34HP45-718-13	24980.86	91326.75	567263.69	19295990.00	666210.00	9799.94	31618.50	37564.89
34HP45-718-14	24699.02	88239.22	967103.56	18870480.00	586175.44	8633.21	17736.02	17370.38
34HP45-718-15	18404.34	82230.66	575857.69	13864067.00	481221.84	6861.00	15490.01	12447.91
34HP45-718-16	16420.69	70204.20	195318.81	4128310.80	320029.09	4986.47	13744.56	7474.16
34HP45-718-17	17987.54	70260.40	153847.55	4307205.00	334788.75	5084.75	14347.92	5499.71
34HP45-718-18	15786.41	70030.84	120907.00	4295633.50	351339.09	4804.99	10856.18	5704.87
SRM614-6	1037.21	71071.20	4240.34	1008966.50	232027.39	3279.98	2747.86	3472.34
SRM612-6	21940.24	95190.58	29757.25	1038052.40	177470.20	8339.13	23156.89	17589.22
SRM610-6	225024.67	309781.75	287243.66	1343930.90	162549.80	55648.23	253818.88	155189.08
AP1-6	827.00	71986.97	6403.24	951388.69	208978.81	3929.26	2405.65	1679.13
AP2-6	1062.41	76190.79	12644.23	957055.75	259604.34	4427.02	4462.87	3712.38
AP3-6	4043.14	122500.33	70616.96	1670498.50	295377.13	8971.81	22229.65	28948.72
AP4-6	3133.50	118480.27	47769.59	1459689.80	318481.47	8268.49	15001.40	18460.86
blank-6	484.64	68806.83	2964.06	1002579.00	316424.22	3087.82	3021.02	569.12
blank average	744.18	72232.69	4847.07	1962613.15	176880.46	2924.36	2061.61	689.12

blank subtraction								
SRM614-5	503.66	1225.56	1522.85	711272.15	-141877.22	1488.91	-615.56	2347.77
SRM612-5	16699.31	18330.02	33155.23	690009.35	-142822.87	6427.02	20369.76	16428.21
SRM610-5	143718.32	172726.61	233577.51	745498.35	-144223.15	45432.23	205597.48	124218.18
AP1-5	365.78	-1167.65	8983.93	544319.65	-112589.58	5758.77	-42.44	1371.09
AP2-5	557.02	1978.37	16829.69	455979.35	-69119.33	5573.41	2133.21	4145.18
AP3-5	3156.80	46350.54	71327.84	1043935.65	-22517.79	10346.72	20998.12	31032.69
AP4-5	2401.67	45293.49	51344.65	735668.15	9903.02	10069.68	14765.72	21580.80
34HP45-718-1	7085.42	-2449.05	192849.91	3767835.85	74293.27	2693.87	5154.83	4444.87
34HP45-718-2	9815.88	-3949.30	295578.34	2573006.85	64621.10	3466.60	5754.59	2631.45
34HP45-718-3	12118.37	-397.52	297541.84	5676600.35	132266.63	4299.84	8089.97	4588.67
34HP45-718-4	37041.23	-1177.53	2278033.93	11815600.85	255738.13	5620.97	39774.10	8255.97
34HP45-718-5	30496.71	-1814.65	1563642.83	9581248.85	234874.07	3910.52	31093.54	6279.04
34HP45-718-6	36627.26	-690.20	2593941.93	13179854.85	319988.13	3978.32	34267.51	8355.85
34HP45-718-7	27108.49	2559.77	888995.18	12071268.85	301579.26	3785.84	25503.50	7321.24
34HP45-718-8	26760.81	2159.77	751540.12	11459985.85	296816.79	3439.40	23687.01	6414.20
34HP45-718-9	28468.30	4089.42	899299.06	13122184.85	336710.67	3993.64	26299.35	7367.48
34HP45-718-10	23427.43	6149.27	633685.18	13356790.85	360218.79	3725.36	27588.28	10405.70

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	23162.11	5287.03	642389.31	11666068.85	327391.07	3184.00	25485.78	7597.36
34HP45-718-12	24730.80	6022.20	675681.81	11031114.85	326199.73	3406.36	28696.72	9837.26
34HP45-718-13	24236.67	19094.06	562416.62	17333376.85	489329.54	6875.58	29556.89	36875.77
34HP45-718-14	23954.84	16006.53	962256.49	16907866.85	409294.98	5708.85	15674.41	16681.25
34HP45-718-15	17660.16	9997.98	571010.62	11901453.85	304341.38	3936.64	13428.40	11758.79
34HP45-718-16	15676.51	-2028.49	190471.74	2165697.65	143148.63	2062.11	11412.94	6785.04
34HP45-718-17	17243.36	-1972.29	149000.48	2344591.85	157908.29	2160.39	12286.31	4810.59
34HP45-718-18	15042.22	-2201.85	116059.93	2333020.35	174458.63	1880.63	8794.57	5015.75
SRM614-6	293.02	-1161.48	-606.72	-953646.65	55146.93	355.62	686.24	2783.22
SRM612-6	21196.06	22957.89	24910.18	-924560.75	589.74	5414.77	21095.28	16900.10
SRM610-6	224280.49	237549.06	282396.59	-618682.25	-14330.66	52723.88	251757.27	154499.96
AP1-6	82.82	-245.72	1556.17	-1011224.46	32098.35	1005.27	344.04	990.01
AP2-6	318.22	3958.10	7797.16	-1005557.40	82723.88	1502.67	2401.25	3023.26
AP3-6	3298.96	50267.64	65769.89	-292114.65	118496.67	6047.45	20168.03	28259.60
AP4-6	2389.31	46247.58	42922.52	-502923.35	141601.01	5344.13	12939.79	17771.74

zero correction								
SRM614-5	503.66	1225.56	1522.85	711272.15	0.00	1488.91	0.00	2347.77
SRM612-5	16699.31	18330.02	33155.23	690009.35	0.00	6427.02	20369.76	16428.21
SRM610-5	143718.32	172726.61	233577.51	745498.35	0.00	45432.23	205597.48	124218.18
AP1-5	365.78	0.00	8983.93	544319.65	0.00	5758.77	0.00	1371.09
AP2-5	557.02	1978.37	16829.69	455979.35	0.00	5573.41	2133.21	4145.18
AP3-5	3156.80	46350.54	71327.84	1043935.65	0.00	10346.72	20998.12	31032.69
AP4-5	2401.67	45293.49	51344.65	735668.15	9903.02	10069.68	14765.72	21580.80
34HP45-718-1	7085.42	0.00	192849.91	3767835.85	74293.27	2693.87	5154.83	4444.87
34HP45-718-2	9815.88	0.00	295578.34	2573006.85	64621.10	3466.60	5754.59	2631.45
34HP45-718-3	12118.37	0.00	297541.84	5676600.35	132266.63	4299.84	8089.97	4588.67
34HP45-718-4	37041.23	0.00	2278033.93	11815600.85	255738.13	5620.97	39774.10	8255.97
34HP45-718-5	30496.71	0.00	1563642.83	9581248.85	234874.07	3910.52	31093.54	6279.04
34HP45-718-6	36627.26	0.00	2593941.93	13179854.85	319988.13	3978.32	34267.51	8355.85
34HP45-718-7	27108.49	2559.77	888995.18	12071268.85	301579.26	3785.84	25503.50	7321.24
34HP45-718-8	26760.81	2159.77	751540.12	11459985.85	296816.79	3439.40	23687.01	6414.20
34HP45-718-9	28468.30	4089.42	899299.06	13122184.85	336710.67	3993.64	26299.35	7367.48
34HP45-718-10	23427.43	6149.27	633685.18	13356790.85	360218.79	3725.36	27588.28	10405.70
34HP45-718-11	23162.11	5287.03	642389.31	11666068.85	327391.07	3184.00	25485.78	7597.36
34HP45-718-12	24730.80	6022.20	675681.81	11031114.85	326199.73	3406.36	28696.72	9837.26
34HP45-718-13	24236.67	19094.06	562416.62	17333376.85	489329.54	6875.58	29556.89	36875.77
34HP45-718-14	23954.84	16006.53	962256.49	16907866.85	409294.98	5708.85	15674.41	16681.25
34HP45-718-15	17660.16	9997.98	571010.62	11901453.85	304341.38	3936.64	13428.40	11758.79
34HP45-718-16	15676.51	0.00	190471.74	2165697.65	143148.63	2062.11	11412.94	6785.04
34HP45-718-17	17243.36	0.00	149000.48	2344591.85	157908.29	2160.39	12286.31	4810.59
34HP45-718-18	15042.22	0.00	116059.93	2333020.35	174458.63	1880.63	8794.57	5015.75
SRM614-6	293.02	0.00	0.00	0.00	55146.93	355.62	686.24	2783.22
SRM612-6	21196.06	22957.89	24910.18	0.00	589.74	5414.77	21095.28	16900.10
SRM610-6	224280.49	237549.06	282396.59	0.00	0.00	52723.88	251757.27	154499.96
AP1-6	82.82	0.00	1556.17	0.00	32098.35	1005.27	344.04	990.01
AP2-6	318.22	3958.10	7797.16	0.00	82723.88	1502.67	2401.25	3023.26
AP3-6	3298.96	50267.64	65769.89	0.00	118496.67	6047.45	20168.03	28259.60
AP4-6	2389.31	46247.58	42922.52	0.00	141601.01	5344.13	12939.79	17771.74

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-5	0.000335	0.000815	0.001013	0.473237	0.000000	0.000991	0.000000	0.001562
SRM612-5	0.009621	0.010560	0.019101	0.397525	0.000000	0.003703	0.011735	0.009465
SRM610-5	0.134915	0.162147	0.219270	0.699835	0.000000	0.042649	0.193004	0.116609
AP1-5	0.000028	0.000000	0.000685	0.041525	0.000000	0.000439	0.000000	0.000105
AP2-5	0.000039	0.000140	0.001191	0.032263	0.000000	0.000394	0.000151	0.000293
AP3-5	0.000183	0.002693	0.004144	0.060649	0.000000	0.000601	0.001220	0.001803
AP4-5	0.000144	0.002723	0.003086	0.044222	0.000595	0.000605	0.000888	0.001297
34HP45-718-1	0.000837	0.000000	0.022793	0.445314	0.008781	0.000318	0.000609	0.000525
34HP45-718-2	0.000773	0.000000	0.023266	0.202533	0.005087	0.000273	0.000453	0.000207

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000808	0.000000	0.019849	0.378692	0.008824	0.000287	0.000540	0.000306
34HP45-718-4	0.001749	0.000000	0.107561	0.557893	0.012075	0.000265	0.001878	0.000390
34HP45-718-5	0.001849	0.000000	0.094813	0.580971	0.014242	0.000237	0.001885	0.000381
34HP45-718-6	0.002326	0.000000	0.164742	0.837056	0.020323	0.000253	0.002176	0.000531
34HP45-718-7	0.001572	0.000148	0.051562	0.700131	0.017492	0.000220	0.001479	0.000425
34HP45-718-8	0.001470	0.000119	0.041276	0.629404	0.016302	0.000189	0.001301	0.000352
34HP45-718-9	0.001492	0.000214	0.047124	0.687613	0.017644	0.000209	0.001378	0.000386
34HP45-718-10	0.001476	0.000387	0.039921	0.841453	0.022693	0.000235	0.001738	0.000656
34HP45-718-11	0.001365	0.000312	0.037848	0.687345	0.019289	0.000188	0.001502	0.000448
34HP45-718-12	0.001359	0.000331	0.037142	0.606378	0.017931	0.000187	0.001577	0.000541
34HP45-718-13	0.001525	0.001201	0.035381	1.090433	0.030783	0.000433	0.001859	0.002320
34HP45-718-14	0.001482	0.000990	0.059545	1.046274	0.025328	0.000353	0.000970	0.001032
34HP45-718-15	0.000989	0.000560	0.031983	0.666623	0.017047	0.000220	0.000752	0.000659
34HP45-718-16	0.000983	0.000000	0.011949	0.135868	0.008981	0.000129	0.000716	0.000426
34HP45-718-17	0.000926	0.000000	0.008001	0.125900	0.008479	0.000116	0.000660	0.000258
34HP45-718-18	0.000894	0.000000	0.006897	0.138633	0.010367	0.000112	0.000523	0.000298
SRM614-6	0.000241	0.000000	0.000000	0.000000	0.045412	0.000293	0.000565	0.002292
SRM612-6	0.014053	0.015221	0.016515	0.000000	0.000391	0.003590	0.013986	0.011205
SRM610-6	0.223852	0.237095	0.281857	0.000000	0.000000	0.052623	0.251276	0.154205
AP1-6	0.000006	0.000000	0.000111	0.000000	0.002297	0.000072	0.000025	0.000071
AP2-6	0.000021	0.000260	0.000513	0.000000	0.005440	0.000099	0.000158	0.000199
AP3-6	0.000177	0.002695	0.003526	0.000000	0.006353	0.000324	0.001081	0.001515
AP4-6	0.000141	0.002722	0.002526	0.000000	0.008333	0.000314	0.000761	0.001046
standardize signal averages AP								
AP1	0.000017	0.000000	0.000398	0.020763	0.001148	0.000256	0.000012	0.000088
AP2	0.000030	0.000200	0.000852	0.016131	0.002720	0.000247	0.000154	0.000246
AP3	0.000180	0.002694	0.003835	0.030325	0.003177	0.000463	0.001151	0.001659
AP4	0.000142	0.002722	0.002806	0.022111	0.004464	0.000460	0.000825	0.001172
linest from std sig ave								
	0.016987	0.012021	0.009317	0.094158	0.662553	0.104726	0.011295	0.015267
standardize signal averages SRM								
srm614-2	0.000288	0.000408	0.000507	0.236618	0.022706	0.000642	0.000283	0.001927
srm612-2	0.011837	0.012890	0.017808	0.198762	0.000195	0.003646	0.012861	0.010335
srm610-2	0.179384	0.199621	0.250564	0.349917	0.000000	0.047636	0.222140	0.135407
linest from std sig ave								
	0.028754	0.023720	0.020189	0.009157	0.000249	0.108721	0.021294	0.037073
concentration data								
SRM614-5	0.49	0.84	0.81	3821.50	0.00	8.90	0.00	2.05
SRM612-5	14.02	10.89	15.26	3210.11	0.00	33.26	11.37	12.39
SRM610-5	196.55	167.17	175.21	5651.34	0.00	383.06	186.97	152.68
AP1-5	0.19	0.00	2.55	1559.81	0.00	18.35	0.00	0.64
AP2-5	0.27	0.67	4.43	1211.88	0.00	16.48	0.68	1.79
AP3-5	1.24	12.91	15.40	2278.16	0.00	25.11	5.50	10.98
AP4-5	0.98	13.06	11.47	1661.12	157.34	25.29	4.00	7.90
34HP45-718-1	5.67	0.00	84.72	16727.28	2320.86	13.30	2.75	3.20
34HP45-718-2	5.24	0.00	86.48	7607.71	1344.48	11.40	2.04	1.26
34HP45-718-3	5.48	0.00	73.78	14224.76	2332.23	11.98	2.43	1.86
34HP45-718-4	11.85	0.00	399.78	20956.06	3191.64	11.09	8.46	2.37
34HP45-718-5	12.53	0.00	352.40	21822.93	3764.36	9.91	8.50	2.32
34HP45-718-6	15.76	0.00	612.31	31442.24	5371.58	10.56	9.81	3.23
34HP45-718-7	10.66	0.71	191.64	26298.93	4623.30	9.17	6.67	2.59
34HP45-718-8	9.96	0.57	153.42	23642.24	4308.82	7.89	5.86	2.15
34HP45-718-9	10.11	1.03	175.15	25828.73	4663.57	8.74	6.21	2.35
34HP45-718-10	10.00	1.86	148.38	31607.41	5998.16	9.81	7.83	3.99
34HP45-718-11	9.25	1.49	140.68	25818.65	5098.48	7.84	6.77	2.73
34HP45-718-12	9.21	1.59	138.05	22777.32	4739.49	7.82	7.11	3.29
34HP45-718-13	10.33	5.76	131.51	40959.83	8136.57	18.07	8.38	14.13
34HP45-718-14	10.05	4.75	221.32	39301.08	6694.49	14.76	4.37	6.29
34HP45-718-15	6.70	2.69	118.88	25040.27	4505.73	9.21	3.39	4.01
34HP45-718-16	6.66	0.00	44.41	5103.59	2373.72	5.40	3.23	2.59
34HP45-718-17	6.27	0.00	29.74	4729.18	2241.24	4.85	2.97	1.57
34HP45-718-18	6.06	0.00	25.63	5207.44	2740.08	4.67	2.35	1.82
SRM614-6	0.35	0.00	0.00	0.00	2580.45	2.63	0.55	3.00
SRM612-6	20.47	15.69	13.20	0.00	22.22	32.24	13.55	14.67
SRM610-6	326.12	244.44	225.21	0.00	0.00	472.64	243.42	201.91
AP1-6	0.04	0.00	0.41	0.00	607.03	3.01	0.11	0.43
AP2-6	0.14	1.25	1.91	0.00	1437.99	4.13	0.71	1.21
AP3-6	1.20	12.93	13.11	0.00	1679.33	13.55	4.87	9.23
AP4-6	0.95	13.05	9.39	0.00	2202.56	13.14	3.43	6.37
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-3	837.96	79256.05	5061.51	2899475.80	34237.56	2017.21	1003.01	694.44
SRM614-3	1427.97	77838.40	6722.36	2714245.80	33400.15	5107.51	1747.17	5193.39
SRM612-3	24512.38	106280.52	57716.29	2806805.50	32923.66	12266.83	30150.33	28465.36
SRM610-3	150794.41	259982.03	265471.94	2996032.80	34303.31	48237.75	207516.30	119270.84
AP1-3	1327.89	80678.85	18218.66	2813581.50	59574.30	9342.69	2418.61	3209.46
AP2-3	1574.21	81988.74	23366.53	2590874.50	97720.43	9010.33	5223.87	6101.51
AP3-3	6832.64	177433.56	151369.66	3977627.80	154677.31	19981.11	45536.10	68141.91
AP4-3	4133.58	204138.08	83506.75	3436793.00	185078.56	20587.48	23743.77	32418.86
34HP45-856-1	13887.20	78298.52	462826.13	6276551.00	251094.53	7968.96	5447.71	14776.68
34HP45-856-2	12980.03	77279.20	395493.59	6807202.50	278106.84	7055.56	5387.51	9073.45
34HP45-856-3	12568.87	76976.48	987318.56	6863769.00	296283.59	7121.44	6834.08	9158.65
34HP45-856-4	16073.85	84961.60	2921372.30	21744828.00	582083.63	9958.82	9542.13	17578.10
34HP45-856-5	17681.94	86748.53	1137278.90	24734374.00	642993.81	7904.72	7609.56	19773.91
34HP45-856-6	19016.23	83068.03	5135158.50	21023104.00	577581.75	11637.27	17090.42	16904.06
34HP45-856-7	19139.43	87216.65	562286.63	23116904.00	620074.31	7011.76	7460.48	15716.17
34HP45-856-8	20352.23	89154.34	2119434.50	25890398.00	675721.25	9102.45	15094.17	19875.07
34HP45-856-9	22371.41	87341.61	5172235.00	25903822.00	707331.31	12290.07	18111.82	18790.39
34HP45-856-10	11377.23	77028.91	435334.69	6201390.50	313675.00	5460.47	5176.47	8014.89
34HP45-856-11	12413.75	76940.35	934623.13	6315953.00	339241.19	5962.79	6883.16	6678.24
34HP45-856-12	14772.80	80655.21	1149073.80	9331456.00	409632.34	6132.67	7630.76	8538.85
34HP45-856-13	12230.23	84197.88	269917.16	4347593.50	327578.28	5328.79	4853.15	14421.68
34HP45-856-14	11561.83	82816.02	114323.17	4641305.50	338373.19	5088.43	4520.83	16403.81
34HP45-856-15	8438.77	80862.17	117084.83	3494740.80	324627.78	4655.87	4139.22	14901.60
34HP45-856-16	7001.48	78485.36	25889.31	3143381.30	332396.81	4254.58	3681.62	8308.13
34HP45-856-17	5375.19	77638.91	18370.90	2068874.30	321978.31	4080.26	3583.86	4523.59
34HP45-856-18	4763.19	77767.16	20151.91	2117248.00	328882.53	4059.94	3806.26	4194.26
SRM614-4	1315.41	79235.24	5142.43	1134648.50	211858.75	3673.66	2885.02	4363.62
SRM612-4	28383.12	108724.21	38449.18	1156897.40	159828.50	10327.34	29688.81	22876.97
SRM610-4	282922.31	371809.09	355466.09	1528873.10	144111.94	68554.23	314939.84	187872.50
AP1-4	853.36	79385.41	7474.36	1053574.90	195941.03	4274.10	2291.65	2012.37
AP2-4	1256.33	83645.39	14610.96	1068183.00	256468.92	4869.91	4654.39	4516.95
AP3-4	6124.79	167935.14	124713.82	2306214.00	307510.56	12524.23	37571.77	53252.58
AP4-4	4743.59	259023.45	94933.13	2595523.30	340410.00	22238.45	27970.96	37493.01
blank-4	610.56	76602.59	3535.50	1155276.80	320434.09	3411.82	3054.06	698.96
blank average	724.26	77929.32	4298.50	2027376.30	177335.82	2714.52	2028.53	696.70

blank subtraction								
SRM614-3	703.70	-90.92	2423.85	686869.50	-143935.67	2392.99	-281.36	4496.69
SRM612-3	23788.11	28351.20	53417.78	779429.20	-144412.16	9552.31	28121.80	27768.66
SRM610-3	150070.15	182052.71	261173.44	968656.50	-143032.51	45523.23	205487.77	118574.14
AP1-3	603.62	2749.53	13920.16	786205.20	-117761.53	6628.18	390.08	2512.75
AP2-3	849.94	4059.42	19068.03	563498.20	-79615.39	6295.82	3195.34	5404.81
AP3-3	6108.37	99504.24	147071.16	1950251.50	-22658.51	17266.60	43507.57	67445.20
AP4-3	3409.32	126208.76	79208.25	1409416.70	7742.74	17872.96	21715.24	31722.16
34HP45-856-1	13162.93	369.20	458527.63	4249174.70	73758.71	5254.45	3419.18	14079.98
34HP45-856-2	12255.77	-650.13	391195.09	4779826.20	100771.02	4341.04	3358.98	8376.75
34HP45-856-3	11844.61	-952.84	983020.06	4836392.70	118947.77	4406.92	4805.55	8461.95
34HP45-856-4	15349.59	7032.28	2917073.80	19717451.70	404747.81	7244.30	7513.60	16881.40
34HP45-856-5	16957.67	8819.21	1132980.40	22706997.70	465657.99	5190.21	5581.03	19077.21
34HP45-856-6	18291.96	5138.71	5130860.00	18995727.70	400245.93	8922.75	15061.88	16207.35
34HP45-856-7	18415.16	9287.33	557988.13	21089527.70	442738.49	4297.24	5431.95	15019.47
34HP45-856-8	19627.97	11225.02	2115136.00	23863021.70	498385.43	6387.94	13065.63	19178.37
34HP45-856-9	21647.14	9412.29	5167936.50	23876445.70	529995.49	9575.55	16083.29	18093.68
34HP45-856-10	10652.96	-900.41	431036.19	4174014.20	136339.18	2745.96	3147.94	7318.18
34HP45-856-11	11689.49	-988.97	930324.63	4288576.70	161905.37	3248.28	4854.63	5981.53
34HP45-856-12	14048.54	2725.89	1144775.30	7304079.70	232296.52	3418.16	5602.23	7842.14
34HP45-856-13	11505.96	6268.55	265618.66	2320217.20	150242.46	2614.27	2824.62	13724.98
34HP45-856-14	10837.56	4886.70	110024.67	2613929.20	161037.37	2373.91	2492.29	15707.11
34HP45-856-15	7714.50	2932.85	112786.33	1467364.50	147291.96	1941.35	2110.69	14204.90
34HP45-856-16	6277.22	556.04	21590.80	1116005.00	155060.99	1540.07	1653.09	7611.42
34HP45-856-17	4650.93	-290.41	14072.40	41498.00	144642.49	1365.75	1555.33	3826.88
34HP45-856-18	4038.92	-162.16	15853.41	89871.70	151546.71	1345.43	1777.73	3497.56
SRM614-4	591.14	1305.92	843.92	-892727.80	34522.93	959.15	856.48	3666.92
SRM612-4	27658.85	30794.89	34150.67	-870478.90	-17507.32	7612.82	27660.28	22180.27
SRM610-4	282198.05	293879.77	351167.59	-498503.20	-33223.88	65839.71	312911.31	187175.80
AP1-4	129.10	1456.09	3175.86	-973801.40	18605.21	1559.59	263.12	1315.67
AP2-4	532.06	5716.07	10312.46	-959193.30	79133.10	2155.39	2625.85	3820.24
AP3-4	5400.53	90005.82	120415.32	278837.70	130174.74	9809.71	35543.24	52555.87
AP4-4	4019.32	181094.13	90634.63	568147.00	163074.18	19523.93	25942.43	36796.31

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
SRM614-3	703.70	0.00	2423.85	686869.50	0.00	2392.99	0.00	4496.69
SRM612-3	23788.11	28351.20	53417.78	779429.20	0.00	9552.31	28121.80	27768.66
SRM610-3	150070.15	182052.71	261173.44	968656.50	0.00	45523.23	205487.77	118574.14
AP1-3	603.62	2749.53	13920.16	786205.20	0.00	6628.18	390.08	2512.75
AP2-3	849.94	4059.42	19068.03	563498.20	0.00	6295.82	3195.34	5404.81
AP3-3	6108.37	99504.24	147071.16	1950251.50	0.00	17266.60	43507.57	67445.20
AP4-3	3409.32	126208.76	79208.25	1409416.70	7742.74	17872.96	21715.24	31722.16
34HP45-856-1	13162.93	369.20	458527.63	4249174.70	73758.71	5254.45	3419.18	14079.98
34HP45-856-2	12255.77	0.00	391195.09	4779826.20	100771.02	4341.04	3358.98	8376.75
34HP45-856-3	11844.61	0.00	983020.06	4836392.70	118947.77	4406.92	4805.55	8461.95
34HP45-856-4	15349.59	7032.28	2917073.80	19717451.70	404747.81	7244.30	7513.60	16881.40
34HP45-856-5	16957.67	8819.21	1132980.40	22706997.70	465657.99	5190.21	5581.03	19077.21
34HP45-856-6	18291.96	5138.71	5130860.00	18995727.70	400245.93	8922.75	15061.88	16207.35
34HP45-856-7	18415.16	9287.33	557988.13	21089527.70	442738.49	4297.24	5431.95	15019.47
34HP45-856-8	19627.97	11225.02	2115136.00	23863021.70	498385.43	6387.94	13065.63	19178.37
34HP45-856-9	21647.14	9412.29	5167936.50	23876445.70	529995.49	9575.55	16083.29	18093.68
34HP45-856-10	10652.96	0.00	431036.19	4174014.20	136339.18	2745.96	3147.94	7318.18
34HP45-856-11	11689.49	0.00	930324.63	4288576.70	161905.37	3248.28	4854.63	5981.53
34HP45-856-12	14048.54	2725.89	1144775.30	7304079.70	232296.52	3418.16	5602.23	7842.14
34HP45-856-13	11505.96	6268.55	265618.66	2320217.20	150242.46	2614.27	2824.62	13724.98
34HP45-856-14	10837.56	4886.70	110024.67	2613929.20	161037.37	2373.91	2492.29	15707.11
34HP45-856-15	7714.50	2932.85	112786.33	1467364.50	147291.96	1941.35	2110.69	14204.90
34HP45-856-16	6277.22	556.04	21590.80	1116005.00	155060.99	1540.07	1653.09	7611.42
34HP45-856-17	4650.93	0.00	14072.40	41498.00	144642.49	1365.75	1555.33	3826.88
34HP45-856-18	4038.92	0.00	15853.41	89871.70	151546.71	1345.43	1777.73	3497.56
SRM614-4	591.14	1305.92	843.92	0.00	34522.93	959.15	856.48	3666.92
SRM612-4	27658.85	30794.89	34150.67	0.00	0.00	7612.82	27660.28	22180.27
SRM610-4	282198.05	293879.77	351167.59	0.00	0.00	65839.71	312911.31	187175.80
AP1-4	129.10	1456.09	3175.86	0.00	18605.21	1559.59	263.12	1315.67
AP2-4	532.06	5716.07	10312.46	0.00	79133.10	2155.39	2625.85	3820.24
AP3-4	5400.53	90005.82	120415.32	278837.70	130174.74	9809.71	35543.24	52555.87
AP4-4	4019.32	181094.13	90634.63	568147.00	163074.18	19523.93	25942.43	36796.31

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-3	0.000297	0.000000	0.001023	0.289942	0.000000	0.001010	0.000000	0.001898
SRM612-3	0.009626	0.011472	0.021615	0.315386	0.000000	0.003865	0.011379	0.011236
SRM610-3	0.108510	0.131635	0.188844	0.700398	0.000000	0.032916	0.148580	0.085736
AP1-3	0.000040	0.000181	0.000917	0.051805	0.000000	0.000437	0.000026	0.000166
AP2-3	0.000052	0.000249	0.001171	0.034602	0.000000	0.000387	0.000196	0.000332
AP3-3	0.000274	0.004459	0.006591	0.087403	0.000000	0.000774	0.001950	0.003023
AP4-3	0.000181	0.006703	0.004207	0.074859	0.000411	0.000949	0.001153	0.001685
34HP45-856-1	0.000774	0.000022	0.026963	0.249870	0.004337	0.000309	0.000201	0.000828
34HP45-856-2	0.000746	0.000000	0.023826	0.291116	0.006137	0.000264	0.000205	0.000510
34HP45-856-3	0.000783	0.000000	0.065011	0.319851	0.007867	0.000291	0.000318	0.000560
34HP45-856-4	0.001207	0.000553	0.229476	1.551100	0.031840	0.000570	0.000591	0.001328
34HP45-856-5	0.001177	0.000612	0.078650	1.576296	0.032325	0.000360	0.000387	0.001324
34HP45-856-6	0.001169	0.000328	0.327801	1.213602	0.025571	0.000570	0.000962	0.001035
34HP45-856-7	0.001364	0.000688	0.041323	1.561835	0.032788	0.000318	0.000402	0.001112
34HP45-856-8	0.001413	0.000808	0.152276	1.717983	0.035881	0.000460	0.000941	0.001381
34HP45-856-9	0.001610	0.000700	0.384481	1.776344	0.039430	0.000712	0.001197	0.001346
34HP45-856-10	0.000716	0.000000	0.028989	0.280718	0.009169	0.000185	0.000212	0.000492
34HP45-856-11	0.000770	0.000000	0.061311	0.282629	0.010670	0.000214	0.000320	0.000394
34HP45-856-12	0.000921	0.000179	0.075020	0.478653	0.015223	0.000224	0.000367	0.000514
34HP45-856-13	0.000732	0.000399	0.016905	0.147671	0.009562	0.000166	0.000180	0.000874
34HP45-856-14	0.000753	0.000339	0.007642	0.181552	0.011185	0.000165	0.000173	0.001091
34HP45-856-15	0.000616	0.000234	0.009000	0.117089	0.011753	0.000155	0.000168	0.001133
34HP45-856-16	0.000665	0.000059	0.002289	0.118314	0.016439	0.000163	0.000175	0.000807
34HP45-856-17	0.000483	0.000000	0.001462	0.004312	0.015031	0.000142	0.000162	0.000398
34HP45-856-18	0.000513	0.000000	0.002014	0.011417	0.019252	0.000171	0.000226	0.000444

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000398	0.000879	0.000568	0.000000	0.023232	0.000645	0.000576	0.002468
SRM612-4	0.014671	0.016334	0.018114	0.000000	0.000000	0.004038	0.014672	0.011765
SRM610-4	0.227901	0.237335	0.283600	0.000000	0.000000	0.053172	0.252704	0.151162
AP1-4	0.000008	0.000094	0.000206	0.000000	0.001205	0.000101	0.000017	0.000085
AP2-4	0.000032	0.000340	0.000613	0.000000	0.004707	0.000128	0.000156	0.000227
AP3-4	0.000234	0.003894	0.005209	0.012062	0.005631	0.000424	0.001538	0.002274
AP4-4	0.000195	0.008792	0.004400	0.027583	0.007917	0.000948	0.001259	0.001786

standardize signal averages AP

AP1	0.000024	0.000138	0.000561	0.025902	0.000603	0.000269	0.000021	0.000125
AP2	0.000042	0.000295	0.000892	0.017301	0.002353	0.000257	0.000176	0.000280
AP3	0.000254	0.004176	0.005900	0.049733	0.002816	0.000599	0.001744	0.002648
AP4	0.000188	0.007748	0.004304	0.051221	0.004164	0.000949	0.001206	0.001736

linest from std sig ave

0.012185	0.005483	0.006082	0.052938	0.711521	0.063267	0.007478	0.009646
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standardize signal averages SRM

srm614-2	0.000347	0.000439	0.000796	0.144971	0.011616	0.000828	0.000288	0.002183
srm612-2	0.012148	0.013903	0.019864	0.157693	0.000000	0.003952	0.013025	0.011501
srm610-2	0.168205	0.184485	0.236222	0.350199	0.000000	0.043044	0.200642	0.118449

linest from std sig ave

0.030655	0.025655	0.021396	0.011690	0.000000	0.120151	0.023570	0.042299
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concentration data

SRM614-3	0.31	0.00	0.53	1316.37	0.00	5.48	0.00	1.57
SRM612-3	10.06	5.39	11.27	1431.89	0.00	20.97	7.30	9.30
SRM610-3	113.39	61.90	98.51	3179.88	0.00	178.60	95.29	70.93
AP1-3	0.19	0.40	2.23	1094.06	0.00	11.02	0.08	0.64
AP2-3	0.25	0.55	2.84	730.74	0.00	9.76	0.59	1.28
AP3-3	1.33	9.75	15.99	1845.84	0.00	19.53	5.82	11.63
AP4-3	0.88	14.66	10.21	1580.94	116.73	23.96	3.44	6.48
34HP45-856-1	3.76	0.05	65.42	5276.96	1231.16	7.80	0.60	3.19
34HP45-856-2	3.63	0.00	57.81	6148.03	1742.13	6.67	0.61	1.96
34HP45-856-3	3.81	0.00	157.74	6754.88	2232.92	7.36	0.95	2.15
34HP45-856-4	5.87	1.21	556.80	32757.42	9037.84	14.38	1.76	5.11
34HP45-856-5	5.72	1.34	190.84	33289.54	9175.64	9.09	1.16	5.10
34HP45-856-6	5.68	0.72	795.38	25629.86	7258.36	14.39	2.87	3.98
34HP45-856-7	6.63	1.50	100.27	32984.14	9306.94	8.03	1.20	4.28
34HP45-856-8	6.87	1.77	369.49	36281.79	10184.74	11.61	2.81	5.31
34HP45-856-9	7.83	1.53	932.91	37514.32	11192.33	17.98	3.57	5.18
34HP45-856-10	3.48	0.00	70.34	5928.44	2602.73	4.66	0.63	1.89
34HP45-856-11	3.74	0.00	148.77	5968.79	3028.70	5.40	0.95	1.52
34HP45-856-12	4.48	0.39	182.03	10108.58	4321.04	5.65	1.10	1.98
34HP45-856-13	3.56	0.87	41.02	3118.65	2714.26	4.20	0.54	3.36
34HP45-856-14	3.66	0.74	18.54	3834.16	3174.86	4.16	0.52	4.20
34HP45-856-15	2.99	0.51	21.84	2472.78	3336.16	3.91	0.50	4.36
34HP45-856-16	3.23	0.13	5.55	2498.66	4666.21	4.12	0.52	3.11
34HP45-856-17	2.35	0.00	3.55	91.07	4266.66	3.58	0.48	1.53
34HP45-856-18	2.49	0.00	4.89	241.12	5464.84	4.31	0.67	1.71
SRM614-4	0.42	0.41	0.30	0.00	1417.64	3.50	0.37	2.04
SRM612-4	15.33	7.68	9.45	0.00	0.00	21.91	9.41	9.73
SRM610-4	238.16	111.60	147.93	0.00	0.00	288.51	162.07	125.05
AP1-4	0.01	0.04	0.11	0.00	73.54	0.55	0.01	0.07
AP2-4	0.03	0.16	0.32	0.00	287.22	0.70	0.10	0.19
AP3-4	0.24	1.83	2.72	54.76	343.63	2.30	0.99	1.88
AP4-4	0.95	19.23	10.68	582.51	2247.26	23.92	3.76	6.87

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

raw data

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	1017.21	93322.93	7165.60	2966531.50	25383.06	4105.70	1140.77	1087.45
SRM614-1	1640.17	92713.88	7278.36	2791270.30	24198.22	5284.71	1712.53	4495.63
SRM612-1	26463.79	118696.35	43514.25	2743224.00	25215.18	11965.07	31057.98	24978.74
SRM610-1	258352.81	382308.25	372439.44	2975035.00	27511.80	74384.38	329343.34	210813.11
AP1-1	1411.41	86248.64	11143.98	2440869.30	41365.71	6571.00	1730.61	2080.53
AP2-1	1633.45	90373.47	20479.28	2341532.50	80501.98	6868.24	4553.63	5694.55
AP3-1	4548.71	143339.64	82715.55	3038970.50	127621.48	11753.03	24855.30	34746.00
AP4-1	5706.27	199229.72	107852.89	3397575.00	174519.55	17557.02	32037.02	45979.74

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	6297.16	81156.22	106737.09	3543366.80	194940.34	4965.07	3617.86	5703.03
34HP45-695-2	4993.59	82884.83	112454.63	3609460.00	208187.86	4371.94	3565.50	4493.55
34HP45-695-3	5154.07	83285.51	119944.39	3751873.00	224319.83	4505.83	3418.66	3744.22
34HP45-695-4	11663.23	93009.68	186288.72	12807287.00	383797.59	6165.71	4996.91	11659.95
34HP45-695-5	9735.46	88708.58	127453.04	9760451.00	325654.72	5640.95	4076.06	9841.78
34HP45-695-6	15434.85	91189.99	121464.93	12886120.00	381833.78	5629.55	4711.31	12632.47
34HP45-695-7	10134.22	82938.51	894747.00	6858656.00	287012.94	6422.08	6774.76	8645.45
34HP45-695-8	10058.58	86544.65	458104.56	8120869.00	323069.81	5492.23	7081.32	7099.12
34HP45-695-9	9314.81	83398.91	177608.41	7242082.00	319355.03	5870.19	4340.10	9301.37
34HP45-695-10	6381.60	80465.70	63374.12	4440823.50	289410.91	4992.35	3528.90	6731.48
34HP45-695-11	6275.88	80116.49	148450.53	4519907.00	305256.06	4840.51	4996.59	4851.67
34HP45-695-12	8617.97	82957.19	66672.66	7156606.00	376327.53	4935.95	4093.78	5080.03
34HP45-695-13	11201.26	85384.56	359122.88	7125706.50	367221.59	5713.43	5385.11	9785.01
34HP45-695-14	5671.07	79153.56	105406.76	3457560.00	306956.38	4539.75	3451.42	4659.99
34HP45-695-15	7832.20	117091.25	342726.16	5631437.00	346325.44	5295.79	4465.54	7029.20
34HP45-695-16	7134.08	79241.77	259603.50	3219264.50	334028.78	4889.67	4426.02	5939.35
34HP45-695-17	5213.43	78163.56	150550.25	2119539.00	320096.91	4449.23	3748.38	3477.62
34HP45-695-18	6032.79	78977.01	162514.59	2259374.00	332806.16	4630.79	3917.78	3372.02
SRM614-2	1343.85	81625.94	4856.23	974860.63	213266.59	4041.42	2715.62	4334.54
SRM612-2	27181.67	107826.48	34358.36	975777.06	155802.23	10090.50	27231.55	21066.04
SRM610-2	270581.75	354155.38	326418.00	1303176.80	142883.53	64123.72	284402.56	183031.34
AP1-2	934.53	80161.89	6986.12	865897.31	188960.98	4145.90	2166.97	1913.53
AP2-2	1336.53	83588.43	12994.95	880944.19	248564.11	4688.99	4348.34	3962.38
AP3-2	3866.18	131006.70	63032.56	1488961.60	292343.44	8732.65	20125.51	26274.51
AP4-2	5154.07	172518.41	91753.12	1951985.30	325081.22	12779.95	28065.36	39995.98
blank-2	705.68	78989.00	3784.02	1001045.20	319484.28	3874.18	3159.34	584.36
blank average	861.44	86155.97	5474.81	1983788.35	172433.67	3989.94	2150.05	835.90

blank subtraction								
SRM614-1	778.72	6557.92	1803.55	807481.95	-148235.45	1294.77	-437.52	3659.72
SRM612-1	25602.34	32540.39	38039.44	759435.65	-147218.49	7975.12	28907.92	24142.84
SRM610-1	257491.37	296152.29	366964.63	991246.65	-144921.88	70394.44	327193.29	209977.21
AP1-1	549.96	92.68	5669.17	457080.95	-131067.96	2581.05	-419.44	1244.63
AP2-1	772.00	4217.50	15004.46	357744.15	-91931.69	2878.30	2403.57	4858.65
AP3-1	3687.26	57183.68	77240.74	1055182.15	-44812.19	7763.08	22705.25	33910.09
AP4-1	4844.83	113073.76	102378.08	1413786.65	2085.88	13567.08	29886.97	45143.83
34HP45-695-1	5435.71	-4999.75	101262.28	1559578.45	22506.67	975.13	1467.81	4867.13
34HP45-695-2	4132.14	-3271.14	106979.82	1625671.65	35754.19	382.00	1415.45	3657.64
34HP45-695-3	4292.62	-2870.46	114469.58	1768084.65	51886.16	515.88	1268.61	2908.32
34HP45-695-4	10801.78	6853.72	180813.91	10823498.65	211363.92	2175.77	2846.86	10824.04
34HP45-695-5	8874.01	2552.61	121978.23	7776662.65	153221.05	1651.01	1926.01	9005.87
34HP45-695-6	14573.40	5034.03	115990.12	10902331.65	209400.11	1639.61	2561.25	11796.57
34HP45-695-7	9272.77	-3217.46	889272.19	4874867.65	114579.27	2432.13	4624.71	7809.54
34HP45-695-8	9197.13	388.68	452629.75	6137080.65	150636.14	1502.29	4931.27	6263.22
34HP45-695-9	8453.37	-2757.06	172133.60	5258293.65	146921.36	1880.25	2190.05	8465.47
34HP45-695-10	5520.15	-5690.27	57899.31	2457035.15	116977.24	1002.41	1378.85	5895.57
34HP45-695-11	5414.43	-6039.47	142975.72	2536118.65	132822.39	850.56	2846.54	4015.76
34HP45-695-12	7756.52	-3198.78	61197.85	5172817.65	203893.86	946.01	1943.73	4244.12
34HP45-695-13	10339.82	-771.40	353648.07	5141918.15	194787.92	1723.49	3235.06	8949.11
34HP45-695-14	4809.63	-7002.40	99931.95	1473771.65	134522.71	549.80	1301.37	3824.08
34HP45-695-15	6970.76	30935.29	337251.35	3647648.65	173891.77	1305.85	2315.49	6193.29
34HP45-695-16	6272.64	-6914.20	254128.69	1235476.15	161595.11	899.72	2275.97	5103.45
34HP45-695-17	4351.98	-7992.40	145075.44	135750.65	147663.24	459.28	1598.33	2641.71
34HP45-695-18	5171.35	-7178.96	157039.78	275585.65	160372.49	640.84	1767.73	2536.11
SRM614-2	482.40	-4530.03	-618.58	-1008927.72	40832.92	51.48	565.56	3498.64
SRM612-2	26320.23	21670.52	28883.54	-1008011.29	-16631.44	6100.55	25081.50	20230.13
SRM610-2	269720.31	267999.42	320943.19	-680611.55	-29550.14	60133.78	282252.51	182195.44
AP1-2	73.08	-5994.07	1511.31	-1117891.04	16527.31	155.96	16.92	1077.63
AP2-2	475.08	-2567.54	7520.14	-1102844.16	76130.44	699.04	2198.29	3126.48
AP3-2	3004.74	44850.74	57557.74	-494826.75	119909.77	4742.71	17975.46	25438.60
AP4-2	4292.62	86362.45	86278.31	-31803.05	152647.55	8790.01	25915.30	39160.08

zero correction								
SRM614-1	778.72	6557.92	1803.55	807481.95	0.00	1294.77	0.00	3659.72
SRM612-1	25602.34	32540.39	38039.44	759435.65	0.00	7975.12	28907.92	24142.84
SRM610-1	257491.37	296152.29	366964.63	991246.65	0.00	70394.44	327193.29	209977.21
AP1-1	549.96	92.68	5669.17	457080.95	0.00	2581.05	0.00	1244.63
AP2-1	772.00	4217.50	15004.46	357744.15	0.00	2878.30	2403.57	4858.65
AP3-1	3687.26	57183.68	77240.74	1055182.15	0.00	7763.08	22705.25	33910.09
AP4-1	4844.83	113073.76	102378.08	1413786.65	2085.88	13567.08	29886.97	45143.83
34HP45-695-1	5435.71	0.00	101262.28	1559578.45	22506.67	975.13	1467.81	4867.13
34HP45-695-2	4132.14	0.00	106979.82	1625671.65	35754.19	382.00	1415.45	3657.64
34HP45-695-3	4292.62	0.00	114469.58	1768084.65	51886.16	515.88	1268.61	2908.32
34HP45-695-4	10801.78	6853.72	180813.91	10823498.65	211363.92	2175.77	2846.86	10824.04
34HP45-695-5	8874.01	2552.61	121978.23	7776662.65	153221.05	1651.01	1926.01	9005.87
34HP45-695-6	14573.40	5034.03	115990.12	10902331.65	209400.11	1639.61	2561.25	11796.57
34HP45-695-7	9272.77	0.00	889272.19	4874867.65	114579.27	2432.13	4624.71	7809.54
34HP45-695-8	9197.13	388.68	452629.75	6137080.65	150636.14	1502.29	4931.27	6263.22

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	8453.37	0.00	172133.60	5258293.65	146921.36	1880.25	2190.05	8465.47
34HP45-695-10	5520.15	0.00	57899.31	2457035.15	116977.24	1002.41	1378.85	5895.57
34HP45-695-11	5414.43	0.00	142975.72	2536118.65	132822.39	850.56	2846.54	4015.76
34HP45-695-12	7756.52	0.00	61197.85	5172817.65	203893.86	946.01	1943.73	4244.12
34HP45-695-13	10339.82	0.00	353648.07	5141918.15	194787.92	1723.49	3235.06	8949.11
34HP45-695-14	4809.63	0.00	99931.95	1473771.65	134522.71	549.80	1301.37	3824.08
34HP45-695-15	6970.76	30935.29	337251.35	3647648.65	173891.77	1305.85	2315.49	6193.29
34HP45-695-16	6272.64	0.00	254128.69	1235476.15	161595.11	899.72	2275.97	5103.45
34HP45-695-17	4351.98	0.00	145075.44	135750.65	147663.24	459.28	1598.33	2641.71
34HP45-695-18	5171.35	0.00	157039.78	275585.65	160372.49	640.84	1767.73	2536.11
SRM614-2	482.40	0.00	0.00	0.00	40832.92	51.48	565.56	3498.64
SRM612-2	26320.23	21670.52	28883.54	0.00	0.00	6100.55	25081.50	20230.13
SRM610-2	269720.31	267999.42	320943.19	0.00	0.00	60133.78	282252.51	182195.44
AP1-2	73.08	0.00	1511.31	0.00	16527.31	155.96	16.92	1077.63
AP2-2	475.08	0.00	7520.14	0.00	76130.44	699.04	2198.29	3126.48
AP3-2	3004.74	44850.74	57557.74	0.00	119909.77	4742.71	17975.56	25438.60
AP4-2	4292.62	86362.45	86278.31	0.00	152647.55	8790.01	25915.30	39160.08

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-1	0.000382	0.003215	0.000884	0.395906	0.000000	0.000635	0.000000	0.001794
SRM612-1	0.011093	0.014099	0.016482	0.329045	0.000000	0.003455	0.012525	0.010461
SRM610-1	0.167710	0.192891	0.239013	0.645623	0.000000	0.045850	0.213109	0.136763
AP1-1	0.000035	0.000006	0.000357	0.028786	0.000000	0.000163	0.000000	0.000078
AP2-1	0.000044	0.000238	0.000845	0.020158	0.000000	0.000162	0.000135	0.000274
AP3-1	0.000165	0.002556	0.003452	0.047162	0.000000	0.000347	0.001015	0.001516
AP4-1	0.000214	0.005002	0.004529	0.062539	0.000092	0.000600	0.001322	0.001997
34HP45-695-1	0.000493	0.000000	0.009178	0.141349	0.002040	0.000088	0.000133	0.000441
34HP45-695-2	0.000498	0.000000	0.012889	0.195865	0.004308	0.000046	0.000171	0.000441
34HP45-695-3	0.000495	0.000000	0.013208	0.204012	0.005987	0.000060	0.000146	0.000336
34HP45-695-4	0.000646	0.000410	0.010819	0.647629	0.012647	0.000130	0.000170	0.000648
34HP45-695-5	0.000602	0.000173	0.008274	0.527478	0.010393	0.000112	0.000131	0.000611
34HP45-695-6	0.001212	0.000418	0.009643	0.906352	0.017408	0.000136	0.000213	0.000981
34HP45-695-7	0.000604	0.000000	0.057902	0.317408	0.007460	0.000158	0.000301	0.000508
34HP45-695-8	0.000605	0.000026	0.029787	0.403878	0.009913	0.000099	0.000325	0.000412
34HP45-695-9	0.000528	0.000000	0.010761	0.328717	0.009185	0.000118	0.000137	0.000529
34HP45-695-10	0.000423	0.000000	0.004437	0.188302	0.008965	0.000077	0.000106	0.000452
34HP45-695-11	0.000425	0.000000	0.011228	0.199165	0.010431	0.000067	0.000224	0.000315
34HP45-695-12	0.000696	0.000000	0.005495	0.464476	0.018308	0.000085	0.000175	0.000381
34HP45-695-13	0.000763	0.000000	0.026112	0.379655	0.014382	0.000127	0.000239	0.000661
34HP45-695-14	0.000378	0.000000	0.007847	0.115720	0.010563	0.000043	0.000102	0.000300
34HP45-695-15	0.000541	0.002402	0.026187	0.283233	0.013502	0.000101	0.000180	0.000481
34HP45-695-16	0.000511	0.000000	0.020691	0.100592	0.013157	0.000073	0.000185	0.000416
34HP45-695-17	0.000371	0.000000	0.012360	0.011565	0.012580	0.000039	0.000136	0.000225
34HP45-695-18	0.000415	0.000000	0.012593	0.022100	0.012861	0.000051	0.000142	0.000203
SRM614-2	0.000307	0.000000	0.000000	0.000000	0.025958	0.000033	0.000360	0.002224
SRM612-2	0.015001	0.012351	0.016462	0.000000	0.000000	0.003477	0.014295	0.011530
SRM610-2	0.232801	0.231315	0.277012	0.000000	0.000000	0.051903	0.243617	0.157256
AP1-2	0.000005	0.000000	0.000107	0.000000	0.001170	0.000011	0.000001	0.000076
AP2-2	0.000032	0.000000	0.000504	0.000000	0.005103	0.000047	0.000147	0.000210
AP3-2	0.000159	0.002373	0.003045	0.000000	0.006344	0.000251	0.000951	0.001346
AP4-2	0.000213	0.004278	0.004273	0.000000	0.007561	0.000435	0.001284	0.001940

standardize signal averages AP								
AP1	0.000020	0.000003	0.000232	0.014393	0.000585	0.000087	0.000001	0.000077
AP2	0.000038	0.000119	0.000675	0.010079	0.002551	0.000105	0.000141	0.000242
AP3	0.000162	0.002464	0.003249	0.023581	0.003172	0.000299	0.000983	0.001431
AP4	0.000213	0.004640	0.004401	0.031269	0.003827	0.000518	0.001303	0.001968

linest from std sig ave								
	0.015574	0.009167	0.008755	0.096303	0.714078	0.116903	0.010584	0.014068

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
srM614-2	0.000344	0.001608	0.000442	0.197953	0.012979	0.000334	0.000180	0.002009
srM612-2	0.013047	0.013225	0.016472	0.164522	0.000000	0.003466	0.013410	0.010995
srM610-2	0.200255	0.212103	0.258012	0.322811	0.000000	0.048876	0.228363	0.147010
linest from std sig ave								
	0.025758	0.022325	0.019613	0.010727	0.000000	0.106012	0.020713	0.034151
concentration data								
SRM614-1	0.51	2.53	0.66	3269.88	0.00	6.36	0.00	2.16
SRM612-1	14.82	11.08	12.38	2717.66	0.00	34.64	11.37	12.62
SRM610-1	224.00	151.65	179.47	5332.34	0.00	459.69	193.44	165.00
AP1-1	0.22	0.02	1.25	1105.92	0.00	7.58	0.00	0.44
AP2-1	0.27	0.87	2.95	774.45	0.00	7.56	0.57	1.54
AP3-1	1.02	9.35	12.06	1811.91	0.00	16.18	4.28	8.51
AP4-1	1.33	18.29	15.82	2402.65	26.28	27.99	5.58	11.21
34HP45-695-1	3.06	0.00	32.06	5430.43	581.09	4.12	0.56	2.48
34HP45-695-2	3.09	0.00	45.02	7524.87	1227.16	2.15	0.72	2.47
34HP45-695-3	3.08	0.00	46.13	7837.88	1705.51	2.78	0.62	1.88
34HP45-695-4	4.02	1.50	37.79	24881.06	3602.79	6.07	0.72	3.63
34HP45-695-5	3.74	0.63	28.90	20265.00	2960.59	5.22	0.55	3.43
34HP45-695-6	7.53	1.53	33.68	34820.86	4959.11	6.36	0.90	5.50
34HP45-695-7	3.75	0.00	202.24	12194.41	2125.25	7.39	1.27	2.85
34HP45-695-8	3.76	0.09	104.04	15516.48	2824.02	4.61	1.37	2.31
34HP45-695-9	3.28	0.00	37.59	12628.89	2616.45	5.48	0.58	2.97
34HP45-695-10	2.63	0.00	15.50	7234.31	2553.84	3.58	0.45	2.54
34HP45-695-11	2.64	0.00	39.22	7651.65	2971.42	3.12	0.94	1.77
34HP45-695-12	4.33	0.00	19.19	17844.57	5215.42	3.96	0.74	2.14
34HP45-695-13	4.74	0.00	91.20	14585.85	4097.09	5.93	1.01	3.71
34HP45-695-14	2.35	0.00	27.41	4445.81	3009.00	2.01	0.43	1.69
34HP45-695-15	3.36	8.78	91.47	10881.45	3846.45	4.73	0.76	2.70
34HP45-695-16	3.17	0.00	72.27	3864.61	3748.05	3.42	0.78	2.33
34HP45-695-17	2.30	0.00	43.17	444.33	3583.75	1.82	0.57	1.26
34HP45-695-18	2.58	0.00	43.99	849.05	3663.64	2.40	0.60	1.14
SRM614-2	0.41	0.00	0.00	0.00	1589.69	0.33	0.33	2.68
SRM612-2	20.04	9.71	12.36	0.00	0.00	34.86	12.98	13.91
SRM610-2	310.94	181.86	208.00	0.00	0.00	520.37	221.13	189.73
AP1-2	0.03	0.00	0.37	0.00	333.42	0.52	0.01	0.43
AP2-2	0.20	0.00	1.76	0.00	1453.66	2.19	0.62	1.18
AP3-2	0.99	8.68	10.64	0.00	1807.12	11.70	4.02	7.55
AP4-2	1.32	15.64	14.93	0.00	2153.86	20.30	5.42	10.89
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	1922.53	80399.29	24687.54	3305201.80	28646.00	8496.69	1498.85	1914.29
SRM614-1	3670.62	78737.96	16457.61	2418732.30	24190.50	7837.08	3166.34	14371.16
SRM612-1	23005.81	98290.23	38798.22	2045371.10	20946.56	10365.10	22393.85	19388.71
SRM610-1	167043.63	236988.38	190976.59	1951190.80	21739.44	41913.32	157863.64	87575.73
AP1-1	2999.02	117126.58	19170.83	1451349.40	37493.05	10077.02	3925.14	9796.38
AP2-1	2299.61	92334.24	23481.49	1252933.10	52376.25	7616.88	4768.19	7739.04
AP3-1	5134.63	142094.59	82351.63	1784311.50	89552.98	11185.90	23674.90	36263.65
AP4-1	6343.08	229243.77	112304.59	2441099.30	123853.81	18960.59	31478.74	53986.42
MZ1-1	1651.33	84222.75	162245.23	1100127.00	110971.70	4645.91	4557.79	3862.50
MZ1-2	1546.05	84665.00	133612.83	1059454.50	119738.07	4768.11	5092.59	2900.98
MZ1-3	1315.85	89014.34	98049.88	980571.19	124442.02	4974.87	5393.47	2026.33
MZ1-4	2555.17	89119.10	195490.86	1451190.30	149483.33	5712.11	8637.81	4462.91
MZ1-5	2498.93	89358.66	210971.67	1308256.00	154723.67	5646.15	8386.25	3156.86
MZ1-6	2362.61	92897.60	172106.81	1378534.60	161408.23	5958.99	6609.72	3148.50
MZ1-7	2289.93	94425.01	108924.73	1249673.00	163045.84	6395.72	5760.35	3761.26
MZ1-8	2196.37	100838.53	113961.64	1223222.90	157646.77	6394.72	6848.32	3031.42
MZ1-9	2107.77	101544.41	101386.69	1140509.60	163000.67	6173.87	6972.64	2897.78
MZ1-10	1840.17	103082.86	165779.97	1031154.90	164902.38	5985.55	6332.44	2285.17
MZ1-11	1742.45	102564.90	112420.28	1033477.00	167228.50	6215.79	7590.56	2327.37
MZ1-12	2100.01	102840.22	124041.54	1054930.60	168927.42	6201.55	7456.68	2477.77
MZ1-13	3321.70	105075.88	551570.56	1958944.80	189742.95	6360.16	8530.89	3682.10
MZ1-14	3574.58	103728.34	773231.69	2121016.50	197953.28	6464.48	9793.98	3978.42
MZ1-15	3400.82	102510.18	664871.00	2065038.80	203360.86	6299.28	10411.34	3623.22
MZ1-16	1714.53	106143.67	66734.98	991322.06	189270.78	6480.04	7232.04	3329.94

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	1521.57	105374.23	48873.00	886733.13	189761.98	6382.76	8455.89	2564.93
MZ1-18	1710.77	108088.25	235850.13	1266223.80	198158.19	6521.08	9784.89	3413.06
MZ1-19	1690.45	103512.30	19959.35	814415.75	200681.48	6453.24	13429.68	3383.58
MZ1-20	1486.73	100688.80	14871.24	746672.88	205565.52	5771.55	13177.95	2734.86
MZ1-21	1563.77	100204.48	14757.08	732617.75	211009.75	5716.51	14355.88	2935.50
srms614-2	2778.22	105379.31	7819.88	638737.44	84045.11	6234.23	2356.49	7569.96
srms612-2	17953.98	116438.09	22573.89	638722.56	59459.70	9574.57	16410.13	12917.63
srms610-2	148583.00	242407.17	157928.45	838392.94	61179.95	39252.02	142066.44	82830.27
AP1-2	1305.33	104618.83	8221.45	638423.38	89589.19	6029.99	1959.53	1821.37
AP2-2	1351.69	106891.72	11584.67	668142.75	124720.58	6378.56	2869.94	3105.38
AP3-2	3481.30	137545.77	48064.71	1008547.20	155688.23	9380.81	14180.32	19361.75
AP4-2	4811.19	200308.81	73412.25	1511205.10	180755.58	15820.93	22150.85	34390.59
blank-2	1067.25	105626.99	5735.51	670308.88	184203.39	6343.88	2189.61	1080.41
blank ave	1494.89	93013.14	15211.53	1987755.34	106424.70	7420.28	1844.23	1497.35

blank subtraction								
SRM614-1	2175.73	-14275.18	1246.09	430976.96	-82234.20	416.80	1322.11	12873.81
SRM612-1	21510.92	5277.09	23586.69	57615.76	-85478.14	2944.82	20549.62	17891.36
SRM610-1	165548.74	143975.24	175765.06	-36564.54	-84685.25	34493.03	156019.41	86078.39
AP1-1	1504.13	24113.44	3959.30	-536405.94	-68931.65	2656.74	2080.91	8299.03
AP2-1	804.72	-678.90	8269.97	-734822.24	-54048.44	196.60	2923.96	6241.70
AP3-1	3639.74	49081.45	67140.10	-203443.84	-16871.71	3765.62	21830.66	34766.30
AP4-1	4848.19	136230.63	97093.06	453343.96	17429.11	11540.30	29634.51	52489.07
MZ1-1	156.44	-8790.39	147033.70	-887628.34	4547.00	-2774.38	2713.56	2365.15
MZ1-2	51.16	-8348.14	118401.30	-928300.84	13313.37	-2652.17	3248.36	1403.63
MZ1-3	-179.04	-3998.80	82838.35	-1007184.15	18017.32	-2445.41	3549.24	528.98
MZ1-4	1060.29	-3894.04	180279.33	-536565.04	43058.63	-1708.17	6793.58	2965.56
MZ1-5	1004.05	-3654.48	195760.14	-679499.34	48298.97	-1774.13	6542.02	1659.51
MZ1-6	867.72	-115.54	156895.28	-609220.74	54983.53	-1461.29	4765.49	1651.15
MZ1-7	795.04	1411.87	93713.20	-738082.34	56621.14	-1024.57	3916.12	2263.91
MZ1-8	701.48	7825.39	98750.11	-764532.44	51222.07	-1025.57	5004.09	1534.07
MZ1-9	612.88	8531.27	86175.16	-847245.74	56575.97	-1246.41	5128.41	1400.43
MZ1-10	345.28	10069.72	150568.44	-956600.44	58477.68	-1434.73	4488.21	787.82
MZ1-11	247.56	9551.76	97208.75	-954278.34	60803.80	-1204.49	5746.33	830.02
MZ1-12	605.12	9827.08	108830.01	-932824.74	62502.72	-1218.73	5612.45	980.43
MZ1-13	1826.81	12062.74	536359.03	-28810.54	83318.25	-1060.13	6686.66	2184.75
MZ1-14	2079.69	10715.20	758020.16	133261.16	91528.58	-955.80	7949.75	2481.07
MZ1-15	1905.93	9497.04	649659.47	77283.46	96936.16	-1121.01	8567.11	2125.87
MZ1-16	219.64	13130.53	51523.45	-996433.28	82846.08	-940.24	5387.81	1832.59
MZ1-17	26.68	12361.09	33661.47	-1101022.21	83337.28	-1037.53	6611.66	1067.59
MZ1-18	215.88	15075.11	220638.60	-721531.54	91733.49	-899.20	7940.66	1915.71
MZ1-19	195.56	10499.16	4747.83	-1173339.59	94256.78	-967.05	11585.45	1886.23
MZ1-20	-8.16	7675.66	-340.28	-1241082.46	99140.82	-1648.73	11333.72	1237.51
MZ1-21	68.88	7191.34	-454.44	-1255137.59	104585.05	-1703.77	12511.65	1438.15
srms614-2	1283.33	12366.17	-7391.64	-1349017.90	-22379.59	-1186.05	512.26	6072.61
srms612-2	16459.09	23424.95	7362.36	-1349032.78	-46965.00	2154.29	14565.90	11420.28
srms610-2	147088.11	149394.03	142716.92	-1149362.40	-45244.75	31831.74	140222.21	81332.92
AP1-2	-189.56	11605.69	-6990.08	-1349331.96	-16835.51	-1390.29	115.30	324.02
AP2-2	-143.20	13878.58	-3626.86	-1319612.59	18295.88	-1041.73	1025.71	1608.03
AP3-2	1986.41	44532.63	32853.19	-979208.14	49263.53	1960.53	12336.09	17864.40
AP4-2	3316.30	107295.67	58200.72	-476550.24	74330.88	8400.65	20306.62	32893.25

zero correction								
SRM614-1	2175.73	78737.96	1246.09	2418732.30	24190.50	416.80	1322.11	12873.81
SRM612-1	21510.92	98290.23	23586.69	2045371.10	20946.56	2944.82	20549.62	17891.36
SRM610-1	165548.74	236988.38	175765.06	1951190.80	21739.44	34493.03	156019.41	86078.39
AP1-1	1504.13	117126.58	3959.30	1451349.40	37493.05	2656.74	2080.91	8299.03
AP2-1	804.72	92334.24	8269.97	1252933.10	52376.25	196.60	2923.96	6241.70
AP3-1	3639.74	142094.59	67140.10	1784311.50	89552.98	3765.62	21830.66	34766.30
AP4-1	4848.19	229243.77	97093.06	2441099.30	123853.81	11540.30	29634.51	52489.07
MZ1-1	156.44	84222.75	147033.70	1100127.00	110971.70	0.00	2713.56	2365.15
MZ1-2	51.16	84665.00	118401.30	1059454.50	119738.07	0.00	3248.36	1403.63
MZ1-3	0.00	89014.34	82838.35	980571.19	124442.02	0.00	3549.24	528.98
MZ1-4	1060.29	89119.10	180279.33	1451190.30	149483.33	0.00	6793.58	2965.56
MZ1-5	1004.05	89358.66	195760.14	1308256.00	154723.67	0.00	6542.02	1659.51
MZ1-6	867.72	92897.60	156895.28	1378534.60	161408.23	0.00	4765.49	1651.15
MZ1-7	795.04	94425.01	93713.20	1249673.00	163045.84	0.00	3916.12	2263.91
MZ1-8	701.48	100838.53	98750.11	1223222.90	157646.77	0.00	5004.09	1534.07
MZ1-9	612.88	101544.41	86175.16	1140509.60	163000.67	0.00	5128.41	1400.43
MZ1-10	345.28	103082.86	150568.44	1031154.90	164902.38	0.00	4488.21	787.82
MZ1-11	247.56	102564.90	97208.75	1033477.00	167228.50	0.00	5746.33	830.02
MZ1-12	605.12	102840.22	108830.01	1054930.60	168927.42	0.00	5612.45	980.43
MZ1-13	1826.81	105075.88	536359.03	1958944.80	189742.95	0.00	6686.66	2184.75
MZ1-14	2079.69	103728.34	758020.16	2121016.50	197953.28	0.00	7949.75	2481.07
MZ1-15	1905.93	102510.18	649659.47	2065038.80	203360.86	0.00	8567.11	2125.87
MZ1-16	219.64	106143.67	51523.45	991322.06	189270.78	0.00	5387.81	1832.59
MZ1-17	26.68	105374.23	33661.47	886733.13	189761.98	0.00	6611.66	1067.59
MZ1-18	215.88	108088.25	220638.60	1266223.80	198158.19	0.00	7940.66	1915.71

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	195.56	103512.30	4747.83	814415.75	200681.48	0.00	11585.45	1886.23
MZ1-20	0.00	100688.80	0.00	746672.88	205565.52	0.00	11333.72	1237.51
MZ1-21	68.88	100204.48	0.00	732617.75	211009.75	0.00	12511.65	1438.15
srm614-2	1283.33	105379.31	0.00	638737.44	84045.11	0.00	512.26	6072.61
srm612-2	16459.09	116438.09	7362.36	638722.56	59459.70	2154.29	14565.90	11420.28
srm610-2	147088.11	242407.17	142716.92	838392.94	61179.95	31831.74	140222.21	81332.92
AP1-2	0.00	104618.83	0.00	638423.38	89589.19	0.00	115.30	324.02
AP2-2	0.00	106891.72	0.00	668142.75	124720.58	0.00	1025.71	1608.03
AP3-2	1986.41	137545.77	32853.19	1008547.20	155688.23	1960.53	12336.09	17864.40
AP4-2	3316.30	200308.81	58200.72	1511205.10	180755.58	8400.65	20306.62	32893.25

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-1	0.000485	0.017565	0.000278	0.539571	0.005396	0.000093	0.000295	0.002872
SRM612-1	0.016839	0.076945	0.018464	1.601186	0.016398	0.002305	0.016087	0.014006
SRM610-1	0.241045	0.345064	0.255920	2.841004	0.031653	0.050223	0.227170	0.125333
AP1-1	0.000087	0.006811	0.000230	0.084399	0.002180	0.000154	0.000121	0.000483
AP2-1	0.000056	0.006378	0.000571	0.086545	0.003618	0.000014	0.000202	0.000431
AP3-1	0.000193	0.007545	0.003565	0.094743	0.004755	0.000200	0.001159	0.001846
AP4-1	0.000282	0.013344	0.005652	0.142092	0.007209	0.000672	0.001725	0.003055
MZ1-1	0.000013	0.007240	0.012640	0.094574	0.009540	0.000000	0.000233	0.000203
MZ1-2	0.000005	0.008263	0.011555	0.103398	0.011686	0.000000	0.000317	0.000137
MZ1-3	0.000000	0.009972	0.009280	0.109848	0.013941	0.000000	0.000398	0.000059
MZ1-4	0.000101	0.008484	0.017162	0.138152	0.014231	0.000000	0.000647	0.000282
MZ1-5	0.000100	0.008915	0.019531	0.130527	0.015437	0.000000	0.000653	0.000166
MZ1-6	0.000100	0.010708	0.018085	0.158903	0.018605	0.000000	0.000549	0.000190
MZ1-7	0.000067	0.007966	0.007906	0.105429	0.013755	0.000000	0.000330	0.000191
MZ1-8	0.000056	0.007993	0.007828	0.096965	0.012497	0.000000	0.000397	0.000122
MZ1-9	0.000055	0.009120	0.007740	0.102435	0.014640	0.000000	0.000461	0.000126
MZ1-10	0.000043	0.012955	0.018922	0.129589	0.020724	0.000000	0.000564	0.000099
MZ1-11	0.000030	0.012345	0.011700	0.124390	0.020128	0.000000	0.000692	0.000100
MZ1-12	0.000072	0.012252	0.012966	0.125683	0.020126	0.000000	0.000669	0.000117
MZ1-13	0.000187	0.010742	0.054831	0.200259	0.019397	0.000000	0.000684	0.000223
MZ1-14	0.000174	0.008659	0.063276	0.177054	0.016524	0.000000	0.000664	0.000207
MZ1-15	0.000158	0.008523	0.054017	0.171700	0.016909	0.000000	0.000712	0.000177
MZ1-16	0.000028	0.013486	0.006546	0.125947	0.024047	0.000000	0.000685	0.000233
MZ1-17	0.000003	0.011435	0.003653	0.096223	0.020592	0.000000	0.000717	0.000116
MZ1-18	0.000016	0.008072	0.016477	0.094558	0.014798	0.000000	0.000593	0.000143
MZ1-19	0.000011	0.005714	0.000262	0.044954	0.011077	0.000000	0.000639	0.000104
MZ1-20	0.000000	0.005601	0.000000	0.041535	0.011435	0.000000	0.000630	0.000069
MZ1-21	0.000004	0.005290	0.000000	0.038676	0.011139	0.000000	0.000661	0.000076
srm614-2	0.000455	0.037384	0.000000	0.226598	0.029816	0.000000	0.000182	0.002154
srm612-2	0.021482	0.151970	0.009609	0.833632	0.077604	0.002812	0.019011	0.014905
srm610-2	0.266966	0.439970	0.259032	1.521687	0.111042	0.057775	0.254504	0.147620
AP1-2	0.000000	0.010993	0.000000	0.067085	0.009414	0.000000	0.000012	0.000034
AP2-2	0.000000	0.013159	0.000000	0.082254	0.015354	0.000000	0.000126	0.000198
AP3-2	0.000160	0.011048	0.002639	0.081009	0.012505	0.000157	0.000991	0.001435
AP4-2	0.000267	0.016098	0.004677	0.121449	0.014527	0.000675	0.001632	0.002643

standardize signal averages AP								
AP1	0.000044	0.008902	0.000115	0.075742	0.005797	0.000077	0.000067	0.000258
AP2	0.000028	0.009769	0.000286	0.084400	0.009486	0.000007	0.000164	0.000315
AP3	0.000176	0.009296	0.003102	0.087876	0.008630	0.000179	0.001075	0.001640
AP4	0.000274	0.014721	0.005164	0.131770	0.010868	0.000673	0.001678	0.002849

linest from std sig ave								
	0.012794	0.001984	0.007948	0.022346	0.244554	0.088563	0.008719	0.010438

standardize signal averages SRM								
srm614-2	0.000470	0.027475	0.000139	0.383085	0.017606	0.000046	0.000238	0.002513
srm612-2	0.019161	0.114457	0.014037	1.217409	0.047001	0.002558	0.017549	0.014456

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	0.254005	0.392517	0.257476	2.181345	0.071348	0.053999	0.240837	0.136476
linest from std sig ave								
	0.020296	0.011367	0.019659	0.001945	0.054029	0.096030	0.019628	0.036674
concentration data								
SRM614-1	0.53	2.99	0.19	1034.08	113.18	0.71	0.22	2.57
SRM612-1	18.48	13.09	12.59	3068.64	343.92	17.51	12.03	12.54
SRM610-1	264.49	58.70	174.44	5444.72	663.89	381.47	169.88	112.20
AP1-1	0.45	5.39	0.73	752.39	212.71	5.46	0.42	2.01
AP2-1	0.28	5.05	1.81	771.52	352.96	0.48	0.70	1.80
AP3-1	0.99	5.97	11.30	844.61	463.91	7.06	4.03	7.69
AP4-1	1.44	10.56	17.92	1266.71	703.35	23.73	6.00	12.72
MZ1-1	0.07	5.73	40.08	843.10	930.72	0.00	0.81	0.85
MZ1-2	0.03	6.54	36.64	921.76	1140.09	0.00	1.10	0.57
MZ1-3	0.00	7.89	29.42	979.27	1360.07	0.00	1.38	0.25
MZ1-4	0.52	6.71	54.42	1231.58	1388.36	0.00	2.25	1.18
MZ1-5	0.51	7.06	61.93	1163.61	1506.06	0.00	2.27	0.69
MZ1-6	0.51	8.47	57.34	1416.58	1815.18	0.00	1.91	0.79
MZ1-7	0.34	6.30	25.07	939.87	1342.00	0.00	1.15	0.80
MZ1-8	0.28	6.33	24.82	864.42	1219.20	0.00	1.38	0.51
MZ1-9	0.28	7.22	24.54	913.18	1428.29	0.00	1.60	0.52
MZ1-10	0.22	10.25	60.00	1155.25	2021.85	0.00	1.96	0.41
MZ1-11	0.15	9.77	37.10	1108.90	1963.69	0.00	2.41	0.42
MZ1-12	0.37	9.70	41.11	1120.42	1963.49	0.00	2.33	0.49
MZ1-13	0.95	8.50	173.85	1785.25	1892.41	0.00	2.38	0.93
MZ1-14	0.89	6.85	200.63	1578.38	1612.14	0.00	2.31	0.86
MZ1-15	0.81	6.75	171.27	1530.65	1649.63	0.00	2.48	0.74
MZ1-16	0.14	10.67	20.76	1122.78	2346.04	0.00	2.38	0.97
MZ1-17	0.01	9.05	11.58	857.80	2008.98	0.00	2.50	0.48
MZ1-18	0.08	6.39	52.24	842.96	1443.71	0.00	2.06	0.60
MZ1-19	0.06	4.52	0.83	400.75	1080.70	0.00	2.22	0.43
MZ1-20	0.00	4.43	0.00	370.27	1115.62	0.00	2.19	0.29
MZ1-21	0.02	4.19	0.00	344.78	1086.79	0.00	2.30	0.32
srm614-2	0.50	6.36	0.00	434.27	625.35	0.00	0.14	1.93
srm612-2	23.57	25.85	6.55	1597.64	1627.65	21.36	14.22	13.34
srm610-2	292.93	74.85	176.56	2916.28	2328.96	438.82	190.32	132.15
AP1-2	0.00	8.70	0.00	598.04	918.44	0.00	0.04	0.14
AP2-2	0.00	10.41	0.00	733.27	1497.98	0.00	0.44	0.82
AP3-2	0.81	8.74	8.37	722.17	1220.03	5.56	3.45	5.98
AP4-2	1.36	12.74	14.83	1082.68	1417.23	23.85	5.68	11.01
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-5	2437.49	261590.11	33104.79	779098.00	51378.97	7968.25	892.97	834.08
SRM614-5	3216.10	102450.82	32112.50	2165223.80	39016.74	12772.03	1839.73	5871.23
SRM612-5	36312.93	140451.72	50677.97	1412315.30	25667.31	17709.22	32148.22	25540.10
SRM610-5	173680.83	273092.22	211610.55	1365951.50	23808.98	47722.91	172441.48	104097.47
AP1-5	1825.49	113728.40	13179.35	966856.81	27517.28	7685.64	943.41	3869.26
AP2-5	1751.13	122795.21	15729.61	933428.69	44818.45	7340.52	2083.77	3539.82
AP3-5	3001.34	145026.45	33773.75	1097519.80	63433.96	9383.13	8626.93	12124.03
AP4-5	3365.14	169546.44	44265.61	1273243.80	86619.05	11051.82	11356.98	17220.18
MZ2-1b	1683.49	134470.44	58312.65	816525.06	90911.71	7383.28	1535.77	1258.29
MZ2-2b	1646.37	136591.73	77226.63	844671.19	93038.84	7826.08	1747.45	1375.41
MZ2-3b	1618.89	137706.94	46555.38	830618.50	95232.86	8048.37	1611.29	1487.49
MZ2-4b	1662.65	138772.19	34507.11	840358.94	100794.13	8083.53	2044.37	1408.37
MZ2-5b	1854.29	138744.98	92099.52	856575.44	105570.91	8088.61	2278.77	1394.69
MZ2-6b	1601.97	140482.31	79221.63	807866.38	106920.32	7966.65	2119.93	1271.25
MZ2-7b	2084.69	140175.11	31150.06	1121526.30	116739.05	8031.21	2184.53	1640.73
MZ2-8b	1914.49	140048.52	27833.52	992858.31	121203.32	8187.61	2152.37	1471.21
MZ2-9b	1710.41	139962.52	21935.60	839436.00	119127.91	7997.81	2008.41	1304.01
MZ2-10b	1714.25	141705.03	25289.06	849627.94	119490.20	8426.65	2304.57	1423.29
MZ2-11b	1590.81	142855.61	29212.81	836714.69	119821.84	8435.49	2466.25	1453.13
MZ2-12b	1518.09	144050.30	18855.15	814765.56	119425.95	8840.61	2401.45	1328.97
MZ2-13b	1713.29	144128.02	23408.53	909630.44	122867.97	8842.01	2510.65	1654.65
MZ2-14b	1719.17	141345.11	24504.38	903905.50	127271.16	8493.85	2632.21	1599.45
MZ2-15b	2366.21	141568.48	28802.36	1315380.80	139736.83	8395.17	2914.22	1926.69
srm614-6	2081.25	145068.33	10273.02	755592.25	62858.67	8926.57	1548.21	3421.06
srm612-6	28006.48	159717.09	32549.94	691041.69	38133.86	13251.23	23214.97	18054.18

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	140668.23	261697.11	159343.42	832206.56	36736.57	37732.05	130731.13	79766.13
AP1-6	1422.25	129105.84	10217.06	653010.81	52277.25	7459.00	947.89	1642.81
AP2-6	1524.85	132253.19	13012.39	679332.00	78388.08	7777.84	1968.13	2543.21
AP3-6	2783.34	150543.61	30135.85	865851.50	96864.78	9766.01	7958.92	10050.06
AP4-6	3410.66	171321.00	41788.36	1085923.40	119121.35	10715.02	10852.94	16284.29
blank-6	1454.09	149163.20	10141.78	808958.38	114493.01	9443.89	1597.37	1116.49
blank ave	1945.79	205376.66	21623.28	794028.19	82935.99	8706.07	1245.17	975.29
blank subtraction								
SRM614-5	1270.31	-102925.84	10489.22	1371195.61	-43919.25	4065.96	594.56	4895.95
SRM612-5	34367.14	-64924.94	29054.68	618287.11	-57268.68	9003.15	30903.05	24564.82
SRM610-5	171735.04	67715.57	189987.27	571923.31	-59127.01	39016.84	171196.31	103122.18
AP1-5	-120.30	-91648.26	-8443.93	172828.62	-55418.71	-1020.43	-301.76	2893.98
AP2-5	-194.66	-82581.45	-5893.67	139400.50	-38117.54	-1365.55	838.60	2564.53
AP3-5	1055.55	-60350.21	12150.47	303491.61	-19502.03	677.06	7381.76	11148.74
AP4-5	1419.35	-35830.22	22642.33	479215.61	3683.06	2345.75	10111.82	16244.89
MZ2-1b	-262.30	-70906.22	36689.37	22496.87	7975.72	-1322.79	290.60	283.00
MZ2-2b	-299.42	-68784.93	55603.35	50643.00	10102.85	-879.98	502.28	400.12
MZ2-3b	-326.90	-67669.72	24932.10	36590.31	12296.87	-657.70	366.12	512.20
MZ2-4b	-283.14	-66604.47	12883.83	46330.75	17858.14	-622.54	799.20	433.08
MZ2-5b	-91.50	-66631.68	70476.24	62547.25	22634.92	-617.46	1033.61	419.40
MZ2-6b	-343.82	-64894.35	57598.34	13838.19	23984.33	-739.42	874.76	295.96
MZ2-7b	138.90	-65201.55	9526.77	327498.11	33803.06	-674.86	939.37	665.44
MZ2-8b	-31.30	-65328.14	6210.24	198830.12	38267.33	-518.46	907.21	495.92
MZ2-9b	-235.38	-65414.14	312.32	45407.81	36191.92	-708.26	763.24	328.72
MZ2-10b	-231.54	-63671.63	3665.78	55599.75	36554.21	-279.42	1059.41	448.00
MZ2-11b	-354.98	-62521.05	7589.52	42686.50	36885.85	-270.58	1221.09	477.84
MZ2-12b	-427.70	-61326.36	-2768.14	20737.37	36489.96	134.54	1156.29	353.68
MZ2-13b	-232.50	-61248.64	1785.25	115602.25	39931.98	135.94	1265.49	679.36
MZ2-14b	-226.62	-64031.55	2881.10	109877.31	44335.17	-212.22	1387.05	624.16
MZ2-15b	420.42	-63808.18	7179.08	521352.61	56800.84	-310.90	1669.05	951.41
srm614-6	135.46	-60308.33	-11350.26	-38435.94	-20077.32	220.50	303.04	2445.77
srm612-6	26060.69	-45659.57	10926.66	-102986.50	-44802.13	4545.17	21969.80	17078.90
srm610-6	138722.44	56320.46	137720.14	38178.37	-46199.42	29025.98	129485.96	78790.85
AP1-6	-523.54	-76270.82	-11406.22	-141017.38	-30658.74	-1247.07	-297.28	667.52
AP2-6	-420.94	-73123.47	-8610.89	-114696.19	-4547.91	-928.23	722.96	1567.93
AP3-6	837.54	-54833.05	8512.57	71823.31	13928.79	1059.95	6713.76	9074.77
AP4-6	1464.87	-34055.66	20165.07	291895.21	36185.36	2008.95	9607.77	15309.01
zero correction								
SRM614-5	1270.31	78737.96	10489.22	2418732.30	24190.50	4065.96	594.56	4895.95
SRM612-5	34367.14	98290.23	29054.68	2045371.10	20946.56	9003.15	30903.05	24564.82
SRM610-5	171735.04	236988.38	189987.27	1951190.80	21739.44	39016.84	171196.31	103122.18
AP1-5	0.00	117126.58	0.00	1451349.40	37493.05	0.00	0.00	2893.98
AP2-5	0.00	92334.24	0.00	1252933.10	52376.25	0.00	838.60	2564.53
AP3-5	1055.55	142094.59	12150.47	1784311.50	89552.98	677.06	7381.76	11148.74
AP4-5	1419.35	229243.77	22642.33	2441099.30	123853.81	2345.75	10111.82	16244.89
MZ2-1b	0.00	84222.75	36689.37	1100127.00	110971.70	0.00	290.60	283.00
MZ2-2b	0.00	84665.00	55603.35	1059454.50	119738.07	0.00	502.28	400.12
MZ2-3b	0.00	89014.34	24932.10	980571.19	124442.02	0.00	366.12	512.20
MZ2-4b	0.00	89119.10	12883.83	1451190.30	149483.33	0.00	799.20	433.08
MZ2-5b	0.00	89358.66	70476.24	1308256.00	154723.67	0.00	1033.61	419.40
MZ2-6b	0.00	92897.60	57598.34	1378534.60	161408.23	0.00	874.76	295.96
MZ2-7b	138.90	94425.01	9526.77	1249673.00	163045.84	0.00	939.37	665.44
MZ2-8b	0.00	100838.53	6210.24	1223222.90	157646.77	0.00	907.21	495.92
MZ2-9b	0.00	101544.41	312.32	1140509.60	163000.67	0.00	763.24	328.72
MZ2-10b	0.00	103082.86	3665.78	1031154.90	164902.38	0.00	1059.41	448.00
MZ2-11b	0.00	102564.90	7589.52	1033477.00	167228.50	0.00	1221.09	477.84
MZ2-12b	0.00	102840.22	0.00	1054930.60	168927.42	134.54	1156.29	353.68
MZ2-13b	0.00	105075.88	1785.25	1958944.80	189742.95	135.94	1265.49	679.36
MZ2-14b	0.00	103728.34	2881.10	2121016.50	197953.28	0.00	1387.05	624.16
MZ2-15b	420.42	102510.18	7179.08	2065038.80	203360.86	0.00	1669.05	951.41
srm614-6	135.46	106143.67	0.00	991322.06	189270.78	220.50	303.04	2445.77
srm612-6	26060.69	105374.23	10926.66	886733.13	189761.98	4545.17	21969.80	17078.90
srm610-6	138722.44	108088.25	137720.14	1266223.80	198158.19	29025.98	129485.96	78790.85
AP1-6	0.00	103512.30	0.00	814415.75	200681.48	0.00	0.00	667.52
AP2-6	0.00	100688.80	0.00	746672.88	205565.52	0.00	722.96	1567.93
AP3-6	837.54	100204.48	8512.57	732617.75	211009.75	1059.95	6713.76	9074.77
AP4-6	1464.87	105379.31	20165.07	638737.44	84045.11	2008.95	9607.77	15309.01
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030
standardized signal								
SRM614-5	0.001062	0.065851	0.008772	2.022850	0.020231	0.003400	0.000497	0.004095
SRM612-5	0.023120	0.066123	0.019546	1.375983	0.014091	0.006057	0.020789	0.016526
SRM610-5	0.255979	0.353242	0.283185	2.908341	0.032404	0.058156	0.255176	0.153708
AP1-5	0.000000	0.016053	0.000000	0.198923	0.005139	0.000000	0.000000	0.000397
AP2-5	0.000000	0.011791	0.000000	0.160001	0.006689	0.000000	0.000107	0.000327
AP3-5	0.000156	0.020935	0.001790	0.262890	0.013194	0.000100	0.001088	0.001643
AP4-5	0.000140	0.022614	0.002234	0.240802	0.012218	0.000231	0.000997	0.001602
MZ2-1b	0.000000	0.025001	0.010891	0.326572	0.032942	0.000000	0.000086	0.000084
MZ2-2b	0.000000	0.022688	0.014900	0.283909	0.032087	0.000000	0.000135	0.000107
MZ2-3b	0.000000	0.026742	0.007490	0.294587	0.037385	0.000000	0.000110	0.000154
MZ2-4b	0.000000	0.019494	0.002818	0.317427	0.032697	0.000000	0.000175	0.000095
MZ2-5b	0.000000	0.019042	0.015018	0.278783	0.032971	0.000000	0.000220	0.000089
MZ2-6b	0.000000	0.022868	0.014179	0.339344	0.039733	0.000000	0.000215	0.000073
MZ2-7b	0.000027	0.018235	0.001840	0.241327	0.031486	0.000000	0.000181	0.000129
MZ2-8b	0.000000	0.019310	0.001189	0.234241	0.030189	0.000000	0.000174	0.000095
MZ2-9b	0.000000	0.022151	0.000068	0.248791	0.035557	0.000000	0.000166	0.000072
MZ2-10b	0.000000	0.025350	0.000901	0.253584	0.040553	0.000000	0.000261	0.000110
MZ2-11b	0.000000	0.027448	0.002031	0.276574	0.044753	0.000000	0.000327	0.000128
MZ2-12b	0.000000	0.032015	0.000000	0.328413	0.052589	0.000042	0.000360	0.000110
MZ2-13b	0.000000	0.022345	0.000380	0.416576	0.040349	0.000029	0.000269	0.000144
MZ2-14b	0.000000	0.018790	0.000522	0.384218	0.035859	0.000000	0.000251	0.000113
MZ2-15b	0.000071	0.017198	0.001204	0.346444	0.034117	0.000000	0.000280	0.000160
srm614-6	0.000149	0.117137	0.000000	1.093997	0.208874	0.000243	0.000334	0.002699
srm612-6	0.024140	0.097609	0.010121	0.821385	0.175777	0.004210	0.020351	0.015820
srm610-6	0.250846	0.195451	0.249033	2.289657	0.358321	0.052486	0.234144	0.142474
AP1-6	0.000000	0.018411	0.000000	0.144851	0.035693	0.000000	0.000000	0.000119
AP2-6	0.000000	0.016264	0.000000	0.120609	0.033205	0.000000	0.000117	0.000253
AP3-6	0.000140	0.016698	0.001418	0.122080	0.035162	0.000177	0.001119	0.001512
AP4-6	0.000162	0.011673	0.002234	0.070752	0.009310	0.000223	0.001064	0.001696
standardize signal averages AP								
AP1	0.000000	0.017232	0.000000	0.171887	0.020416	0.000000	0.000000	0.000258
AP2	0.000000	0.014028	0.000000	0.140305	0.019947	0.000000	0.000112	0.000290
AP3	0.000148	0.018816	0.001604	0.192485	0.024178	0.000138	0.001103	0.001577
AP4	0.000151	0.017143	0.002234	0.155777	0.010764	0.000227	0.001031	0.001649
linest from std sig ave								
	0.019355	0.001158	0.017189	0.013236	0.109269	0.236173	0.011057	0.014418
standardize signal averages SRM								
srm614-2	0.000606	0.091494	0.004386	1.558424	0.114553	0.001822	0.000416	0.003397
srm612-2	0.023630	0.081866	0.014834	1.098684	0.094934	0.005133	0.020570	0.016173
srm610-2	0.253412	0.274347	0.266109	2.598999	0.195362	0.055321	0.244660	0.148091
linest from std sig ave								
	1.009859	1.199356	1.065207	1.176354	0.165598	1.053218	1.042756	1.037828
concentration data								
SRM614-5	1.76	6.54	12.93	2296.20	189.59	68.88	0.47	5.06
SRM612-5	38.38	6.57	28.81	1561.92	132.05	122.68	19.71	20.43
SRM610-5	424.90	35.08	417.46	3301.34	303.66	1177.95	241.98	190.06
AP1-5	0.00	7.41	0.00	1050.35	224.01	0.00	0.00	2.28
AP2-5	0.00	5.45	0.00	844.83	291.56	0.00	0.47	1.88
AP3-5	1.20	9.67	12.28	1388.11	575.16	9.40	4.80	9.45
AP4-5	1.08	10.45	15.32	1271.48	532.58	21.80	4.40	9.22
MZ2-1b	0.00	11.55	74.68	1724.36	1435.99	0.00	0.38	0.48
MZ2-2b	0.00	10.48	102.17	1499.09	1398.72	0.00	0.59	0.62
MZ2-3b	0.00	12.35	51.36	1555.47	1629.68	0.00	0.49	0.89
MZ2-4b	0.00	9.00	19.32	1676.07	1425.33	0.00	0.77	0.54
MZ2-5b	0.00	8.80	102.98	1472.02	1437.25	0.00	0.97	0.51
MZ2-6b	0.00	10.56	97.23	1791.80	1732.01	0.00	0.95	0.42
MZ2-7b	0.21	8.42	12.62	1274.25	1372.53	0.00	0.80	0.74
MZ2-8b	0.00	8.92	8.15	1236.83	1315.96	0.00	0.77	0.55
MZ2-9b	0.00	10.23	0.47	1313.66	1549.98	0.00	0.73	0.41
MZ2-10b	0.00	11.71	6.18	1338.97	1767.78	0.00	1.15	0.63
MZ2-11b	0.00	12.68	13.93	1460.36	1950.85	0.00	1.44	0.74
MZ2-12b	0.00	14.79	0.00	1734.08	2292.45	3.95	1.59	0.63

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	0.00	10.32	2.60	2199.60	1758.90	2.72	1.19	0.83
MZ2-14b	0.00	8.68	3.58	2028.74	1563.14	0.00	1.11	0.65
MZ2-15b	0.54	7.94	8.26	1829.28	1487.22	0.00	1.24	0.92
srm614-6	0.25	11.63	0.00	1241.83	1957.42	4.93	0.32	3.34
srm612-6	40.07	9.69	14.92	932.38	1647.26	85.28	19.30	19.56
srm610-6	416.38	19.41	367.11	2599.06	3357.92	1063.11	222.03	176.17
AP1-6	0.00	8.50	0.00	764.84	1555.91	0.00	0.00	0.68
AP2-6	0.00	7.51	0.00	636.84	1447.44	0.00	0.52	1.46
AP3-6	1.08	7.71	9.73	644.60	1532.75	16.64	4.93	8.70
AP4-6	1.25	5.39	15.32	373.58	405.82	20.97	4.69	9.75

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-7	1217.09	66924.02	9171.17	2754217.50	28250.84	4636.67	1061.21	1041.21
SRM614-7	2039.01	65458.05	8953.69	2362122.50	24795.34	5206.55	1824.01	6515.84
SRM612-7	37314.37	99367.72	50940.77	2142626.00	22320.13	13337.35	39996.75	29225.97
SRM610-7	329330.13	394907.50	447304.09	2455916.50	27430.23	84053.95	386068.94	241285.64
AP1-7	1336.65	62607.95	9374.65	1770020.10	40247.91	4903.35	1468.25	1612.29
AP2-7	1856.93	68221.14	17136.26	1709631.40	84430.95	5355.15	4156.66	4734.79
AP3-7	3855.46	103473.82	58009.93	2088262.00	134001.88	9078.37	17264.94	22343.29
AP4-7	4405.82	134182.19	65764.61	2208411.50	204835.23	11941.51	21256.20	27419.48
T1-1	1149.57	63906.68	9760.82	1243351.00	208996.61	4512.15	3646.98	2590.41
T1-2	1010.89	64606.88	7773.12	1160451.50	222073.09	4241.46	3477.98	1857.17
T1-3	991.33	65360.61	7548.44	1128924.00	230686.50	4333.46	3226.42	1707.77
T1-4	1011.33	67307.66	11219.78	1163467.00	246984.11	4705.35	3736.10	2514.81
T1-5	1006.65	68143.98	11414.22	1098355.30	263187.59	4670.99	3696.06	2380.69
T1-6	1055.45	69166.31	11666.27	1070111.60	275105.88	4569.55	3911.30	2287.65
T1-7	1123.45	70618.52	10190.02	1075431.10	283186.44	4704.03	3504.82	2137.97
T1-8	963.93	71428.92	8798.37	984228.63	292629.59	4766.99	3279.62	1686.05
T1-9	1023.61	72619.73	10673.06	964411.81	300625.72	4695.55	3672.86	2073.29
T1-10	1034.25	74328.38	11252.14	971625.63	301093.63	4837.63	3683.18	2312.01
T1-11	971.97	74885.10	11401.62	940262.56	304882.81	4935.47	3756.18	2098.33
T1-12	980.13	76080.55	11213.06	904172.06	308706.41	4966.79	3598.98	2040.13
T1-13	1041.37	77487.20	11006.94	939537.19	311570.63	4983.55	3656.90	2492.45
T1-14	954.41	76782.43	10334.98	873040.13	316074.66	4863.31	3677.70	1931.33
T1-15	990.85	77776.88	10442.02	839966.81	318483.88	4983.83	3802.22	1960.77
T1-16	956.41	78669.32	12849.47	848698.44	318779.47	4993.47	3817.02	2402.33
T1-17	954.73	78979.20	14924.16	807061.13	315462.50	4960.23	3991.50	2338.37
T1-18	910.41	79883.05	14544.96	771831.81	315996.78	4910.63	3958.18	2344.93
SRM614-8	1597.57	86281.73	5437.35	728352.50	181067.78	5142.91	2477.29	4555.71
SRM612-8	31436.22	115969.61	37209.69	737559.13	124350.62	11519.10	29552.17	21550.32
SRM610-8	268171.28	341946.94	314877.63	1051843.40	106147.16	62026.31	269211.28	165850.86
AP1-8	1147.89	86483.16	6521.92	659267.00	154293.11	4992.03	1826.33	1676.17
AP2-8	1361.37	89953.47	12113.27	692223.63	221871.17	5535.47	3882.22	3588.38
AP3-8	3568.18	122027.41	50788.21	1121045.40	267861.22	8569.25	15993.93	19904.67
AP4-8	3638.50	143248.77	51473.25	1242867.50	298045.16	10728.46	16919.94	21145.64
blank-8	764.44	83356.55	4508.79	763080.94	317792.91	5294.67	2964.66	871.12
blank average	990.77	75140.28	6839.98	1758649.22	173021.88	4965.67	2012.93	956.17

blank subtraction								
SRM614-7	1048.25	-9682.23	2113.71	603473.28	-148226.54	240.88	-188.92	5559.67
SRM612-7	36323.61	24227.44	44100.79	383976.78	-150701.75	8371.69	37983.81	28269.80
SRM610-7	328339.36	319767.22	440464.11	697267.28	-145591.64	79088.29	384056.01	240329.47
AP1-7	345.88	-12532.33	2534.67	11370.88	-132773.97	-62.32	-544.68	656.12
AP2-7	866.16	-6919.14	10476.28	-49017.82	-88590.92	389.48	2143.73	3778.62
AP3-7	2864.70	28333.54	51169.95	329612.78	-39020.00	4112.70	15252.01	21387.12
AP4-7	3415.06	59041.91	58924.63	449762.28	31813.36	6975.84	19243.27	26463.31
T1-1	158.80	-11233.60	2920.84	-515298.22	35974.74	-453.52	1634.05	1634.25
T1-2	20.12	-10533.40	933.15	-598197.72	49051.22	-724.20	1465.05	901.01
T1-3	0.56	-9779.67	708.46	-629725.22	57664.63	-632.20	1213.49	751.60
T1-4	20.56	-7832.63	4379.80	-595182.22	73962.24	-260.32	1723.17	1558.65
T1-5	15.88	-6996.30	4574.25	-660293.92	90165.72	-294.68	1683.13	1424.53
T1-6	64.68	-5973.97	4826.29	-688537.62	102084.01	-396.12	1898.37	1331.49
T1-7	132.68	-4521.77	3350.04	-683218.12	110164.57	-261.64	1491.89	1181.81
T1-8	-26.84	-3711.36	1958.39	-774420.59	119607.72	-198.68	1266.69	729.88
T1-9	32.84	-2520.55	3833.08	-794237.41	127603.85	-270.12	1659.93	1117.13
T1-10	43.48	-811.91	4412.17	-787023.59	128071.76	-128.04	1670.25	1355.85
T1-11	-18.80	-255.18	4561.65	-818386.66	131860.94	-30.20	1743.25	1142.17
T1-12	-10.64	940.27	4373.08	-854477.16	135684.54	1.12	1586.05	1083.97

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	50.60	2346.91	4166.96	-819112.03	138548.76	17.88	1643.97	1536.29
T1-14	-36.36	1642.15	3495.00	-885609.09	143052.79	-102.36	1664.77	975.17
T1-15	0.08	2636.59	3602.04	-918682.41	145462.01	18.16	1789.29	1004.61
T1-16	-34.36	3529.04	6009.49	-909950.78	145757.60	27.80	1804.09	1446.17
T1-17	-36.04	3838.92	8084.19	-951588.09	142440.63	-5.44	1978.57	1382.21
T1-18	-80.36	4742.77	7704.98	-986817.41	142974.91	-55.04	1945.25	1388.77
SRM614-8	606.80	11141.45	-1402.63	-1030296.72	8045.91	177.24	464.36	3599.54
SRM612-8	30445.45	40829.33	30369.71	-1021090.09	-48671.26	6553.44	27539.23	20594.16
SRM610-8	267180.51	266806.66	308037.65	-706805.82	-66874.72	57060.64	267198.35	164894.69
AP1-8	157.12	11342.88	-318.06	-1099382.22	-18728.77	26.36	-186.60	720.00
AP2-8	370.60	14813.19	5273.29	-1066425.59	48849.30	569.80	1869.29	2632.21
AP3-8	2577.41	46887.13	43948.23	-637603.82	94839.35	3603.58	13981.00	18948.51
AP4-8	2647.73	68108.49	44633.27	-515781.72	125023.29	5762.79	14907.00	20189.47

zero correction

SRM614-7	1048.25	78737.96	2113.71	2418732.30	24190.50	240.88	0.00	5559.67
SRM612-7	36323.61	98290.23	44100.79	2045371.10	20946.56	8371.69	37983.81	28269.80
SRM610-7	328339.36	236988.38	440464.11	1951190.80	21739.44	79088.29	384056.01	240329.47
AP1-7	345.88	117126.58	2534.67	1451349.40	37493.05	0.00	0.00	656.12
AP2-7	866.16	92334.24	10476.28	1252933.10	52376.25	389.48	2143.73	3778.62
AP3-7	2864.70	142094.59	51169.95	1784311.50	89552.98	4112.70	15252.01	21387.12
AP4-7	3415.06	229243.77	58924.63	2441099.30	123853.81	6975.84	19243.27	26463.31
T1-1	158.80	84222.75	2920.84	1100127.00	110971.70	0.00	1634.05	1634.25
T1-2	20.12	84665.00	933.15	1059454.50	119738.07	0.00	1465.05	901.01
T1-3	0.56	89014.34	708.46	980571.19	124442.02	0.00	1213.49	751.60
T1-4	20.56	89119.10	4379.80	1451190.30	149483.33	0.00	1723.17	1558.65
T1-5	15.88	89358.66	4574.25	1308256.00	154723.67	0.00	1683.13	1424.53
T1-6	64.68	92897.60	4826.29	1378534.60	161408.23	0.00	1898.37	1331.49
T1-7	132.68	94425.01	3350.04	1249673.00	163045.84	0.00	1491.89	1181.81
T1-8	0.00	100838.53	1958.39	1223222.90	157646.77	0.00	1266.69	729.88
T1-9	32.84	101544.41	3833.08	1140509.60	163000.67	0.00	1659.93	1117.13
T1-10	43.48	103082.86	4412.17	1031154.90	164902.38	0.00	1670.25	1355.85
T1-11	0.00	102564.90	4561.65	1033477.00	167228.50	0.00	1743.25	1142.17
T1-12	0.00	102840.22	4373.08	1054930.60	168927.42	1.12	1586.05	1083.97
T1-13	50.60	105075.88	4166.96	1958944.80	189742.95	17.88	1643.97	1536.29
T1-14	0.00	103728.34	3495.00	2121016.50	197953.28	0.00	1664.77	975.17
T1-15	0.08	102510.18	3602.04	2065038.80	203360.86	18.16	1789.29	1004.61
T1-16	0.00	106143.67	6009.49	991322.06	189270.78	27.80	1804.09	1446.17
T1-17	0.00	105374.23	8084.19	886733.13	189761.98	0.00	1978.57	1382.21
T1-18	0.00	108088.25	7704.98	1266223.80	198158.19	0.00	1945.25	1388.77
SRM614-8	606.80	103512.30	0.00	814415.75	200681.48	177.24	464.36	3599.54
SRM612-8	30445.45	100688.80	30369.71	746672.88	205565.52	6553.44	27539.23	20594.16
SRM610-8	267180.51	100204.48	308037.65	732617.75	211009.75	57060.64	267198.35	164894.69
AP1-8	157.12	105379.31	0.00	638737.44	84045.11	26.36	0.00	720.00
AP2-8	370.60	116438.09	5273.29	638722.56	59459.70	569.80	1869.29	2632.21
AP3-8	2577.41	242407.17	43948.23	838392.94	61179.95	3603.58	13981.00	18948.51
AP4-8	2647.73	104618.83	44633.27	638423.38	89589.19	5762.79	14907.00	20189.47

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-7	0.000369	0.027742	0.000745	0.852185	0.008523	0.000085	0.000000	0.001959
SRM612-7	0.013209	0.035743	0.016037	0.743784	0.007617	0.003044	0.013813	0.010280
SRM610-7	0.198696	0.143415	0.266549	1.180772	0.013156	0.047861	0.232413	0.145437
AP1-7	0.000021	0.007232	0.000157	0.089615	0.002315	0.000000	0.000000	0.000041
AP2-7	0.000051	0.005453	0.000619	0.073997	0.003093	0.000023	0.000127	0.000223
AP3-7	0.000140	0.006938	0.002498	0.087116	0.004372	0.000201	0.000745	0.001044
AP4-7	0.000196	0.013185	0.003389	0.140401	0.007123	0.000401	0.001107	0.001522
T1-1	0.000011	0.005615	0.000195	0.073338	0.007398	0.000000	0.000109	0.000109
T1-2	0.000002	0.007523	0.000083	0.094137	0.010639	0.000000	0.000130	0.000080
T1-3	0.000000	0.010426	0.000083	0.114847	0.014575	0.000000	0.000142	0.000088
T1-4	0.000001	0.006296	0.000309	0.102523	0.010561	0.000000	0.000122	0.000110

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000001	0.006096	0.000312	0.089247	0.010555	0.000000	0.000115	0.000097
T1-6	0.000004	0.006103	0.000317	0.090561	0.010603	0.000000	0.000125	0.000087
T1-7	0.000012	0.008495	0.000301	0.112433	0.014669	0.000000	0.000134	0.000106
T1-8	0.000000	0.009559	0.000186	0.115958	0.014944	0.000000	0.000120	0.000069
T1-9	0.000003	0.008409	0.000317	0.094442	0.013498	0.000000	0.000137	0.000093
T1-10	0.000004	0.008872	0.000380	0.088745	0.014192	0.000000	0.000144	0.000117
T1-11	0.000000	0.008301	0.000369	0.083642	0.013534	0.000000	0.000141	0.000092
T1-12	0.000000	0.008305	0.000353	0.085193	0.013642	0.000000	0.000128	0.000088
T1-13	0.000004	0.007847	0.000311	0.146297	0.014170	0.000001	0.000123	0.000115
T1-14	0.000000	0.007271	0.000245	0.148667	0.013875	0.000000	0.000117	0.000068
T1-15	0.000000	0.007642	0.000269	0.153939	0.015160	0.000001	0.000133	0.000075
T1-16	0.000000	0.009101	0.000515	0.084995	0.016228	0.000002	0.000155	0.000124
T1-17	0.000000	0.007668	0.000588	0.064524	0.013808	0.000000	0.000144	0.000101
T1-18	0.000000	0.008032	0.000573	0.094096	0.014726	0.000000	0.000145	0.000103
SRM614-8	0.000343	0.058528	0.000000	0.460491	0.113470	0.000100	0.000263	0.002035
SRM612-8	0.015818	0.052312	0.015778	0.387930	0.106800	0.003405	0.014308	0.010700
SRM610-8	0.227561	0.085345	0.262359	0.623978	0.179719	0.048599	0.227576	0.140443
AP1-8	0.000013	0.009004	0.000000	0.054578	0.007181	0.000002	0.000000	0.000062
AP2-8	0.000028	0.008738	0.000396	0.047935	0.004462	0.000043	0.000140	0.000198
AP3-8	0.000159	0.014980	0.002716	0.051809	0.003781	0.000223	0.000864	0.001171
AP4-8	0.000198	0.007833	0.003342	0.047800	0.006708	0.000431	0.001116	0.001512
standardize signal averages AP								
AP1	0.000017	0.008118	0.000078	0.072097	0.004748	0.000001	0.000000	0.000051
AP2	0.000039	0.007096	0.000507	0.060966	0.003778	0.000033	0.000133	0.000210
AP3	0.000150	0.010959	0.002607	0.069463	0.004076	0.000212	0.000804	0.001108
AP4	0.000197	0.010509	0.003365	0.094100	0.006916	0.000416	0.001111	0.001517
linest from std sig ave								
	0.016812	0.002240	0.011218	0.029287	0.431472	0.137686	0.012618	0.018209
standardize signal averages SRM								
srm614-2	0.000356	0.043135	0.000372	0.656338	0.060997	0.000093	0.000131	0.001997
srm612-2	0.014513	0.044027	0.015908	0.565857	0.057209	0.003225	0.014060	0.010490
srm610-2	0.213128	0.114380	0.264454	0.902375	0.096437	0.048230	0.229995	0.142940
linest from std sig ave								
	0.024199	0.033322	0.019137	0.003310	0.033852	0.107458	0.020565	0.035126
concentration data								
SRM614-7	0.53	5.33	0.72	2140.44	315.39	1.00	0.00	3.06
SRM612-7	19.05	6.87	15.43	1868.17	281.86	35.95	14.95	16.05
SRM610-7	286.49	27.55	256.44	2965.75	486.82	565.16	251.52	227.13
AP1-7	0.14	6.46	0.70	1047.02	398.49	0.00	0.00	0.29
AP2-7	0.34	4.87	2.77	864.54	532.45	1.26	0.64	1.62
AP3-7	0.94	6.20	11.18	1017.81	752.60	11.03	3.75	7.59
AP4-7	1.32	11.78	15.17	1640.37	1226.17	22.04	5.57	11.06
T1-1	0.07	5.02	0.87	856.85	1273.38	0.00	0.55	0.79
T1-2	0.01	6.72	0.37	1099.85	1831.33	0.00	0.66	0.58
T1-3	0.00	9.32	0.37	1341.82	2508.80	0.00	0.72	0.64
T1-4	0.01	5.63	1.38	1197.82	1817.80	0.00	0.61	0.80
T1-5	0.01	5.45	1.40	1042.71	1816.83	0.00	0.58	0.71
T1-6	0.03	5.45	1.42	1058.06	1825.17	0.00	0.63	0.64
T1-7	0.08	7.59	1.35	1313.60	2525.00	0.00	0.68	0.77
T1-8	0.00	8.54	0.83	1354.79	2572.39	0.00	0.60	0.50
T1-9	0.02	7.51	1.42	1103.41	2323.33	0.00	0.69	0.67
T1-10	0.03	7.93	1.70	1036.85	2442.89	0.00	0.72	0.85
T1-11	0.00	7.42	1.65	977.23	2329.65	0.00	0.71	0.67
T1-12	0.00	7.42	1.58	995.35	2348.20	0.00	0.64	0.64
T1-13	0.03	7.01	1.39	1709.25	2439.12	0.07	0.62	0.83
T1-14	0.00	6.50	1.10	1736.95	2388.30	0.00	0.59	0.50
T1-15	0.00	6.83	1.20	1798.54	2609.42	0.07	0.67	0.54
T1-16	0.00	8.13	2.31	993.04	2793.31	0.13	0.78	0.90
T1-17	0.00	6.85	2.63	753.86	2376.80	0.00	0.72	0.73
T1-18	0.00	7.18	2.56	1099.36	2534.70	0.00	0.73	0.75
SRM614-8	0.49	11.24	0.00	1156.62	4198.90	1.18	0.28	3.18
SRM612-8	22.81	10.05	15.18	974.37	3952.08	40.21	15.48	16.71
SRM610-8	328.11	16.39	252.41	1567.25	6650.40	573.88	246.28	219.33
AP1-8	0.09	8.05	0.00	637.66	1236.14	0.12	0.00	0.45
AP2-8	0.19	7.81	1.77	560.05	768.10	2.35	0.71	1.44
AP3-8	1.07	13.39	12.15	605.31	650.77	12.23	4.35	8.51
AP4-8	1.33	7.00	14.96	558.47	1154.59	23.70	5.62	10.98
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-5	1025.57	52278.54	8414.85	2549808.50	28341.88	3061.34	1018.61	1011.65
SRM614-5	2412.77	53726.50	10753.66	2070865.00	23947.65	4884.59	2118.97	8372.49
SRM612-5	44950.37	95754.54	111111.10	2002273.80	23201.17	14701.52	46736.90	36463.88
SRM610-5	283892.69	342470.44	422807.22	2288972.00	27809.16	71660.32	322377.22	197135.88
AP1-5	1267.65	57063.08	121784.69	1871262.90	48690.88	4698.19	1609.33	2249.81
AP2-5	1726.81	64886.85	177495.00	1903097.60	101857.25	5584.87	5085.95	6168.99
AP3-5	7002.84	158444.89	251538.30	3015601.80	175011.70	14854.48	43907.97	63505.88
AP4-5	4180.94	154648.03	141588.48	2413641.80	210591.70	14086.72	23854.77	32259.42
TGP12-1	785.04	60423.74	91827.48	1471818.30	194701.06	3837.22	2468.21	1488.25
TGP12-2	835.52	64092.72	82877.70	1417919.80	192120.41	4165.38	2561.57	1391.49
TGP12-3	806.20	68305.78	67782.74	1345264.40	190127.47	4312.46	2601.73	1297.53
TGP12-4	1196.25	73096.73	264902.13	1703122.90	201952.81	4925.35	3539.54	2882.46
TGP12-5	1102.45	76603.51	196574.86	1345488.00	210861.98	4947.59	3470.34	2733.98
TGP12-6	1605.65	81305.78	372212.59	1440936.00	225124.31	5390.35	4504.67	4356.14
TGP12-7	1875.49	80238.65	774977.69	1912739.60	249701.45	5251.23	4424.11	4824.99
TGP12-8	1448.29	79418.69	399473.81	1321177.80	257537.48	5061.43	4288.70	3379.62
TGP12-9	1285.09	78705.92	369016.22	1108822.40	267186.72	4932.99	4322.62	2999.62
TGP12-10	1038.09	77857.32	162703.03	1189687.10	284530.63	4865.07	4578.67	2870.46
TGP12-11	963.69	80169.61	74872.18	1008661.80	290602.06	5079.31	4333.74	2159.17
TGP12-12	977.65	79562.29	84531.52	887507.25	296995.72	4841.03	4623.87	1818.61
TGP12-13	836.20	78087.84	20044.11	844651.31	301340.91	4911.31	3426.70	1170.57
TGP12-14	747.88	80492.38	9328.13	827371.13	303349.50	5065.39	3493.58	1204.41
TGP12-15	904.01	83031.35	12040.19	817620.19	304284.13	5139.03	3558.66	1279.69
TGP12-16	1169.09	86791.33	36150.81	1031086.60	309636.53	5972.75	4050.02	2933.58
TGP12-17	1228.49	89602.23	20399.04	1325274.50	311903.91	6106.27	4184.26	3362.34
TGP12-18	1076.89	90055.87	33204.91	885320.88	306338.13	5977.91	3868.14	1666.17
SRM614-6	1690.37	90965.43	5901.99	694326.25	124739.42	5304.63	2189.17	5917.95
SRM612-6	34389.27	121355.56	40392.31	701254.69	73898.77	12090.35	31588.30	24628.18
SRM610-6	226633.52	309663.81	252141.05	977533.00	72378.37	54522.83	224879.11	139727.27
AP1-6	989.53	89968.87	8741.05	677495.44	126813.44	5383.19	1667.53	1955.65
AP2-6	1306.89	94873.30	16049.97	719145.81	199149.80	5810.59	4013.86	4422.11
AP3-6	5208.99	159320.02	95120.81	1575933.30	261755.88	11734.83	29049.76	40009.27
AP4-6	3613.46	161790.47	60476.26	1385714.40	290621.53	12515.27	18605.31	25247.14
blank-6	729.44	94524.61	4889.87	785451.25	292092.94	6015.23	2811.30	807.76
blank average	877.50	73401.57	6652.36	1667629.88	160217.41	4538.29	1914.95	909.71

blank subtraction								
SRM614-5	1535.27	-19675.07	4101.30	403235.13	-136269.76	346.30	204.02	7462.78
SRM612-5	44072.87	22352.97	104458.74	334643.93	-137016.24	10163.24	44821.95	35554.18
SRM610-5	283015.19	269068.87	416154.86	621342.13	-132408.25	67122.03	320462.27	196226.17
AP1-5	390.14	-16338.49	115132.33	203633.03	-111526.53	159.90	-305.62	1340.11
AP2-5	849.30	-8514.72	170392.64	235467.73	-58360.16	1046.59	3171.00	5259.29
AP3-5	6125.33	85043.32	244885.94	1347971.93	14794.29	10316.20	41993.02	62596.17
AP4-5	3303.44	81246.46	134936.12	746011.93	50374.29	9548.43	21939.82	31349.74
TGP12-1	-92.46	-12977.83	85175.12	-195811.58	34483.65	-701.06	553.26	578.54
TGP12-2	-41.98	-9308.85	76225.35	-249710.08	31903.00	-372.90	646.62	481.78
TGP12-3	-71.30	-5095.79	61130.38	-322365.48	29910.06	-225.82	686.78	387.82
TGP12-4	318.74	-304.84	258249.77	35493.02	41735.40	387.06	1624.59	1972.75
TGP12-5	224.94	3201.94	189922.50	-322141.88	50644.57	409.30	1555.39	1824.27
TGP12-6	728.14	7904.21	365560.23	-226693.88	64906.90	852.07	2589.71	3446.44
TGP12-7	997.99	6837.08	768325.33	245109.73	89484.04	712.94	2509.15	3915.28
TGP12-8	570.78	6017.12	392821.45	-346452.08	97320.07	523.14	2373.75	2469.91
TGP12-9	407.58	5304.35	362363.86	-558807.48	106969.31	394.70	2407.67	2089.91
TGP12-10	160.58	4455.75	156050.67	-477942.78	124313.22	326.78	2663.72	1960.75
TGP12-11	86.18	6768.04	68219.82	-658968.08	130384.65	541.02	2418.79	1249.47
TGP12-12	100.14	6160.72	77879.16	-780122.63	136778.31	302.74	2708.92	908.91
TGP12-13	-41.30	4686.26	13391.76	-822978.57	141123.50	373.02	1511.75	260.86
TGP12-14	-129.62	7090.80	2675.78	-840258.75	143132.09	527.10	1578.63	294.70
TGP12-15	26.50	9629.78	5387.83	-850009.69	144066.72	600.74	1643.71	369.98
TGP12-16	291.58	13389.76	29498.45	-636543.28	149419.12	1434.47	2135.07	2023.87
TGP12-17	350.98	16200.66	13746.68	-342355.38	151686.50	1567.99	2269.31	2452.63
TGP12-18	199.38	16654.30	26552.55	-782309.00	146120.72	1439.63	1953.19	756.46
SRM614-6	812.86	17563.86	-750.36	-973303.63	-35477.99	766.34	274.22	5008.25
SRM612-6	33511.77	47953.99	33739.95	-966375.19	-86318.64	7552.06	29673.35	23718.47
SRM610-6	225756.02	236262.24	245488.69	-690096.88	-87839.04	49984.54	222964.16	138817.56
AP1-6	112.02	16567.30	2088.69	-990134.44	-33403.97	844.90	-247.42	1045.95
AP2-6	429.38	21471.73	9397.61	-948484.07	38932.39	1272.31	2098.91	3512.40
AP3-6	4331.48	85918.45	88468.46	-91696.58	101538.47	7196.54	27134.81	39099.56
AP4-6	2735.96	88388.90	53823.90	-281915.48	130404.12	7976.99	16690.35	24337.44

zero correction								
SRM614-5	1535.27	0.00	4101.30	403235.13	0.00	346.30	204.02	7462.78

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	44072.87	22352.97	104458.74	334643.93	0.00	10163.24	44821.95	35554.18
SRM610-5	283015.19	269068.87	416154.86	621342.13	0.00	67122.03	320462.27	196226.17
AP1-5	390.14	0.00	115132.33	203633.03	0.00	159.90	0.00	1340.11
AP2-5	849.30	0.00	170392.64	235467.73	0.00	1046.59	3171.00	5259.29
AP3-5	6125.33	85043.32	244885.94	1347971.93	14794.29	10316.20	41993.02	62596.17
AP4-5	3303.44	81246.46	134936.12	746011.93	50374.29	9548.43	21939.82	31349.72
TGP12-1	0.00	0.00	85175.12	0.00	34483.65	0.00	553.26	578.54
TGP12-2	0.00	0.00	76225.35	0.00	31903.00	0.00	646.62	481.78
TGP12-3	0.00	0.00	61130.38	0.00	29910.06	0.00	686.78	387.82
TGP12-4	318.74	0.00	258249.77	35493.02	41735.40	387.06	1624.59	1972.75
TGP12-5	224.94	3201.94	189922.50	0.00	50644.57	409.30	1555.39	1824.27
TGP12-6	728.14	7904.21	365560.23	0.00	64906.90	852.07	2589.71	3446.44
TGP12-7	997.99	6837.08	768325.33	245109.73	89484.04	712.94	2509.15	3915.28
TGP12-8	570.78	6017.12	392821.45	0.00	97320.07	523.14	2373.75	2469.91
TGP12-9	407.58	5304.35	362363.86	0.00	106969.31	394.70	2407.67	2089.91
TGP12-10	160.58	4455.75	156050.67	0.00	124313.22	326.78	2663.72	1960.75
TGP12-11	86.18	6768.04	68219.82	0.00	130384.65	541.02	2418.79	1249.47
TGP12-12	100.14	6160.72	77879.16	0.00	136778.31	302.74	2708.92	908.91
TGP12-13	0.00	4686.26	13391.76	0.00	141123.50	373.02	1511.75	260.86
TGP12-14	0.00	7090.80	2675.78	0.00	143132.09	527.10	1578.63	294.70
TGP12-15	26.50	9629.78	5387.83	0.00	144066.72	600.74	1643.71	369.98
TGP12-16	291.58	13389.76	29498.45	0.00	149419.12	1434.47	2135.07	2023.87
TGP12-17	350.98	16200.66	13746.68	0.00	151686.50	1567.99	2269.31	2452.63
TGP12-18	199.38	16654.30	26552.55	0.00	146120.72	1439.63	1953.19	756.46
SRM614-6	812.86	17563.86	0.00	0.00	0.00	766.34	274.22	5008.25
SRM612-6	33511.77	47953.99	33739.95	0.00	0.00	7552.06	29673.35	23718.47
SRM610-6	225756.02	236262.24	245488.69	0.00	0.00	49984.54	222964.16	138817.56
AP1-6	112.02	16567.30	2088.69	0.00	0.00	844.90	0.00	1045.95
AP2-6	429.38	21471.73	9397.61	0.00	38932.39	1272.31	2098.91	3512.40
AP3-6	4331.48	85918.45	88468.46	0.00	101538.47	7196.54	27134.81	39099.56
AP4-6	2735.96	88388.90	53823.90	0.00	130404.12	7976.99	16690.35	24337.44

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-5	0.000408	0.000000	0.001090	0.107142	0.000000	0.000092	0.000054	0.001983
SRM612-5	0.013718	0.006958	0.032514	0.104161	0.000000	0.003163	0.013951	0.011067
SRM610-5	0.198853	0.189054	0.292400	0.436569	0.000000	0.047161	0.225164	0.137873
AP1-5	0.000023	0.000000	0.006909	0.012220	0.000000	0.000010	0.000000	0.000080
AP2-5	0.000046	0.000000	0.009134	0.012622	0.000000	0.000056	0.000170	0.000282
AP3-5	0.000236	0.003281	0.009449	0.052012	0.000571	0.000398	0.001620	0.002415
AP4-5	0.000205	0.005036	0.008364	0.046239	0.003122	0.000592	0.001360	0.001943
TGP12-1	0.000000	0.000000	0.019965	0.000000	0.008083	0.000000	0.000130	0.000136
TGP12-2	0.000000	0.000000	0.018875	0.000000	0.007900	0.000000	0.000160	0.000119
TGP12-3	0.000000	0.000000	0.017020	0.000000	0.008328	0.000000	0.000191	0.000108
TGP12-4	0.000051	0.000000	0.041466	0.005699	0.006701	0.000062	0.000261	0.000317
TGP12-5	0.000028	0.000396	0.023513	0.000000	0.006270	0.000051	0.000193	0.000226
TGP12-6	0.000046	0.000503	0.023267	0.000000	0.004131	0.000054	0.000165	0.000219
TGP12-7	0.000052	0.000356	0.039955	0.012746	0.004653	0.000037	0.000130	0.000204
TGP12-8	0.000030	0.000317	0.020727	0.000000	0.005135	0.000028	0.000125	0.000130
TGP12-9	0.000022	0.000286	0.019537	0.000000	0.005767	0.000021	0.000130	0.000113
TGP12-10	0.000012	0.000319	0.011185	0.000000	0.008910	0.000023	0.000191	0.000141
TGP12-11	0.000006	0.000480	0.004843	0.000000	0.009256	0.000038	0.000172	0.000089
TGP12-12	0.000007	0.000445	0.005620	0.000000	0.009871	0.000022	0.000195	0.000066
TGP12-13	0.000000	0.000698	0.001994	0.000000	0.021010	0.000056	0.000225	0.000039
TGP12-14	0.000000	0.001029	0.000388	0.000000	0.020771	0.000076	0.000229	0.000043
TGP12-15	0.000004	0.001358	0.000760	0.000000	0.020318	0.000085	0.000232	0.000052
TGP12-16	0.000023	0.001065	0.002347	0.000000	0.011888	0.000114	0.000170	0.000161
TGP12-17	0.000029	0.001331	0.001130	0.000000	0.012466	0.000129	0.000186	0.000202
TGP12-18	0.000018	0.001537	0.002451	0.000000	0.013486	0.000133	0.000180	0.000070
SRM614-6	0.000342	0.007387	0.000000	0.000000	0.000000	0.000322	0.000115	0.002106
SRM612-6	0.016086	0.023018	0.016195	0.000000	0.000000	0.003625	0.014243	0.011385

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.243372	0.254698	0.264645	0.000000	0.000000	0.053885	0.240363	0.149650
AP1-6	0.000009	0.001259	0.000159	0.000000	0.000000	0.000064	0.000000	0.000079
AP2-6	0.000029	0.001457	0.000638	0.000000	0.002642	0.000086	0.000142	0.000238
AP3-6	0.000204	0.004046	0.004166	0.000000	0.004781	0.000339	0.001278	0.001841
AP4-6	0.000202	0.006530	0.003976	0.000000	0.009634	0.000589	0.001233	0.001798

standardize signal averages AP

AP1	0.000016	0.000629	0.003534	0.006110	0.000000	0.000037	0.000000	0.000080
AP2	0.000037	0.000729	0.004886	0.006311	0.001321	0.000071	0.000156	0.000260
AP3	0.000220	0.003664	0.006807	0.026006	0.002676	0.000368	0.001449	0.002128
AP4	0.000203	0.005783	0.006170	0.023120	0.006378	0.000591	0.001296	0.001871

linest from std sig ave

	0.013429	0.007021	0.004008	0.106177	0.473531	0.096604	0.008536	0.011470
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standardize signal averages SRM

srm614-2	0.000375	0.003694	0.000545	0.053571	0.000000	0.000207	0.000085	0.002045
srm612-2	0.014902	0.014988	0.024354	0.052080	0.000000	0.003394	0.014097	0.011226
srm610-2	0.221113	0.221876	0.278522	0.218285	0.000000	0.050523	0.232763	0.143761

linest from std sig ave

	0.023326	0.021335	0.018142	0.022499	0.000000	0.102578	0.020321	0.034914
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concentration data

SRM614-5	0.47	0.00	0.37	975.65	0.00	0.76	0.04	1.95
SRM612-5	15.80	4.19	11.18	948.50	0.00	26.21	10.21	10.89
SRM610-5	229.01	113.84	100.51	3975.42	0.00	390.74	164.83	135.63
AP1-5	0.13	0.00	11.05	517.63	0.00	0.37	0.00	0.37
AP2-5	0.24	0.00	14.60	534.63	0.00	2.16	0.58	1.29
AP3-5	1.27	9.19	15.11	2203.09	107.84	15.34	5.52	11.05
AP4-5	1.10	14.11	13.37	1958.59	589.83	22.81	4.63	8.89
TGP12-1	0.00	0.00	31.92	0.00	1526.90	0.00	0.44	0.62
TGP12-2	0.00	0.00	30.18	0.00	1492.35	0.00	0.55	0.55
TGP12-3	0.00	0.00	27.21	0.00	1573.15	0.00	0.65	0.49
TGP12-4	0.27	0.00	66.30	241.39	1265.92	2.40	0.89	1.45
TGP12-5	0.15	1.11	37.60	0.00	1184.45	1.95	0.66	1.03
TGP12-6	0.25	1.41	37.20	0.00	780.41	2.09	0.56	1.00
TGP12-7	0.28	1.00	63.88	539.90	879.06	1.43	0.44	0.93
TGP12-8	0.16	0.89	33.14	0.00	970.07	1.06	0.43	0.60
TGP12-9	0.12	0.80	31.24	0.00	1089.50	0.82	0.44	0.52
TGP12-10	0.06	0.89	17.88	0.00	1683.22	0.90	0.65	0.64
TGP12-11	0.03	1.35	7.74	0.00	1748.48	1.48	0.58	0.41
TGP12-12	0.04	1.25	8.99	0.00	1864.72	0.84	0.67	0.30
TGP12-13	0.00	1.95	3.19	0.00	3968.88	2.14	0.77	0.18
TGP12-14	0.00	2.88	0.62	0.00	3923.88	2.95	0.78	0.20
TGP12-15	0.02	3.80	1.21	0.00	3838.26	3.27	0.79	0.24
TGP12-16	0.12	2.98	3.75	0.00	2245.78	4.40	0.58	0.74
TGP12-17	0.15	3.73	1.81	0.00	2354.92	4.97	0.64	0.92
TGP12-18	0.10	4.31	3.92	0.00	2547.55	5.12	0.61	0.32
SRM614-6	0.39	4.45	0.00	0.00	0.00	2.67	0.08	2.07
SRM612-6	18.53	13.86	5.57	0.00	0.00	30.03	10.43	11.20
SRM610-6	280.28	153.37	90.97	0.00	0.00	446.44	175.96	147.21
AP1-6	0.05	3.53	0.25	0.00	0.00	2.47	0.00	0.36
AP2-6	0.16	4.08	1.02	0.00	499.11	3.33	0.49	1.09
AP3-6	1.09	11.33	6.66	0.00	903.24	13.06	4.35	8.42
AP4-6	1.08	18.29	6.36	0.00	1819.91	22.71	4.20	8.23

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-1	1443.89	86923.77	10930.42	2293429.30	19913.91	5324.07	1019.05	1328.33
SRM614-1	2982.42	80102.61	15798.37	1907805.00	18842.59	5440.83	2167.05	8705.57
SRM612-1	51399.97	125204.91	73156.89	1707059.00	17625.58	15898.37	51569.21	36701.32
SRM610-1	313629.19	385456.16	401032.13	1962102.90	21945.97	76587.91	353076.00	199115.92
AP1-1	1901.29	75593.06	29854.97	1401331.10	38592.86	4430.34	1603.37	2455.17
AP2-1	2276.09	84932.92	52845.46	1450838.10	83997.27	5582.35	5516.19	8474.17
AP3-1	6998.64	159487.78	135283.72	2432535.50	139487.34	12707.35	37265.17	53159.82
AP4-1	7879.40	220586.13	165826.89	2864243.50	186472.45	19256.39	46020.62	67030.06
TGP18-1	1657.29	72258.61	96771.55	2403733.80	207218.41	4466.91	2670.42	4386.30
TGP18-2	1348.21	71147.28	134890.11	2427078.50	230354.33	4248.70	2768.82	3501.10

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	1321.33	72472.09	128978.24	2053708.50	245760.22	4398.50	2882.14	3926.42
TGP18-4	2524.01	100966.53	1053584.30	4790654.50	309348.41	4839.27	3881.74	11929.75
TGP18-5	2480.41	97362.35	1077815.00	4722035.50	329182.78	4766.35	4104.94	10945.46
TGP18-6	1293.25	73858.90	176123.59	1849174.50	318883.03	4186.46	3575.30	3038.10
TGP18-7	1579.49	74341.54	1051527.30	3393588.00	351268.81	4418.26	4207.98	5297.59
TGP18-8	1547.89	74131.50	1147668.80	3778182.00	365142.75	4497.79	4230.38	5371.91
TGP18-9	1742.09	77047.35	1230008.50	4131488.80	380067.94	4593.15	4229.58	7074.20
TGP18-10	1778.89	84579.04	194612.73	2314871.80	348960.41	4546.15	4424.06	12044.71
TGP18-11	1860.57	88826.14	204230.47	2427656.50	348477.63	4633.95	4815.51	12297.71
TGP18-12	1921.45	92768.60	203942.50	2380990.50	351239.13	4674.87	4493.19	14294.36
SRM614-2	1671.93	74387.26	6759.84	676273.88	204660.88	4109.38	2712.66	5392.71
SRM612-2	39793.38	113085.04	46069.02	690731.13	157100.53	12548.59	37334.65	28648.52
SRM610-2	262159.84	324640.38	286885.41	962654.88	145877.34	59063.21	257401.13	155563.39
AP1-2	1165.89	77702.44	8944.25	608704.75	214145.48	4368.62	2318.61	1955.69
AP2-2	1465.77	86174.73	19794.75	687864.06	270285.44	5057.39	5241.83	5094.75
AP3-2	5845.83	153419.27	100643.84	1633552.10	314920.81	11493.83	31707.10	43622.13
AP4-2	7063.84	209599.55	136163.13	2119028.50	345472.94	17198.58	41756.36	56650.22
blank-2	721.52	69337.43	3940.22	719515.06	361562.84	3861.02	3157.78	1042.41
blank ave	1082.71	78130.60	7435.32	1506472.18	190738.38	4592.55	2088.41	1185.37

blank subtraction								
SRM614-1	1899.71	1972.01	8363.05	401332.82	-171895.79	848.28	78.64	7520.20
SRM612-1	50317.26	47074.31	65721.57	200586.82	-173112.80	11305.82	49480.80	35515.96
SRM610-1	312546.48	307325.56	393596.81	455630.72	-168792.41	71995.37	350987.59	197930.55
AP1-1	818.58	-2537.54	22419.65	-105141.08	-152145.52	-162.20	-485.04	1269.81
AP2-1	1193.39	6802.32	45410.13	-55634.08	-106741.10	989.81	3427.78	7288.80
AP3-1	5915.93	81357.18	127848.40	926063.32	-51251.04	8114.81	35176.76	51974.45
AP4-1	6796.70	142455.53	158391.57	1357771.32	-4265.93	14663.84	43932.21	65844.69
TGP18-1	574.58	-5871.99	89336.22	897261.62	16480.03	-125.64	582.00	3200.94
TGP18-2	265.50	-6983.32	127454.79	920606.32	39615.95	-343.84	680.40	2315.73
TGP18-3	238.62	-5658.51	121542.92	547236.32	55021.84	-194.04	793.72	2741.06
TGP18-4	1441.31	22835.93	1046148.98	3284182.32	118610.03	246.72	1793.33	10744.38
TGP18-5	1397.71	19231.75	1070379.68	3215563.32	138444.40	173.80	2016.53	9760.10
TGP18-6	210.54	-4271.70	168688.27	342702.32	128144.65	-406.08	1486.89	1852.73
TGP18-7	496.78	-3789.06	1044091.98	1887115.82	160530.43	-174.28	2119.57	4112.22
TGP18-8	465.18	-3999.10	1140233.48	2271709.82	174404.37	-94.76	2141.97	4186.54
TGP18-9	659.38	-1083.25	1222573.18	2625016.62	189329.56	0.60	2141.17	5888.83
TGP18-10	696.18	6448.44	187177.41	808399.62	158222.03	-46.40	2335.65	10859.34
TGP18-11	777.86	10695.54	196795.15	921184.32	157739.25	41.40	2727.10	11112.34
TGP18-12	838.74	14638.00	196507.18	874518.32	160500.75	82.32	2404.77	13108.99
SRM614-2	589.22	-3743.34	-675.48	-830198.30	13922.50	-483.16	624.24	4207.34
SRM612-2	38710.68	34954.44	38633.70	-815741.05	-33637.85	7956.05	35246.24	27463.15
SRM610-2	261077.13	246509.78	279450.09	-543817.30	-44861.04	54470.67	255312.72	154378.02
AP1-2	83.18	-428.16	1508.93	-897767.43	23407.10	-223.92	230.20	770.32
AP2-2	383.06	8044.13	12359.43	-818608.12	79547.06	464.84	3153.42	3909.38
AP3-2	4763.13	75288.67	93208.52	127079.92	124182.43	6901.28	29618.69	42436.76
AP4-2	5981.13	131468.95	128727.81	612556.32	154734.56	12606.03	39667.94	58464.85

zero correction								
SRM614-1	1899.71	78737.96	8363.05	2418732.30	24190.50	848.28	78.64	7520.20
SRM612-1	50317.26	98290.23	65721.57	2045371.10	20946.56	11305.82	49480.80	35515.96
SRM610-1	312546.48	236988.38	393596.81	1951190.80	21739.44	71995.37	350987.59	197930.55
AP1-1	818.58	117126.58	22419.65	1451349.40	37493.05	0.00	0.00	1269.81
AP2-1	1193.39	92334.24	45410.13	1252933.10	52376.25	989.81	3427.78	7288.80
AP3-1	5915.93	142094.59	127848.40	1784311.50	89552.98	8114.81	35176.76	51974.45
AP4-1	6796.70	229243.77	158391.57	2441099.30	123853.81	14663.84	43932.21	65844.69
TGP18-1	574.58	84222.75	89336.22	1100127.00	110971.70	0.00	582.00	3200.94
TGP18-2	265.50	84665.00	127454.79	1059454.50	119738.07	0.00	680.40	2315.73
TGP18-3	238.62	89014.34	121542.92	980571.19	124442.02	0.00	793.72	2741.06
TGP18-4	1441.31	89119.10	1046148.98	1451190.30	149483.33	246.72	1793.33	10744.38
TGP18-5	1397.71	89358.66	1070379.68	1308256.00	154723.67	173.80	2016.53	9760.10
TGP18-6	210.54	92897.60	168688.27	1378534.60	161408.23	0.00	1486.89	1852.73
TGP18-7	496.78	94425.01	1044091.98	1249673.00	163045.84	0.00	2119.57	4112.22
TGP18-8	465.18	100838.53	1140233.48	1223222.90	157646.77	0.00	2141.97	4186.54
TGP18-9	659.38	101544.41	1222573.18	1140509.60	163000.67	0.60	2141.17	5888.83
TGP18-10	696.18	103082.86	187177.41	1031154.90	164902.38	0.00	2335.65	10859.34
TGP18-11	777.86	102564.90	196795.15	1033477.00	167228.50	41.40	2727.10	11112.34
TGP18-12	838.74	102840.22	196507.18	1054930.60	168927.42	82.32	2404.77	13108.99
SRM614-2	589.22	105075.88	0.00	1958944.80	189742.95	0.00	624.24	4207.34
SRM612-2	38710.68	103728.34	38633.70	2121016.50	197953.28	7956.05	35246.24	27463.15
SRM610-2	261077.13	102510.18	279450.09	2065038.80	203360.86	54470.67	255312.72	154378.02
AP1-2	83.18	106143.67	1508.93	991322.06	189270.78	0.00	230.20	770.32
AP2-2	383.06	105374.23	12359.43	886733.13	189761.98	464.84	3153.42	3909.38
AP3-2	4763.13	108088.25	93208.52	1266223.80	198158.19	6901.28	29618.69	42436.76
AP4-2	5981.13	103512.30	128727.81	814415.75	200681.48	12606.03	39667.94	58464.85

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-1	0.000480	0.019897	0.002113	0.611200	0.006113	0.000214	0.000020	0.001900
SRM612-1	0.013744	0.026848	0.017952	0.558687	0.005721	0.003088	0.013516	0.009701
SRM610-1	0.217459	0.164888	0.273851	1.357569	0.015126	0.050092	0.244205	0.137713
AP1-1	0.000037	0.005333	0.001021	0.066082	0.001707	0.000000	0.000000	0.000058
AP2-1	0.000050	0.003885	0.001910	0.052713	0.002204	0.000042	0.000144	0.000307
AP3-1	0.000247	0.005942	0.005346	0.074615	0.003745	0.000339	0.001471	0.002173
AP4-1	0.000305	0.010287	0.007108	0.109542	0.005558	0.000658	0.001971	0.002955
TGP18-1	0.000025	0.003614	0.003834	0.047208	0.004762	0.000000	0.000025	0.000137
TGP18-2	0.000014	0.004343	0.006538	0.054347	0.006142	0.000000	0.000035	0.000119
TGP18-3	0.000013	0.005000	0.006827	0.055078	0.006990	0.000000	0.000045	0.000154
TGP18-4	0.000046	0.002826	0.033177	0.046022	0.004741	0.000008	0.000057	0.000341
TGP18-5	0.000046	0.002922	0.035001	0.042780	0.005059	0.000006	0.000066	0.000319
TGP18-6	0.000009	0.003967	0.007204	0.058870	0.006893	0.000000	0.000063	0.000079
TGP18-7	0.000018	0.003389	0.037475	0.044854	0.005852	0.000000	0.000076	0.000148
TGP18-8	0.000017	0.003601	0.040715	0.043678	0.005629	0.000000	0.000076	0.000149
TGP18-9	0.000023	0.003528	0.042474	0.039623	0.005663	0.000000	0.000074	0.000205
TGP18-10	0.000023	0.003471	0.006303	0.034723	0.005553	0.000000	0.000079	0.000366
TGP18-11	0.000024	0.003198	0.006137	0.032227	0.005215	0.000001	0.000085	0.000347
TGP18-12	0.000026	0.003142	0.006005	0.032235	0.005162	0.000003	0.000073	0.000401
SRM614-2	0.000317	0.056490	0.000000	1.053146	0.102007	0.000000	0.000336	0.002262
SRM612-2	0.015439	0.041370	0.015408	0.845930	0.078950	0.003173	0.014057	0.010953
SRM610-2	0.244012	0.095810	0.261184	1.930059	0.190068	0.050910	0.238624	0.144287
AP1-2	0.000005	0.006730	0.000096	0.062856	0.012001	0.000000	0.000015	0.000049
AP2-2	0.000021	0.005852	0.000686	0.049245	0.010539	0.000026	0.000175	0.000217
AP3-2	0.000253	0.005749	0.004957	0.067345	0.010539	0.000367	0.001575	0.002257
AP4-2	0.000329	0.005694	0.007081	0.044801	0.011039	0.000693	0.002182	0.003216

standardize signal averages AP								
AP1	0.000021	0.006032	0.000558	0.064469	0.006854	0.000000	0.000007	0.000053
AP2	0.000036	0.004868	0.001298	0.050979	0.006371	0.000034	0.000160	0.000262
AP3	0.000250	0.005845	0.005152	0.070980	0.007142	0.000353	0.001523	0.002215
AP4	0.000317	0.007991	0.007094	0.077171	0.008299	0.000676	0.002077	0.003085

linest from std sig ave								
	0.010373	0.003361	0.005457	0.033048	0.307455	0.083459	0.006705	0.009034

standardize signal averages SRM								
srm614-2	0.000398	0.038193	0.001057	0.832173	0.054060	0.000107	0.000178	0.002081
srm612-2	0.014592	0.034109	0.016680	0.702308	0.042336	0.003131	0.013786	0.010327
srm610-2	0.230735	0.130349	0.267517	1.643814	0.102597	0.050501	0.241415	0.141000

linest from std sig ave								
	0.942458	1.181292	1.023893	0.805732	0.139395	0.991881	1.011455	0.976474

concentration data								
SRM614-1	0.43	5.74	0.99	1732.31	161.18	1.53	0.01	1.47
SRM612-1	12.23	7.74	8.40	1583.47	150.87	22.10	7.77	7.52
SRM610-1	193.45	47.53	128.18	3847.73	398.83	358.54	140.42	106.70
AP1-1	0.15	7.15	2.22	871.22	209.38	0.00	0.00	0.21
AP2-1	0.21	5.21	4.16	694.97	270.28	1.39	0.39	1.11
AP3-1	1.02	7.97	11.64	983.72	459.32	11.30	3.93	7.83
AP4-1	1.26	13.79	15.47	1444.20	681.69	21.91	5.27	10.65
TGP18-1	0.10	4.85	8.35	622.39	584.08	0.00	0.07	0.50
TGP18-2	0.06	5.82	14.23	716.51	753.38	0.00	0.09	0.43
TGP18-3	0.06	6.70	14.86	726.14	857.33	0.00	0.12	0.55
TGP18-4	0.19	3.79	72.23	606.76	581.46	0.26	0.15	1.23
TGP18-5	0.19	3.92	76.20	564.01	620.57	0.19	0.18	1.15
TGP18-6	0.04	5.32	15.68	776.15	845.46	0.00	0.17	0.29
TGP18-7	0.07	4.54	81.59	591.35	717.79	0.00	0.20	0.53
TGP18-8	0.07	4.83	88.64	575.85	690.44	0.00	0.20	0.54
TGP18-9	0.09	4.73	92.47	522.38	694.58	0.00	0.20	0.74

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.10	4.65	13.72	457.79	681.10	0.00	0.21	1.32
TGP18-11	0.10	4.29	13.36	424.88	639.60	0.04	0.23	1.25
TGP18-12	0.11	4.21	13.07	424.99	633.13	0.08	0.20	1.44
SRM614-2	1.31	75.74	0.00	13884.63	12511.73	0.00	0.90	8.15
SRM612-2	13.73	11.92	7.21	2397.60	2081.78	22.71	8.08	8.49
SRM610-2	217.07	27.62	122.25	5470.32	5011.78	364.40	137.21	111.79
AP1-2	0.00	1.94	0.04	178.15	316.45	0.00	0.01	0.04
AP2-2	0.09	7.85	1.49	649.25	1292.60	0.86	0.47	0.78
AP3-2	1.05	7.71	10.79	887.87	1292.68	12.22	4.21	8.13
AP4-2	1.36	7.63	15.42	590.65	1354.05	23.09	5.84	11.59

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-7b	2822	323458	37424	863624	31076	9093	722	933
SRM614-7b	3152	125544	25852	1811254	29555	13760	1734	6029
SRM612-7	36836	140602	47954	1237851	20764	16211	32918	25603
SRM610-7	176373	275580	216179	1276895	21175	47092	175830	108898
AP1-7	1888	111163	12094	917480	28683	6453	961	2921
AP2-7	1878	118286	14966	859692	49474	6737	2152	3548
AP3-7	2444	131486	23653	934500	71553	7675	5412	7763
AP4-7	3036	164727	36413	1187440	94347	9582	9340	14908
MZ3-1	2650	128905	82109	860658	95017	6888	1982	1528
MZ3-2	2557	131595	107016	854771	100866	7206	2340	1602
MZ3-3	2381	134844	60251	842702	105411	7177	1937	1398
MZ3-4	10515	129600	429677	1120238	130199	7082	15499	3689
MZ3-5	6455	123888	288407	979114	143216	6779	9250	3035
MZ3-6	9909	125249	391661	1031662	157855	6834	13693	2857
MZ3-7	6435	125408	252834	1029900	170573	6659	10705	5304
MZ3-8	6178	125017	212921	910965	180871	6442	9255	10460
MZ3-9	5539	122234	158801	793096	187453	6480	9723	10626
srm614-8	1967	128678	7479	641514	88435	6710	1814	4153
srm612-8	27429	146867	30260	614012	52636	11676	23028	18300
srm610-8	149433	259214	168054	775981	47426	37895	138346	83721
AP1-8	1469	119916	8407	597352	68738	6424	1214	1639
AP2-8	1514	123348	11264	632628	101143	6671	2147	2487
AP3-8	2336	134279	22581	738714	125165	7818	5944	7172
AP4-8	2961	180862	33587	1046531	140684	12164	8732	12148
blank-8	1419	128433	7587	637179	118086	7176	1490	1144
blank ave	2120	225946	22505	750402	74581	8134	1106	1039

blank subtraction

SRM614-7b	1031.75	-100401.60	3346.90	1060852.30	-45026.37	5625.31	628.24	4990.17
SRM612-7	34715.69	-85343.75	25448.82	487449.50	-53816.46	8076.93	31812.50	24564.20
SRM610-7	174252.45	49634.80	193673.12	526493.30	-53406.18	38957.26	174723.90	107858.86
AP1-7	-232.90	-114782.89	-10411.14	167078.19	-45897.54	-1681.49	-145.32	1881.87
AP2-7	-242.74	-107659.57	-7539.24	109290.13	-25107.30	-1397.89	1046.33	2509.07
AP3-7	323.74	-94459.25	1147.53	184098.94	-3028.38	-458.92	4305.86	6724.78
AP4-7	915.59	-61218.10	13907.44	437038.30	19765.99	1447.41	8234.45	13869.22
MZ3-1	529.58	-97040.07	59603.41	110256.81	20436.08	-1246.37	876.48	489.30
MZ3-2	436.58	-94350.77	84510.83	104369.25	26284.79	-928.41	1233.93	563.06
MZ3-3	260.74	-91101.47	37745.33	92300.00	30829.65	-957.37	831.56	359.78
MZ3-4	8394.75	-96345.66	407171.45	369836.00	55617.95	-1052.73	14392.80	2650.68
MZ3-5	4334.24	-102057.69	265901.73	228712.50	68634.63	-1354.97	8143.61	1996.51
MZ3-6	7788.42	-100696.53	369155.04	281260.10	83274.58	-1300.85	12587.55	1818.79
MZ3-7	4314.40	-100537.36	230328.93	279498.40	95991.94	-1474.93	9599.21	4264.84
MZ3-8	4057.48	-100928.28	190415.43	160563.13	106290.29	-1692.13	8148.89	9421.47
MZ3-9	3418.84	-103711.10	136295.89	42694.63	112871.88	-1654.41	8617.13	9587.43
srm614-8	-153.42	-97267.67	-15026.00	-108887.25	13854.40	-1424.57	708.16	3113.92
srm612-8	25309.04	-79078.92	7754.08	-136390.00	-21945.24	3541.98	21922.28	17261.56
srm610-8	147312.98	33268.19	145548.46	25579.19	-27154.71	29760.37	137240.37	82682.72
AP1-8	-651.54	-106029.47	-14098.64	-153049.06	-5843.35	-1710.57	108.48	600.58
AP2-8	-606.02	-102597.42	-11241.58	-117773.06	26562.59	-1463.89	1041.33	1448.27
AP3-8	215.26	-91666.35	76.00	-11687.37	50584.16	-316.88	4838.19	6132.85
AP4-8	840.58	-45083.94	11081.98	296129.80	66102.80	4029.86	7626.44	11109.00

zero correction

SRM614-7b	1031.75	78737.96	3346.90	2418732.30	24190.50	5625.31	628.24	4990.17
SRM612-7	34715.69	98290.23	25448.82	2045371.10	20946.56	8076.93	31812.50	24564.20
SRM610-7	174252.45	236988.38	193673.12	1951190.80	21739.44	38957.26	174723.90	107858.86

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	0.00	117126.58	0.00	1451349.40	37493.05	0.00	0.00	1881.87
AP2-7	0.00	92334.24	0.00	1252933.10	52376.25	0.00	1046.33	2509.07
AP3-7	323.74	142094.59	1147.53	1784311.50	89552.98	0.00	4305.86	6724.78
AP4-7	915.59	229243.77	13907.44	2441099.30	123853.81	1447.41	8234.45	13869.22
MZ3-1	529.58	84222.75	59603.41	1100127.00	110971.70	0.00	876.48	489.30
MZ3-2	436.58	84665.00	84510.83	1059454.50	119738.07	0.00	1233.93	563.06
MZ3-3	260.74	89014.34	37745.33	980571.19	124442.02	0.00	831.56	359.78
MZ3-4	8394.75	89119.10	407171.45	1451190.30	149483.33	0.00	14392.80	2650.68
MZ3-5	4334.24	89358.66	265901.73	1308256.00	154723.67	0.00	8143.61	1996.51
MZ3-6	7788.42	92897.60	369155.04	1378534.60	161408.23	0.00	12587.55	1818.79
MZ3-7	4314.40	94425.01	230328.93	1249673.00	163045.84	0.00	9599.21	4264.84
MZ3-8	4057.48	100838.53	190415.43	1223222.90	157646.77	0.00	8148.89	9421.47
MZ3-9	3418.84	101544.41	136295.89	1140509.60	163000.67	0.00	8617.13	9587.43
srm614-8	0.00	103082.86	0.00	1031154.90	164902.38	0.00	708.16	3113.92
srm612-8	25309.04	102564.90	7754.08	1033477.00	167228.50	3541.98	21922.28	17261.56
srm610-8	147312.98	102840.22	145548.46	1054930.60	168927.42	29760.37	137240.37	82682.72
AP1-8	0.00	105075.88	0.00	1958944.80	189742.95	0.00	108.48	600.58
AP2-8	0.00	103728.34	0.00	2121016.50	197953.28	0.00	1041.33	1448.27
AP3-8	215.26	102510.18	76.00	2065038.80	203360.86	0.00	4838.19	6132.85
AP4-8	840.58	106143.67	11081.98	991322.06	189270.78	4029.86	7626.44	11109.00

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-7b	0.000728	0.055588	0.002363	1.707586	0.017078	0.003971	0.000444	0.003523
SRM612-7	0.022496	0.063692	0.016491	1.325390	0.013573	0.005234	0.020614	0.015917
SRM610-7	0.245612	0.334039	0.272986	2.750238	0.030642	0.054911	0.246276	0.152029
AP1-7	0.000000	0.012934	0.000000	0.160269	0.004140	0.000000	0.000000	0.000208
AP2-7	0.000000	0.011011	0.000000	0.149418	0.006246	0.000000	0.000125	0.000299
AP3-7	0.000039	0.017000	0.000137	0.213467	0.010714	0.000000	0.000515	0.000805
AP4-7	0.000117	0.029346	0.001780	0.312494	0.015855	0.000185	0.001054	0.001775
MZ3-1	0.000117	0.018618	0.013176	0.243187	0.024531	0.000000	0.000194	0.000108
MZ3-2	0.000095	0.018502	0.018468	0.231522	0.026166	0.000000	0.000270	0.000123
MZ3-3	0.000063	0.021616	0.009166	0.238124	0.030220	0.000000	0.000202	0.000087
MZ3-4	0.000628	0.006664	0.030446	0.108513	0.011178	0.000000	0.001076	0.000198
MZ3-5	0.000418	0.008621	0.025652	0.126210	0.014926	0.000000	0.000786	0.000193
MZ3-6	0.000611	0.007287	0.028957	0.108134	0.012661	0.000000	0.000987	0.000143
MZ3-7	0.000341	0.007462	0.018201	0.098753	0.012884	0.000000	0.000759	0.000337
MZ3-8	0.000326	0.008099	0.015293	0.098241	0.012661	0.000000	0.000654	0.000757
MZ3-9	0.000273	0.008123	0.010902	0.091229	0.013038	0.000000	0.000689	0.000767
srm614-8	0.000000	0.101535	0.000000	1.015673	0.162427	0.000000	0.000698	0.003067
srm612-8	0.023129	0.093732	0.007086	0.944470	0.152826	0.003237	0.020034	0.015775
srm610-8	0.236347	0.164996	0.233516	1.692519	0.271025	0.047747	0.220187	0.132655
AP1-8	0.000000	0.014921	0.000000	0.278178	0.026944	0.000000	0.000015	0.000085
AP2-8	0.000000	0.014697	0.000000	0.300528	0.028048	0.000000	0.000148	0.000205
AP3-8	0.000028	0.013267	0.000010	0.267252	0.026318	0.000000	0.000626	0.000794
AP4-8	0.000119	0.015058	0.001572	0.140635	0.026851	0.000572	0.001082	0.001576

standardize signal averages AP								
AP1	0.000000	0.013928	0.000000	0.219223	0.015542	0.000000	0.000008	0.000147
AP2	0.000000	0.012854	0.000000	0.224973	0.017147	0.000000	0.000136	0.000252
AP3	0.000033	0.015133	0.000074	0.240360	0.018516	0.000000	0.000571	0.000799
AP4	0.000118	0.022202	0.001676	0.226565	0.021353	0.000378	0.001068	0.001676

linest from std sig ave								
	0.033557	0.001330	0.024814	0.009723	0.120906	0.133201	0.014340	0.018389

standardize signal averages SRM								
srm614-2	0.000364	0.078561	0.001181	1.361629	0.089752	0.001986	0.000571	0.003295
srm612-2	0.022812	0.078712	0.011788	1.134930	0.083200	0.004235	0.020324	0.015846
srm610-2	0.240980	0.249518	0.253251	2.221378	0.150834	0.051329	0.233232	0.142342

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
	1.018931	1.242576	1.078639	1.230544	0.193063	1.072284	1.055615	1.067276
concentration data								
SRM614-7b	2.10	6.34	5.03	1423.85	177.09	45.37	0.55	5.56
SRM612-7	64.74	7.26	35.09	1105.16	140.74	59.79	25.35	25.10
SRM610-7	706.86	38.10	580.96	2293.25	317.74	627.29	302.88	239.76
AP1-7	0.00	6.86	0.00	621.63	199.70	0.00	0.00	1.52
AP2-7	0.00	5.84	0.00	579.54	301.27	0.00	0.71	2.20
AP3-7	0.52	9.02	1.36	827.97	516.76	0.00	2.95	5.90
AP4-7	1.57	15.57	17.62	1212.07	764.75	9.85	6.03	13.02
MZ3-1	1.57	9.88	130.43	943.25	1183.21	0.00	1.11	0.79
MZ3-2	1.28	9.82	182.82	898.00	1262.10	0.00	1.54	0.90
MZ3-3	0.85	11.47	90.74	923.61	1457.61	0.00	1.16	0.64
MZ3-4	8.40	3.54	301.40	420.89	539.14	0.00	6.16	1.45
MZ3-5	5.60	4.57	253.94	489.53	719.96	0.00	4.49	1.41
MZ3-6	8.18	3.87	286.65	419.42	610.69	0.00	5.65	1.05
MZ3-7	4.56	3.96	180.18	383.03	621.46	0.00	4.34	2.47
MZ3-8	4.36	4.30	151.39	381.05	610.70	0.00	3.74	5.55
MZ3-9	3.66	4.31	107.93	353.85	628.89	0.00	3.94	5.63
srm614-8	0.00	11.58	0.00	846.91	1684.25	0.00	0.86	4.84
srm612-8	66.57	10.69	15.08	787.54	1584.70	36.98	24.64	24.88
srm610-8	680.20	18.82	496.96	1411.29	2810.33	545.45	270.80	209.21
AP1-8	0.00	7.92	0.00	1078.96	1299.62	0.00	0.09	0.63
AP2-8	0.00	7.80	0.00	1165.65	1352.87	0.00	0.84	1.51
AP3-8	0.37	7.04	0.10	1036.59	1269.44	0.00	3.58	5.82
AP4-8	1.60	7.99	15.56	545.48	1295.13	30.38	6.19	11.56
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02
raw data								
	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
blank-5	3464.78	100995.45	44624.61	148692.72	3670666.00	7673.24	1468.45	1826.41
SRM614-5	3742.66	80322.21	18897.31	80854.17	2034040.30	6909.56	2455.69	9380.25
SRM612-5	61763.79	135251.20	74467.54	63281.07	1587230.80	18684.98	58119.05	40598.19
SRM610-5	289939.59	360355.50	313898.94	73695.30	1701403.80	69879.80	291343.28	177811.23
AP1-5	1965.93	90904.63	14255.56	51035.09	1305012.40	5647.27	1681.21	4601.35
AP2-5	2839.10	104163.74	31829.10	51811.37	1299537.00	7204.76	6085.31	10960.02
AP3-5	5940.07	163458.64	97562.67	75797.59	1953173.00	13772.08	29776.13	42590.12
AP4-5	9695.38	331591.59	199786.64	140813.08	3367885.00	28776.64	57759.52	98332.67
V1-1	7053.72	110827.91	490316.16	173812.09	3108879.30	8310.41	4441.98	10312.42
V1-2	5452.47	121725.84	854992.56	134493.39	2999952.50	7854.68	3874.86	9423.45
V1-3	4295.78	110850.59	405649.75	106379.96	2197061.30	6935.44	3448.98	5152.03
V1-4	6953.48	111837.35	301472.31	187096.09	3400358.00	7334.20	3953.18	4925.11
V1-5	4070.46	113400.55	183328.72	113886.76	2319965.00	7897.96	3873.98	4759.19
V1-6	3358.10	114559.80	178421.16	100805.01	2272316.50	7416.16	3834.78	3236.34
V1-7	4424.59	117979.27	331992.31	123692.61	2540181.80	7411.68	3591.86	4227.14
V1-8	3320.58	119642.43	299192.69	98590.03	2211074.80	8729.85	3685.66	3536.74
V1-9	4542.31	119868.48	558057.31	129848.05	3006855.50	7896.52	3913.42	3807.42
V1-10	2537.17	121504.09	130105.77	75916.98	1684874.30	7670.76	3511.54	2686.02
V1-11	2346.17	123712.66	107480.37	68699.27	1581808.00	7857.44	3604.74	2273.65
V1-12	2243.21	126673.20	109979.05	68740.19	1589325.00	8181.25	4107.22	2802.74
V1-13	6480.24	131811.55	200889.28	156974.00	2473648.50	8932.01	3999.62	3959.02
V1-14	2378.25	130709.81	112962.23	67911.30	1499974.00	8608.29	3197.10	3399.46
V1-15	4201.18	132175.66	106229.32	95224.34	1677250.00	8574.89	3585.86	2200.45
SRM614-6	1984.93	136473.61	8222.17	37203.09	852367.94	8336.57	2026.97	4005.02
SRM612-6	44321.13	167914.34	49087.88	38488.10	810205.19	16993.10	39271.90	28399.80
SRM610-6	314535.34	421185.41	310725.78	55894.95	1082935.80	72995.01	290838.84	187746.06
AP1-6	1363.85	115705.17	8858.41	32949.71	728546.13	6859.96	1390.85	1840.69
AP2-6	1872.01	123711.86	17797.78	35049.72	786697.50	7735.28	4158.34	5107.91
AP3-6	4601.71	169707.72	69985.31	55450.83	1308550.80	12520.95	21259.44	28110.36
AP4-6	6524.00	234690.52	114705.57	83756.75	1967869.90	17813.62	35723.52	56046.56
blank-6	1272.73	138112.66	7681.28	38467.62	913333.50	8992.65	2170.41	873.28
blank average	2368.75	119554.06	26152.95	93580.17	2291999.75	8332.95	1819.43	1349.85
blank subtraction								
SRM614-5	1373.91	-39231.84	-7255.64	-12726.00	-257959.45	-1423.39	636.26	8030.41
SRM612-5	59395.04	15697.15	48314.59	-30299.09	-704768.95	10352.04	56299.62	39248.34
SRM610-5	287570.84	240801.45	287745.99	-19884.87	-590595.95	61546.85	289523.85	176461.38
AP1-5	-402.82	-28649.42	-11897.39	-42545.08	-986987.35	-2685.67	-138.22	3251.50
AP2-5	470.34	-15390.32	5676.15	-41768.80	-992462.75	-1128.19	4265.88	9610.17

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	3571.32	43904.59	71409.73	-17782.58	-338826.75	5439.13	27956.70	41240.27
AP4-5	7326.62	212037.54	173633.69	47232.91	1075885.25	20443.70	55940.09	96982.82
V1-1	4684.97	-8726.14	464163.21	80231.92	816879.55	-22.54	2622.55	8962.57
V1-2	3083.72	2171.79	828839.61	40913.22	707952.75	-478.26	2055.43	8073.61
V1-3	1927.03	-8703.47	379496.80	12799.79	-94938.45	-1397.51	1629.55	3802.18
V1-4	4584.73	-7716.70	275319.36	93515.92	1108358.25	-998.75	2133.75	3575.26
V1-5	1701.71	-6153.50	157175.77	20306.59	27965.25	-434.98	2054.55	3409.34
V1-6	989.35	-4994.25	152268.21	7224.84	-19683.25	-916.79	2015.35	1886.49
V1-7	2055.83	-1574.78	305839.36	30112.44	248182.05	-921.27	1772.43	2877.30
V1-8	951.83	88.38	273039.74	5009.86	-80924.95	396.90	1866.23	2186.89
V1-9	2173.55	314.43	531904.36	36267.88	714855.75	-436.42	2093.99	2457.57
V1-10	168.42	1950.04	103952.82	-17663.18	-607125.45	-662.18	1692.11	1336.17
V1-11	-22.58	4158.61	81327.42	-24880.90	-710191.75	-475.50	1785.31	923.81
V1-12	-125.54	7119.15	83826.10	-24839.98	-702674.75	-151.70	2287.79	1452.89
V1-13	4111.48	12257.50	174736.33	63393.83	181648.75	599.06	2180.19	2609.17
V1-14	9.50	11155.76	86809.28	-25668.87	-792025.75	275.34	1377.67	2049.61
V1-15	1832.43	12621.61	80076.37	1644.17	-614749.75	241.94	1766.43	850.60
SRM614-6	-383.82	16919.56	-17930.78	-56377.08	-1439631.81	3.62	207.54	2655.18
SRM612-6	41952.38	48360.29	22934.93	-55092.07	-1481794.56	8660.15	37452.47	27049.95
SRM610-6	312166.59	301631.36	284572.83	-37685.22	-1209063.95	64662.06	289019.41	186396.21
AP1-6	-1004.91	-3848.88	-17294.54	-60630.46	-1563453.62	-1472.99	-428.58	490.84
AP2-6	-496.74	4157.81	-8355.17	-58530.45	-1505302.25	-597.66	2338.91	3758.06
AP3-6	2232.95	50153.67	43832.37	-38129.34	-983448.95	4188.00	19440.01	26760.51
AP4-6	4155.24	115136.47	88552.62	-9823.42	-324129.85	9480.67	33904.09	54696.71

zero correction

SRM614-5	1373.91	0.00	0.00	0.00	0.00	0.00	636.26	8030.41
SRM612-5	59395.04	15697.15	48314.59	0.00	0.00	10352.04	56299.62	39248.34
SRM610-5	287570.84	240801.45	287745.99	0.00	0.00	61546.85	289523.85	176461.38
AP1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3251.50
AP2-5	470.34	0.00	5676.15	0.00	0.00	0.00	4265.88	9610.17
AP3-5	3571.32	43904.59	71409.73	0.00	0.00	5439.13	27956.70	41240.27
AP4-5	7326.62	212037.54	173633.69	47232.91	1075885.25	20443.70	55940.09	96982.82
V1-1	4684.97	0.00	464163.21	80231.92	816879.55	0.00	2622.55	8962.57
V1-2	3083.72	2171.79	828839.61	40913.22	707952.75	0.00	2055.43	8073.61
V1-3	1927.03	0.00	379496.80	12799.79	0.00	0.00	1629.55	3802.18
V1-4	4584.73	0.00	275319.36	93515.92	1108358.25	0.00	2133.75	3575.26
V1-5	1701.71	0.00	157175.77	20306.59	27965.25	0.00	2054.55	3409.34
V1-6	989.35	0.00	152268.21	7224.84	0.00	0.00	2015.35	1886.49
V1-7	2055.83	0.00	305839.36	30112.44	248182.05	0.00	1772.43	2877.30
V1-8	951.83	88.38	273039.74	5009.86	0.00	396.90	1866.23	2186.89
V1-9	2173.55	314.43	531904.36	36267.88	714855.75	0.00	2093.99	2457.57
V1-10	168.42	1950.04	103952.82	0.00	0.00	0.00	1692.11	1336.17
V1-11	0.00	4158.61	81327.42	0.00	0.00	0.00	1785.31	923.81
V1-12	0.00	7119.15	83826.10	0.00	0.00	0.00	2287.79	1452.89
V1-13	4111.48	12257.50	174736.33	63393.83	181648.75	599.06	2180.19	2609.17
V1-14	9.50	11155.76	86809.28	0.00	0.00	275.34	1377.67	2049.61
V1-15	1832.43	12621.61	80076.37	1644.17	0.00	241.94	1766.43	850.60
SRM614-6	0.00	16919.56	0.00	0.00	0.00	3.62	207.54	2655.18
SRM612-6	41952.38	48360.29	22934.93	0.00	0.00	8660.15	37452.47	27049.95
SRM610-6	312166.59	301631.36	284572.83	0.00	0.00	64662.06	289019.41	186396.21
AP1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	490.84
AP2-6	0.00	4157.81	0.00	0.00	0.00	0.00	2338.91	3758.06
AP3-6	2232.95	50153.67	43832.37	0.00	0.00	4188.00	19440.01	26760.51
AP4-6	4155.24	115136.47	88552.62	0.00	0.00	9480.67	33904.09	54696.71

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration

SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal

SRM614-5	0.000346	0.000000	0.000000	0.000000	0.000000	0.000000	0.000160	0.002022
SRM612-5	0.016983	0.004488	0.013815	0.000000	0.000000	0.002960	0.016098	0.011223
SRM610-5	0.264395	0.221394	0.264556	0.000000	0.000000	0.056587	0.266190	0.162240

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000209
AP2-5	0.000021	0.000000	0.000258	0.000000	0.000000	0.000000	0.000194	0.000437
AP3-5	0.000184	0.002266	0.003686	0.000000	0.000000	0.000281	0.001443	0.002129
AP4-5	0.000374	0.010823	0.008862	0.002411	0.054915	0.001043	0.002855	0.004950
V1-1	0.000504	0.000000	0.049924	0.008629	0.087861	0.000000	0.000282	0.000964
V1-2	0.000273	0.000193	0.073489	0.003628	0.062771	0.000000	0.000182	0.000716
V1-3	0.000227	0.000000	0.044715	0.001508	0.000000	0.000000	0.000192	0.000448
V1-4	0.000511	0.000000	0.030703	0.010429	0.123603	0.000000	0.000238	0.000399
V1-5	0.000176	0.000000	0.016297	0.002106	0.002900	0.000000	0.000213	0.000354
V1-6	0.000113	0.000000	0.017315	0.000822	0.000000	0.000000	0.000229	0.000215
V1-7	0.000242	0.000000	0.036045	0.003549	0.029250	0.000000	0.000209	0.000339
V1-8	0.000109	0.000010	0.031244	0.000573	0.000000	0.000045	0.000214	0.000250
V1-9	0.000192	0.000028	0.046988	0.003204	0.063150	0.000000	0.000185	0.000217
V1-10	0.000025	0.000286	0.015228	0.000000	0.000000	0.000000	0.000248	0.000196
V1-11	0.000000	0.000579	0.011328	0.000000	0.000000	0.000000	0.000249	0.000129
V1-12	0.000000	0.001071	0.012610	0.000000	0.000000	0.000000	0.000344	0.000219
V1-13	0.000656	0.001956	0.027879	0.010114	0.028981	0.000096	0.000348	0.000416
V1-14	0.000002	0.001886	0.014678	0.000000	0.000000	0.000047	0.000233	0.000347
V1-15	0.000283	0.001948	0.012356	0.000254	0.000000	0.000037	0.000273	0.000131
SRM614-6	0.000000	0.014657	0.000000	0.000000	0.000000	0.000003	0.000180	0.002300
SRM612-6	0.018429	0.021244	0.010075	0.000000	0.000000	0.003804	0.016452	0.011882
SRM610-6	0.283377	0.273813	0.258328	0.000000	0.000000	0.058699	0.262365	0.169206
AP1-6	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000048
AP2-6	0.000000	0.000248	0.000000	0.000000	0.000000	0.000000	0.000140	0.000224
AP3-6	0.000125	0.002818	0.002463	0.000000	0.000000	0.000235	0.001092	0.001503
AP4-6	0.000305	0.008459	0.006506	0.000000	0.000000	0.000697	0.002491	0.004019

standardize signal averages AP

AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000128
AP2	0.000011	0.000124	0.000129	0.000000	0.000000	0.000000	0.000167	0.000331
AP3	0.000155	0.002542	0.003074	0.000000	0.000000	0.000258	0.001268	0.001816
AP4	0.000340	0.009641	0.007684	0.001205	0.027457	0.000870	0.002673	0.004484

linest from std sig ave

0.011349	0.004716	0.005673	1.943212	0.085310	0.065129	0.005830	0.007088
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standardize signal averages SRM

srm614-2	0.000173	0.007328	0.000000	0.000000	0.000000	0.000002	0.000170	0.002161
srm612-2	0.017706	0.012866	0.011945	0.000000	0.000000	0.003382	0.016275	0.011552
srm610-2	0.273886	0.247604	0.261442	0.000000	0.000000	0.057643	0.264277	0.165723

linest from std sig ave

0.018834	0.019115	0.019363	0.000000	0.000000	0.089939	0.017897	0.030304
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concentration data

SRM614-5	0.34	0.00	0.00	0.00	0.00	0.00	0.08	1.23
SRM612-5	16.53	1.82	6.72	0.00	0.00	16.53	8.05	6.82
SRM610-5	257.35	89.54	128.71	0.00	0.00	316.07	133.08	98.63
AP1-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
AP2-5	0.10	0.00	0.58	0.00	0.00	0.00	0.45	1.24
AP3-5	0.83	4.26	8.34	0.00	0.00	7.29	3.36	6.02
AP4-5	1.69	20.36	20.06	1868.91	1868.91	27.11	6.64	14.00
V1-1	2.28	0.00	112.99	6689.73	2990.18	0.00	0.66	2.73
V1-2	1.24	0.36	166.32	2812.17	2136.29	0.00	0.42	2.02
V1-3	1.03	0.00	101.20	1169.15	0.00	0.00	0.45	1.27
V1-4	2.31	0.00	69.49	8084.60	4206.61	0.00	0.55	1.13
V1-5	0.80	0.00	36.88	1632.28	98.69	0.00	0.50	1.00
V1-6	0.51	0.00	39.19	636.90	0.00	0.00	0.53	0.61
V1-7	1.10	0.00	81.57	2751.18	995.46	0.00	0.49	0.96
V1-8	0.49	0.02	70.71	444.41	0.00	1.18	0.50	0.71
V1-9	0.87	0.05	106.34	2483.71	2149.19	0.00	0.43	0.61
V1-10	0.11	0.54	34.46	0.00	0.00	0.00	0.58	0.55
V1-11	0.00	1.09	25.64	0.00	0.00	0.00	0.58	0.36
V1-12	0.00	2.01	28.54	0.00	0.00	0.00	0.80	0.62
V1-13	2.97	3.68	63.09	7840.77	986.33	2.48	0.81	1.18
V1-14	0.01	3.55	33.22	0.00	0.00	1.21	0.54	0.98
V1-15	1.28	3.66	27.96	196.67	0.00	0.97	0.63	0.37
SRM614-6	0.00	5.93	0.00	0.00	0.00	0.02	0.09	1.40
SRM612-6	17.94	8.59	4.90	0.00	0.00	21.25	8.23	7.22
SRM610-6	275.83	110.74	125.68	0.00	0.00	327.87	131.17	102.86
AP1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
AP2-6	0.00	0.47	0.00	0.00	0.00	0.00	0.32	0.63
AP3-6	0.57	5.30	5.57	0.00	0.00	6.11	2.54	4.25
AP4-6	1.38	15.91	14.72	0.00	0.00	18.10	5.79	11.36

certified concentration

SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

	V	Cr	Mn	Fe56	Fe57	Ni	Co	Cu63
raw data								
blank-3	2620.13	109273.58	40895.39	3548469.30	49551.40	12250.27	1593.81	2430.13
SRM614-3	3171.46	92803.60	20801.12	2219143.50	33121.15	8795.33	2234.21	8877.73
SRM612-3	45588.34	124795.06	61101.98	1638561.60	24843.38	16222.37	44598.53	33244.95
SRM610-3	268930.56	346442.81	308622.28	1751527.30	26531.99	68039.94	286613.38	170809.44
AP1-3	1875.13	85002.16	19167.87	1228611.50	57519.04	5695.95	1698.61	3172.34
AP2-3	1990.93	94010.77	26038.07	1185497.40	112579.59	6061.99	5037.71	6709.44
AP3-3	5416.43	144987.34	87594.13	1767082.10	171838.84	11720.67	25911.75	34877.44
AP4-3	6834.64	209632.14	121837.13	2306501.80	223399.38	17448.78	35800.88	55774.91
V3-1	4745.19	98523.59	85341.52	1812030.10	214658.13	5883.07	2968.54	2133.45
V3-2	1787.69	102603.34	94811.94	1188397.80	199657.52	5998.83	2466.01	1241.25
V3-3	2105.01	106159.67	50438.48	1195522.60	206155.08	6507.36	2664.49	1366.77
V3-4	4411.71	113588.16	246916.78	1935924.40	222474.73	7004.04	3871.06	1882.17
V3-5	2286.45	113028.23	147569.34	1286297.10	214366.64	6817.96	3261.26	1471.09
V3-6	2296.53	112918.72	186377.69	1224613.60	226116.36	6917.48	3685.94	1485.25
V3-7	4598.59	111403.27	219351.28	1646432.90	263109.13	6708.56	10736.06	2667.26
V3-8	2083.41	105447.95	143780.20	924804.56	263537.13	6079.87	10943.94	1988.89
V3-9	2052.77	101645.25	102837.18	843456.25	278180.22	5782.11	11531.95	2110.97
SRM614-4	2019.69	101836.85	6948.08	705529.00	141841.59	5796.63	2467.53	5513.23
SRM612-4	35348.76	132242.31	40993.79	704127.00	88204.41	13095.19	32898.66	25357.82
SRM610-4	245401.11	337401.75	259489.06	952501.56	75203.87	60502.18	246915.59	152663.63
AP1-4	1317.53	96632.23	9021.25	622607.50	141987.00	5273.19	1844.77	1999.89
AP2-4	1480.69	102564.86	14513.72	670741.63	204022.55	5875.39	4081.46	4094.34
AP3-4	4730.59	150113.72	69484.71	1233908.30	244819.69	10679.02	22297.25	28128.00
AP4-4	5134.75	193831.33	80440.45	1541965.30	277367.75	14582.96	24608.34	35230.80
blank-4	918.57	97419.07	5070.35	716463.81	275632.91	5526.83	2808.02	852.16
blank average	1769.35	103346.33	22982.87	2132466.56	162592.15	8888.55	2200.91	1641.15

blank subtraction								
SRM614-3	1402.11	-10542.72	-2181.75	86676.95	-129471.01	-93.22	33.30	7236.58
SRM612-3	43818.99	21448.74	38119.11	-493904.96	-137748.77	7333.82	42397.62	31603.80
SRM610-3	267161.21	243096.49	285639.41	-380939.26	-136060.17	59151.39	284412.47	169168.29
AP1-3	105.78	-18344.17	-3815.00	-903855.06	-105073.11	-3192.60	-502.30	1531.19
AP2-3	221.58	-9335.56	3055.20	-946969.16	-50012.56	-2826.56	2836.80	5068.29
AP3-3	3647.08	41641.02	64611.26	-365384.46	9246.69	2832.12	23710.83	33236.29
AP4-3	5065.29	106285.82	98854.26	174035.25	60807.23	8560.23	33599.97	54133.76
V3-1	2975.84	-4822.73	62358.65	-320436.46	52065.98	-3005.48	767.62	492.30
V3-2	18.34	-742.99	71829.07	-944068.76	37065.37	-2889.72	265.10	-399.90
V3-3	335.66	2813.34	27455.61	-936943.96	43562.93	-2381.19	463.58	-274.38
V3-4	2642.36	10241.84	223933.91	-196542.16	59882.58	-1884.51	1670.15	241.02
V3-5	517.10	9681.90	124586.47	-846169.46	51774.49	-2070.59	1060.35	-170.06
V3-6	527.18	9572.39	163394.82	-907852.96	63524.21	-1971.07	1485.03	-155.90
V3-7	2829.24	8056.94	196368.41	-486033.66	100516.98	-2179.99	8535.15	1026.11
V3-8	314.06	2101.62	120797.33	-1207662.00	100944.98	-2808.68	8743.03	347.74
V3-9	283.42	-1701.08	79854.31	-1289010.31	115588.07	-3106.44	9331.03	469.82
SRM614-4	250.34	-1509.48	-16034.79	-1426937.56	-20750.56	-3091.92	266.62	3872.08
SRM612-4	33579.41	28895.99	18010.92	-1428339.56	-74387.74	4206.64	30697.75	23716.67
SRM610-4	243631.76	234055.43	236506.19	-1179965.00	-87388.29	51613.63	244714.68	151022.48
AP1-4	-451.82	-6714.10	-13961.62	-1509859.06	-20605.15	-3615.36	-356.14	358.74
AP2-4	-288.66	-781.47	-8469.15	-1461724.93	41430.40	-3013.16	1880.55	2453.19
AP3-4	2961.24	46767.40	46501.84	-898558.26	82227.54	1790.47	20096.33	26486.85
AP4-4	3365.40	90485.01	57457.58	-590501.26	114775.60	5694.41	22407.43	33589.65

zero correction								
SRM614-3	1402.11	0.00	0.00	86676.95	0.00	0.00	33.30	7236.58
SRM612-3	43818.99	21448.74	38119.11	0.00	0.00	7333.82	42397.62	31603.80
SRM610-3	267161.21	243096.49	285639.41	0.00	0.00	59151.39	284412.47	169168.29
AP1-3	105.78	0.00	0.00	0.00	0.00	0.00	0.00	1531.19
AP2-3	221.58	0.00	3055.20	0.00	0.00	0.00	2836.80	5068.29
AP3-3	3647.08	41641.02	64611.26	0.00	9246.69	2832.12	23710.83	33236.29
AP4-3	5065.29	106285.82	98854.26	174035.25	60807.23	8560.23	33599.97	54133.76
V3-1	2975.84	0.00	62358.65	0.00	52065.98	0.00	767.62	492.30
V3-2	18.34	0.00	71829.07	0.00	37065.37	0.00	265.10	0.00
V3-3	335.66	2813.34	27455.61	0.00	43562.93	0.00	463.58	0.00
V3-4	2642.36	10241.84	223933.91	0.00	59882.58	0.00	1670.15	241.02
V3-5	517.10	9681.90	124586.47	0.00	51774.49	0.00	1060.35	0.00
V3-6	527.18	9572.39	163394.82	0.00	63524.21	0.00	1485.03	0.00
V3-7	2829.24	8056.94	196368.41	0.00	100516.98	0.00	8535.15	1026.11
V3-8	314.06	2101.62	120797.33	0.00	100944.98	0.00	8743.03	347.74
V3-9	283.42	0.00	79854.31	0.00	115588.07	0.00	9331.03	469.82
SRM614-4	250.34	0.00	0.00	0.00	0.00	0.00	266.62	3872.08

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	33579.41	28895.99	18010.92	0.00	0.00	4206.64	30697.75	23716.67
SRM610-4	243631.76	234055.43	236506.19	0.00	0.00	51613.63	244714.68	151022.48
AP1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	358.74
AP2-4	0.00	0.00	0.00	0.00	41430.40	0.00	1880.55	2453.19
AP3-4	2961.24	46767.40	46501.84	0.00	82227.54	1790.47	20096.33	26486.85
AP4-4	3365.40	90485.01	57457.58	0.00	114775.60	5694.41	22407.43	33589.65

certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

standardized concentration								
SRM614	0.000013	0.000038	0.000026	0.000000	0.000000	0.000010	0.000008	0.000015
SRM612	0.000457	0.000465	0.000448	0.000657	0.000657	0.000448	0.000411	0.000428
SRM610	0.005150	0.004725	0.005052	0.005330	0.005330	0.005176	0.004722	0.005017
STD AP1	0.000000	0.000003	0.000004	0.002246	0.002246	0.000033	0.000001	0.000000
STD AP2	0.000001	0.000009	0.000011	0.002163	0.002163	0.000035	0.000004	0.000005
STD AP3	0.000002	0.000022	0.000025	0.002124	0.002124	0.000038	0.000009	0.000017
STD AP4	0.000004	0.000043	0.000041	0.002342	0.002342	0.000050	0.000015	0.000030

standardized signal								
SRM614-3	0.000512	0.000000	0.000000	0.031641	0.000000	0.000000	0.000012	0.002642
SRM612-3	0.016650	0.008150	0.014484	0.000000	0.000000	0.002787	0.016110	0.012009
SRM610-3	0.272112	0.247602	0.290933	0.000000	0.000000	0.060248	0.289683	0.172303
AP1-3	0.000005	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000065
AP2-3	0.000012	0.000000	0.000167	0.000000	0.000000	0.000000	0.000155	0.000277
AP3-3	0.000168	0.001923	0.002983	0.000000	0.000427	0.000131	0.001095	0.001535
AP4-3	0.000272	0.005706	0.005307	0.009342	0.003264	0.000460	0.001804	0.002906
V3-1	0.000486	0.000000	0.010194	0.000000	0.008512	0.000000	0.000125	0.000080
V3-2	0.000003	0.000000	0.010116	0.000000	0.005220	0.000000	0.000037	0.000000
V3-3	0.000042	0.000352	0.003438	0.000000	0.005455	0.000000	0.000058	0.000000
V3-4	0.000280	0.001087	0.023762	0.000000	0.006354	0.000000	0.000177	0.000026
V3-5	0.000057	0.001068	0.013739	0.000000	0.005709	0.000000	0.000117	0.000000
V3-6	0.000044	0.000802	0.013690	0.000000	0.005322	0.000000	0.000124	0.000000
V3-7	0.000128	0.000366	0.008916	0.000000	0.004564	0.000000	0.000388	0.000047
V3-8	0.000013	0.000088	0.005083	0.000000	0.004248	0.000000	0.000368	0.000015
V3-9	0.000011	0.000000	0.003191	0.000000	0.004619	0.000000	0.000373	0.000019
SRM614-4	0.000133	0.000000	0.000000	0.000000	0.000000	0.000000	0.000141	0.002053
SRM612-4	0.017240	0.014835	0.009247	0.000000	0.000000	0.002160	0.015760	0.012176
SRM610-4	0.291115	0.279672	0.282601	0.000000	0.000000	0.061673	0.292409	0.180457
AP1-4	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000020
AP2-4	0.000000	0.000000	0.000000	0.000000	0.003086	0.000000	0.000140	0.000183
AP3-4	0.000159	0.002509	0.002495	0.000000	0.004411	0.000096	0.001078	0.001421
AP4-4	0.000211	0.005685	0.003610	0.000000	0.007211	0.000358	0.001408	0.002110

standardize signal averages AP								
AP1	0.000002	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000042
AP2	0.000006	0.000000	0.000084	0.000000	0.001543	0.000000	0.000148	0.000230
AP3	0.000164	0.002216	0.002739	0.000000	0.002419	0.000113	0.001086	0.001478
AP4	0.000242	0.005695	0.004458	0.004671	0.005237	0.000409	0.001606	0.002508

linest from std sig ave								
	0.014495	0.007814	0.009093	0.501448	0.581647	0.138435	0.008940	0.011864

standardize signal averages SRM								
srm614-2	0.000322	0.000000	0.000000	0.015820	0.000000	0.000000	0.000077	0.002347
srm612-2	0.016945	0.011493	0.011865	0.000000	0.000000	0.002473	0.015935	0.012092
srm610-2	0.281614	0.263637	0.286767	0.000000	0.000000	0.060960	0.291046	0.176380

linest from std sig ave								
	0.018320	0.017964	0.017653	0.000000	0.000000	0.085064	0.016254	0.028475

concentration data								
SRM614-3	0.64	0.00	0.00	1360.73	0.00	0.00	0.01	2.69
SRM612-3	20.70	5.46	11.30	0.00	0.00	33.08	12.35	12.22
SRM610-3	338.28	165.93	226.88	0.00	0.00	715.30	222.11	175.31
AP1-3	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.31
AP2-3	0.07	0.00	0.61	0.00	0.00	0.00	0.55	1.31
AP3-3	0.97	5.99	10.82	0.00	99.07	7.22	3.90	7.26
AP4-3	1.57	17.79	19.25	1868.91	757.43	25.38	6.43	13.75
V3-1	2.81	0.00	36.98	0.00	1975.04	0.00	0.45	0.38
V3-2	0.01	0.00	36.70	0.00	1211.32	0.00	0.13	0.00
V3-3	0.24	1.10	12.47	0.00	1265.69	0.00	0.21	0.00

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	1.62	3.39	86.20	0.00	1474.44	0.00	0.63	0.12
V3-5	0.33	3.33	49.84	0.00	1324.80	0.00	0.42	0.00
V3-6	0.26	2.50	49.66	0.00	1235.00	0.00	0.44	0.00
V3-7	0.74	1.14	32.34	0.00	1059.04	0.00	1.38	0.22
V3-8	0.08	0.28	18.44	0.00	985.68	0.00	1.31	0.07
V3-9	0.07	0.00	11.58	0.00	1071.90	0.00	1.33	0.09
SRM614-4	0.16	0.00	0.00	0.00	0.00	0.00	0.11	2.09
SRM612-4	21.43	9.94	7.21	0.00	0.00	25.64	12.08	12.39
SRM610-4	361.91	187.42	220.39	0.00	0.00	732.22	224.20	183.61
AP1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
AP2-4	0.00	0.00	0.00	0.00	716.07	0.00	0.50	0.86
AP3-4	0.92	7.82	9.05	0.00	1023.58	5.30	3.85	6.73
AP4-4	1.22	17.72	13.09	0.00	1673.12	19.76	5.02	9.99
certified concentration								
SRM614	1.09	3.30	2.20			0.90	0.71	1.30
SRM612	39.22	39.88	38.43	56.33	56.33	38.44	35.26	36.71
SRM610	441.70	405.20	433.30	457.10	457.10	443.90	405.00	430.30
STD AP1	0.00	1.18	1.65	895.84	895.84	13.27	0.50	0.00
STD AP2	0.24	3.67	4.26	863.09	863.09	13.86	1.53	1.89
STD AP3	0.82	8.66	9.78	847.16	847.16	15.11	3.52	6.63
STD AP4	1.48	17.07	16.20	934.46	934.46	20.11	5.87	12.02

Appendix A. Raw trace element datasheets from laser ablation.

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
436.04 blank-3	365.00	354.84	527.64	3272.66	964.93	1721.37	675.04	510.84
1040.17 SRM614-3	1767.37	1092.89	782.16	6651.68	1450.25	3729.78	1382.29	750.76
15371.13 SRM612-3	16372.73	9542.41	2014.65	12183.91	14975.00	43056.56	19758.31	11442.19
81664.94 SRM610-3	85846.88	47877.63	7753.56	38701.26	68568.15	244000.38	92980.32	41684.04
505.04 AP1-3	2668.98	1656.01	636.08	4013.74	934.69	4033.46	881.76	614.84
2681.98 AP2-3	62663.15	36436.09	5787.23	28283.16	2047.33	6915.44	1033.17	865.00
18229.46 AP3-3	749867.63	404804.16	46916.06	270524.84	9897.38	18297.30	1085.33	2329.69
24122.02 AP4-3	1034193.50	560662.94	61876.27	372619.88	12750.59	23163.85	1083.89	2661.69
2675.49 EVA2.5-1	233194.39	128755.28	17764.58	93740.77	3438.66	34320.40	798.36	521.08
2495.09 EVA2.5-2	143513.38	80550.94	11540.15	60228.10	2494.45	21836.72	691.76	493.84
2322.65 EVA2.5-3	196837.88	108883.73	15370.73	80079.73	3093.62	29853.21	647.52	493.24
1286.65 EVA2.5-4	193749.66	108072.61	16045.41	82071.95	3194.46	45382.93	814.40	533.76
1022.93 EVA2.5-5	202450.98	112824.27	16735.61	85373.84	3177.94	49658.92	788.24	566.84
1100.01 EVA2.5-6	206305.16	114979.97	16835.86	87018.97	3330.02	49718.12	850.36	577.84
1168.81 EVA2.5-7	141054.83	79658.84	10991.30	58295.41	2470.05	5999.71	784.60	449.96
984.25 EVA2.5-8	154443.67	86742.73	12035.43	63208.52	2569.21	6392.44	803.76	488.44
1075.29 EVA2.5-9	156100.77	87760.62	12198.83	64215.40	2706.82	6582.32	807.60	408.48
1384.85 EVA2.5-10	92705.28	53285.54	7824.08	40834.39	1885.29	5267.11	744.64	438.32
1433.01 EVA2.5-11	121736.09	68626.91	9801.82	51375.25	2203.45	5816.75	759.76	455.20
1677.65 EVA2.5-12	137450.58	77403.88	11029.66	57683.84	2573.01	6489.60	802.36	459.08
1513.85 EVA2.5-13	142498.97	80528.66	11181.38	59718.10	2541.13	6209.96	803.16	437.20
1483.33 EVA2.5-14	160372.14	90178.55	12383.83	66303.41	2822.90	6535.76	754.72	468.96
1572.57 EVA2.5-15	158997.14	89718.23	12350.91	65779.33	2814.82	6563.48	825.52	476.80
756.72 SRM614-4	1091.09	846.16	451.00	6889.64	1097.49	3267.02	1125.05	672.28
9657.41 SRM612-4	10783.86	6406.92	1355.61	10555.62	11046.14	27825.44	13958.44	9136.73
59375.90 SRM610-4	72326.61	40377.67	6440.72	34775.40	59676.18	176372.95	77370.99	41331.11
467.64 AP1-4	928.09	641.04	442.04	4907.23	901.41	3359.50	881.92	532.44
1766.17 AP2-4	31104.70	18085.90	2955.14	16544.45	1526.01	4816.23	914.77	623.60
11669.11 AP3-4	498851.41	268398.03	32114.14	182840.52	7035.16	12088.27	1066.29	1781.13
10751.18 AP4-4	413735.50	223590.78	26879.23	153494.91	6309.72	11823.55	957.09	1492.01
647.44 blank-4	597.28	452.32	266.72	5034.11	735.76	1994.05	748.04	321.36
541.74 blank average	481.14	403.58	397.18	4153.38	850.34	1857.71	711.54	416.10
blank subtraction								
498.42 SRM614-3	1286.23	689.30	384.98	2498.29	599.90	1872.07	670.74	334.66
14829.38 SRM612-3	15891.59	9138.83	1617.47	8030.52	14124.66	41198.85	19046.77	11026.08
81123.19 SRM610-3	85365.74	47474.05	7356.38	34547.87	67717.80	242142.67	92268.78	41267.93
-36.70 AP1-3	2187.83	1252.43	238.90	-139.64	84.34	2175.75	170.22	198.74
2140.23 AP2-3	62182.01	36032.50	5390.05	24129.78	1196.99	5057.73	321.62	448.90
17687.72 AP3-3	749386.49	404400.58	46518.88	266371.46	9047.03	16439.59	373.78	1913.59
23580.27 AP4-3	1033712.36	560259.36	61479.08	368466.50	11900.25	21306.14	372.34	2245.59
2133.75 EVA2.5-1	232713.25	128351.70	17367.40	89587.38	2588.31	32462.68	86.82	104.98
1953.35 EVA2.5-2	143032.24	80147.36	11142.96	56074.71	1644.11	19979.01	-19.78	77.74
1780.91 EVA2.5-3	196356.74	108480.15	14973.54	75926.35	2243.27	27995.50	-64.02	77.14
744.90 EVA2.5-4	193268.52	107669.03	15648.23	77918.56	2344.11	43525.22	102.86	117.66
481.18 EVA2.5-5	201969.84	112420.69	16338.43	81220.46	2327.59	47801.21	76.70	150.74
558.26 EVA2.5-6	205824.02	114576.39	16438.67	82865.59	2479.67	47860.41	138.82	161.74
627.06 EVA2.5-7	140573.69	79255.26	10594.12	54142.02	1619.71	4142.00	73.06	33.86
442.50 EVA2.5-8	153962.53	86339.14	11638.25	59055.13	1718.87	4534.73	92.22	72.34
533.54 EVA2.5-9	155619.63	87357.03	11801.65	60062.02	1856.47	4724.61	96.06	-7.62
843.10 EVA2.5-10	92224.14	52881.96	7426.90	36681.01	1034.95	3409.40	33.10	22.22
891.27 EVA2.5-11	121254.95	68223.32	9404.63	47221.87	1353.11	3959.04	48.22	39.10
1135.91 EVA2.5-12	136969.44	77000.29	10632.48	53530.46	1722.67	4631.89	90.82	42.98
972.11 EVA2.5-13	142017.83	80125.07	10784.20	55564.71	1690.79	4352.24	91.62	21.10
941.59 EVA2.5-14	159891.00	89774.96	11986.65	62150.03	1972.55	4678.05	43.18	52.86
1030.83 EVA2.5-15	158516.00	89314.64	11953.73	61625.94	1964.47	4705.77	113.98	60.70
214.98 SRM614-4	609.94	442.58	53.82	2736.26	247.14	1409.31	413.50	256.18
9115.67 SRM612-4	10302.72	6003.33	958.43	6402.24	10195.80	25967.73	13246.89	8720.63
58834.15 SRM610-4	71845.47	39974.09	6043.53	30622.01	58825.83	174515.24	76659.45	40915.01
-74.10 AP1-4	446.94	237.46	44.86	753.84	51.06	1501.79	170.38	116.34
1224.43 AP2-4	30623.55	17682.32	2557.95	12391.07	675.66	2958.52	203.22	207.50
11127.36 AP3-4	498370.27	267994.45	31716.96	178687.14	6184.81	10230.56	354.74	1365.03
10209.44 AP4-4	413254.36	223187.20	26482.05	149341.53	5459.37	9965.84	245.54	1075.91
zero correction								
498.42 SRM614-3	1286.23	689.30	384.98	2498.29	599.90	1872.07	670.74	334.66
14829.38 SRM612-3	15891.59	9138.83	1617.47	8030.52	14124.66	41198.85	19046.77	11026.08

Appendix A. Raw trace element datasheets from laser ablation.

81123.19 SRM610-3	85365.74	47474.05	7356.38	34547.87	67717.80	242142.67	92268.78	41267.93
0.00 AP1-3	2187.83	1252.43	238.90	0.00	84.34	2175.75	170.22	198.74
2140.23 AP2-3	62182.01	36032.50	5390.05	24129.78	1196.99	5057.73	321.62	448.90
17687.72 AP3-3	749386.49	404400.58	46518.88	266371.46	9047.03	16439.59	373.78	1913.59
23580.27 AP4-3	1033712.36	560259.36	61479.08	368466.50	11900.25	21306.14	372.34	2245.59
2133.75 EVA2.5-1	232713.25	128351.70	17367.40	89587.38	2588.31	32462.68	86.82	104.98
1953.35 EVA2.5-2	143032.24	80147.36	11142.96	56074.71	1644.11	19979.01	0.00	77.74
1780.91 EVA2.5-3	196356.74	108480.15	14973.54	75926.35	2243.27	27995.50	0.00	77.14
744.90 EVA2.5-4	193268.52	107669.03	15648.23	77918.56	2344.11	43525.22	102.86	117.66
481.18 EVA2.5-5	201969.84	112420.69	16338.43	81220.46	2327.59	47801.21	76.70	150.74
558.26 EVA2.5-6	205824.02	114576.39	16438.67	82865.59	2479.67	47860.41	138.82	161.74
627.06 EVA2.5-7	140573.69	79255.26	10594.12	54142.02	1619.71	4142.00	73.06	33.86
442.50 EVA2.5-8	153962.53	86339.14	11638.25	59055.13	1718.87	4534.73	92.22	72.34
533.54 EVA2.5-9	155619.63	87357.03	11801.65	60062.02	1856.47	4724.61	96.06	0.00
843.10 EVA2.5-10	92224.14	52881.96	7426.90	36681.01	1034.95	3409.40	33.10	22.22
891.27 EVA2.5-11	121254.95	68223.32	9404.63	47221.87	1353.11	3959.04	48.22	39.10
1135.91 EVA2.5-12	136969.44	77000.29	10632.48	53530.46	1722.67	4631.89	90.82	42.98
972.11 EVA2.5-13	142017.83	80125.07	10784.20	55564.71	1690.79	4352.24	91.62	21.10
941.59 EVA2.5-14	159891.00	89774.96	11986.65	62150.03	1972.55	4678.05	43.18	52.86
1030.83 EVA2.5-15	158516.00	89314.64	11953.73	61625.94	1964.47	4705.77	113.98	60.70
214.98 SRM614-4	609.94	442.58	53.82	2736.26	247.14	1409.31	413.50	256.18
9115.67 SRM612-4	10302.72	6003.33	958.43	6402.24	10195.80	25967.73	13246.89	8720.63
58834.15 SRM610-4	71845.47	39974.09	6043.53	30622.01	58825.83	174515.24	76659.45	40915.01
0.00 AP1-4	446.94	237.46	44.86	753.84	51.06	1501.79	170.38	116.34
1224.43 AP2-4	30623.55	17682.32	2557.95	12391.07	675.66	2958.52	203.22	207.50
11127.36 AP3-4	498370.27	267994.45	31716.96	178687.14	6184.81	10230.56	354.74	1365.03
10209.44 AP4-4	413254.36	223187.20	26482.05	149341.53	5459.37	9965.84	245.54	1075.91

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000122 SRM614-3	0.000316	0.000169	0.000095	0.000613	0.000147	0.000460	0.000165	0.000082
0.004161 SRM612-3	0.004459	0.002565	0.000454	0.002254	0.003964	0.011561	0.005345	0.003094
0.062962 SRM610-3	0.066254	0.036846	0.005709	0.026813	0.052557	0.187932	0.071612	0.032029
0.000000 AP1-3	0.000109	0.000063	0.000012	0.000000	0.000004	0.000109	0.000008	0.000010
0.000102 AP2-3	0.002965	0.001718	0.000257	0.001150	0.000057	0.000241	0.000015	0.000021
0.000756 AP3-3	0.032032	0.017286	0.001988	0.011386	0.000387	0.000703	0.000016	0.000082
0.001169 AP4-3	0.051241	0.027772	0.003048	0.018265	0.000590	0.001056	0.000018	0.000111
0.000185 EVA2.5-1	0.020159	0.011119	0.001504	0.007761	0.000224	0.002812	0.000008	0.000009
0.000247 EVA2.5-2	0.018061	0.010120	0.001407	0.007081	0.000208	0.002523	0.000000	0.000010
0.000204 EVA2.5-3	0.022509	0.012435	0.001716	0.008703	0.000257	0.003209	0.000000	0.000009
0.000051 EVA2.5-4	0.013258	0.007386	0.001073	0.005345	0.000161	0.002986	0.000007	0.000008
0.000027 EVA2.5-5	0.011400	0.006345	0.000922	0.004584	0.000131	0.002698	0.000004	0.000009
0.000030 EVA2.5-6	0.011018	0.006133	0.000880	0.004436	0.000133	0.002562	0.000007	0.000009
0.000053 EVA2.5-7	0.011901	0.006710	0.000897	0.004584	0.000137	0.000351	0.000006	0.000003
0.000034 EVA2.5-8	0.011998	0.006728	0.000907	0.004602	0.000134	0.000353	0.000007	0.000006
0.000039 EVA2.5-9	0.011477	0.006442	0.000870	0.004430	0.000137	0.000348	0.000007	0.000000
0.000089 EVA2.5-10	0.009747	0.005589	0.000785	0.003877	0.000109	0.000360	0.000003	0.000002
0.000080 EVA2.5-11	0.010904	0.006135	0.000846	0.004247	0.000122	0.000356	0.000004	0.000004
0.000096 EVA2.5-12	0.011518	0.006475	0.000894	0.004501	0.000145	0.000389	0.000008	0.000004
0.000084 EVA2.5-13	0.012209	0.006888	0.000927	0.004777	0.000145	0.000374	0.000008	0.000002
0.000073 EVA2.5-14	0.012350	0.006934	0.000926	0.004800	0.000152	0.000361	0.000003	0.000004

Appendix A. Raw trace element datasheets from laser ablation.

0.000081	EVA2.5-15	0.012479	0.007031	0.000941	0.004851	0.000155	0.000370	0.000009	0.000005
0.000089	SRM614-4	0.000252	0.000183	0.000022	0.001132	0.000102	0.000583	0.000171	0.000106
0.004026	SRM612-4	0.004550	0.002651	0.000423	0.002828	0.004503	0.011469	0.005851	0.003852
0.062436	SRM610-4	0.076244	0.042421	0.006414	0.032497	0.062427	0.185199	0.081352	0.043420
0.000000	AP1-4	0.000031	0.000017	0.000003	0.000052	0.000004	0.000104	0.000012	0.000008
0.000084	AP2-4	0.002089	0.001206	0.000174	0.000845	0.000046	0.000202	0.000014	0.000014
0.000669	AP3-4	0.029970	0.016116	0.001907	0.010746	0.000372	0.000615	0.000021	0.000082
0.000768	AP4-4	0.031068	0.016779	0.001991	0.011227	0.000410	0.000749	0.000018	0.000081
standardize signal averages AP									
0.000000	AP1	0.000070	0.000040	0.000008	0.000026	0.000004	0.000107	0.000010	0.000009
0.000093	AP2	0.002527	0.001462	0.000216	0.000998	0.000052	0.000221	0.000015	0.000018
0.000713	AP3	0.031001	0.016701	0.001948	0.011066	0.000379	0.000659	0.000019	0.000082
0.000968	AP4	0.041155	0.022276	0.002519	0.014746	0.000500	0.000903	0.000018	0.000096
linest from std sig ave									
0.030267		0.015568	0.029708	0.259355	0.044864	1.317855	0.004947	0.000000	0.041926
standardize signal averages SRM									
0.000106	srm614-2	0.000284	0.000176	0.000058	0.000873	0.000125	0.000521	0.000168	0.000094
0.004094	srm612-2	0.004505	0.002608	0.000439	0.002541	0.004233	0.011515	0.005598	0.003473
0.062699	srm610-2	0.071249	0.039633	0.006061	0.029655	0.057492	0.186566	0.076482	0.037724
linest from std sig ave									
0.000000		0.074768	0.000000	0.000000	0.000000	0.000000	0.027416	0.065029	0.098332
concentration data									
0.32	SRM614-3	0.42	0.43	2.10	2.36	16.64	0.19	0.00	0.30
10.80	SRM612-3	5.95	6.53	10.10	8.67	447.98	4.90	0.00	11.13
163.43	SRM610-3	88.46	93.88	127.00	103.17	5940.20	79.73	0.00	115.17
0.00	AP1-3	0.68	0.74	1.23	0.00	2.21	0.21	0.00	0.17
1.23	AP2-3	18.41	20.36	26.59	20.59	30.00	0.48	0.00	0.36
9.13	AP3-3	198.94	204.86	205.73	203.78	203.31	1.39	0.00	1.37
14.11	AP4-3	318.25	329.14	315.32	326.90	310.13	2.08	0.00	1.86
2.23	EVA2.5-1	125.20	131.77	155.66	138.90	117.88	5.55	0.00	0.15
2.98	EVA2.5-2	112.17	119.94	145.58	126.73	109.15	4.98	0.00	0.16
2.46	EVA2.5-3	139.79	147.37	177.59	155.77	135.19	6.33	0.00	0.15
0.62	EVA2.5-4	82.34	87.54	111.07	95.67	84.54	5.89	0.00	0.14
0.33	EVA2.5-5	70.80	75.20	95.42	82.05	69.07	5.32	0.00	0.14
0.36	EVA2.5-6	68.43	72.69	91.05	79.39	69.79	5.06	0.00	0.14
0.64	EVA2.5-7	73.91	79.52	92.80	82.04	72.09	0.69	0.00	0.05
0.42	EVA2.5-8	74.52	79.74	93.84	82.37	70.42	0.70	0.00	0.09
0.48	EVA2.5-9	71.28	76.35	90.05	79.28	71.98	0.69	0.00	0.00
1.08	EVA2.5-10	60.54	66.24	81.22	69.39	57.51	0.71	0.00	0.04
0.97	EVA2.5-11	67.72	72.71	87.51	76.00	63.97	0.70	0.00	0.06
1.15	EVA2.5-12	71.53	76.74	92.51	80.57	76.16	0.77	0.00	0.06
1.01	EVA2.5-13	75.83	81.63	95.92	85.49	76.42	0.74	0.00	0.03
0.88	EVA2.5-14	76.70	82.18	95.79	85.92	80.10	0.71	0.00	0.07
0.98	EVA2.5-15	77.50	83.33	97.37	86.83	81.31	0.73	0.00	0.08
0.23	SRM614-4	0.34	0.47	0.50	4.36	11.56	0.25	0.00	0.38
10.45	SRM612-4	6.08	6.76	9.42	10.88	508.95	4.87	0.00	13.85
162.07	SRM610-4	101.80	108.08	142.66	125.04	7055.71	78.57	0.00	156.13
0.00	AP1-4	0.19	0.20	0.32	0.94	1.87	0.21	0.00	0.14
1.01	AP2-4	12.97	14.29	18.05	15.13	24.23	0.40	0.00	0.24
8.08	AP3-4	186.14	191.00	197.34	192.32	195.54	1.21	0.00	1.37
9.27	AP4-4	192.96	198.86	205.99	200.95	215.78	1.48	0.00	1.35
certified concentration									
	SRM614	1.90					1.12		
	SRM612	37.92					36.24	34.64	37.33
	SRM610	456.30					438.10	426.30	317.40
0.14	STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25	STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94	STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81	STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65		Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data									

Appendix A. Raw trace element datasheets from laser ablation.

387.08 blank-5	314.84	347.24	591.64	4078.30	1111.53	1840.93	736.32	497.08
797.16 SRM614-5	1093.45	821.60	682.68	5956.67	1298.65	3028.22	1091.13	700.72
13195.91 SRM612-5	12255.07	7469.52	1748.05	10602.14	12471.95	35126.96	16706.41	9742.13
76244.79 SRM610-5	79217.64	43523.73	7091.36	36173.40	63999.84	221380.77	87323.89	41331.27
405.28 AP1-5	1601.25	1087.57	568.84	3893.38	931.41	3657.06	808.64	583.40
1865.41 AP2-5	38776.54	22579.69	3744.50	18705.71	1491.89	5269.23	832.48	699.08
10805.54 AP3-5	375196.13	204459.22	25469.98	139716.78	5959.63	12776.79	983.81	1467.69
13981.16 AP4-5	512733.94	276831.09	33304.67	187293.58	7615.72	15099.85	1025.73	1643.29
1352.49 EVA3-1	246020.58	136356.72	19839.79	102171.85	3764.70	59226.61	818.36	578.36
1335.09 EVA3-2	191085.28	106663.76	16040.65	82101.63	3104.78	56313.16	787.72	529.12
1078.81 EVA3-3	184649.72	104096.06	15401.13	78608.68	3133.94	48044.55	791.20	525.96
630.88 SRM614-6	808.20	650.52	399.72	5397.39	892.13	2452.01	909.85	493.20
9606.93 SRM612-6	10001.74	6062.95	1402.65	9889.42	10074.74	26154.91	12956.63	8259.61
66893.34 SRM610-6	77353.07	43873.57	6904.80	36660.29	62370.51	192273.52	82878.83	43354.77
415.36 AP1-6	881.12	607.36	361.60	4324.54	800.60	3255.90	864.28	505.24
1771.13 AP2-6	30755.89	17902.78	2966.50	16365.57	1421.73	4811.75	849.88	663.76
12276.11 AP3-6	479592.41	258051.38	30828.81	175350.83	6849.40	12738.35	1054.29	1598.21
16034.09 AP4-6	674647.25	364280.81	41295.51	244187.63	8744.93	15413.41	995.37	1938.09
498.24 blank-6	292.16	304.36	268.72	3787.86	672.88	1681.61	660.28	410.68
442.66 blank average	303.50	325.80	430.18	3933.08	892.20	1761.27	698.30	453.88

blank subtraction								
354.50 SRM614-5	789.94	495.80	252.50	2023.59	406.44	1266.95	392.82	246.84
12753.25 SRM612-5	11951.57	7143.72	1317.87	6669.06	11579.75	33365.69	16008.11	9288.25
75802.13 SRM610-5	78914.14	43197.93	6661.18	32240.32	63107.64	219619.50	86625.59	40877.39
-37.38 AP1-5	1297.75	761.76	138.66	-39.70	39.20	1895.79	110.34	129.52
1422.75 AP2-5	38473.04	22253.89	3314.32	14772.62	599.68	3507.96	134.18	245.20
10362.88 AP3-5	374892.63	204133.42	25039.80	135783.70	5067.43	11015.52	285.50	1013.81
13538.50 AP4-5	512430.44	276505.29	32874.49	183360.50	6723.52	13338.58	327.42	1189.41
909.83 EVA3-1	245717.08	136030.92	19409.61	98238.77	2872.50	57465.34	120.06	124.48
892.43 EVA3-2	190781.78	106337.96	15610.47	78168.54	2212.57	54551.89	89.42	75.24
636.14 EVA3-3	184346.22	103770.26	14970.94	74675.60	2241.73	46283.28	92.90	72.08
188.22 SRM614-6	504.70	324.72	-30.46	1464.31	-0.08	690.74	211.54	39.32
9164.27 SRM612-6	9698.23	5737.15	972.47	5956.33	9182.53	24393.64	12258.33	7805.72
66450.67 SRM610-6	77049.57	43547.76	6474.62	32727.20	61478.31	190512.25	82180.52	42900.88
-27.30 AP1-6	577.62	281.56	-68.58	391.46	-91.60	1494.63	165.98	51.36
1328.47 AP2-6	30452.39	17576.98	2536.31	12432.49	529.52	3050.48	151.58	209.88
11833.45 AP3-6	479288.91	257725.58	30398.63	171417.75	5957.19	10977.08	355.98	1144.33
15591.43 AP4-6	674343.75	363955.01	40865.33	240254.55	7852.72	13652.14	297.06	1484.21

zero correction								
354.50 SRM614-5	789.94	495.80	252.50	2023.59	406.44	1266.95	392.82	246.84
12753.25 SRM612-5	11951.57	7143.72	1317.87	6669.06	11579.75	33365.69	16008.11	9288.25
75802.13 SRM610-5	78914.14	43197.93	6661.18	32240.32	63107.64	219619.50	86625.59	40877.39
0.00 AP1-5	1297.75	761.76	138.66	0.00	39.20	1895.79	110.34	129.52
1422.75 AP2-5	38473.04	22253.89	3314.32	14772.62	599.68	3507.96	134.18	245.20
10362.88 AP3-5	374892.63	204133.42	25039.80	135783.70	5067.43	11015.52	285.50	1013.81
13538.50 AP4-5	512430.44	276505.29	32874.49	183360.50	6723.52	13338.58	327.42	1189.41
909.83 EVA3-1	245717.08	136030.92	19409.61	98238.77	2872.50	57465.34	120.06	124.48
892.43 EVA3-2	190781.78	106337.96	15610.47	78168.54	2212.57	54551.89	89.42	75.24
636.14 EVA3-3	184346.22	103770.26	14970.94	74675.60	2241.73	46283.28	92.90	72.08
188.22 SRM614-6	504.70	324.72	0.00	1464.31	0.00	690.74	211.54	39.32
9164.27 SRM612-6	9698.23	5737.15	972.47	5956.33	9182.53	24393.64	12258.33	7805.72
66450.67 SRM610-6	77049.57	43547.76	6474.62	32727.20	61478.31	190512.25	82180.52	42900.88
0.00 AP1-6	577.62	281.56	0.00	391.46	0.00	1494.63	165.98	51.36
1328.47 AP2-6	30452.39	17576.98	2536.31	12432.49	529.52	3050.48	151.58	209.88
11833.45 AP3-6	479288.91	257725.58	30398.63	171417.75	5957.19	10977.08	355.98	1144.33
15591.43 AP4-6	674343.75	363955.01	40865.33	240254.55	7852.72	13652.14	297.06	1484.21

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
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Appendix A. Raw trace element datasheets from laser ablation.

0.000128 SRM614-5	0.000285	0.000179	0.000091	0.000731	0.000147	0.000457	0.000142	0.000089
0.004352 SRM612-5	0.004079	0.002438	0.000450	0.002276	0.003952	0.011387	0.005463	0.003170
0.063181 SRM610-5	0.065775	0.036005	0.005552	0.026872	0.052600	0.183052	0.072202	0.034071
0.000000 AP1-5	0.000077	0.000045	0.000008	0.000000	0.000002	0.000112	0.000007	0.000008
0.000085 AP2-5	0.002298	0.001329	0.000198	0.000883	0.000036	0.000210	0.000008	0.000015
0.000508 AP3-5	0.018395	0.010016	0.001229	0.006663	0.000249	0.000541	0.000014	0.000050
0.000755 AP4-5	0.028573	0.015418	0.001833	0.010224	0.000375	0.000744	0.000018	0.000066
0.000049 EVA3-1	0.013307	0.007367	0.001051	0.005320	0.000156	0.003112	0.000007	0.000007
0.000053 EVA3-2	0.011272	0.006283	0.000922	0.004618	0.000131	0.003223	0.000005	0.000004
0.000042 EVA3-3	0.012215	0.006876	0.000992	0.004948	0.000149	0.003067	0.000006	0.000005
0.000116 SRM614-6	0.000312	0.000201	0.000000	0.000906	0.000000	0.000428	0.000131	0.000024
0.004085 SRM612-6	0.004323	0.002558	0.000434	0.002655	0.004094	0.010875	0.005465	0.003480
0.062413 SRM610-6	0.072367	0.040901	0.006081	0.030738	0.057742	0.178935	0.077187	0.040294
0.000000 AP1-6	0.000041	0.000020	0.000000	0.000028	0.000000	0.000105	0.000012	0.000004
0.000089 AP2-6	0.002048	0.001182	0.000171	0.000836	0.000036	0.000205	0.000010	0.000014
0.000656 AP3-6	0.026568	0.014286	0.001685	0.009502	0.000330	0.000608	0.000020	0.000063
0.001011 AP4-6	0.043712	0.023592	0.002649	0.015574	0.000509	0.000885	0.000019	0.000096
standardize signal averages AP								
0.000000 AP1	0.000059	0.000032	0.000004	0.000014	0.000001	0.000108	0.000009	0.000006
0.000087 AP2	0.002173	0.001256	0.000184	0.000859	0.000036	0.000207	0.000009	0.000014
0.000582 AP3	0.022481	0.012151	0.001457	0.008082	0.000289	0.000574	0.000017	0.000057
0.000883 AP4	0.036143	0.019505	0.002241	0.012899	0.000442	0.000814	0.000019	0.000081
linest from std sig ave								
0.034605	0.019020	0.036297	0.311876	0.054795	1.577466	0.005538	0.000000	0.054155
standardize signal averages SRM								
0.000122 srm614-2	0.000299	0.000190	0.000046	0.000818	0.000073	0.000442	0.000136	0.000057
0.004219 srm612-2	0.004201	0.002498	0.000442	0.002466	0.004023	0.011131	0.005464	0.003325
0.062797 srm610-2	0.069071	0.038453	0.005817	0.028805	0.055171	0.180994	0.074694	0.037183
linest from std sig ave								
0.000000	0.077133	0.000000	0.000000	0.000000	0.000000	0.028260	0.066586	0.099782
concentration data								
0.38 SRM614-5	0.47	0.56	2.44	3.43	19.85	0.22	0.00	0.41
12.92 SRM612-5	6.65	7.59	12.03	10.70	534.63	5.41	0.00	14.72
187.51 SRM610-5	107.29	112.08	148.50	126.28	7116.15	86.95	0.00	158.24
0.00 AP1-5	0.58	0.65	1.02	0.00	1.46	0.25	0.00	0.17
1.17 AP2-5	17.44	19.25	24.64	19.29	22.55	0.46	0.00	0.32
7.02 AP3-5	139.58	145.04	152.87	145.64	156.48	1.19	0.00	1.07
10.42 AP4-5	216.80	223.25	228.07	223.49	235.93	1.64	0.00	1.43
0.68 EVA3-1	100.97	106.67	130.78	116.30	97.89	6.88	0.00	0.15
0.73 EVA3-2	85.53	90.97	114.75	100.96	82.27	7.12	0.00	0.10
0.58 EVA3-3	92.68	99.56	123.42	108.16	93.48	6.78	0.00	0.10
0.35 SRM614-6	0.51	0.63	0.00	4.26	0.00	0.20	0.00	0.11
12.12 SRM612-6	7.05	7.96	11.60	12.48	553.81	5.17	0.00	16.16
185.23 SRM610-6	118.05	127.32	162.66	144.45	7811.87	84.99	0.00	187.15
0.00 AP1-6	0.31	0.29	0.00	0.60	0.00	0.23	0.00	0.08
1.23 AP2-6	15.54	17.12	21.22	18.28	22.41	0.45	0.00	0.30
9.06 AP3-6	201.59	206.86	209.65	207.71	207.81	1.34	0.00	1.37
13.95 AP4-6	331.68	341.62	329.58	340.44	320.34	1.96	0.00	2.08
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65								
	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
397.52 blank-3	327.12	592.00	940.89	3548.82	1469.69	4520.91	980.25	534.00
1094.77 SRM614-3	1545.73	1009.53	1031.45	4801.87	1534.41	2451.41	984.29	482.20
932.65 SRM612-3	752.28	751.32	926.25	7676.96	1566.49	2623.21	999.41	473.12
30224.01 SRM610-3	34771.48	20416.31	3942.38	30681.97	32864.11	93117.97	38123.06	19168.67
2060.17 AP1-3	11706.51	7078.00	1630.37	16129.49	1526.25	4247.78	823.32	470.88
3997.70 AP2-3	109985.73	63295.64	9118.33	53482.94	2819.42	6252.92	855.36	825.72
20381.23 AP3-3	943284.00	515188.41	61559.75	352856.00	12273.91	15596.17	935.05	2948.50
36411.68 AP4-3	1654692.80	914123.38	102964.78	617089.31	19769.19	24622.62	1111.25	4363.62
2660.38 MZ5-1	253597.27	142236.00	19896.83	108437.29	4060.06	22994.33	680.60	408.32
1857.49 MZ5-2	230862.06	130147.17	18337.06	98288.79	3708.90	16030.57	633.00	353.36
2584.21 MZ5-3	234858.92	132110.22	18822.03	100710.21	3756.70	20535.76	658.84	394.40
1301.81 MZ5-4	76454.23	45547.46	7005.76	40155.82	1941.49	4615.11	645.28	302.08
1360.77 MZ5-5	99865.73	58908.61	8844.49	50069.04	2227.61	4779.95	647.12	316.68

Appendix A. Raw trace element datasheets from laser ablation.

1679.61	MZ5-6	118476.95	68376.98	10009.66	56370.00	2441.29	5089.95	640.16	350.40
1564.45	MZ5-7	146047.42	84223.80	12273.55	66610.62	2797.50	5244.95	718.60	388.08
1478.37	MZ5-8	156322.23	89911.42	12919.23	70204.23	2854.70	5640.99	672.24	400.20
1335.85	MZ5-9	145914.22	84178.12	12005.39	64695.84	2713.74	5081.99	684.64	355.72
1369.97	MZ5-10	177920.00	101785.13	14519.92	76363.23	3182.38	5568.03	732.84	407.04
1412.73	MZ5-11	208076.25	118230.95	16546.33	88404.86	3449.82	5729.63	750.44	356.76
1264.25	MZ5-12	185650.64	105189.71	14704.76	78730.00	3077.78	5464.11	713.76	367.76
1647.93	MZ5-13	248597.00	138464.69	18622.35	101879.30	3845.22	5865.95	722.28	743.76
1721.45	MZ5-14	374448.44	208167.22	27231.43	146923.67	5114.11	6087.43	692.32	433.56
1981.93	MZ5-15	348038.06	194312.17	25066.14	137543.14	4759.75	6397.44	748.00	454.48
8822.05	MZ5-16	134571.84	77258.31	11118.38	60352.66	2499.89	7791.88	714.84	357.52
1677.29	MZ5-17	145964.27	82881.98	12350.71	64645.92	2772.10	7874.24	702.36	378.68
1841.73	MZ5-18	148162.00	85041.44	12260.27	65703.97	2729.82	7950.64	761.76	375.00
673.12	SRM614-4	1520.21	1158.85	436.00	9141.05	905.61	2830.86	795.68	383.56
5498.39	SRM612-4	16221.69	9882.86	1821.93	15705.09	5891.47	14384.64	7697.28	5324.67
34602.47	SRM610-4	40864.23	23340.77	3907.86	25971.47	33950.11	95483.34	44304.21	24107.06
770.68	AP1-4	2788.46	1920.73	622.04	9335.37	863.48	3353.38	736.24	416.16
1903.13	AP2-4	33719.23	20143.79	3231.30	21822.64	1537.57	4283.90	723.16	494.00
10528.58	AP3-4	445210.63	243878.25	30705.57	172922.73	6798.32	9687.29	894.21	1647.73
16950.38	AP4-4	751270.69	410319.78	48725.40	282391.84	10207.38	14786.40	911.13	2285.45
598.36	blank-4	440.44	563.28	276.96	7953.56	843.76	2244.29	605.00	281.84
497.94	blank average	383.78	577.64	608.92	5751.19	1156.73	3382.60	792.62	407.92

blank subtraction									
596.82	SRM614-3	1161.95	431.88	422.52	-949.33	377.68	-931.19	191.66	74.28
434.70	SRM612-3	368.50	173.68	317.32	1925.77	409.76	-759.38	206.78	65.20
29726.07	SRM610-3	34387.69	19838.67	3333.46	24930.78	31707.38	89735.37	37330.43	18760.75
1562.23	AP1-3	11322.72	6500.36	1021.45	10378.30	369.52	865.19	30.70	62.96
3499.76	AP2-3	109601.95	62717.99	8509.41	47731.75	1662.69	2870.32	62.74	417.80
19883.29	AP3-3	942900.22	514610.77	60950.82	347104.81	11117.18	12213.57	142.42	2540.57
35913.74	AP4-3	1654309.02	913545.74	102355.86	611338.12	18612.46	21240.02	318.62	3955.70
2162.43	MZ5-1	253213.49	141658.36	19287.91	102686.10	2903.34	19611.73	-112.02	0.40
1359.55	MZ5-2	230478.28	129569.53	17728.14	92537.60	2552.17	12647.97	-159.62	-54.56
2086.27	MZ5-3	234475.14	131532.58	18213.10	94959.02	2599.97	17153.16	-133.78	-13.52
803.86	MZ5-4	76070.45	44969.81	6396.84	34404.63	784.76	1232.51	-147.34	-105.84
862.82	MZ5-5	99481.94	58330.97	8235.57	44317.85	1070.89	1397.35	-145.50	-91.24
1181.67	MZ5-6	118093.17	67799.34	9400.73	50618.80	1284.57	1707.35	-152.46	-57.52
1066.51	MZ5-7	145663.64	83646.15	11664.63	60859.42	1640.77	1862.35	-74.02	-19.84
980.43	MZ5-8	155938.45	89333.78	12310.31	64453.04	1697.97	2258.39	-120.38	-7.72
837.90	MZ5-9	145530.44	83600.47	11396.46	58944.65	1557.01	1699.39	-107.98	-52.20
872.02	MZ5-10	177536.22	101207.49	13911.00	70612.03	2025.65	2185.43	-59.78	-0.88
914.79	MZ5-11	207692.47	117653.31	15937.41	82653.67	2293.09	2347.03	-42.18	-51.16
766.30	MZ5-12	185266.86	104612.07	14095.84	72978.81	1921.05	2081.51	-78.86	-40.16
1149.99	MZ5-13	248213.22	137887.05	18013.42	96128.11	2688.49	2483.35	-70.34	335.84
1223.51	MZ5-14	374064.66	207589.58	26622.51	141172.48	3957.38	2704.84	-100.30	25.64
1483.99	MZ5-15	347654.28	193734.53	24457.22	131791.95	3603.02	3014.84	-44.62	46.56
8324.11	MZ5-16	134188.06	76680.67	10509.46	54601.47	1343.17	4409.28	-77.78	-50.40
1179.35	MZ5-17	145580.49	82304.34	11741.79	58894.73	1615.37	4491.65	-90.26	-29.24
1343.79	MZ5-18	147778.22	84463.79	11651.35	59952.78	1573.09	4568.05	-30.86	-32.92
175.18	SRM614-4	1136.43	581.20	-172.92	3389.86	-251.12	-551.74	3.06	-24.36
5000.45	SRM612-4	15837.91	9305.21	1213.01	9953.90	4734.75	11002.04	6904.66	4916.75
34104.53	SRM610-4	40480.45	22763.13	3298.94	20220.27	32793.38	92100.74	43511.58	23699.13
272.74	AP1-4	2404.67	1343.09	13.12	3584.18	-293.24	-29.22	-56.38	8.24
1405.19	AP2-4	33335.45	19566.15	2622.37	16071.45	380.84	901.31	-69.46	86.08
10030.64	AP3-4	444826.85	243300.61	30096.65	167171.54	5641.59	6304.70	101.58	1239.81
16452.43	AP4-4	750886.91	409742.14	48116.47	276640.65	9050.65	11403.80	118.50	1877.53

zero correction									
596.82	SRM614-3	1161.95	431.88	422.52	0.00	377.68	0.00	191.66	74.28
434.70	SRM612-3	368.50	173.68	317.32	1925.77	409.76	0.00	206.78	65.20
29726.07	SRM610-3	34387.69	19838.67	3333.46	24930.78	31707.38	89735.37	37330.43	18760.75
1562.23	AP1-3	11322.72	6500.36	1021.45	10378.30	369.52	865.19	30.70	62.96
3499.76	AP2-3	109601.95	62717.99	8509.41	47731.75	1662.69	2870.32	62.74	417.80
19883.29	AP3-3	942900.22	514610.77	60950.82	347104.81	11117.18	12213.57	142.42	2540.57
35913.74	AP4-3	1654309.02	913545.74	102355.86	611338.12	18612.46	21240.02	318.62	3955.70
2162.43	MZ5-1	253213.49	141658.36	19287.91	102686.10	2903.34	19611.73	0.00	0.40
1359.55	MZ5-2	230478.28	129569.53	17728.14	92537.60	2552.17	12647.97	0.00	0.00
2086.27	MZ5-3	234475.14	131532.58	18213.10	94959.02	2599.97	17153.16	0.00	0.00
803.86	MZ5-4	76070.45	44969.81	6396.84	34404.63	784.76	1232.51	0.00	0.00
862.82	MZ5-5	99481.94	58330.97	8235.57	44317.85	1070.89	1397.35	0.00	0.00
1181.67	MZ5-6	118093.17	67799.34	9400.73	50618.80	1284.57	1707.35	0.00	0.00
1066.51	MZ5-7	145663.64	83646.15	11664.63	60859.42	1640.77	1862.35	0.00	0.00
980.43	MZ5-8	155938.45	89333.78	12310.31	64453.04	1697.97	2258.39	0.00	0.00
837.90	MZ5-9	145530.44	83600.47	11396.46	58944.65	1557.01	1699.39	0.00	0.00
872.02	MZ5-10	177536.22	101207.49	13911.00	70612.03	2025.65	2185.43	0.00	0.00
914.79	MZ5-11	207692.47	117653.31	15937.41	82653.67	2293.09	2347.03	0.00	0.00
766.30	MZ5-12	185266.86	104612.07	14095.84	72978.81	1921.05	2081.51	0.00	0.00
1149.99	MZ5-13	248213.22	137887.05	18013.42	96128.11	2688.49	2483.35	0.00	335.84

Appendix A. Raw trace element datasheets from laser ablation.

1223.51 MZ5-14	374064.66	207589.58	26622.51	141172.48	3957.38	2704.84	0.00	25.64
1483.99 MZ5-15	347654.28	193734.53	24457.22	131791.95	3603.02	3014.84	0.00	46.56
8324.11 MZ5-16	134188.06	76680.67	10509.46	54601.47	1343.17	4409.28	0.00	0.00
1179.35 MZ5-17	145580.49	82304.34	11741.79	58894.73	1615.37	4491.65	0.00	0.00
1343.79 MZ5-18	147778.22	84463.79	11651.35	59952.78	1573.09	4568.05	0.00	0.00
175.18 SRM614-4	1136.43	581.20	0.00	3389.86	0.00	0.00	3.06	0.00
5000.45 SRM612-4	15837.91	9305.21	1213.01	9953.90	4734.75	11002.04	6904.66	4916.75
34104.53 SRM610-4	40480.45	22763.13	3298.94	20220.27	32793.38	92100.74	43511.58	23699.13
272.74 AP1-4	2404.67	1343.09	13.12	3584.18	0.00	0.00	0.00	8.24
1405.19 AP2-4	33335.45	19566.15	2622.37	16071.45	380.84	901.31	0.00	86.08
10030.64 AP3-4	444826.85	243300.61	30096.65	167171.54	5641.59	6304.70	101.58	1239.81
16452.43 AP4-4	750886.91	409742.14	48116.47	276640.65	9050.65	11403.80	118.50	1877.53

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000508 SRM614-3	0.000990	0.000368	0.000360	0.000000	0.000322	0.000000	0.000163	0.000063
0.000506 SRM612-3	0.000429	0.000202	0.000369	0.002241	0.000477	0.000000	0.000241	0.000076
0.059650 SRM610-3	0.069005	0.039810	0.006689	0.050028	0.063626	0.180069	0.074910	0.037647
0.000119 AP1-3	0.000863	0.000496	0.000078	0.000791	0.000028	0.000066	0.000002	0.000005
0.000241 AP2-3	0.007548	0.004319	0.000586	0.003287	0.000114	0.000198	0.000004	0.000029
0.001339 AP3-3	0.063507	0.034660	0.004105	0.023378	0.000749	0.000823	0.000010	0.000171
0.002201 AP4-3	0.101389	0.055989	0.006273	0.037468	0.001141	0.001302	0.000020	0.000242
0.000170 MZ5-1	0.019948	0.011160	0.001519	0.008089	0.000229	0.001545	0.000000	0.000000
0.000099 MZ5-2	0.016818	0.009455	0.001294	0.006753	0.000186	0.000923	0.000000	0.000000
0.000178 MZ5-3	0.020020	0.011230	0.001555	0.008108	0.000222	0.001465	0.000000	0.000000
0.000095 MZ5-4	0.009000	0.005320	0.000757	0.004070	0.000093	0.000146	0.000000	0.000000
0.000093 MZ5-5	0.010679	0.006261	0.000884	0.004757	0.000115	0.000150	0.000000	0.000000
0.000119 MZ5-6	0.011846	0.006801	0.000943	0.005078	0.000129	0.000171	0.000000	0.000000
0.000073 MZ5-7	0.009956	0.005717	0.000797	0.004160	0.000112	0.000127	0.000000	0.000000
0.000062 MZ5-8	0.009808	0.005619	0.000774	0.004054	0.000107	0.000142	0.000000	0.000000
0.000056 MZ5-9	0.009689	0.005566	0.000759	0.003924	0.000104	0.000113	0.000000	0.000000
0.000053 MZ5-10	0.010746	0.006126	0.000842	0.004274	0.000123	0.000132	0.000000	0.000000
0.000050 MZ5-11	0.011243	0.006369	0.000863	0.004474	0.000124	0.000127	0.000000	0.000000
0.000046 MZ5-12	0.011011	0.006217	0.000838	0.004337	0.000114	0.000124	0.000000	0.000000
0.000090 MZ5-13	0.019435	0.010796	0.001410	0.007527	0.000211	0.000194	0.000000	0.000026
0.000090 MZ5-14	0.027649	0.015344	0.001968	0.010435	0.000293	0.000200	0.000000	0.000002
0.000104 MZ5-15	0.024395	0.013594	0.001716	0.009248	0.000253	0.000212	0.000000	0.000003
0.000572 MZ5-16	0.009224	0.005271	0.000722	0.003753	0.000092	0.000303	0.000000	0.000000
0.000077 MZ5-17	0.009544	0.005396	0.000770	0.003861	0.000106	0.000294	0.000000	0.000000
0.000085 MZ5-18	0.009384	0.005364	0.000740	0.003807	0.000100	0.000290	0.000000	0.000000
0.000264 SRM614-4	0.001713	0.000876	0.000000	0.005110	0.000000	0.000000	0.000005	0.000000
0.007046 SRM612-4	0.022316	0.013111	0.001709	0.014025	0.006671	0.015502	0.009729	0.006928
0.075729 SRM610-4	0.089886	0.050545	0.007325	0.044899	0.072817	0.204508	0.096617	0.052624
0.000029 AP1-4	0.000256	0.000143	0.000001	0.000382	0.000000	0.000000	0.000000	0.000001
0.000139 AP2-4	0.003308	0.001941	0.000260	0.001595	0.000038	0.000089	0.000000	0.000009
0.000924 AP3-4	0.040972	0.022410	0.002772	0.015398	0.000520	0.000581	0.000009	0.000114
0.001469 AP4-4	0.067065	0.036596	0.004297	0.024708	0.000808	0.001019	0.000011	0.000168

standardize signal averages AP								
0.000074 AP1	0.000560	0.000319	0.000040	0.000587	0.000014	0.000033	0.000001	0.000003
0.000190 AP2	0.005428	0.003130	0.000423	0.002441	0.000076	0.000144	0.000002	0.000019
0.001132 AP3	0.052239	0.028535	0.003439	0.019388	0.000634	0.000702	0.000009	0.000143
0.001835 AP4	0.084227	0.046293	0.005285	0.031088	0.000975	0.001160	0.000015	0.000205

linest from std sig ave								
0.016993	0.008171	0.015344	0.132190	0.022773	0.716748	0.004070	0.000000	0.021567

standardize signal averages SRM								
0.000386 srm614-2	0.001351	0.000622	0.000180	0.002555	0.000161	0.000000	0.000084	0.000032
0.003776 srm612-2	0.011372	0.006657	0.001039	0.008133	0.003574	0.007751	0.004985	0.003502
0.067689 srm610-2	0.079445	0.045177	0.007007	0.047463	0.068222	0.192289	0.085763	0.045135

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
0.000000	0.066392	0.000000	0.000000	0.000000	0.000000	0.026611	0.058036	0.082249
concentration data								
0.74 SRM614-3	0.69	0.48	4.08	0.00	19.77	0.00	0.00	0.12
0.74 SRM612-3	0.30	0.27	4.19	4.38	29.31	0.00	0.00	0.14
86.94 SRM610-3	48.35	52.39	75.84	97.71	3911.13	62.85	0.00	69.63
0.81 AP1-3	2.81	3.03	4.11	7.19	8.06	0.11	0.00	0.04
1.63 AP2-3	24.60	26.44	30.90	29.86	32.74	0.32	0.00	0.25
9.08 AP3-3	207.00	212.17	216.49	212.39	214.10	1.34	0.00	1.47
14.92 AP4-3	330.48	342.73	330.82	340.39	326.17	2.11	0.00	2.09
1.15 MZ5-1	65.02	68.31	80.13	73.49	65.40	2.51	0.00	0.00
0.67 MZ5-2	54.82	57.88	68.22	61.35	53.25	1.50	0.00	0.00
1.21 MZ5-3	65.26	68.75	82.01	73.66	63.48	2.38	0.00	0.00
0.64 MZ5-4	29.34	32.57	39.91	36.98	26.55	0.24	0.00	0.00
0.63 MZ5-5	34.81	38.33	46.62	43.22	32.87	0.24	0.00	0.00
0.80 MZ5-6	38.61	41.63	49.73	46.13	36.85	0.28	0.00	0.00
0.49 MZ5-7	32.45	35.00	42.04	37.79	32.07	0.21	0.00	0.00
0.42 MZ5-8	31.97	34.39	40.83	36.83	30.54	0.23	0.00	0.00
0.38 MZ5-9	31.58	34.07	40.01	35.65	29.64	0.18	0.00	0.00
0.36 MZ5-10	35.03	37.50	44.40	38.83	35.06	0.21	0.00	0.00
0.34 MZ5-11	36.65	38.98	45.50	40.65	35.49	0.21	0.00	0.00
0.31 MZ5-12	35.89	38.06	44.18	39.40	32.65	0.20	0.00	0.00
0.61 MZ5-13	63.35	66.09	74.38	68.38	60.19	0.32	0.00	0.23
0.61 MZ5-14	90.12	93.92	103.77	94.80	83.64	0.32	0.00	0.02
0.71 MZ5-15	79.52	83.21	90.50	84.01	72.29	0.34	0.00	0.03
3.88 MZ5-16	30.06	32.26	38.10	34.10	26.40	0.49	0.00	0.00
0.52 MZ5-17	31.11	33.03	40.59	35.08	30.28	0.48	0.00	0.00
0.58 MZ5-18	30.59	32.83	39.02	34.59	28.56	0.47	0.00	0.00
0.38 SRM614-4	1.20	1.15	0.00	9.98	0.00	0.00	0.00	0.00
10.27 SRM612-4	15.64	17.25	19.38	27.39	410.09	5.41	0.00	12.81
110.37 SRM610-4	62.99	66.52	83.05	87.69	4476.11	71.38	0.00	97.33
0.20 AP1-4	0.84	0.88	0.07	3.47	0.00	0.00	0.00	0.01
0.95 AP2-4	10.78	11.88	13.72	14.49	10.80	0.15	0.00	0.07
6.26 AP3-4	133.55	137.18	146.19	139.89	148.58	0.94	0.00	0.98
9.96 AP4-4	218.60	224.01	226.63	224.47	231.14	1.65	0.00	1.44

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
399.92 blank-1	587.88	1056.21	608.12	18121.38	1434.21	3206.10	700.84	405.24
1292.45 SRM614-1	1956.65	1355.77	1189.01	7431.84	1804.77	2657.46	1163.81	484.08
10471.10 SRM612-1	11002.26	6571.20	1777.13	12212.75	9627.77	25101.78	12292.79	7849.80
37690.89 SRM610-1	33618.31	19426.35	3651.50	22354.69	30455.01	85794.16	38622.38	22005.12
1094.65 AP1-1	6071.91	3951.74	1129.25	12053.87	1382.81	3550.38	986.05	459.00
1475.09 AP2-1	22659.21	13609.36	2507.41	20000.71	1615.53	4880.87	904.93	523.72
4276.66 AP3-1	106516.72	61334.95	8898.85	53181.62	2838.22	6038.55	863.92	732.48
7663.28 AP4-1	261677.75	147037.70	19687.47	111746.51	4978.71	10123.06	915.01	1089.45
605.84 MZ4-1	35532.92	21604.00	3717.46	26481.59	1602.53	6753.76	698.92	359.08
736.04 MZ4-2	39968.18	23814.09	4343.10	28563.48	1650.25	14292.80	720.80	371.44
1006.49 MZ4-3	38770.66	23124.77	4404.58	29060.00	1634.49	25027.46	677.76	346.40
948.93 MZ4-4	56862.12	34143.51	5381.39	34546.20	1803.05	4379.78	691.56	339.32
829.20 MZ4-5	57988.73	34332.79	5317.95	34609.91	1783.69	4002.94	733.68	340.08
907.89 MZ4-6	59827.18	35291.44	5520.63	35345.56	1802.17	3924.34	716.00	329.92
1002.01 MZ4-7	41894.80	25092.06	3999.34	28482.84	1617.65	3632.22	704.64	285.08
1006.21 MZ4-8	36100.13	21499.96	3578.42	26015.03	1512.65	3459.30	739.20	355.68
916.97 MZ4-9	36598.41	21803.20	3531.30	26516.87	1541.25	3672.22	718.84	335.36
649.40 MZ4-10	31834.58	19093.75	3329.94	29358.32	1836.69	4887.11	724.76	365.28
633.88 MZ4-11	39854.58	23810.14	4076.14	31824.06	1859.53	4851.75	736.52	384.60
724.88 MZ4-12	47103.95	27996.80	4600.55	33292.07	1817.37	4954.87	733.84	356.48
719.84 SRM614-2	1367.33	1417.09	700.08	16010.93	1454.13	3725.98	995.53	460.12
7474.80 SRM612-2	7873.88	4928.55	1318.01	16962.06	7906.56	20492.76	9849.22	6652.32
35360.36 SRM610-2	37766.93	21691.28	3803.62	28365.72	33556.15	93685.52	41608.00	22203.05
433.44 AP1-2	1689.49	1475.73	640.08	11842.67	1153.77	3417.90	805.92	352.16
946.29 AP2-2	16513.05	10237.42	1943.45	17898.38	1282.37	4329.98	773.56	440.52
4195.02 AP3-2	123544.70	70380.63	10018.90	58878.41	2945.18	6133.27	723.64	708.76
6472.08 AP4-2	209363.45	117991.30	16109.85	91371.44	4396.38	8722.65	799.40	912.13
488.52 blank-2	664.32	952.53	537.88	16736.30	1367.49	3214.14	760.80	342.16
444.22 blank average	626.10	1004.37	573.00	17428.84	1400.85	3210.12	730.82	373.70

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction								
848.22 SRM614-1	1330.55	351.40	616.00	-9997.00	403.92	-552.66	432.98	110.38
10026.88 SRM612-1	10376.16	5566.83	1204.13	-5216.09	8226.93	21891.66	11561.96	7476.10
37246.67 SRM610-1	32992.21	18421.98	3078.50	4925.85	29054.16	82584.05	37891.55	21631.42
650.42 AP1-1	5445.81	2947.38	556.24	-5374.97	-18.04	340.26	255.22	85.30
1030.87 AP2-1	22033.10	12604.99	1934.41	2571.87	214.68	1670.75	174.10	150.02
3832.44 AP3-1	105890.62	60330.58	8325.85	35752.78	1437.37	2828.44	133.10	358.78
7219.06 AP4-1	261051.65	146033.33	19114.47	94317.67	3577.86	6912.94	184.18	715.74
161.62 MZ4-1	34906.81	20599.64	3144.46	9052.75	201.68	3543.64	-31.90	-14.62
291.82 MZ4-2	39342.08	22809.73	3770.10	11134.64	249.40	11082.68	-10.02	-2.26
562.26 MZ4-3	38144.55	22120.40	3831.58	11631.17	233.64	21817.34	-53.06	-27.30
504.70 MZ4-4	56236.02	33139.15	4808.39	17117.36	402.20	1169.67	-39.26	-34.38
384.98 MZ4-5	57362.62	33328.43	4744.95	17181.08	382.84	792.82	2.86	-33.62
463.66 MZ4-6	59201.07	34287.07	4947.63	17916.72	401.32	714.22	-14.82	-43.78
557.78 MZ4-7	41268.69	24087.70	3426.34	11054.00	216.80	422.10	-26.18	-88.62
561.98 MZ4-8	35474.02	20495.60	3005.42	8586.19	111.80	249.18	8.38	-18.02
472.74 MZ4-9	35972.30	20798.84	2958.30	9088.03	140.40	462.10	-11.98	-38.34
205.18 MZ4-10	31208.48	18089.38	2756.94	11929.49	435.84	1676.99	-6.06	-8.42
189.66 MZ4-11	39228.48	22805.77	3503.14	14395.22	458.68	1641.63	5.70	10.90
280.66 MZ4-12	46477.84	26992.43	4027.54	15863.23	416.52	1744.75	3.02	-17.22
275.62 SRM614-2	741.22	412.72	127.08	-1417.91	53.28	515.86	264.70	86.42
7030.58 SRM612-2	7247.78	3924.18	745.00	-466.78	6505.72	17282.64	9118.39	6278.62
34916.14 SRM610-2	37140.83	20686.92	3230.62	10936.88	32155.30	90475.41	40877.17	21829.34
-10.78 AP1-2	1063.39	471.36	67.08	-5586.17	-247.08	207.78	75.10	-21.54
502.06 AP2-2	15886.95	9233.05	1370.45	469.54	-118.48	1119.87	42.74	66.82
3750.80 AP3-2	122918.60	69376.27	9445.89	41449.57	1544.33	2923.16	-7.18	335.06
6027.85 AP4-2	208737.35	116986.93	15536.85	73942.60	2995.54	5512.53	68.58	538.42

zero correction								
848.22 SRM614-1	1330.55	351.40	616.00	0.00	403.92	0.00	432.98	110.38
10026.88 SRM612-1	10376.16	5566.83	1204.13	0.00	8226.93	21891.66	11561.96	7476.10
37246.67 SRM610-1	32992.21	18421.98	3078.50	4925.85	29054.16	82584.05	37891.55	21631.42
650.42 AP1-1	5445.81	2947.38	556.24	0.00	0.00	340.26	255.22	85.30
1030.87 AP2-1	22033.10	12604.99	1934.41	2571.87	214.68	1670.75	174.10	150.02
3832.44 AP3-1	105890.62	60330.58	8325.85	35752.78	1437.37	2828.44	133.10	358.78
7219.06 AP4-1	261051.65	146033.33	19114.47	94317.67	3577.86	6912.94	184.18	715.74
161.62 MZ4-1	34906.81	20599.64	3144.46	9052.75	201.68	3543.64	0.00	0.00
291.82 MZ4-2	39342.08	22809.73	3770.10	11134.64	249.40	11082.68	0.00	0.00
562.26 MZ4-3	38144.55	22120.40	3831.58	11631.17	233.64	21817.34	0.00	0.00
504.70 MZ4-4	56236.02	33139.15	4808.39	17117.36	402.20	1169.67	0.00	0.00
384.98 MZ4-5	57362.62	33328.43	4744.95	17181.08	382.84	792.82	2.86	0.00
463.66 MZ4-6	59201.07	34287.07	4947.63	17916.72	401.32	714.22	0.00	0.00
557.78 MZ4-7	41268.69	24087.70	3426.34	11054.00	216.80	422.10	0.00	0.00
561.98 MZ4-8	35474.02	20495.60	3005.42	8586.19	111.80	249.18	8.38	0.00
472.74 MZ4-9	35972.30	20798.84	2958.30	9088.03	140.40	462.10	0.00	0.00
205.18 MZ4-10	31208.48	18089.38	2756.94	11929.49	435.84	1676.99	0.00	0.00
189.66 MZ4-11	39228.48	22805.77	3503.14	14395.22	458.68	1641.63	5.70	10.90
280.66 MZ4-12	46477.84	26992.43	4027.54	15863.23	416.52	1744.75	3.02	0.00
275.62 SRM614-2	741.22	412.72	127.08	0.00	53.28	515.86	264.70	86.42
7030.58 SRM612-2	7247.78	3924.18	745.00	0.00	6505.72	17282.64	9118.39	6278.62
34916.14 SRM610-2	37140.83	20686.92	3230.62	10936.88	32155.30	90475.41	40877.17	21829.34
0.00 AP1-2	1063.39	471.36	67.08	0.00	0.00	207.78	75.10	0.00
502.06 AP2-2	15886.95	9233.05	1370.45	469.54	0.00	1119.87	42.74	66.82
3750.80 AP3-2	122918.60	69376.27	9445.89	41449.57	1544.33	2923.16	0.00	335.06
6027.85 AP4-2	208737.35	116986.93	15536.85	73942.60	2995.54	5512.53	68.58	538.42

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.001063 SRM614-1	0.001668	0.000440	0.000772	0.000000	0.000506	0.000000	0.000543	0.000138
0.007216 SRM612-1	0.007467	0.004006	0.000867	0.000000	0.005920	0.015754	0.008321	0.005380

Appendix A. Raw trace element datasheets from laser ablation.

0.085235 SRM610-1	0.075499	0.042157	0.007045	0.011272	0.066487	0.188984	0.086710	0.049501
0.000079 AP1-1	0.000665	0.000360	0.000068	0.000000	0.000000	0.000042	0.000031	0.000010
0.000152 AP2-1	0.003257	0.001863	0.000286	0.000380	0.000032	0.000247	0.000026	0.000022
0.000593 AP3-1	0.016386	0.009336	0.001288	0.005533	0.000222	0.000438	0.000021	0.000056
0.000850 AP4-1	0.030741	0.017197	0.002251	0.011107	0.000421	0.000814	0.000022	0.000084
0.000026 MZ4-1	0.005529	0.003263	0.000498	0.001434	0.000032	0.000561	0.000000	0.000000
0.000044 MZ4-2	0.005994	0.003475	0.000574	0.001697	0.000038	0.001689	0.000000	0.000000
0.000086 MZ4-3	0.005866	0.003402	0.000589	0.001789	0.000036	0.003355	0.000000	0.000000
0.000080 MZ4-4	0.008921	0.005257	0.000763	0.002716	0.000064	0.001866	0.000000	0.000000
0.000063 MZ4-5	0.009319	0.005414	0.000771	0.002791	0.000062	0.000129	0.000000	0.000000
0.000075 MZ4-6	0.009635	0.005580	0.000805	0.002916	0.000065	0.000116	0.000000	0.000000
0.000111 MZ4-7	0.008221	0.004799	0.000683	0.002202	0.000043	0.000084	0.000000	0.000000
0.000117 MZ4-8	0.007373	0.004260	0.000625	0.001785	0.000023	0.000052	0.000002	0.000000
0.000095 MZ4-9	0.007255	0.004195	0.000597	0.001833	0.000028	0.000093	0.000000	0.000000
0.000042 MZ4-10	0.006428	0.003726	0.000568	0.002457	0.000090	0.000345	0.000000	0.000000
0.000032 MZ4-11	0.006586	0.003829	0.000588	0.002417	0.000077	0.000276	0.000001	0.000002
0.000042 MZ4-12	0.006873	0.003992	0.000596	0.002346	0.000062	0.000258	0.000000	0.000000
0.000263 SRM614-2	0.000708	0.000394	0.000121	0.000000	0.000051	0.000493	0.000253	0.000083
0.006757 SRM612-2	0.006966	0.003772	0.000716	0.000000	0.006253	0.016611	0.008764	0.006035
0.078227 SRM610-2	0.083211	0.046347	0.007238	0.024503	0.072041	0.202702	0.091582	0.048907
0.000000 AP1-2	0.000186	0.000082	0.000012	0.000000	0.000000	0.000036	0.000013	0.000000
0.000084 AP2-2	0.002665	0.001549	0.000230	0.000079	0.000000	0.000188	0.000007	0.000011
0.000584 AP3-2	0.019153	0.010810	0.001472	0.006458	0.000241	0.000455	0.000000	0.000052
0.000759 AP4-2	0.026299	0.014739	0.001957	0.009316	0.000377	0.000695	0.000009	0.000068
standardize signal averages AP								
0.000040 AP1	0.000425	0.000221	0.000040	0.000000	0.000000	0.000039	0.000022	0.000005
0.000118 AP2	0.002961	0.001706	0.000258	0.000229	0.000016	0.000217	0.000016	0.000017
0.000589 AP3	0.017769	0.010073	0.001380	0.005996	0.000232	0.000447	0.000010	0.000054
0.000805 AP4	0.028520	0.015968	0.002104	0.010211	0.000399	0.000754	0.000015	0.000076
linest from std sig ave								
0.036401	0.024115	0.044196	0.331056	0.070282	1.806168	0.006243	0.000000	0.057234
standardize signal averages SRM								
0.000663 srm614-2	0.001188	0.000417	0.000447	0.000000	0.000279	0.000246	0.000398	0.000110
0.006987 srm612-2	0.007217	0.003889	0.000791	0.000000	0.006087	0.016183	0.008542	0.005707
0.081731 srm610-2	0.079355	0.044252	0.007141	0.017888	0.069264	0.195843	0.089146	0.049204
linest from std sig ave								
0.000000	0.066989	0.000000	0.000000	0.000000	0.000000	0.026084	0.055681	0.075229
concentration data								
3.32 SRM614-1	3.45	1.67	21.92	0.00	78.42	0.00	0.00	0.68
22.53 SRM612-1	15.44	15.19	24.60	0.00	917.10	8.44	0.00	26.41
266.09 SRM610-1	156.14	159.79	200.02	67.94	10299.00	101.19	0.00	242.98
1.15 AP1-1	6.39	6.34	8.97	0.00	0.00	0.10	0.00	0.24
2.21 AP2-1	31.34	32.86	37.77	10.66	22.87	0.62	0.00	0.51
8.61 AP3-1	157.64	164.61	170.16	155.12	160.27	1.09	0.00	1.27
12.35 AP4-1	295.74	303.21	297.28	311.41	303.59	2.03	0.00	1.92
0.37 MZ4-1	53.19	57.52	65.77	40.20	23.02	1.40	0.00	0.00
0.65 MZ4-2	57.67	61.28	75.87	47.57	27.38	4.21	0.00	0.00
1.26 MZ4-3	56.44	59.98	77.83	50.15	25.89	8.36	0.00	0.00
1.16 MZ4-4	85.83	92.69	100.75	76.14	45.98	0.46	0.00	0.00
0.91 MZ4-5	89.65	95.46	101.80	78.26	44.81	0.32	0.00	0.00
1.10 MZ4-6	92.69	98.39	106.35	81.76	47.06	0.29	0.00	0.00
1.61 MZ4-7	79.09	84.61	90.15	61.74	31.12	0.21	0.00	0.00
1.70 MZ4-8	70.93	75.11	82.50	50.04	16.74	0.13	0.00	0.00
1.38 MZ4-9	69.80	73.96	78.80	51.39	20.40	0.23	0.00	0.00
0.61 MZ4-10	61.84	65.69	74.99	68.89	64.68	0.86	0.00	0.00
0.46 MZ4-11	63.36	67.51	77.67	67.76	55.49	0.69	0.00	0.04
0.60 MZ4-12	66.12	70.38	78.66	65.77	44.38	0.64	0.00	0.00
0.82 SRM614-2	1.46	1.49	3.45	0.00	7.89	0.26	0.00	0.41
21.10 SRM612-2	14.41	14.30	20.33	0.00	968.59	8.89	0.00	29.62
244.21 SRM610-2	172.09	175.68	205.50	147.69	11159.35	108.53	0.00	240.06
0.00 AP1-2	1.79	1.45	1.55	0.00	0.00	0.09	0.00	0.00
1.22 AP2-2	25.64	27.31	30.36	2.21	0.00	0.47	0.00	0.26
8.49 AP3-2	184.25	190.59	194.38	181.08	173.38	1.13	0.00	1.19
11.03 AP4-2	253.00	259.88	258.53	261.20	271.94	1.73	0.00	1.55
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
363.64 blank-3	271.64	281.60	431.64	2433.17	931.61	1322.37	651.88	360.68
999.69 SRM614-3	2096.25	1235.37	752.52	5920.63	1218.73	2932.54	1049.77	608.32
13932.16 SRM612-3	19152.55	11024.62	2265.09	12780.87	10247.62	34689.68	14353.56	8538.77
75738.43 SRM610-3	102015.89	56266.40	8694.05	45030.54	56593.76	217764.78	79953.61	41311.43
712.32 AP1-3	7599.88	4263.22	1073.81	6239.31	1000.29	5830.83	868.72	599.36
2417.17 AP2-3	51926.21	30317.17	4781.19	23995.78	1771.45	7402.20	882.32	718.80
15782.77 AP3-3	640411.50	347035.19	42161.12	232908.19	8415.53	16994.98	1039.93	2119.33
27743.96 AP4-3	1159291.40	627594.63	70254.59	415563.28	13304.48	23485.85	1013.97	2772.70
1351.61 TGP3-1	294000.91	161558.63	23610.37	121094.16	4278.14	82925.43	846.88	531.68
1236.21 TGP3-2	220186.59	123258.62	19125.75	94259.69	3518.74	75364.02	792.08	554.12
1279.33 TGP3-3	240749.03	133993.36	20291.07	101542.38	3630.86	71236.44	754.96	568.08
1573.29 TGP3-4	235410.77	131369.98	20536.28	101491.13	3803.70	83525.47	833.88	697.32
1310.61 TGP3-5	218213.19	122167.69	18930.51	94287.69	3512.10	77775.40	809.40	657.40
2106.53 TGP3-6	241627.69	134390.88	20212.79	102766.94	3607.94	76754.20	770.92	633.72
2308.37 TGP3-7	153564.19	86913.85	14448.40	71150.48	3397.62	79680.57	872.80	852.12
1612.29 TGP3-8	124105.58	70421.31	11975.67	58148.53	2687.06	68704.06	782.00	699.96
1190.61 TGP3-9	84806.59	48816.84	8996.05	42597.56	2048.93	57877.13	831.32	658.36
1570.37 TGP3-10	154282.19	86346.24	13970.80	69259.59	3159.98	61500.23	804.28	732.36
1633.61 TGP3-11	170556.41	95938.58	15250.85	75472.59	3082.42	64477.88	780.44	692.28
1474.29 TGP3-12	128191.84	73051.09	12107.99	59195.33	2616.29	61101.58	816.32	655.36
1800.41 TGP3-13	127909.92	71782.00	10427.90	53504.54	3787.02	13808.48	769.92	584.32
1560.09 TGP3-14	117627.14	66916.02	9729.70	50791.29	2863.14	12404.47	712.44	534.76
2652.22 TGP3-15	201007.89	111439.66	15140.65	80944.41	5763.63	15372.89	837.64	668.92
922.69 SRM614-4	1640.21	1051.49	395.92	6021.11	885.92	2648.97	873.72	490.92
9351.33 SRM612-4	11144.58	6434.08	1299.97	10231.82	9456.49	25096.02	11947.27	8008.89
56704.68 SRM610-4	68440.66	38334.26	6002.71	32939.23	52161.38	160860.42	67875.42	36105.24
566.68 AP1-4	959.37	688.64	354.56	4766.63	701.00	2855.94	734.40	412.80
1718.89 AP2-4	30433.25	18022.26	2863.86	16948.70	1308.33	4286.46	754.36	539.96
8888.21 AP3-4	363647.34	197920.31	24807.82	136608.33	5432.55	9702.05	886.84	1453.09
19314.55 AP4-4	844563.13	453127.75	51297.05	303315.91	10375.02	16470.13	893.13	2124.89
721.28 blank-4	744.08	528.84	207.52	4377.66	583.20	1614.17	632.04	296.96
542.46 blank average	507.86	405.22	319.58	3405.42	757.40	1468.27	641.96	328.82
blank subtraction								
457.22 SRM614-3	1588.39	830.14	432.94	2515.21	461.32	1464.27	407.80	279.50
13389.69 SRM612-3	18644.69	10619.40	1945.51	9375.45	9490.21	33221.41	13711.60	8209.95
75195.97 SRM610-3	101508.03	55861.18	8374.47	41625.12	55836.35	216296.51	79311.65	40982.61
169.86 AP1-3	7092.02	3858.00	754.22	2833.90	242.88	4362.56	226.76	270.54
1874.71 AP2-3	51418.35	29911.95	4461.61	20590.36	1014.05	5933.93	240.36	389.98
15240.31 AP3-3	639903.64	346629.97	41841.54	229502.77	7658.12	15526.71	397.96	1790.51
27201.49 AP4-3	1158783.54	627189.41	69935.01	412157.86	12547.07	22017.58	372.00	2443.87
809.14 TGP3-1	293493.05	161153.41	23290.79	117688.74	3520.74	81457.16	204.92	202.86
693.74 TGP3-2	219678.73	122853.40	18806.17	90854.27	2761.34	73895.75	150.12	225.30
736.86 TGP3-3	240241.17	133588.14	19971.49	98136.96	2873.46	69768.17	113.00	239.26
1030.83 TGP3-4	234902.91	130964.76	20216.69	98085.71	3046.30	82057.20	191.92	368.50
768.14 TGP3-5	217705.33	121762.47	18610.92	90882.27	2754.70	76307.13	167.44	328.58
1564.07 TGP3-6	241119.83	133985.66	19893.21	99361.52	2850.54	75285.93	128.96	304.90
1765.91 TGP3-7	153056.33	86508.63	14128.82	67745.06	2640.21	78212.30	230.84	523.30
1069.83 TGP3-8	123597.72	70016.09	11656.09	54743.11	1929.65	67235.79	140.04	371.14
648.14 TGP3-9	84298.73	48411.61	8676.47	39192.14	1291.53	56408.86	189.36	329.54
1027.91 TGP3-10	153774.33	85941.02	13651.22	65854.17	2402.57	60031.96	162.32	403.54
1091.15 TGP3-11	170048.55	95533.36	14931.26	72067.17	2325.01	63009.61	138.48	363.46
931.83 TGP3-12	127683.98	72645.86	11788.41	55789.91	1858.89	59633.31	174.36	326.54
1257.95 TGP3-13	127402.06	71376.78	10108.32	50099.12	3029.62	12340.21	127.96	255.50
1017.63 TGP3-14	117119.28	66510.79	9410.11	47385.87	2105.73	10936.20	70.48	205.94
2109.75 TGP3-15	200500.03	111034.44	14821.06	77538.99	5006.23	13904.62	195.68	340.10
380.22 SRM614-4	1132.35	646.26	76.34	2615.69	128.52	1180.71	231.76	162.10
8808.87 SRM612-4	10636.72	6028.85	980.39	6826.40	8699.09	23627.75	11305.30	7680.06
56162.22 SRM610-4	67932.80	37929.04	5683.13	29533.81	51403.97	159392.15	67233.46	35776.42
24.22 AP1-4	451.50	283.42	34.98	1361.21	-56.40	1387.67	92.44	83.98
1176.43 AP2-4	29925.39	17617.04	2544.27	13543.28	550.92	2818.20	112.40	211.14
8345.75 AP3-4	363139.48	197515.09	24488.24	133202.91	4675.15	8233.79	244.88	1124.27
18772.09 AP4-4	844055.27	452722.53	50977.47	299910.49	9617.61	15001.86	251.16	1796.07
zero correction								
457.22 SRM614-3	1588.39	830.14	432.94	2515.21	461.32	1464.27	407.80	279.50
13389.69 SRM612-3	18644.69	10619.40	1945.51	9375.45	9490.21	33221.41	13711.60	8209.95
75195.97 SRM610-3	101508.03	55861.18	8374.47	41625.12	55836.35	216296.51	79311.65	40982.61
169.86 AP1-3	7092.02	3858.00	754.22	2833.90	242.88	4362.56	226.76	270.54
1874.71 AP2-3	51418.35	29911.95	4461.61	20590.36	1014.05	5933.93	240.36	389.98
15240.31 AP3-3	639903.64	346629.97	41841.54	229502.77	7658.12	15526.71	397.96	1790.51
27201.49 AP4-3	1158783.54	627189.41	69935.01	412157.86	12547.07	22017.58	372.00	2443.87
809.14 TGP3-1	293493.05	161153.41	23290.79	117688.74	3520.74	81457.16	204.92	202.86
693.74 TGP3-2	219678.73	122853.40	18806.17	90854.27	2761.34	73895.75	150.12	225.30
736.86 TGP3-3	240241.17	133588.14	19971.49	98136.96	2873.46	69768.17	113.00	239.26

Appendix A. Raw trace element datasheets from laser ablation.

1030.83 TGP3-4	234902.91	130964.76	20216.69	98085.71	3046.30	82057.20	191.92	368.50
768.14 TGP3-5	217705.33	121762.47	18610.92	90882.27	2754.70	76307.13	167.44	328.58
1564.07 TGP3-6	241119.83	133985.66	19893.21	99361.52	2850.54	75285.93	128.96	304.90
1765.91 TGP3-7	153056.33	86508.63	14128.82	67745.06	2640.21	78212.30	230.84	523.30
1069.83 TGP3-8	123597.72	70016.09	11656.09	54743.11	1929.65	67235.79	140.04	371.14
648.14 TGP3-9	84298.73	48411.61	8676.47	39192.14	1291.53	56408.86	189.36	329.54
1027.91 TGP3-10	153774.33	85941.02	13651.22	65854.17	2402.57	60031.96	162.32	403.54
1091.15 TGP3-11	170048.55	95533.36	14931.26	72067.17	2325.01	63009.61	138.48	363.46
931.83 TGP3-12	127683.98	72645.86	11788.41	55789.91	1858.89	59633.31	174.36	326.54
1257.95 TGP3-13	127402.06	71376.78	10108.32	50099.12	3029.62	12340.21	127.96	255.50
1017.63 TGP3-14	117119.28	66510.79	9410.11	47385.87	2105.73	10936.20	70.48	205.94
2109.75 TGP3-15	200500.03	111034.44	14821.06	77538.99	5006.23	13904.62	195.68	340.10
380.22 SRM614-4	1132.35	646.26	76.34	2615.69	128.52	1180.71	231.76	162.10
8808.87 SRM612-4	10636.72	6028.85	980.39	6826.40	8699.09	23627.75	11305.30	7680.06
56162.22 SRM610-4	67932.80	37929.04	5683.13	29533.81	51403.97	159392.15	67233.46	35776.42
24.22 AP1-4	451.50	283.42	34.98	1361.21	0.00	1387.67	92.44	83.98
1176.43 AP2-4	29925.39	17617.04	2544.27	13543.28	550.92	2818.20	112.40	211.14
8345.75 AP3-4	363139.48	197515.09	24488.24	133202.91	4675.15	8233.79	244.88	1124.27
18772.09 AP4-4	844055.27	452722.53	50977.47	299910.49	9617.61	15001.86	251.16	1796.07

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000141 SRM614-3	0.000491	0.000257	0.000134	0.000778	0.000143	0.000453	0.000126	0.000086
0.004371 SRM612-3	0.006086	0.003466	0.000635	0.003060	0.003098	0.010844	0.004476	0.002680
0.055266 SRM610-3	0.074604	0.041055	0.006155	0.030593	0.041037	0.158968	0.058290	0.030120
0.000009 AP1-3	0.000394	0.000214	0.000042	0.000157	0.000013	0.000242	0.000013	0.000015
0.000108 AP2-3	0.002974	0.001730	0.000258	0.001191	0.000059	0.000343	0.000014	0.000023
0.000685 AP3-3	0.028751	0.015574	0.001880	0.010311	0.000344	0.000698	0.000018	0.000080
0.001386 AP4-3	0.059050	0.031961	0.003564	0.021003	0.000639	0.001122	0.000019	0.000125
0.000032 TGP3-1	0.011475	0.006301	0.000911	0.004601	0.000138	0.003185	0.000008	0.000008
0.000030 TGP3-2	0.009458	0.005289	0.000810	0.003912	0.000119	0.003182	0.000006	0.000010
0.000035 TGP3-3	0.011488	0.006388	0.000955	0.004693	0.000137	0.003336	0.000005	0.000011
0.000040 TGP3-4	0.009157	0.005105	0.000788	0.003823	0.000119	0.003199	0.000007	0.000014
0.000032 TGP3-5	0.008991	0.005029	0.000769	0.003753	0.000114	0.003152	0.000007	0.000014
0.000068 TGP3-6	0.010528	0.005850	0.000869	0.004338	0.000124	0.003287	0.000006	0.000013
0.000082 TGP3-7	0.007143	0.004037	0.000659	0.003161	0.000123	0.003650	0.000011	0.000024
0.000051 TGP3-8	0.005861	0.003320	0.000553	0.002596	0.000092	0.003188	0.000007	0.000018
0.000027 TGP3-9	0.003515	0.002019	0.000362	0.001634	0.000054	0.002352	0.000008	0.000014
0.000051 TGP3-10	0.007694	0.004300	0.000683	0.003295	0.000120	0.003004	0.000008	0.000020
0.000052 TGP3-11	0.008131	0.004568	0.000714	0.003446	0.000111	0.003013	0.000007	0.000017
0.000043 TGP3-12	0.005918	0.003367	0.000546	0.002586	0.000086	0.002764	0.000008	0.000015
0.000112 TGP3-13	0.011329	0.006347	0.000899	0.004455	0.000269	0.001097	0.000011	0.000023
0.000089 TGP3-14	0.010208	0.005797	0.000820	0.004130	0.000184	0.000953	0.000006	0.000018
0.000143 TGP3-15	0.013578	0.007520	0.001004	0.005251	0.000339	0.000942	0.000013	0.000023
0.000193 SRM614-4	0.000576	0.000329	0.000039	0.001330	0.000065	0.000600	0.000118	0.000082
0.004069 SRM612-4	0.004913	0.002785	0.000453	0.003153	0.000410	0.010914	0.005222	0.003548
0.059431 SRM610-4	0.071886	0.040136	0.006014	0.031253	0.054395	0.168668	0.071146	0.037858
0.000002 AP1-4	0.000035	0.000022	0.000003	0.000107	0.000000	0.000109	0.000007	0.000007
0.000089 AP2-4	0.002254	0.001327	0.000192	0.001020	0.000041	0.000212	0.000008	0.000016
0.000509 AP3-4	0.022144	0.012044	0.001493	0.008123	0.000285	0.000502	0.000015	0.000069
0.001219 AP4-4	0.054799	0.029392	0.003310	0.019471	0.000624	0.000974	0.000016	0.000117

standardize signal averages AP								
0.000006 AP1	0.000215	0.000118	0.000022	0.000132	0.000007	0.000176	0.000010	0.000011
0.000099 AP2	0.002614	0.001528	0.000225	0.001105	0.000050	0.000278	0.000011	0.000019
0.000597 AP3	0.025447	0.013809	0.001687	0.009217	0.000315	0.000600	0.000016	0.000075
0.001302 AP4	0.056924	0.030676	0.003437	0.020237	0.000632	0.001048	0.000018	0.000121

linest from std sig ave								
0.025581	0.012956	0.024735	0.217999	0.037444	1.183089	0.004523	0.000000	0.037897

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
0.000167 srm614-2	0.000533	0.000293	0.000086	0.001054	0.000104	0.000527	0.000122	0.000084
0.004220 srm612-2	0.005500	0.003126	0.000544	0.003107	0.003558	0.010879	0.004849	0.003114
0.057348 srm610-2	0.073245	0.040596	0.006084	0.030923	0.047716	0.163818	0.064718	0.033989

linest from std sig ave								
0.000000	0.072681	0.000000	0.000000	0.000000	0.000000	0.031216	0.076841	0.109140

concentration data								
0.31 SRM614-3	0.55	0.54	2.50	2.50	14.48	0.18	0.00	0.28
9.59 SRM612-3	6.76	7.35	11.87	9.83	314.31	4.21	0.00	8.71
121.25 SRM610-3	82.89	87.09	115.07	98.24	4163.85	61.67	0.00	97.90
0.10 AP1-3	2.04	2.12	3.65	2.35	6.37	0.44	0.00	0.23
1.11 AP2-3	15.37	17.07	22.44	17.79	27.68	0.62	0.00	0.34
6.99 AP3-3	148.60	153.68	163.49	154.03	162.40	1.26	0.00	1.22
14.15 AP4-3	305.20	315.38	309.94	313.74	301.77	2.02	0.00	1.88
0.32 TGP3-1	59.31	62.17	79.19	68.73	64.97	5.75	0.00	0.12
0.30 TGP3-2	48.88	52.19	70.42	58.43	56.11	5.74	0.00	0.15
0.36 TGP3-3	59.38	63.04	83.06	70.10	64.85	6.02	0.00	0.17
0.41 TGP3-4	47.33	50.38	68.54	57.11	56.05	5.77	0.00	0.22
0.32 TGP3-5	46.47	49.62	66.85	56.07	53.70	5.69	0.00	0.21
0.70 TGP3-6	54.42	57.73	75.54	64.81	58.74	5.93	0.00	0.20
0.84 TGP3-7	36.92	39.84	57.34	47.22	58.15	6.59	0.00	0.37
0.52 TGP3-8	30.29	32.76	48.07	38.78	43.19	5.75	0.00	0.27
0.28 TGP3-9	18.17	19.92	31.47	24.41	25.42	4.24	0.00	0.21
0.52 TGP3-10	39.77	42.43	59.40	49.22	56.74	5.42	0.00	0.31
0.53 TGP3-11	42.02	45.07	62.09	51.47	52.47	5.44	0.00	0.26
0.44 TGP3-12	30.59	33.22	47.52	38.62	40.66	4.99	0.00	0.23
1.14 TGP3-13	58.55	62.63	78.17	66.55	127.15	1.98	0.00	0.34
0.91 TGP3-14	52.76	57.20	71.33	61.69	86.62	1.72	0.00	0.27
1.46 TGP3-15	70.18	74.20	87.29	78.44	160.02	1.70	0.00	0.35
0.42 SRM614-4	0.64	0.70	0.73	4.27	6.63	0.23	0.00	0.27
8.93 SRM612-4	5.46	5.91	8.47	10.13	407.72	4.23	0.00	11.53
130.38 SRM610-4	79.88	85.14	112.44	100.36	5519.25	65.43	0.00	123.05
0.02 AP1-4	0.18	0.22	0.24	1.60	0.00	0.20	0.00	0.10
0.90 AP2-4	11.65	13.09	16.66	15.24	19.58	0.38	0.00	0.24
5.19 AP3-4	114.45	118.85	129.87	121.33	134.55	0.91	0.00	1.04
12.44 AP4-4	283.23	290.03	287.83	290.85	294.70	1.76	0.00	1.76

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
563.52 blank-1	359.60	290.44	448.56	2318.77	957.65	1310.61	590.72	365.88
966.77 SRM614-1	1620.33	1036.53	742.84	6383.24	1327.81	3056.66	1161.45	695.76
15821.69 SRM612-1	19177.71	10919.74	2168.29	12399.39	11815.67	39394.46	17185.34	9927.10
74061.18 SRM610-1	75832.39	42756.96	7019.36	33898.55	51738.93	203734.67	76728.91	35356.24
942.93 AP1-1	9697.37	5567.91	1217.37	5936.35	927.25	3932.26	954.97	645.88
3203.38 AP2-1	74809.42	43182.08	6772.96	32486.42	2087.17	6640.36	911.69	764.92
26879.59 AP3-1	1070233.40	582114.31	65559.85	385579.84	12477.55	20269.03	1074.49	2728.98
29659.37 AP4-1	1282540.90	693376.56	77087.67	459172.03	14495.36	24772.66	1086.57	3048.78
4006.30 TGP2-1	334193.81	186277.00	26384.51	135504.41	4812.47	63490.48	870.24	596.52
2998.38 TGP2-2	408644.63	223869.42	30128.25	159511.94	5445.71	60110.02	827.56	571.16
3845.82 TGP2-3	379237.75	208099.20	28758.72	149472.16	5269.35	57616.13	805.80	641.64
2928.10 TGP2-4	178497.25	102682.54	14228.12	74698.70	2727.74	13739.88	701.00	597.72
1507.81 TGP2-5	117763.51	67823.54	9589.01	50071.16	2101.17	6604.56	641.72	438.52
1563.61 TGP2-6	109077.94	62175.07	8885.81	46294.90	1950.65	6371.64	662.92	391.04
2788.86 TGP2-7	149611.77	87834.09	12770.83	65276.49	2508.65	6339.96	665.20	420.60
1830.13 TGP2-8	107278.24	61577.27	8963.61	46148.82	2021.61	4806.91	662.08	391.92
2890.02 TGP2-9	105604.16	60583.62	8780.97	45613.70	2010.17	4712.43	639.20	382.32
843.48 TGP2-10	87540.21	50210.00	7617.72	38673.94	1811.21	5186.79	686.96	376.80
1201.97 TGP2-11	114955.84	65191.37	9615.61	49387.52	2018.29	9897.34	701.36	372.80
1055.69 TGP2-12	108555.09	62091.43	8876.73	46839.34	2011.41	5725.71	622.84	393.24
1194.33 TGP2-13	117066.02	66776.90	9658.93	50895.52	2162.57	12905.67	632.12	395.00
1224.37 TGP2-14	101416.85	57998.25	8420.97	45359.09	2038.97	13779.36	760.08	356.64
1198.45 TGP2-15	137739.53	77545.36	11143.78	58636.85	2426.61	20706.04	722.08	388.96
1591.09 TGP2-16	217296.75	121022.52	17685.58	90311.59	3280.18	44720.73	838.28	434.96
1358.57 TGP2-17	221909.81	123473.53	17965.62	92182.36	3436.26	43424.08	791.16	418.48
1458.45 TGP2-18	242764.41	134334.19	19017.15	99060.44	3687.62	44844.93	788.92	416.88
852.28 SRM614-2	1207.49	792.52	401.48	5830.35	869.84	2510.85	959.09	517.36
9687.49 SRM612-2	11098.66	6585.08	1340.49	9966.42	9536.09	25080.38	12003.51	7965.56

Appendix A. Raw trace element datasheets from laser ablation.

55086.03 SRM610-2	65197.85	36513.77	5707.47	31151.46	48957.11	150447.92	65304.25	35630.60
637.00 AP1-2	900.93	608.12	292.88	4337.82	749.92	3012.18	763.64	441.44
1997.21 AP2-2	41315.95	24089.38	3695.34	20873.24	1485.09	4169.70	776.08	518.04
19091.95 AP3-2	826868.25	442843.41	50206.72	294161.63	10201.90	14187.12	971.73	2285.41
15499.17 AP4-2	683140.94	366734.00	42029.76	246668.27	8830.57	14562.44	925.61	1946.69
712.16 blank-2	314.96	277.72	207.04	4005.50	564.36	1639.73	572.32	283.40
637.84 blank average	337.28	284.08	327.80	3162.14	761.00	1475.17	581.52	324.64
blank subtraction								
328.92 SRM614-1	1283.05	752.44	415.04	3221.10	566.80	1581.49	579.92	371.12
15183.85 SRM612-1	18840.43	10635.66	1840.49	9237.25	11054.66	37919.29	16603.81	9602.45
73423.34 SRM610-1	75495.11	42472.88	6691.56	30736.41	50977.93	202259.50	76147.39	35031.60
305.08 AP1-1	9360.09	5283.83	889.56	2774.22	166.24	2457.09	373.44	321.24
2565.53 AP2-1	74472.14	42898.00	6445.16	29324.28	1326.17	5165.19	330.16	440.28
26241.75 AP3-1	1069896.12	581830.23	65232.05	382417.70	11716.55	18793.86	492.96	2404.33
29021.52 AP4-1	1282203.62	693092.48	76759.87	456009.89	13734.36	23297.49	505.04	2724.14
3368.46 TGP2-1	333856.53	185992.92	26056.71	132342.27	4051.46	62015.31	288.72	271.88
2360.53 TGP2-2	408307.35	223585.34	29800.45	156349.80	4684.71	58634.85	246.04	246.52
3207.98 TGP2-3	378900.47	207815.12	28430.92	146310.02	4508.35	56140.96	224.28	317.00
2290.25 TGP2-4	178159.97	102398.46	13900.32	71536.56	1966.73	12264.71	119.48	273.08
869.96 TGP2-5	117426.23	67539.46	9261.21	46909.02	1340.17	5129.39	60.20	113.88
925.77 TGP2-6	108740.66	61890.99	8558.01	43132.76	1189.65	4896.47	81.40	66.40
2151.01 TGP2-7	149274.49	87550.01	12443.03	62114.35	1747.65	4864.79	83.68	95.96
1192.29 TGP2-8	106940.96	61293.18	8635.81	42986.68	1260.61	3331.74	80.56	67.28
2252.17 TGP2-9	105266.88	60299.54	8453.17	42451.56	1249.17	3237.26	57.68	57.68
205.64 TGP2-10	87202.93	49925.92	7289.92	35511.80	1050.21	3711.62	105.44	52.16
564.12 TGP2-11	114618.56	64907.29	9287.81	46225.38	1257.29	8422.17	119.84	48.16
417.84 TGP2-12	108217.81	61807.35	8548.93	43677.21	1250.41	4250.54	41.32	68.60
556.48 TGP2-13	116728.74	66492.82	9331.13	47733.39	1401.57	11430.50	50.60	70.36
586.52 TGP2-14	101079.57	57714.16	8093.17	42196.96	1277.97	12304.19	178.56	32.00
560.60 TGP2-15	137402.25	77261.28	10815.98	55474.71	1665.61	19230.87	140.56	64.32
953.25 TGP2-16	216959.47	120738.44	17357.78	87149.45	2519.17	43245.56	256.76	110.32
720.72 TGP2-17	221572.53	123189.45	17637.82	89020.22	2675.26	41948.91	209.64	93.84
820.60 TGP2-18	242427.13	134050.11	18689.34	95898.30	2926.62	43369.77	207.40	92.24
214.44 SRM614-2	870.20	508.44	73.68	2668.22	108.84	1035.69	377.56	192.72
9049.65 SRM612-2	10761.38	6301.00	1012.69	6804.28	8775.09	23605.21	11421.98	7640.92
54448.19 SRM610-2	64860.57	36229.68	5379.67	27989.32	48196.11	148972.75	64722.72	35305.96
-0.84 AP1-2	563.64	324.04	-34.92	1175.69	-11.08	1537.01	182.12	116.80
1359.37 AP2-2	40978.67	23805.29	3367.54	17711.10	724.08	2694.54	194.56	193.40
18454.10 AP3-2	826530.97	442559.33	49878.92	290999.49	9440.89	12711.95	390.20	1960.77
14861.32 AP4-2	682803.66	366449.92	41701.96	243506.13	8069.57	13087.27	344.08	1622.05
zero correction								
328.92 SRM614-1	1283.05	752.44	415.04	3221.10	566.80	1581.49	579.92	371.12
15183.85 SRM612-1	18840.43	10635.66	1840.49	9237.25	11054.66	37919.29	16603.81	9602.45
73423.34 SRM610-1	75495.11	42472.88	6691.56	30736.41	50977.93	202259.50	76147.39	35031.60
305.08 AP1-1	9360.09	5283.83	889.56	2774.22	166.24	2457.09	373.44	321.24
2565.53 AP2-1	74472.14	42898.00	6445.16	29324.28	1326.17	5165.19	330.16	440.28
26241.75 AP3-1	1069896.12	581830.23	65232.05	382417.70	11716.55	18793.86	492.96	2404.33
29021.52 AP4-1	1282203.62	693092.48	76759.87	456009.89	13734.36	23297.49	505.04	2724.14
3368.46 TGP2-1	333856.53	185992.92	26056.71	132342.27	4051.46	62015.31	288.72	271.88
2360.53 TGP2-2	408307.35	223585.34	29800.45	156349.80	4684.71	58634.85	246.04	246.52
3207.98 TGP2-3	378900.47	207815.12	28430.92	146310.02	4508.35	56140.96	224.28	317.00
2290.25 TGP2-4	178159.97	102398.46	13900.32	71536.56	1966.73	12264.71	119.48	273.08
869.96 TGP2-5	117426.23	67539.46	9261.21	46909.02	1340.17	5129.39	60.20	113.88
925.77 TGP2-6	108740.66	61890.99	8558.01	43132.76	1189.65	4896.47	81.40	66.40
2151.01 TGP2-7	149274.49	87550.01	12443.03	62114.35	1747.65	4864.79	83.68	95.96
1192.29 TGP2-8	106940.96	61293.18	8635.81	42986.68	1260.61	3331.74	80.56	67.28
2252.17 TGP2-9	105266.88	60299.54	8453.17	42451.56	1249.17	3237.26	57.68	57.68
205.64 TGP2-10	87202.93	49925.92	7289.92	35511.80	1050.21	3711.62	105.44	52.16
564.12 TGP2-11	114618.56	64907.29	9287.81	46225.38	1257.29	8422.17	119.84	48.16
417.84 TGP2-12	108217.81	61807.35	8548.93	43677.21	1250.41	4250.54	41.32	68.60
556.48 TGP2-13	116728.74	66492.82	9331.13	47733.39	1401.57	11430.50	50.60	70.36
586.52 TGP2-14	101079.57	57714.16	8093.17	42196.96	1277.97	12304.19	178.56	32.00
560.60 TGP2-15	137402.25	77261.28	10815.98	55474.71	1665.61	19230.87	140.56	64.32
953.25 TGP2-16	216959.47	120738.44	17357.78	87149.45	2519.17	43245.56	256.76	110.32
720.72 TGP2-17	221572.53	123189.45	17637.82	89020.22	2675.26	41948.91	209.64	93.84
820.60 TGP2-18	242427.13	134050.11	18689.34	95898.30	2926.62	43369.77	207.40	92.24
214.44 SRM614-2	870.20	508.44	73.68	2668.22	108.84	1035.69	377.56	192.72
9049.65 SRM612-2	10761.38	6301.00	1012.69	6804.28	8775.09	23605.21	11421.98	7640.92
54448.19 SRM610-2	64860.57	36229.68	5379.67	27989.32	48196.11	148972.75	64722.72	35305.96
0.00 AP1-2	563.64	324.04	0.00	1175.69	0.00	1537.01	182.12	116.80
1359.37 AP2-2	40978.67	23805.29	3367.54	17711.10	724.08	2694.54	194.56	193.40
18454.10 AP3-2	826530.97	442559.33	49878.92	290999.49	9440.89	12711.95	390.20	1960.77
14861.32 AP4-2	682803.66	366449.92	41701.96	243506.13	8069.57	13087.27	344.08	1622.05
certified concentration								
SRM614	1.90					1.12		

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000084 SRM614-1	0.000328	0.000192	0.000106	0.000824	0.000145	0.000405	0.000148	0.000095
0.004491 SRM612-1	0.005572	0.003146	0.000544	0.002732	0.003270	0.011215	0.004911	0.002840
0.066193 SRM610-1	0.068061	0.038290	0.006033	0.027710	0.045958	0.182342	0.068649	0.031582
0.000014 AP1-1	0.000436	0.000246	0.000041	0.000129	0.000008	0.000114	0.000017	0.000015
0.000156 AP2-1	0.004540	0.002615	0.000393	0.001788	0.000081	0.000315	0.000020	0.000027
0.001248 AP3-1	0.050885	0.027672	0.003102	0.018188	0.000557	0.000894	0.000023	0.000114
0.001467 AP4-1	0.064815	0.035036	0.003880	0.023051	0.000694	0.001178	0.000026	0.000138
0.000131 TGP2-1	0.013030	0.007259	0.001017	0.005165	0.000158	0.002420	0.000011	0.000011
0.000098 TGP2-2	0.017035	0.009328	0.001243	0.006523	0.000195	0.002446	0.000010	0.000010
0.000134 TGP2-3	0.015802	0.008667	0.001186	0.006102	0.000188	0.002341	0.000009	0.000013
0.000208 TGP2-4	0.016213	0.009319	0.001265	0.006510	0.000179	0.001116	0.000011	0.000025
0.000075 TGP2-5	0.010080	0.005797	0.000795	0.004027	0.000115	0.000440	0.000005	0.000010
0.000094 TGP2-6	0.011029	0.006277	0.000868	0.004375	0.000121	0.000497	0.000008	0.000007
0.000235 TGP2-7	0.016334	0.009580	0.001362	0.006797	0.000191	0.000532	0.000009	0.000011
0.000122 TGP2-8	0.010925	0.006262	0.000882	0.004391	0.000129	0.000340	0.000008	0.000007
0.000227 TGP2-9	0.010600	0.006072	0.000851	0.004275	0.000126	0.000326	0.000006	0.000006
0.000016 TGP2-10	0.006817	0.003903	0.000570	0.002776	0.000082	0.000290	0.000008	0.000004
0.000040 TGP2-11	0.008123	0.004600	0.000658	0.003276	0.000089	0.000597	0.000008	0.000003
0.000033 TGP2-12	0.008529	0.004871	0.000674	0.003442	0.000099	0.000335	0.000003	0.000005
0.000047 TGP2-13	0.009853	0.005612	0.000788	0.004029	0.000118	0.000965	0.000004	0.000006
0.000044 TGP2-14	0.007535	0.004302	0.000603	0.003146	0.000095	0.000917	0.000013	0.000002
0.000036 TGP2-15	0.008772	0.004933	0.000691	0.003542	0.000106	0.001228	0.000009	0.000004
0.000044 TGP2-16	0.010019	0.005576	0.000802	0.004024	0.000116	0.001997	0.000012	0.000005
0.000038 TGP2-17	0.010215	0.005679	0.000813	0.004104	0.000123	0.001934	0.000010	0.000004
0.000038 TGP2-18	0.011106	0.006141	0.000856	0.004393	0.000134	0.001987	0.000010	0.000004
0.000097 SRM614-2	0.000392	0.000229	0.000033	0.001203	0.000049	0.000467	0.000170	0.000087
0.004263 SRM612-2	0.005069	0.002968	0.000477	0.003205	0.000134	0.011120	0.005381	0.003599
0.063671 SRM610-2	0.075848	0.042367	0.006291	0.032731	0.056360	0.174208	0.075686	0.041287
0.000000 AP1-2	0.000038	0.000022	0.000000	0.000079	0.000000	0.000103	0.000012	0.000008
0.000114 AP2-2	0.003444	0.002001	0.000283	0.001489	0.000061	0.000226	0.000016	0.000016
0.001011 AP3-2	0.045278	0.024244	0.002732	0.015941	0.000517	0.000696	0.000021	0.000107
0.000994 AP4-2	0.045670	0.024511	0.002789	0.016287	0.000540	0.000875	0.000023	0.000108
standardize signal averages AP								
0.000007 AP1	0.000237	0.000134	0.000021	0.000104	0.000004	0.000109	0.000015	0.000011
0.000135 AP2	0.003992	0.002308	0.000338	0.001638	0.000071	0.000271	0.000018	0.000022
0.001130 AP3	0.048081	0.025958	0.002917	0.017065	0.000537	0.000795	0.000022	0.000111
0.001231 AP4	0.055243	0.029773	0.003335	0.019669	0.000617	0.001027	0.000024	0.000123
linest from std sig ave								
0.021336	0.010817	0.020674	0.184360	0.031384	0.999075	0.004251	0.000000	0.031839
standardize signal averages SRM								
0.000090 srm614-2	0.000360	0.000211	0.000070	0.001013	0.000097	0.000436	0.000159	0.000091
0.004377 srm612-2	0.005321	0.003057	0.000511	0.002969	0.003702	0.011167	0.005146	0.003220
0.064932 srm610-2	0.071954	0.040329	0.006162	0.030220	0.051159	0.178275	0.072168	0.036434
linest from std sig ave								
0.000000	0.073992	0.000000	0.000000	0.000000	0.000000	0.028690	0.068925	0.101837
concentration data								
0.15 SRM614-1	0.30	0.34	1.68	2.22	12.42	0.15	0.00	0.26
8.22 SRM612-1	5.17	5.58	8.61	7.35	280.14	4.09	0.00	7.75
121.12 SRM610-1	63.14	67.89	95.38	74.58	3937.83	66.47	0.00	86.24
0.12 AP1-1	1.88	2.03	3.05	1.62	3.09	0.19	0.00	0.19
1.33 AP2-1	19.59	21.57	28.90	22.38	32.22	0.53	0.00	0.34
10.62 AP3-1	219.58	228.23	228.18	227.72	222.10	1.52	0.00	1.45
12.49 AP4-1	279.69	288.97	285.38	288.61	276.71	2.00	0.00	1.75
1.12 TGP2-1	56.23	59.87	74.80	64.67	63.02	4.10	0.00	0.13
0.84 TGP2-2	73.51	76.94	91.44	81.67	77.90	4.15	0.00	0.13
1.14 TGP2-3	68.19	71.48	87.21	76.40	74.94	3.97	0.00	0.17

Appendix A. Raw trace element datasheets from laser ablation.

1.77 TGP2-4	69.96	76.86	93.04	81.51	71.34	1.89	0.00	0.32
0.64 TGP2-5	43.50	47.82	58.47	50.41	45.85	0.75	0.00	0.12
0.80 TGP2-6	47.59	51.77	63.84	54.77	48.09	0.84	0.00	0.09
2.00 TGP2-7	70.48	79.01	100.14	85.10	76.22	0.90	0.00	0.13
1.04 TGP2-8	47.14	51.64	64.89	54.98	51.33	0.58	0.00	0.09
1.93 TGP2-9	45.74	50.08	62.60	53.52	50.13	0.55	0.00	0.07
0.14 TGP2-10	29.42	32.19	41.91	34.76	32.72	0.49	0.00	0.05
0.34 TGP2-11	35.05	37.94	48.41	41.02	35.51	1.01	0.00	0.04
0.28 TGP2-12	36.80	40.18	49.55	43.10	39.28	0.57	0.00	0.07
0.40 TGP2-13	42.52	46.29	57.93	50.44	47.15	1.64	0.00	0.08
0.37 TGP2-14	32.51	35.48	44.37	39.38	37.97	1.56	0.00	0.03
0.30 TGP2-15	37.85	40.68	50.79	44.34	42.38	2.08	0.00	0.05
0.37 TGP2-16	43.23	45.99	58.95	50.39	46.37	3.39	0.00	0.06
0.28 TGP2-17	44.08	46.84	59.81	51.38	49.16	3.28	0.00	0.05
0.32 TGP2-18	47.93	50.65	62.97	55.01	53.44	3.37	0.00	0.05
0.18 SRM614-2	0.36	0.41	0.53	3.24	4.20	0.17	0.00	0.24
7.80 SRM612-2	4.70	5.26	7.54	8.63	354.19	4.05	0.00	9.83
116.51 SRM610-2	70.36	75.12	99.47	88.10	4829.16	63.51	0.00	112.74
0.00 AP1-2	0.16	0.18	0.00	0.99	0.00	0.18	0.00	0.10
0.97 AP2-2	14.86	16.50	20.82	18.64	24.26	0.38	0.00	0.21
8.60 AP3-2	195.38	199.96	200.96	199.59	206.13	1.18	0.00	1.36
8.46 AP4-2	197.08	202.16	205.15	203.92	215.13	1.48	0.00	1.38

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
411.04 blank-11	321.68	305.64	513.64	2658.14	905.21	1477.49	661.40	461.36
1146.25 SRM614-11	2462.01	1451.89	855.20	6617.56	1484.45	3357.06	1219.49	720.76
15067.89 SRM612-11	18758.87	10890.74	2214.49	12782.87	12110.83	36494.73	16232.41	9661.61
91392.27 SRM610-11	107725.45	59206.93	9263.37	46214.50	73418.34	266929.06	103379.74	51041.21
1231.01 AP1-11	13034.39	7927.80	1530.29	8071.29	1096.77	4132.42	890.33	697.40
3253.42 AP2-11	75804.15	43761.33	6530.28	33047.47	2048.17	6626.04	872.52	742.96
20459.80 AP3-11	937837.13	504601.84	57123.88	333549.09	11163.74	17938.02	1133.89	2697.54
53902.95 AP4-11	2617875.80	1455062.50	150057.64	961713.25	26147.91	38748.70	1220.05	5270.23
1224.53 GCK4-1	366948.59	200328.56	25994.43	140092.16	4716.63	25898.43	758.60	483.48
1182.41 GCK4-2	237613.50	131997.09	18115.66	94744.53	3514.82	22209.21	665.28	433.36
1147.81 GCK4-3	248099.91	137123.33	18918.99	98554.31	3642.02	23480.37	716.96	497.48
1071.49 GCK4-4	211050.98	117149.90	16715.33	85962.45	3367.14	26524.43	837.60	555.20
1014.85 GCK4-5	198189.91	110212.14	15590.93	80845.89	3235.70	25448.38	876.12	568.08
1130.49 GCK4-6	278341.41	154062.27	20921.00	109994.14	3921.54	28293.84	851.84	595.04
745.56 GCK4-7	61640.95	35834.04	5519.31	28515.08	1482.81	5716.35	680.32	398.08
756.28 GCK4-8	62933.27	36330.45	5391.23	29308.01	1468.41	4329.54	658.00	386.76
913.61 GCK4-9	121290.52	68490.23	9625.77	51987.45	2219.29	8772.33	652.20	406.52
906.01 GCK4-10	62899.40	36559.32	5542.47	29953.81	1533.09	3627.02	696.00	406.96
758.52 GCK4-11	34493.68	20316.28	3216.34	18783.67	1110.57	2768.62	594.24	339.72
758.68 GCK4-12	39197.42	22852.69	3422.26	20783.84	1212.45	2841.34	653.80	342.80
906.45 GCK4-13	100875.81	57603.77	8471.25	45079.73	2090.73	3709.50	759.84	420.56
851.44 GCK4-14	94530.38	54272.15	7850.16	42606.60	1968.13	3611.74	761.24	365.96
831.44 GCK4-15	98858.00	56041.80	8061.45	44194.01	1982.97	3658.98	699.48	381.88
791.72 GCK4-16	98437.03	56166.96	8034.21	44322.01	2062.93	3837.30	801.72	387.80
795.68 GCK4-17	104043.30	60038.10	8629.57	45940.78	2109.61	3690.06	750.56	382.92
811.08 GCK4-18	98907.32	56615.52	8258.09	43961.29	2059.25	3677.26	783.32	364.80
883.48 SRM614-11	898.85	1046.25	976.49	13804.60	1878.69	3514.42	1067.73	536.80
6347.40 SRM612-11	7730.96	4970.55	1409.65	14983.20	7029.24	17763.62	8585.57	5716.47
46417.22 SRM610-11	58267.41	32573.50	5634.51	35286.64	40763.63	125304.70	55982.52	30926.81
491.44 AP1-11	1992.85	1572.49	778.28	10789.74	1182.93	3586.70	814.80	475.72
1607.41 AP2-11	36672.65	21923.44	3598.10	23550.41	1710.37	4505.91	800.64	572.80
10015.14 AP3-11	419279.38	227101.95	27876.12	159931.73	6229.52	9242.65	835.84	1523.41
21972.48 AP4-11	1086888.50	587455.00	65137.77	394195.28	12800.07	16368.37	922.57	2765.66
717.68 blank-11	382.48	736.32	926.97	11883.55	1826.17	3001.70	916.93	479.24
564.36 blank average	352.08	520.98	720.30	7270.84	1365.69	2239.59	789.16	470.30

blank subtraction								
581.88 SRM614-11	2109.93	930.91	134.90	-653.28	118.76	1117.47	430.32	250.46
14503.52 SRM612-11	18406.78	10369.76	1494.19	5512.03	10745.14	34255.13	15443.25	9191.31
90827.91 SRM610-11	107373.37	58685.95	8543.07	38943.66	72052.65	264689.47	102590.58	50570.90
666.64 AP1-11	12682.31	7406.82	809.98	800.44	-268.92	1892.83	101.16	227.10
2689.06 AP2-11	75452.07	43240.35	5809.97	25776.63	682.48	4386.45	83.36	272.66
19895.43 AP3-11	937485.05	504080.86	56403.58	326278.25	9798.06	15698.43	344.72	2227.23
53338.58 AP4-11	2617523.72	1454541.52	149337.34	954442.41	24782.22	36509.11	430.88	4799.93

Appendix A. Raw trace element datasheets from laser ablation.

660.16 GCK4-1	366596.51	199807.58	25274.12	132821.32	3350.94	23658.83	-30.56	13.18
618.04 GCK4-2	237261.42	131476.11	17395.36	87473.69	2149.13	19969.61	-123.88	-36.94
583.44 GCK4-3	247747.83	136602.35	18198.68	91283.47	2276.33	21240.78	-72.20	27.18
507.12 GCK4-4	210698.90	116628.92	15995.03	78691.60	2001.45	24284.84	48.44	84.90
450.48 GCK4-5	197837.83	109691.16	14870.62	73575.05	1870.01	23208.79	86.96	97.78
566.12 GCK4-6	277989.33	153541.29	20200.69	102723.30	2555.85	26054.25	62.68	124.74
181.20 GCK4-7	61288.86	35313.06	4799.01	21244.24	117.12	3476.76	-108.84	-72.22
191.92 GCK4-8	62581.19	35809.46	4670.93	22037.17	102.72	2089.95	-131.16	-83.54
349.24 GCK4-9	120938.44	67969.24	8905.47	44716.61	853.60	6532.74	-136.96	-63.78
341.64 GCK4-10	62547.31	36038.34	4822.17	22682.97	167.40	1387.43	-93.16	-63.34
194.16 GCK4-11	34141.59	19795.29	2496.03	11512.83	-255.12	529.02	-194.92	-130.58
194.32 GCK4-12	38845.34	22331.71	2701.96	13513.00	-153.24	601.74	-135.36	-127.50
342.08 GCK4-13	100523.73	57082.78	7750.94	37808.89	725.04	1469.91	-29.32	-49.74
287.08 GCK4-14	94178.29	53751.16	7129.86	35335.76	602.44	1372.15	-27.92	-104.34
267.08 GCK4-15	98505.92	55520.81	7341.14	36923.17	617.28	1419.39	-89.68	-88.42
227.36 GCK4-16	98084.95	55645.97	7313.90	37051.17	697.24	1597.71	12.56	-82.50
231.32 GCK4-17	103691.22	59517.12	7909.26	38669.94	743.92	1450.47	-38.60	-87.38
246.72 GCK4-18	98555.24	56094.54	7537.78	36690.45	693.56	1437.67	-5.84	-105.50
319.12 SRM614-11	546.76	525.26	256.18	6533.76	513.00	1274.83	278.56	66.50
5783.03 SRM612-11	7378.88	4449.56	689.34	7712.36	5663.55	15524.03	7796.40	5246.17
45852.86 SRM610-11	57915.33	32052.52	4914.21	28015.80	39397.94	123065.11	55193.35	30456.51
-72.92 AP1-11	1640.77	1051.51	57.98	3518.90	-182.76	1347.11	25.64	5.42
1043.05 AP2-11	36320.56	21402.46	2877.80	16279.57	344.68	2266.31	11.48	102.50
9450.77 AP3-11	418927.30	226580.97	27155.81	152660.89	4863.83	7003.06	46.68	1053.11
21408.12 AP4-11	1086536.42	586934.02	64417.46	386924.44	11434.38	14128.78	133.40	2295.35

zero correction								
581.88 SRM614-11	2109.93	930.91	134.90	0.00	118.76	1117.47	430.32	250.46
14503.52 SRM612-11	18406.78	10369.76	1494.19	5512.03	10745.14	34255.13	15443.25	9191.31
90827.91 SRM610-11	107373.37	58685.95	8543.07	38943.66	72052.65	264689.47	102590.58	50570.90
666.64 AP1-11	12682.31	7406.82	809.98	800.44	0.00	1892.83	101.16	227.10
2689.06 AP2-11	75452.07	43240.35	5809.97	25776.63	682.48	4386.45	83.36	272.66
19895.43 AP3-11	937485.05	504080.86	56403.58	326278.25	9798.06	15698.43	344.72	2227.23
53338.58 AP4-11	2617523.72	1454541.52	149337.34	954442.41	24782.22	36509.11	430.88	4799.93
660.16 GCK4-1	366596.51	199807.58	25274.12	132821.32	3350.94	23658.83	0.00	13.18
618.04 GCK4-2	237261.42	131476.11	17395.36	87473.69	2149.13	19969.61	0.00	0.00
583.44 GCK4-3	247747.83	136602.35	18198.68	91283.47	2276.33	21240.78	0.00	27.18
507.12 GCK4-4	210698.90	116628.92	15995.03	78691.60	2001.45	24284.84	48.44	84.90
450.48 GCK4-5	197837.83	109691.16	14870.62	73575.05	1870.01	23208.79	86.96	97.78
566.12 GCK4-6	277989.33	153541.29	20200.69	102723.30	2555.85	26054.25	62.68	124.74
181.20 GCK4-7	61288.86	35313.06	4799.01	21244.24	117.12	3476.76	0.00	0.00
191.92 GCK4-8	62581.19	35809.46	4670.93	22037.17	102.72	2089.95	0.00	0.00
349.24 GCK4-9	120938.44	67969.24	8905.47	44716.61	853.60	6532.74	0.00	0.00
341.64 GCK4-10	62547.31	36038.34	4822.17	22682.97	167.40	1387.43	0.00	0.00
194.16 GCK4-11	34141.59	19795.29	2496.03	11512.83	0.00	529.02	0.00	0.00
194.32 GCK4-12	38845.34	22331.71	2701.96	13513.00	0.00	601.74	0.00	0.00
342.08 GCK4-13	100523.73	57082.78	7750.94	37808.89	725.04	1469.91	0.00	0.00
287.08 GCK4-14	94178.29	53751.16	7129.86	35335.76	602.44	1372.15	0.00	0.00
267.08 GCK4-15	98505.92	55520.81	7341.14	36923.17	617.28	1419.39	0.00	0.00
227.36 GCK4-16	98084.95	55645.97	7313.90	37051.17	697.24	1597.71	12.56	0.00
231.32 GCK4-17	103691.22	59517.12	7909.26	38669.94	743.92	1450.47	0.00	0.00
246.72 GCK4-18	98555.24	56094.54	7537.78	36690.45	693.56	1437.67	0.00	0.00
319.12 SRM614-11	546.76	525.26	256.18	6533.76	513.00	1274.83	278.56	66.50
5783.03 SRM612-11	7378.88	4449.56	689.34	7712.36	5663.55	15524.03	7796.40	5246.17
45852.86 SRM610-11	57915.33	32052.52	4914.21	28015.80	39397.94	123065.11	55193.35	30456.51
0.00 AP1-11	1640.77	1051.51	57.98	3518.90	0.00	1347.11	25.64	5.42
1043.05 AP2-11	36320.56	21402.46	2877.80	16279.57	344.68	2266.31	11.48	102.50
9450.77 AP3-11	418927.30	226580.97	27155.81	152660.89	4863.83	7003.06	46.68	1053.11
21408.12 AP4-11	1086536.42	586934.02	64417.46	386924.44	11434.38	14128.78	133.40	2295.35

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
0.000161 SRM614-11	0.000582	0.000257	0.000037	0.000000	0.000033	0.000308	0.000119	0.000069
0.004589 SRM612-11	0.005824	0.003281	0.000473	0.001744	0.003400	0.010839	0.004886	0.002908
0.055818 SRM610-11	0.065986	0.036065	0.005250	0.023933	0.044280	0.162664	0.063047	0.031078
0.000033 AP1-11	0.000629	0.000368	0.000040	0.000040	0.000000	0.000094	0.000005	0.000011
0.000145 AP2-11	0.004081	0.002339	0.000314	0.001394	0.000037	0.000237	0.000005	0.000015
0.000925 AP3-11	0.043587	0.023437	0.002622	0.015170	0.000456	0.000730	0.000016	0.000104
0.002398 AP4-11	0.117663	0.065385	0.006713	0.042904	0.001114	0.001641	0.000019	0.000216
0.000037 GCK4-1	0.020397	0.011117	0.001406	0.007390	0.000186	0.001316	0.000000	0.000001
0.000034 GCK4-2	0.013079	0.007248	0.000959	0.004822	0.000118	0.001101	0.000000	0.000000
0.000030 GCK4-3	0.012575	0.006934	0.000924	0.004633	0.000116	0.001078	0.000000	0.000001
0.000019 GCK4-4	0.007746	0.004288	0.000588	0.002893	0.000074	0.000893	0.000002	0.000003
0.000017 GCK4-5	0.007308	0.004052	0.000549	0.002718	0.000069	0.000857	0.000003	0.000004
0.000021 GCK4-6	0.010233	0.005652	0.000744	0.003781	0.000094	0.000959	0.000002	0.000005
0.000019 GCK4-7	0.006422	0.003700	0.000503	0.002226	0.000012	0.000364	0.000000	0.000000
0.000025 GCK4-8	0.008044	0.004603	0.000600	0.002833	0.000013	0.000269	0.000000	0.000000
0.000031 GCK4-9	0.010615	0.005966	0.000782	0.003925	0.000075	0.000573	0.000000	0.000000
0.000032 GCK4-10	0.005827	0.003357	0.000449	0.002113	0.000016	0.000129	0.000000	0.000000
0.000036 GCK4-11	0.006268	0.003634	0.000458	0.002113	0.000000	0.000097	0.000000	0.000000
0.000032 GCK4-12	0.006439	0.003702	0.000448	0.002240	0.000000	0.000100	0.000000	0.000000
0.000027 GCK4-13	0.007825	0.004443	0.000603	0.002943	0.000056	0.000114	0.000000	0.000000
0.000022 GCK4-14	0.007358	0.004199	0.000557	0.002761	0.000047	0.000107	0.000000	0.000000
0.000021 GCK4-15	0.007765	0.004377	0.000579	0.002911	0.000049	0.000112	0.000000	0.000000
0.000014 GCK4-16	0.005991	0.003399	0.000447	0.002263	0.000043	0.000098	0.000001	0.000000
0.000014 GCK4-17	0.006396	0.003671	0.000488	0.002385	0.000046	0.000089	0.000000	0.000000
0.000016 GCK4-18	0.006268	0.003568	0.000479	0.002334	0.000044	0.000091	0.000000	0.000000
0.000333 SRM614-11	0.000571	0.000548	0.000267	0.006819	0.000535	0.001330	0.000291	0.000069
0.004606 SRM612-11	0.005877	0.003544	0.000549	0.006142	0.004511	0.012364	0.006209	0.004178
0.074012 SRM610-11	0.093483	0.051737	0.007932	0.045221	0.063593	0.198642	0.089089	0.049161
0.000000 AP1-11	0.000135	0.000087	0.000005	0.000290	0.000000	0.000111	0.000002	0.000000
0.000089 AP2-11	0.003103	0.001828	0.000246	0.001391	0.000029	0.000194	0.000001	0.000009
0.000711 AP3-11	0.031529	0.017053	0.002044	0.011489	0.000366	0.000527	0.000004	0.000079
0.001640 AP4-11	0.083212	0.044950	0.004933	0.029632	0.000876	0.001082	0.000010	0.000176
standardize signal averages AP								
0.000017 AP1	0.000382	0.000227	0.000022	0.000165	0.000000	0.000102	0.000004	0.000006
0.000117 AP2	0.003592	0.002084	0.000280	0.001392	0.000033	0.000215	0.000003	0.000012
0.000818 AP3	0.037558	0.020245	0.002333	0.013330	0.000411	0.000628	0.000010	0.000091
0.002019 AP4	0.100437	0.055167	0.005823	0.036268	0.000995	0.001362	0.000015	0.000196
linest from std sig ave								
0.016752	0.007476	0.014032	0.132079	0.021342	0.769759	0.003646	0.000000	0.024861
standardize signal averages SRM								
0.000247 srm614-2	0.000576	0.000403	0.000152	0.003409	0.000284	0.000819	0.000205	0.000069
0.004597 srm612-2	0.005850	0.003412	0.000511	0.003943	0.003955	0.011601	0.005548	0.003543
0.064915 srm610-2	0.079734	0.043901	0.006591	0.034577	0.053937	0.180653	0.076068	0.040119
linest from std sig ave								
0.000000	0.066773	0.000000	0.000000	0.000000	0.000000	0.028310	0.065384	0.092484
concentration data								
0.23 SRM614-11	0.37	0.31	0.42	0.00	2.16	0.10	0.00	0.15
6.59 SRM612-11	3.73	3.95	5.36	3.19	224.45	3.39	0.00	6.20
80.19 SRM610-11	42.31	43.40	59.47	43.81	2923.21	50.86	0.00	66.26
0.22 AP1-11	1.88	2.06	2.12	0.34	0.00	0.14	0.00	0.11
0.97 AP2-11	12.17	13.09	16.56	11.87	11.34	0.35	0.00	0.15
6.18 AP3-11	130.00	131.19	138.18	129.16	139.89	1.06	0.00	1.03
16.02 AP4-11	350.94	366.00	353.72	365.29	342.10	2.39	0.00	2.14
0.25 GCK4-1	60.84	62.23	74.10	62.92	57.25	1.91	0.00	0.01
0.23 GCK4-2	39.01	40.57	50.53	41.06	36.38	1.60	0.00	0.00
0.20 GCK4-3	37.51	38.81	48.67	39.45	35.48	1.57	0.00	0.01
0.12 GCK4-4	23.10	24.00	30.98	24.63	22.59	1.30	0.00	0.03
0.11 GCK4-5	21.80	22.68	28.94	23.14	21.21	1.25	0.00	0.04
0.14 GCK4-6	30.52	31.64	39.18	32.19	28.89	1.39	0.00	0.05
0.13 GCK4-7	19.15	20.71	26.49	18.95	3.77	0.53	0.00	0.00
0.16 GCK4-8	23.99	25.76	31.63	24.12	4.05	0.39	0.00	0.00
0.20 GCK4-9	31.66	33.40	41.19	33.42	23.01	0.83	0.00	0.00
0.21 GCK4-10	17.38	18.79	23.67	17.99	4.79	0.19	0.00	0.00
0.24 GCK4-11	18.69	20.34	24.14	17.99	0.00	0.14	0.00	0.00
0.22 GCK4-12	19.20	20.72	23.60	19.07	0.00	0.15	0.00	0.00
0.18 GCK4-13	23.34	24.87	31.79	25.06	17.33	0.17	0.00	0.00
0.15 GCK4-14	21.94	23.51	29.35	23.50	14.45	0.16	0.00	0.00
0.14 GCK4-15	23.16	24.50	30.49	24.78	14.94	0.16	0.00	0.00
0.09 GCK4-16	17.87	19.03	23.54	19.27	13.08	0.14	0.00	0.00
0.10 GCK4-17	19.08	20.55	25.71	20.31	14.09	0.13	0.00	0.00
0.10 GCK4-18	18.70	19.97	25.26	19.87	13.55	0.13	0.00	0.00
0.48 SRM614-11	0.37	0.66	3.03	12.48	35.35	0.42	0.00	0.15

Appendix A. Raw trace element datasheets from laser ablation.

6.62 SRM612-11	3.77	4.26	6.22	11.24	297.78	3.87	0.00	8.91
106.33 SRM610-11	59.94	62.26	89.85	82.77	4198.22	62.11	0.00	104.82
0.00 AP1-11	0.40	0.48	0.25	2.47	0.00	0.16	0.00	0.00
0.60 AP2-11	9.25	10.23	12.95	11.84	9.04	0.28	0.00	0.09
4.75 AP3-11	94.04	95.46	107.69	97.82	112.41	0.77	0.00	0.79
10.96 AP4-11	248.18	251.62	259.94	252.29	268.91	1.57	0.00	1.74

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
560.40 blank-9	624.04	458.24	530.96	3135.18	1055.89	1375.37	672.88	397.32
1032.33 SRM614-9	1565.65	989.37	802.60	6451.88	1363.33	3089.02	1121.97	694.00
17059.70 SRM612-9	16332.05	9478.57	2147.45	12218.63	13030.15	43663.73	18198.42	10434.42
121476.20 SRM610-9	122965.45	67531.34	10425.02	52256.34	79023.73	337846.97	119643.35	54312.75
633.88 AP1-9	4050.50	2264.25	731.48	3775.58	863.16	3942.38	851.96	595.16
2691.18 AP2-9	66213.66	38924.26	6051.43	29318.24	1886.61	6175.51	827.72	755.96
19830.19 AP3-9	658423.81	359755.63	43457.61	240692.83	8903.29	18004.58	1065.29	2077.85
27943.68 AP4-9	1085343.10	591102.00	67809.86	393842.94	13019.95	25325.62	993.57	2586.85
1807.61 GCK3-1	290207.38	161845.88	22054.52	113655.52	4126.90	19042.75	740.04	534.84
6435.36 GCK3-2	703963.06	380272.50	46734.06	259348.98	7662.36	38861.58	815.64	617.16
5559.67 GCK3-3	637372.81	344250.91	42894.52	235546.73	7017.56	37646.65	839.72	589.68
1062.49 GCK3-4	121664.88	70170.67	10250.70	51100.37	2174.45	4426.19	653.20	411.04
953.17 GCK3-5	120071.84	68412.66	9839.50	49949.80	2067.25	4263.50	664.24	372.04
1036.61 GCK3-6	126942.59	72141.29	10068.82	52194.90	2194.61	4137.90	604.80	393.04
1802.45 GCK3-7	241894.80	134470.80	18112.14	95138.13	3529.02	5414.15	757.20	443.84
1588.05 GCK3-8	231926.42	129737.33	17464.70	90822.87	3289.98	4885.11	734.44	418.80
1604.41 GCK3-9	208589.30	116483.73	15956.73	82599.38	3087.50	4980.91	738.44	438.04
1395.65 GCK3-10	153402.14	87069.01	12366.43	62693.83	2566.09	4559.75	729.12	442.68
1262.77 GCK3-11	169173.23	95511.82	13116.11	68249.34	2726.14	4341.30	721.28	399.64
1246.77 GCK3-12	156557.00	87958.62	12556.31	64001.08	2522.57	4082.42	728.68	386.20
1292.25 GCK3-13	168589.03	95080.45	13251.48	68405.23	2773.42	5028.39	748.44	453.36
1269.49 GCK3-14	175478.47	98274.71	13572.16	71123.12	2799.74	4813.39	765.52	404.72
1176.77 GCK3-15	180036.05	101343.65	14093.76	73093.69	2860.06	4786.55	687.32	371.92
1659.77 GCK3-16	234681.16	130249.38	17540.90	91789.80	3371.46	6404.96	769.24	405.28
1557.21 GCK3-17	256745.00	141394.31	19264.63	99811.68	3662.30	6395.44	666.96	406.80
1470.81 GCK3-18	225904.06	126141.23	17182.58	89705.98	3500.86	6299.88	788.84	403.84
900.29 SRM614-10	1088.61	800.64	406.24	5774.99	917.29	2608.01	1010.01	506.12
10394.34 SRM612-10	11556.99	6759.96	1415.93	10260.02	9659.25	26481.79	12930.75	8236.25
72225.41 SRM610-10	85671.88	47414.23	7240.60	39095.10	61063.15	196683.52	83518.47	43903.37
650.92 AP1-10	1231.89	765.88	359.36	4189.22	710.64	3114.94	775.20	465.20
1670.45 AP2-10	32037.82	18678.90	3057.18	16825.06	1225.13	4102.26	705.60	482.28
13536.28 AP3-10	505640.19	272910.00	32719.94	185625.48	7148.04	12287.71	899.93	1600.77
20262.43 AP4-10	891382.63	481783.34	53857.82	320813.03	10963.34	18098.58	928.37	2155.57
716.96 blank-10	513.20	380.68	184.88	3969.94	577.16	1476.93	651.32	270.20
638.68 blank average	568.62	419.46	357.92	3552.56	816.52	1426.15	662.10	333.76

blank subtraction								
393.64 SRM614-9	997.03	569.90	444.68	2899.32	546.80	1662.87	459.86	360.24
16421.01 SRM612-9	15763.43	9059.11	1789.53	8666.07	12213.63	42237.58	17536.32	10100.66
120837.52 SRM610-9	122396.83	67111.88	10067.10	48703.78	78207.20	336420.82	118981.25	53978.98
-4.80 AP1-9	3481.88	1844.79	373.56	223.02	46.64	2516.23	189.86	261.40
2052.49 AP2-9	65645.03	38504.80	5693.51	25765.68	1070.09	4749.37	165.62	422.20
19191.51 AP3-9	657855.19	359336.17	43099.68	237140.27	8086.77	16578.43	403.18	1744.09
27304.99 AP4-9	1084774.48	590682.54	67451.94	390290.38	12203.43	23899.47	331.46	2253.09
1168.93 GCK3-1	289638.76	161426.42	21696.60	110102.96	3310.38	17616.60	77.94	201.08
5796.67 GCK3-2	703394.44	379853.04	46376.14	255796.42	6845.84	37435.43	153.54	283.40
4920.99 GCK3-3	636804.19	343831.45	42536.60	231994.17	6201.03	36220.50	177.62	255.92
423.80 GCK3-4	121096.26	69751.21	9892.77	47547.81	1357.93	3000.04	-8.90	77.28
314.48 GCK3-5	119503.22	67993.20	9481.57	46397.24	1250.73	2837.36	2.14	38.28
397.92 GCK3-6	126373.97	71721.83	9710.89	48642.33	1378.09	2711.76	-57.30	59.28
1163.77 GCK3-7	241326.18	134051.34	17754.22	91585.57	2712.50	3988.00	95.10	110.08
949.37 GCK3-8	231357.80	129317.87	17106.78	87270.31	2473.45	3458.96	72.34	85.04
965.73 GCK3-9	208020.68	116064.27	15598.81	79046.82	2270.97	3554.76	76.34	104.28
756.96 GCK3-10	152833.52	86649.55	12008.51	59141.27	1749.57	3133.60	67.02	108.92
624.08 GCK3-11	168604.61	95092.36	12758.19	64696.78	1909.61	2915.16	59.18	65.88
608.08 GCK3-12	155988.38	87539.15	12198.39	60448.52	1706.05	2656.27	66.58	52.44
653.56 GCK3-13	168020.41	94660.99	12893.55	64852.67	1956.89	3602.24	86.34	119.60
630.80 GCK3-14	174909.85	97855.25	13214.23	67570.56	1983.21	3387.24	103.42	70.96
538.08 GCK3-15	179467.43	100924.19	13735.84	69541.13	2043.53	3360.40	25.22	38.16
1021.09 GCK3-16	234112.54	129829.92	17182.98	88237.24	2554.93	4978.81	107.14	71.52

Appendix A. Raw trace element datasheets from laser ablation.

918.53 GCK3-17	256176.38	140974.85	18906.71	96259.12	2845.78	4969.29	4.86	73.04
832.12 GCK3-18	225335.44	125721.77	16824.65	86153.42	2684.33	4873.73	126.74	70.08
261.60 SRM614-10	519.98	381.18	48.32	2222.43	100.76	1181.87	347.90	172.36
9755.66 SRM612-10	10988.36	6340.50	1058.01	6707.46	8842.73	25055.64	12268.65	7902.48
71586.72 SRM610-10	85103.26	46994.76	6882.68	35542.54	60246.62	195257.37	82856.37	43569.61
12.24 AP1-10	663.26	346.42	1.44	636.66	0.00	1688.79	113.10	131.44
1031.77 AP2-10	31469.20	18259.44	2699.26	13272.49	408.60	2676.12	43.50	148.52
12897.59 AP3-10	505071.57	272490.54	32362.02	182072.92	6331.52	10861.56	237.82	1267.01
19623.75 AP4-10	890814.01	481363.88	53499.90	317260.47	10146.82	16672.43	266.26	1821.81

zero correction								
393.64 SRM614-9	997.03	569.90	444.68	2899.32	546.80	1662.87	459.86	360.24
16421.01 SRM612-9	15763.43	9059.11	1789.53	8666.07	12213.63	42237.58	17536.32	10100.66
120837.52 SRM610-9	122396.83	67111.88	10067.10	48703.78	78207.20	336420.82	118981.25	53978.98
0.00 AP1-9	3481.88	1844.79	373.56	223.02	46.64	2516.23	189.86	261.40
2052.49 AP2-9	65645.03	38504.80	5693.51	25765.68	1070.09	4749.37	165.62	422.20
19191.51 AP3-9	657855.19	359336.17	43099.68	237140.27	8086.77	16578.43	403.18	1744.09
27304.99 AP4-9	1084774.48	590682.54	67451.94	390290.38	12203.43	23899.47	331.46	2253.09
1168.93 GCK3-1	289638.76	161426.42	21696.60	110102.96	3310.38	17616.60	77.94	201.08
5796.67 GCK3-2	703394.44	379853.04	46376.14	255796.42	6845.84	37435.43	153.54	283.40
4920.99 GCK3-3	636804.19	343831.45	42536.60	231994.17	6201.03	36220.50	177.62	255.92
423.80 GCK3-4	121096.26	69751.21	9892.77	47547.81	1357.93	3000.04	0.00	77.28
314.48 GCK3-5	119503.22	67993.20	9481.57	46397.24	1250.73	2837.36	2.14	38.28
397.92 GCK3-6	126373.97	71721.83	9710.89	48642.33	1378.09	2711.76	0.00	59.28
1163.77 GCK3-7	241326.18	134051.34	17754.22	91585.57	2712.50	3988.00	95.10	110.08
949.37 GCK3-8	231357.80	129317.87	17106.78	87270.31	2473.45	3458.96	72.34	85.04
965.73 GCK3-9	208020.68	116064.27	15598.81	79046.82	2270.97	3554.76	76.34	104.28
756.96 GCK3-10	152833.52	86649.55	12008.51	59141.27	1749.57	3133.60	67.02	108.92
624.08 GCK3-11	168604.61	95092.36	12758.19	64696.78	1909.61	2915.16	59.18	65.88
608.08 GCK3-12	155988.38	87539.15	12198.39	60448.52	1706.05	2656.27	66.58	52.44
653.56 GCK3-13	168020.41	94660.99	12893.55	64852.67	1956.89	3602.24	86.34	119.60
630.80 GCK3-14	174909.85	97855.25	13214.23	67570.56	1983.21	3387.24	103.42	70.96
538.08 GCK3-15	179467.43	100924.19	13735.84	69541.13	2043.53	3360.40	25.22	38.16
1021.09 GCK3-16	234112.54	129829.92	17182.98	88237.24	2554.93	4978.81	107.14	71.52
918.53 GCK3-17	256176.38	140974.85	18906.71	96259.12	2845.78	4969.29	4.86	73.04
832.12 GCK3-18	225335.44	125721.77	16824.65	86153.42	2684.33	4873.73	126.74	70.08
261.60 SRM614-10	519.98	381.18	48.32	2222.43	100.76	1181.87	347.90	172.36
9755.66 SRM612-10	10988.36	6340.50	1058.01	6707.46	8842.73	25055.64	12268.65	7902.48
71586.72 SRM610-10	85103.26	46994.76	6882.68	35542.54	60246.62	195257.37	82856.37	43569.61
12.24 AP1-10	663.26	346.42	1.44	636.66	0.00	1688.79	113.10	131.44
1031.77 AP2-10	31469.20	18259.44	2699.26	13272.49	408.60	2676.12	43.50	148.52
12897.59 AP3-10	505071.57	272490.54	32362.02	182072.92	6331.52	10861.56	237.82	1267.01
19623.75 AP4-10	890814.01	481363.88	53499.90	317260.47	10146.82	16672.43	266.26	1821.81

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000115 SRM614-9	0.000291	0.000166	0.000130	0.000847	0.000160	0.000486	0.000134	0.000105
0.004417 SRM612-9	0.004241	0.002437	0.000481	0.002331	0.003286	0.011362	0.004717	0.002717
0.067137 SRM610-9	0.068003	0.037287	0.005593	0.027059	0.043451	0.186913	0.066105	0.029990
0.000000 AP1-9	0.000147	0.000078	0.000016	0.000009	0.000002	0.000107	0.000008	0.000011
0.000104 AP2-9	0.003323	0.001949	0.000288	0.001304	0.000054	0.000240	0.000008	0.000021
0.000718 AP3-9	0.024626	0.013451	0.001613	0.008877	0.000303	0.000621	0.000015	0.000065
0.001224 AP4-9	0.048638	0.026485	0.003024	0.017500	0.000547	0.001072	0.000015	0.000101
0.000052 GCK3-1	0.012923	0.007203	0.000968	0.004913	0.000148	0.000786	0.000003	0.000009
0.000230 GCK3-2	0.027880	0.015056	0.001838	0.010139	0.000271	0.001484	0.000006	0.000011
0.000214 GCK3-3	0.027739	0.014977	0.001853	0.010106	0.000270	0.001578	0.000008	0.000011
0.000048 GCK3-4	0.013612	0.007841	0.001112	0.005345	0.000153	0.000337	0.000000	0.000009
0.000033 GCK3-5	0.012662	0.007204	0.001005	0.004916	0.000133	0.000301	0.000000	0.000004
0.000043 GCK3-6	0.013651	0.007747	0.001049	0.005254	0.000149	0.000293	0.000000	0.000006
0.000073 GCK3-7	0.015096	0.008385	0.001111	0.005729	0.000170	0.000249	0.000006	0.000007
0.000060 GCK3-8	0.014668	0.008199	0.001085	0.005533	0.000157	0.000219	0.000005	0.000005

Appendix A. Raw trace element datasheets from laser ablation.

0.000062 GCK3-9	0.013251	0.007394	0.000994	0.005035	0.000145	0.000226	0.000005	0.000007
0.000058 GCK3-10	0.011743	0.006658	0.000923	0.004544	0.000134	0.000241	0.000005	0.000008
0.000046 GCK3-11	0.012332	0.006955	0.000933	0.004732	0.000140	0.000213	0.000004	0.000005
0.000047 GCK3-12	0.011988	0.006727	0.000937	0.004645	0.000131	0.000204	0.000005	0.000004
0.000045 GCK3-13	0.011476	0.006465	0.000881	0.004429	0.000134	0.000246	0.000006	0.000008
0.000042 GCK3-14	0.011711	0.006552	0.000885	0.004524	0.000133	0.000227	0.000007	0.000005
0.000035 GCK3-15	0.011680	0.006569	0.000894	0.004526	0.000133	0.000219	0.000002	0.000002
0.000056 GCK3-16	0.012741	0.007066	0.000935	0.004802	0.000139	0.000271	0.000006	0.000004
0.000050 GCK3-17	0.013960	0.007682	0.001030	0.005245	0.000155	0.000271	0.000000	0.000004
0.000041 GCK3-18	0.011074	0.006179	0.000827	0.004234	0.000132	0.000240	0.000006	0.000003
0.000138 SRM614-10	0.000274	0.000201	0.000025	0.001170	0.000053	0.000622	0.000183	0.000091
0.004596 SRM612-10	0.005176	0.002987	0.000498	0.003160	0.004166	0.011803	0.005779	0.003723
0.066280 SRM610-10	0.078795	0.043511	0.006372	0.032908	0.055781	0.180784	0.076714	0.040340
0.000001 AP1-10	0.000039	0.000020	0.000000	0.000037	0.000000	0.000099	0.000007	0.000008
0.000084 AP2-10	0.002576	0.001495	0.000221	0.001087	0.000033	0.000219	0.000004	0.000012
0.000646 AP3-10	0.025308	0.013654	0.001622	0.009123	0.000317	0.000544	0.000012	0.000063
0.001152 AP4-10	0.052283	0.028252	0.003140	0.018620	0.000596	0.000979	0.000016	0.000107
standardize signal averages AP								
0.000000 AP1	0.000093	0.000049	0.000008	0.000023	0.000001	0.000103	0.000007	0.000009
0.000094 AP2	0.002950	0.001722	0.000255	0.001196	0.000044	0.000230	0.000006	0.000017
0.000682 AP3	0.024967	0.013553	0.001617	0.009000	0.000310	0.000582	0.000014	0.000064
0.001188 AP4	0.050461	0.027368	0.003082	0.018060	0.000571	0.001025	0.000015	0.000104
linest from std sig ave								
0.026801	0.014393	0.027328	0.240104	0.041372	1.285763	0.004675	0.000000	0.043911
standardize signal averages SRM								
0.000126 srm614-2	0.000282	0.000184	0.000078	0.001008	0.000106	0.000554	0.000159	0.000098
0.004506 srm612-2	0.004708	0.002712	0.000490	0.002745	0.003726	0.011583	0.005248	0.003220
0.066708 srm610-2	0.073399	0.040399	0.005983	0.029984	0.049616	0.183848	0.071410	0.035165
linest from std sig ave								
0.000000	0.072575	0.000000	0.000000	0.000000	0.000000	0.027820	0.069647	0.105491
concentration data								
0.26 SRM614-9	0.36	0.39	2.67	3.00	17.61	0.19	0.00	0.20
10.15 SRM612-9	5.23	5.71	9.91	8.27	362.30	4.56	0.00	10.43
154.31 SRM610-9	83.94	87.39	115.18	96.01	4791.43	74.94	0.00	112.94
0.00 AP1-9	0.85	0.85	1.51	0.16	1.01	0.20	0.00	0.19
1.11 AP2-9	19.08	21.25	27.61	21.53	27.79	0.45	0.00	0.37
7.68 AP3-9	141.40	146.65	154.54	146.51	155.27	1.16	0.00	1.14
13.09 AP4-9	279.28	288.74	289.69	288.83	280.66	2.00	0.00	1.77
0.56 GCK3-1	74.21	78.53	92.73	81.08	75.76	1.47	0.00	0.16
2.46 GCK3-2	160.08	164.14	176.07	167.34	139.18	2.77	0.00	0.20
2.29 GCK3-3	159.28	163.29	177.48	166.79	138.55	2.94	0.00	0.20
0.51 GCK3-4	78.16	85.48	106.52	88.21	78.30	0.63	0.00	0.15
0.36 GCK3-5	72.70	78.54	96.23	81.14	67.97	0.56	0.00	0.07
0.46 GCK3-6	78.38	84.46	100.48	86.72	76.36	0.55	0.00	0.11
0.78 GCK3-7	86.68	91.42	106.38	94.56	87.03	0.47	0.00	0.12
0.64 GCK3-8	84.23	89.39	103.89	91.32	80.44	0.41	0.00	0.09
0.66 GCK3-9	76.09	80.61	95.18	83.11	74.20	0.42	0.00	0.12
0.62 GCK3-10	67.43	72.58	88.38	75.00	68.95	0.45	0.00	0.15
0.49 GCK3-11	70.81	75.83	89.39	78.10	71.65	0.40	0.00	0.08
0.50 GCK3-12	68.83	73.34	89.79	76.67	67.25	0.38	0.00	0.07
0.48 GCK3-13	65.89	70.49	84.35	73.11	68.56	0.46	0.00	0.14
0.45 GCK3-14	67.25	71.43	84.75	74.67	68.11	0.42	0.00	0.08
0.37 GCK3-15	67.07	71.61	85.63	74.70	68.22	0.41	0.00	0.04
0.59 GCK3-16	73.16	77.03	89.58	79.26	71.32	0.51	0.00	0.07
0.54 GCK3-17	80.16	83.75	98.68	86.57	79.54	0.50	0.00	0.07
0.44 GCK3-18	63.59	67.36	79.20	69.88	67.67	0.45	0.00	0.06
0.32 SRM614-10	0.34	0.47	0.52	4.15	5.85	0.25	0.00	0.34
10.56 SRM612-10	6.39	7.00	10.26	11.21	459.34	4.73	0.00	14.02
152.35 SRM610-10	97.26	101.98	131.22	116.76	6150.99	72.48	0.00	151.92
0.01 AP1-10	0.22	0.22	0.01	0.62	0.00	0.18	0.00	0.14
0.90 AP2-10	14.79	16.30	21.17	17.93	17.16	0.41	0.00	0.21
6.91 AP3-10	145.32	148.86	155.33	150.58	162.73	1.01	0.00	1.11
12.31 AP4-10	300.21	308.01	300.77	307.33	305.47	1.82	0.00	1.87
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
634.08 blank-7	492.24	711.56	811.28	8795.73	1523.29	2466.97	697.20	466.76
1030.53 SRM614-7	1377.45	1267.33	1043.17	9841.98	1590.05	3638.82	1177.41	687.88
10603.34 SRM612-7	13595.52	8262.97	1960.41	14235.68	11668.91	30844.29	14320.12	8203.77
63454.84 SRM610-7	72460.41	40569.39	6642.40	37839.73	61179.15	189481.31	78807.92	34288.19
938.33 AP1-7	7666.80	4561.11	1181.17	9407.41	1047.81	4271.62	844.84	676.92
2570.33 AP2-7	57198.96	33508.19	5321.71	29144.12	1965.33	5818.79	830.24	771.60
15219.29 AP3-7	537327.38	291233.59	35473.48	200142.41	7985.52	12869.87	917.33	1923.85
20439.56 AP4-7	877636.38	474633.56	54654.71	320625.47	11315.78	17448.14	864.20	2363.85
2313.85 GCK2-1	23429.53	14035.20	2375.65	16616.73	1056.49	6601.44	578.88	435.40
954.97 GCK2-2	16930.98	10158.70	1811.73	14213.96	1028.29	6009.99	642.28	461.16
1032.73 GCK2-3	25437.86	15067.37	2529.81	18106.30	1170.25	6114.91	593.76	434.64
2854.90 GCK2-4	66467.13	38788.10	5612.35	34588.20	1653.97	6114.03	552.92	444.24
1222.37 GCK2-5	49237.72	28937.00	4570.99	28024.88	1576.65	5878.27	631.84	410.20
1531.33 GCK2-6	56108.96	32780.27	5235.39	30855.77	1653.97	6339.72	645.56	439.96
2825.02 GCK2-7	65689.89	38441.46	5665.59	34763.91	1694.37	5760.75	668.04	505.44
1817.45 GCK2-8	73187.09	42291.96	6375.56	37358.09	1816.17	5420.55	637.72	450.84
1320.97 GCK2-9	74294.46	42964.60	6485.88	38280.38	1842.33	5700.71	626.00	415.84
6435.32 GCK2-10	356828.84	194951.63	26434.59	144921.94	4903.75	47900.35	768.32	515.64
4761.91 GCK2-11	311387.78	171012.72	23670.53	127376.63	4567.27	46208.22	790.48	489.92
4638.51 GCK2-12	274560.94	152399.14	21584.64	115402.37	4135.46	42984.80	733.48	521.00
8680.21 GCK2-13	255295.55	142016.44	20187.19	107433.24	3959.70	40906.39	780.16	502.40
4909.95 GCK2-14	233482.44	129549.01	18426.23	98263.31	3685.02	34819.32	821.68	489.20
7513.20 GCK2-15	297044.19	163855.36	22723.61	120537.96	4452.98	40405.39	794.72	549.96
5196.43 GCK2-16	199403.97	111616.35	16006.09	85168.96	3459.66	29692.13	779.88	522.76
4207.02 GCK2-17	167173.55	94036.37	13679.24	73568.13	2929.10	24361.74	809.40	509.96
2157.97 GCK2-18	97529.99	55777.72	8270.13	46018.10	2152.33	13984.48	714.92	508.76
649.08 SRM614-8	1076.29	925.97	618.60	7912.44	1121.29	3216.34	1027.45	635.76
6988.84 SRM612-8	8252.77	5141.23	1304.25	10835.46	7957.56	20743.12	10254.26	7057.28
47932.23 SRM610-8	60056.30	33838.07	5642.87	31762.14	48853.59	142154.33	66701.30	36322.29
497.64 AP1-8	1366.53	978.01	485.92	5552.43	931.89	3481.50	873.36	561.88
1449.41 AP2-8	34692.36	20231.51	3425.18	19204.59	1513.45	4311.42	772.64	690.52
11231.82 AP3-8	421564.03	228866.30	28434.56	157791.38	6342.28	9331.69	988.33	1704.45
10790.86 AP4-8	445988.75	242211.36	29759.93	167541.34	6432.80	10626.86	954.33	1654.97
579.12 blank-8	592.24	590.88	389.20	8445.85	929.05	2575.97	650.44	434.92
606.60 blank average	542.24	651.22	600.24	8620.79	1226.17	2521.47	673.82	450.84
blank subtraction								
423.92 SRM614-7	835.20	616.10	442.92	1221.19	363.88	1117.35	503.58	237.04
9996.74 SRM612-7	13053.27	7611.74	1360.17	5614.89	10442.74	28322.82	13646.30	7752.92
62848.23 SRM610-7	71918.16	39918.16	6042.15	29218.95	59952.98	186959.84	78134.10	33837.35
331.72 AP1-7	7124.56	3909.88	580.92	786.62	-178.36	1750.15	171.02	226.08
1963.73 AP2-7	56656.72	32856.96	4721.47	20523.33	739.16	3297.32	156.42	320.76
14612.68 AP3-7	536785.14	290582.37	34873.24	191521.62	6759.36	10348.40	243.50	1473.01
19832.95 AP4-7	877094.14	473982.34	54054.46	312004.68	10089.62	14926.66	190.38	1913.01
1707.25 GCK2-1	22887.29	13383.98	1775.41	7995.95	-169.68	4079.96	-94.94	-15.44
348.36 GCK2-2	16388.73	9507.47	1211.49	5593.17	-197.88	3488.52	-31.54	10.32
426.12 GCK2-3	24895.62	14416.14	1929.57	9485.51	-55.92	3593.44	-80.06	-16.20
2248.29 GCK2-4	65924.89	38136.87	5012.11	25967.41	427.80	3592.56	-120.90	-6.60
615.76 GCK2-5	48695.48	28285.78	3970.74	19404.09	350.48	3356.80	-41.98	-40.64
924.73 GCK2-6	55566.71	32129.04	4635.15	22234.98	427.80	3818.24	-28.26	-10.88
2218.41 GCK2-7	65147.65	37790.23	5065.35	26143.13	468.20	3239.28	-5.78	54.60
1210.85 GCK2-8	72644.85	41640.73	5775.31	28737.30	590.00	2899.08	-36.10	0.00
714.36 GCK2-9	73752.22	42313.38	5885.63	29659.59	616.16	3179.24	-47.82	-35.00
5828.71 GCK2-10	356286.60	194300.41	25834.35	136301.15	3677.58	45378.88	94.50	64.80
4155.30 GCK2-11	310845.54	170361.50	23070.29	118755.84	3341.10	43686.74	116.66	39.08
4031.90 GCK2-12	274018.70	151747.92	20984.40	106781.58	2909.30	40463.33	59.66	70.16
8073.61 GCK2-13	254753.31	141365.22	19586.95	98812.45	2733.54	38384.92	106.34	51.56
4303.34 GCK2-14	232940.20	128897.79	17825.98	89642.52	2458.85	32297.84	147.86	38.36
6906.60 GCK2-15	296501.95	163204.14	22123.36	111917.17	3226.82	37883.91	120.90	99.12
4589.83 GCK2-16	198861.73	110965.13	15405.85	76548.17	2233.49	27170.65	106.06	71.92
3600.42 GCK2-17	166631.31	93385.14	13078.99	64947.34	1702.93	21840.26	135.58	59.12
1551.37 GCK2-18	96987.75	55126.49	7669.88	37397.31	926.17	11463.00	41.10	57.92
42.48 SRM614-8	534.04	274.74	18.36	-708.34	-104.88	694.86	353.62	184.92
6382.24 SRM612-8	7710.52	4490.01	704.00	2214.67	6731.40	18221.64	9580.43	6606.44
47325.63 SRM610-8	59514.05	33186.85	5042.63	23141.35	47627.43	139632.86	66027.47	35871.44
-108.96 AP1-8	824.28	326.78	-114.32	-3068.36	-294.28	960.03	199.54	111.04
842.80 AP2-8	34150.11	19580.29	2824.94	10583.80	287.28	1789.95	98.82	239.68
10625.22 AP3-8	421021.79	228215.08	27834.32	149170.59	5116.11	6810.22	314.50	1253.61
10184.26 AP4-8	445446.51	241560.14	29159.68	158920.55	5206.63	8105.38	280.50	1204.13
zero correction								
423.92 SRM614-7	835.20	616.10	442.92	1221.19	363.88	1117.35	503.58	237.04
9996.74 SRM612-7	13053.27	7611.74	1360.17	5614.89	10442.74	28322.82	13646.30	7752.92
62848.23 SRM610-7	71918.16	39918.16	6042.15	29218.95	59952.98	186959.84	78134.10	33837.35
331.72 AP1-7	7124.56	3909.88	580.92	786.62	0.00	1750.15	171.02	226.08
1963.73 AP2-7	56656.72	32856.96	4721.47	20523.33	739.16	3297.32	156.42	320.76

Appendix A. Raw trace element datasheets from laser ablation.

14612.68 AP3-7	536785.14	290582.37	34873.24	191521.62	6759.36	10348.40	243.50	1473.01
19832.95 AP4-7	877094.14	473982.34	54054.46	312004.68	10089.62	14926.66	190.38	1913.01
1707.25 GCK2-1	22887.29	13383.98	1775.41	7995.95	0.00	4079.96	0.00	0.00
348.36 GCK2-2	16388.73	9507.47	1211.49	5593.17	0.00	3488.52	0.00	10.32
426.12 GCK2-3	24895.62	14416.14	1929.57	9485.51	0.00	3593.44	0.00	0.00
2248.29 GCK2-4	65924.89	38136.87	5012.11	25967.41	427.80	3592.56	0.00	0.00
615.76 GCK2-5	48695.48	28285.78	3970.74	19404.09	350.48	3356.80	0.00	0.00
924.73 GCK2-6	55566.71	32129.04	4635.15	22234.98	427.80	3818.24	0.00	0.00
2218.41 GCK2-7	65147.65	37790.23	5065.35	26143.13	468.20	3239.28	0.00	54.60
1210.85 GCK2-8	72644.85	41640.73	5775.31	28737.30	590.00	2899.08	0.00	0.00
714.36 GCK2-9	73752.22	42313.38	5885.63	29659.59	616.16	3179.24	0.00	0.00
5828.71 GCK2-10	356286.60	194300.41	25834.35	136301.15	3677.58	45378.88	94.50	64.80
4155.30 GCK2-11	310845.54	170361.50	23070.29	118755.84	3341.10	43686.74	116.66	39.08
4031.90 GCK2-12	274018.70	151747.92	20984.40	106781.58	2909.30	40463.33	59.66	70.16
8073.61 GCK2-13	254753.31	141365.22	19586.95	98812.45	2733.54	38384.92	106.34	51.56
4303.34 GCK2-14	232940.20	128897.79	17825.98	89642.52	2458.85	32297.84	147.86	38.36
6906.60 GCK2-15	296501.95	163204.14	22123.36	111917.17	3226.82	37883.91	120.90	99.12
4589.83 GCK2-16	198861.73	110965.13	15405.85	76548.17	2233.49	27170.65	106.06	71.92
3600.42 GCK2-17	166631.31	93385.14	13078.99	64947.34	1702.93	21840.26	135.58	59.12
1551.37 GCK2-18	96987.75	55126.49	7669.88	37397.31	926.17	11463.00	41.10	57.92
42.48 SRM614-8	534.04	274.74	18.36	0.00	0.00	694.86	353.62	184.92
6382.24 SRM612-8	7710.52	4490.01	704.00	2214.67	6731.40	18221.64	9580.43	6606.44
47325.63 SRM610-8	59514.05	33186.85	5042.63	23141.35	47627.43	139632.86	66027.47	35871.44
0.00 AP1-8	824.28	326.78	0.00	0.00	0.00	960.03	199.54	111.04
842.80 AP2-8	34150.11	19580.29	2824.94	10583.80	287.28	1789.95	98.82	239.68
10625.22 AP3-8	421021.79	228215.08	27834.32	149170.59	5116.11	6810.22	314.50	1253.61
10184.26 AP4-8	445446.51	241560.14	29159.68	158920.55	5206.63	8105.38	280.50	1204.13

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000170 SRM614-7	0.000335	0.000247	0.000178	0.000490	0.000146	0.000448	0.000202	0.000095
0.004206 SRM612-7	0.005491	0.003202	0.000572	0.002362	0.004393	0.011915	0.005741	0.003262
0.065120 SRM610-7	0.074517	0.041361	0.006261	0.030275	0.062120	0.193717	0.080958	0.035060
0.000018 AP1-7	0.000387	0.000212	0.000032	0.000043	0.000000	0.000009	0.000009	0.000012
0.000131 AP2-7	0.003784	0.002194	0.000315	0.001371	0.000049	0.000220	0.000010	0.000021
0.000718 AP3-7	0.026363	0.014271	0.001713	0.009406	0.000332	0.000508	0.000012	0.000072
0.001156 AP4-7	0.051132	0.027632	0.003151	0.018189	0.000588	0.000870	0.000011	0.000112
0.000302 GCK2-1	0.004049	0.002368	0.000314	0.001414	0.000000	0.000722	0.000000	0.000000
0.000068 GCK2-2	0.003182	0.001846	0.000235	0.001086	0.000000	0.000677	0.000000	0.000002
0.000084 GCK2-3	0.004900	0.002837	0.000380	0.001867	0.000000	0.000707	0.000000	0.000000
0.000388 GCK2-4	0.011362	0.006573	0.000864	0.004476	0.000074	0.000619	0.000000	0.000000
0.000101 GCK2-5	0.008009	0.004652	0.000653	0.003191	0.000058	0.000552	0.000000	0.000000
0.000134 GCK2-6	0.008054	0.004657	0.000672	0.003223	0.000062	0.000553	0.000000	0.000000
0.000361 GCK2-7	0.010589	0.006142	0.000823	0.004249	0.000076	0.000527	0.000000	0.000009
0.000176 GCK2-8	0.010540	0.006041	0.000838	0.004169	0.000086	0.000421	0.000000	0.000000
0.000110 GCK2-9	0.011405	0.006543	0.000910	0.004587	0.000095	0.000492	0.000000	0.000000
0.000428 GCK2-10	0.026182	0.014279	0.001898	0.010016	0.000270	0.003335	0.000007	0.000005
0.000315 GCK2-11	0.023570	0.012918	0.001749	0.009005	0.000253	0.003313	0.000009	0.000003
0.000310 GCK2-12	0.021083	0.011675	0.001615	0.008216	0.000224	0.003113	0.000005	0.000005
0.000598 GCK2-13	0.018882	0.010478	0.001452	0.007324	0.000203	0.002845	0.000008	0.000004
0.000341 GCK2-14	0.018463	0.010216	0.001413	0.007105	0.000195	0.002560	0.000012	0.000003
0.000506 GCK2-15	0.021708	0.011949	0.001620	0.008194	0.000236	0.002774	0.000009	0.000007
0.000409 GCK2-16	0.017708	0.009881	0.001372	0.006817	0.000199	0.002420	0.000009	0.000006
0.000332 GCK2-17	0.015362	0.008610	0.001206	0.005988	0.000157	0.002014	0.000012	0.000005
0.000182 GCK2-18	0.011380	0.006468	0.000900	0.004388	0.000109	0.001345	0.000005	0.000007
0.000031 SRM614-8	0.000394	0.000203	0.000014	0.000000	0.000000	0.000513	0.000261	0.000136
0.004249 SRM612-8	0.005133	0.002989	0.000469	0.001474	0.004481	0.012130	0.006378	0.004398
0.066729 SRM610-8	0.083915	0.046794	0.007110	0.032629	0.067155	0.196883	0.093099	0.050579
0.000000 AP1-8	0.000063	0.000025	0.000000	0.000000	0.000000	0.000073	0.000015	0.000008
0.000076 AP2-8	0.003098	0.001776	0.000256	0.000960	0.000026	0.000162	0.000009	0.000022
0.000645 AP3-8	0.025553	0.013851	0.001689	0.009054	0.000311	0.000413	0.000019	0.000076

Appendix A. Raw trace element datasheets from laser ablation.

0.000823 AP4-8	0.036007	0.019526	0.002357	0.012846	0.000421	0.000655	0.000023	0.000097
standardize signal averages AP								
0.000009 AP1	0.000225	0.000119	0.000016	0.000021	0.000000	0.000084	0.000012	0.000010
0.000104 AP2	0.003441	0.001985	0.000286	0.001165	0.000038	0.000191	0.000010	0.000022
0.000681 AP3	0.025958	0.014061	0.001701	0.009230	0.000321	0.000461	0.000016	0.000074
0.000990 AP4	0.043569	0.023579	0.002754	0.015517	0.000505	0.000763	0.000017	0.000104
linest from std sig ave								
0.030398	0.015991	0.030430	0.257934	0.046262	1.394348	0.006181	0.000000	0.041599
standardize signal averages SRM								
0.000101 srm614-2	0.000364	0.000225	0.000096	0.000245	0.000073	0.000480	0.000231	0.000116
0.004227 srm612-2	0.005312	0.003096	0.000520	0.001918	0.004437	0.012023	0.006059	0.003830
0.065924 srm610-2	0.079216	0.044077	0.006685	0.031452	0.064637	0.195300	0.087028	0.042820
linest from std sig ave								
0.000000	0.067236	0.000000	0.000000	0.000000	0.000000	0.026190	0.057161	0.086645
concentration data								
0.44 SRM614-7	0.46	0.64	3.93	1.94	17.45	0.24	0.00	0.34
10.96 SRM612-7	7.53	8.36	12.66	9.37	525.35	6.32	0.00	11.64
169.77 SRM610-7	102.19	107.94	138.49	120.12	7428.50	102.70	0.00	125.08
0.22 AP1-7	2.47	2.58	3.25	0.79	0.00	0.23	0.00	0.20
1.59 AP2-7	24.14	26.64	32.45	25.30	27.46	0.54	0.00	0.36
8.70 AP3-7	168.17	173.25	176.24	173.59	184.66	1.25	0.00	1.20
14.02 AP4-7	326.18	335.44	324.26	335.68	327.18	2.15	0.00	1.85
3.66 GCK2-1	25.83	28.74	32.32	26.11	0.00	1.78	0.00	0.00
0.82 GCK2-2	20.30	22.41	24.21	20.04	0.00	1.67	0.00	0.03
1.02 GCK2-3	31.26	34.44	39.08	34.45	0.00	1.74	0.00	0.00
4.70 GCK2-4	72.48	79.80	88.89	82.60	41.01	1.53	0.00	0.00
1.23 GCK2-5	51.09	56.47	67.20	58.90	32.06	1.36	0.00	0.00
1.63 GCK2-6	51.38	56.53	69.13	59.48	34.49	1.36	0.00	0.00
4.37 GCK2-7	67.55	74.57	84.72	78.42	42.33	1.30	0.00	0.15
2.13 GCK2-8	67.23	73.34	86.22	76.95	47.62	1.04	0.00	0.00
1.34 GCK2-9	72.76	79.43	93.65	84.65	53.00	1.21	0.00	0.00
5.19 GCK2-10	167.02	173.34	195.35	184.86	150.33	8.22	0.00	0.08
3.82 GCK2-11	150.36	156.82	180.01	166.19	140.92	8.17	0.00	0.05
3.76 GCK2-12	134.49	141.74	166.13	151.63	124.51	7.68	0.00	0.09
7.26 GCK2-13	120.45	127.20	149.39	135.17	112.70	7.02	0.00	0.06
4.14 GCK2-14	117.78	124.03	145.39	131.13	108.41	6.31	0.00	0.05
6.13 GCK2-15	138.48	145.06	166.67	151.22	131.42	6.84	0.00	0.12
4.96 GCK2-16	112.97	119.96	141.16	125.80	110.63	5.97	0.00	0.11
4.03 GCK2-17	98.00	104.52	124.08	110.51	87.33	4.97	0.00	0.09
2.21 GCK2-18	72.59	78.52	92.60	80.98	60.45	3.32	0.00	0.11
0.08 SRM614-8	0.54	0.53	0.30	0.00	0.00	0.27	0.00	0.49
11.08 SRM612-8	7.04	7.80	10.37	5.85	535.88	6.43	0.00	15.69
173.96 SRM610-8	115.08	122.12	157.28	129.46	8030.61	104.37	0.00	180.45
0.00 AP1-8	0.40	0.30	0.00	0.00	0.00	0.18	0.00	0.14
0.93 AP2-8	19.76	21.56	26.37	17.72	14.50	0.40	0.00	0.36
7.82 AP3-8	163.01	168.15	173.83	167.09	172.72	1.02	0.00	1.26
9.98 AP4-8	229.69	237.04	242.54	237.08	234.11	1.62	0.00	1.62
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65								
raw data								
618.44 blank-5	1440.77	1183.05	1259.25	5460.03	1698.49	2313.69	937.77	335.24
2180.17 SRM614-5	7241.84	4731.91	1716.93	13520.52	2256.41	4311.86	1403.77	747.60
11378.98 SRM612-5	16738.81	10141.34	2335.09	17224.34	11584.63	29560.17	14268.48	9204.13
66870.90 SRM610-5	87231.97	49461.48	7930.84	45777.86	67088.38	201546.42	84875.63	44695.37
1090.13 AP1-5	9339.13	5708.07	1442.97	11082.14	1306.33	4348.10	966.53	602.24
2511.29 AP2-5	64019.08	37199.09	5872.27	32624.18	2257.25	5732.23	908.61	709.68
26997.59 AP3-5	1228693.40	666764.94	74054.02	446970.72	14560.60	17470.62	1127.61	3410.94
40579.11 AP4-5	2027030.80	1121966.00	119526.27	749235.81	22210.53	26601.63	1178.61	4904.11
1194.37 GCK1-1	365245.13	199611.44	25289.26	140976.19	4817.67	15927.17	891.97	593.40
1264.61 GCK1-2	521750.66	283869.84	34912.76	196095.83	6427.16	18389.38	827.44	551.92
1098.89 GCK1-3	384889.81	210597.83	27390.03	149567.00	5125.27	14649.52	829.48	555.84
1761.49 GCK1-4	423628.69	230960.38	29519.97	163466.47	5648.11	16677.09	844.16	568.04
1339.65 GCK1-5	271023.97	150519.13	20126.03	108797.41	4135.26	15088.89	870.00	579.92
1232.89 GCK1-6	200972.81	112107.20	15286.37	82592.55	3191.78	9686.25	804.52	491.68

Appendix A. Raw trace element datasheets from laser ablation.

954.85 GCK1-7	60208.26	35190.32	5137.07	30119.69	1633.69	3973.70	748.28	498.24
745.92 GCK1-8	54028.79	31535.66	5027.67	28381.60	1624.85	3576.46	714.24	500.88
791.80 GCK1-9	55844.27	33020.91	5080.31	29887.61	1674.97	3699.66	713.48	438.00
1115.29 GCK1-10	174854.11	98011.71	14152.16	74465.38	3261.50	12223.03	875.92	578.80
976.73 GCK1-11	154695.88	87729.21	12426.03	66631.81	2866.78	10865.22	848.52	550.28
1004.13 GCK1-12	155483.63	88316.77	12525.27	66616.45	2975.94	10752.90	869.96	520.16
916.73 GCK1-13	94246.33	54017.34	7965.76	43600.13	2181.93	3894.22	780.08	506.60
858.68 GCK1-14	98183.59	55828.43	8312.45	45262.57	2259.85	3766.58	725.52	486.24
836.32 GCK1-15	85089.20	49235.12	7161.52	40628.51	1997.25	3730.14	764.52	472.44
1226.61 GCK1-16	80432.45	46413.14	6890.32	39433.14	1999.09	3723.98	817.40	491.36
1042.29 GCK1-17	90736.03	52387.06	7736.00	43097.16	2126.25	3735.06	740.64	482.84
1016.29 GCK1-18	85213.48	49534.12	7381.72	41526.19	2206.65	3808.46	734.92	466.88
729.88 SRM614-6	1496.97	1107.93	688.36	8276.69	1171.29	3355.10	999.73	611.48
6603.40 SRM612-6	7641.88	4738.23	1251.65	10380.58	7514.08	19654.19	9551.09	6419.44
45454.82 SRM610-6	55855.72	31811.14	5259.99	30239.53	47415.63	141394.08	63713.08	32957.66
511.16 AP1-6	1639.17	1161.49	590.00	5706.23	1032.41	3393.34	892.37	568.40
1414.41 AP2-6	31965.30	18802.99	3202.86	17987.62	1554.53	4237.30	844.76	631.00
13737.40 AP3-6	571583.50	308681.22	37097.97	210356.98	7782.16	10336.70	1061.13	2183.05
14584.92 AP4-6	683828.25	370311.31	43224.36	250809.48	8757.69	12508.07	991.17	2137.33
665.52 blank-6	733.44	699.72	438.60	8440.45	889.01	2682.58	703.80	424.00
641.98 blank average	1087.11	941.39	848.92	6950.24	1293.75	2498.13	820.78	379.62

blank subtraction								
1538.19 SRM614-5	6154.73	3790.52	868.00	6570.28	962.67	1813.73	582.98	367.98
10737.00 SRM612-5	15651.71	9199.95	1486.17	10274.10	10290.88	27062.03	13447.70	8824.51
66228.91 SRM610-5	86144.86	48520.09	7081.92	38827.62	65794.63	199048.29	84054.85	44315.75
448.14 AP1-5	8252.03	4766.69	594.04	4131.90	12.58	1849.97	145.74	222.62
1869.31 AP2-5	62931.98	36257.70	5023.35	25673.94	963.51	3234.10	87.82	330.06
26355.61 AP3-5	1227606.29	665823.55	73205.09	440020.48	13266.86	14972.48	306.82	3031.32
39937.12 AP4-5	2025943.69	1121024.61	118677.35	742285.57	20916.78	24103.49	357.82	4524.49
552.38 GCK1-1	364158.02	198670.05	24440.34	134025.95	3523.92	13429.04	71.18	213.78
622.62 GCK1-2	520663.55	282928.45	34063.83	189145.59	5133.41	15891.25	6.66	172.30
456.90 GCK1-3	383802.70	209656.44	26541.11	142616.76	3831.52	12151.39	8.70	176.22
1119.51 GCK1-4	422541.58	230018.99	28671.04	156516.23	4354.36	14178.96	23.38	188.42
697.66 GCK1-5	269936.86	149577.74	19277.11	101847.17	2841.52	12590.75	49.22	200.30
590.90 GCK1-6	199885.70	111165.81	14437.44	75642.31	1898.03	7188.12	-16.26	112.06
312.86 GCK1-7	59121.15	34248.93	4288.14	23169.45	339.94	1475.57	-72.50	118.62
103.94 GCK1-8	52941.68	30594.27	4178.74	21431.36	331.10	1078.33	-106.54	121.26
149.82 GCK1-9	54757.17	32079.52	4231.38	22937.37	381.22	1201.53	-107.30	58.38
473.30 GCK1-10	173767.00	97070.33	13303.23	67515.14	1967.75	9724.89	55.14	199.18
334.74 GCK1-11	153608.77	86787.83	11577.11	59681.57	1573.03	8367.09	27.74	170.66
362.14 GCK1-12	154396.52	87375.39	11676.35	59666.21	1682.19	8254.77	49.18	140.54
274.74 GCK1-13	93159.22	53075.96	7116.84	36649.89	888.19	1396.09	-40.70	126.98
216.70 GCK1-14	97096.49	54887.05	7463.52	38312.33	966.11	1268.45	-95.26	106.62
194.34 GCK1-15	84002.10	48293.73	6312.60	33678.27	703.50	1232.01	-56.26	92.82
584.62 GCK1-16	79345.35	45471.76	6041.39	32482.90	705.34	1225.85	-3.38	111.74
400.30 GCK1-17	89648.92	51445.67	6887.08	36146.92	832.50	1236.93	-80.14	103.22
374.30 GCK1-18	84126.38	48592.73	6532.80	34575.95	912.91	1310.33	-85.86	87.26
87.90 SRM614-6	409.86	166.54	-160.56	1326.45	-122.46	856.96	178.94	231.86
5961.41 SRM612-6	6554.78	3796.84	402.72	3430.34	6220.33	17156.06	8730.31	6039.81
44812.83 SRM610-6	54768.61	30869.75	4411.06	23289.29	46121.88	138895.95	62892.29	32578.04
-130.82 AP1-6	552.06	220.10	-258.92	-1244.01	-261.34	895.20	71.58	188.78
772.42 AP2-6	30878.19	17861.60	2353.93	11037.38	260.78	1739.17	23.98	251.38
13095.41 AP3-6	570496.39	307739.83	36249.04	203406.74	6488.42	7838.56	240.34	1803.43
13942.94 AP4-6	682741.14	369369.92	42375.44	243859.24	7463.94	10009.94	170.38	1757.71

zero correction								
1538.19 SRM614-5	6154.73	3790.52	868.00	6570.28	962.67	1813.73	582.98	367.98
10737.00 SRM612-5	15651.71	9199.95	1486.17	10274.10	10290.88	27062.03	13447.70	8824.51
66228.91 SRM610-5	86144.86	48520.09	7081.92	38827.62	65794.63	199048.29	84054.85	44315.75
448.14 AP1-5	8252.03	4766.69	594.04	4131.90	12.58	1849.97	145.74	222.62
1869.31 AP2-5	62931.98	36257.70	5023.35	25673.94	963.51	3234.10	87.82	330.06
26355.61 AP3-5	1227606.29	665823.55	73205.09	440020.48	13266.86	14972.48	306.82	3031.32
39937.12 AP4-5	2025943.69	1121024.61	118677.35	742285.57	20916.78	24103.49	357.82	4524.49
552.38 GCK1-1	364158.02	198670.05	24440.34	134025.95	3523.92	13429.04	71.18	213.78
622.62 GCK1-2	520663.55	282928.45	34063.83	189145.59	5133.41	15891.25	6.66	172.30
456.90 GCK1-3	383802.70	209656.44	26541.11	142616.76	3831.52	12151.39	8.70	176.22
1119.51 GCK1-4	422541.58	230018.99	28671.04	156516.23	4354.36	14178.96	23.38	188.42
697.66 GCK1-5	269936.86	149577.74	19277.11	101847.17	2841.52	12590.75	49.22	200.30
590.90 GCK1-6	199885.70	111165.81	14437.44	75642.31	1898.03	7188.12	0.00	112.06
312.86 GCK1-7	59121.15	34248.93	4288.14	23169.45	339.94	1475.57	0.00	118.62
103.94 GCK1-8	52941.68	30594.27	4178.74	21431.36	331.10	1078.33	0.00	121.26
149.82 GCK1-9	54757.17	32079.52	4231.38	22937.37	381.22	1201.53	0.00	58.38
473.30 GCK1-10	173767.00	97070.33	13303.23	67515.14	1967.75	9724.89	55.14	199.18
334.74 GCK1-11	153608.77	86787.83	11577.11	59681.57	1573.03	8367.09	27.74	170.66
362.14 GCK1-12	154396.52	87375.39	11676.35	59666.21	1682.19	8254.77	49.18	140.54
274.74 GCK1-13	93159.22	53075.96	7116.84	36649.89	888.19	1396.09	0.00	126.98
216.70 GCK1-14	97096.49	54887.05	7463.52	38312.33	966.11	1268.45	0.00	106.62

Appendix A. Raw trace element datasheets from laser ablation.

194.34	GCK1-15	84002.10	48293.73	6312.60	33678.27	703.50	1232.01	0.00	92.82
584.62	GCK1-16	79345.35	45471.76	6041.39	32482.90	705.34	1225.85	0.00	111.74
400.30	GCK1-17	89648.92	51445.67	6887.08	36146.92	832.50	1236.93	0.00	103.22
374.30	GCK1-18	84126.38	48592.73	6532.80	34575.95	912.91	1310.33	0.00	87.26
87.90	SRM614-6	409.86	166.54	0.00	1326.45	0.00	856.96	178.94	231.86
5961.41	SRM612-6	6554.78	3796.84	402.72	3430.34	6220.33	17156.06	8730.31	6039.81
44812.83	SRM610-6	54768.61	30869.75	4411.06	23289.29	46121.88	138895.95	62892.29	32578.04
0.00	AP1-6	552.06	220.10	0.00	0.00	0.00	895.20	71.58	188.78
772.42	AP2-6	30878.19	17861.60	2353.93	11037.38	260.78	1739.17	23.98	251.38
13095.41	AP3-6	570496.39	307739.83	36249.04	203406.74	6488.42	7838.56	240.34	1803.43
13942.94	AP4-6	682741.14	369369.92	42375.44	243859.24	7463.94	10009.94	170.38	1757.71

certified concentration									
SRM614		1.90					1.12		
SRM612		37.92					36.24	34.64	37.33
SRM610		456.30					438.10	426.30	317.40
0.14	STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25	STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94	STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81	STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration									
0.000000	SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000	SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000	SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000	STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006	STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017	STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032	STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal									
0.000624	SRM614-5	0.002497	0.001538	0.000352	0.002665	0.000391	0.000736	0.000236	0.000149
0.004815	SRM612-5	0.007019	0.004126	0.000666	0.004607	0.004615	0.012135	0.006030	0.003957
0.061581	SRM610-5	0.080099	0.045115	0.006585	0.036103	0.061177	0.185079	0.078156	0.041206
0.000026	AP1-5	0.000478	0.000276	0.000034	0.000239	0.000001	0.000107	0.000008	0.000013
0.000132	AP2-5	0.004441	0.002559	0.000354	0.001812	0.000068	0.000228	0.000006	0.000023
0.001299	AP3-5	0.060503	0.032815	0.003608	0.021687	0.000654	0.000738	0.000015	0.000149
0.002179	AP4-5	0.110528	0.061159	0.006475	0.040496	0.001141	0.001315	0.000020	0.000247
0.000031	GCK1-1	0.020352	0.011103	0.001366	0.007490	0.000197	0.000751	0.000004	0.000012
0.000031	GCK1-2	0.026195	0.014235	0.001714	0.009516	0.000258	0.000800	0.000000	0.000009
0.000030	GCK1-3	0.025491	0.013925	0.001763	0.009472	0.000254	0.000807	0.000001	0.000012
0.000060	GCK1-4	0.022639	0.012324	0.001536	0.008386	0.000233	0.000760	0.000001	0.000010
0.000037	GCK1-5	0.014188	0.007862	0.001013	0.005353	0.000149	0.000662	0.000003	0.000011
0.000038	GCK1-6	0.012734	0.007082	0.000920	0.004819	0.000121	0.000458	0.000000	0.000007
0.000038	GCK1-7	0.007119	0.004124	0.000516	0.002790	0.000041	0.000178	0.000000	0.000014
0.000013	GCK1-8	0.006604	0.003817	0.000521	0.002674	0.000041	0.000135	0.000000	0.000015
0.000018	GCK1-9	0.006577	0.003853	0.000508	0.002755	0.000046	0.000144	0.000000	0.000007
0.000024	GCK1-10	0.008916	0.004981	0.000683	0.003464	0.000101	0.000499	0.000003	0.000010
0.000021	GCK1-11	0.009504	0.005370	0.000716	0.003693	0.000097	0.000518	0.000002	0.000011
0.000022	GCK1-12	0.009230	0.005223	0.000698	0.003567	0.000101	0.000493	0.000003	0.000008
0.000025	GCK1-13	0.008349	0.004757	0.000638	0.003285	0.000080	0.000125	0.000000	0.000011
0.000019	GCK1-14	0.008550	0.004833	0.000657	0.003374	0.000085	0.000112	0.000000	0.000009
0.000018	GCK1-15	0.007901	0.004542	0.000594	0.003168	0.000066	0.000116	0.000000	0.000009
0.000072	GCK1-16	0.009746	0.005586	0.000742	0.003990	0.000087	0.000151	0.000000	0.000014
0.000042	GCK1-17	0.009488	0.005445	0.000729	0.003826	0.000088	0.000131	0.000000	0.000011
0.000047	GCK1-18	0.010654	0.006154	0.000827	0.004379	0.000116	0.000166	0.000000	0.000011
0.000065	SRM614-6	0.000304	0.000123	0.000000	0.000984	0.000000	0.000635	0.000133	0.000172
0.004201	SRM612-6	0.004619	0.002675	0.000284	0.002417	0.004383	0.012088	0.006152	0.004256
0.061061	SRM610-6	0.074627	0.042063	0.006010	0.031734	0.062845	0.189257	0.085696	0.044390
0.000000	AP1-6	0.000046	0.000018	0.000000	0.000000	0.000000	0.000075	0.000006	0.000016
0.000075	AP2-6	0.003016	0.001745	0.000230	0.001078	0.000025	0.000170	0.000002	0.000025
0.000858	AP3-6	0.037377	0.020162	0.002375	0.013326	0.000425	0.000514	0.000016	0.000118
0.001261	AP4-6	0.061741	0.033402	0.003832	0.022052	0.000675	0.000905	0.000015	0.000159

standardize signal averages AP									
0.000013	AP1	0.000262	0.000147	0.000017	0.000120	0.000000	0.000091	0.000007	0.000014
0.000104	AP2	0.003729	0.002152	0.000292	0.001445	0.000047	0.000199	0.000004	0.000024
0.001078	AP3	0.048940	0.026489	0.002991	0.017507	0.000539	0.000626	0.000015	0.000134
0.001720	AP4	0.086135	0.047281	0.005153	0.031274	0.000908	0.001110	0.000017	0.000203

linest from std sig ave									
0.018046		0.008175	0.015396	0.140098	0.023281	0.789860	0.004335	0.000000	0.022164

standardize signal averages SRM									
0.000345	srm614-2	0.001400	0.000831	0.000176	0.001824	0.000195	0.000686	0.000185	0.000161
0.004508	srm612-2	0.005819	0.003400	0.000475	0.003512	0.004499	0.012112	0.006091	0.004106
0.061321	srm610-2	0.077363	0.043589	0.006298	0.033918	0.062011	0.187168	0.081926	0.042798

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
0.000000	0.068796	0.000000	0.000000	0.000000	0.000000	0.027324	0.060704	0.086651

concentration data								
0.97 SRM614-5	1.75	2.03	4.23	5.32	26.45	0.27	0.00	0.28
7.45 SRM612-5	4.92	5.45	8.01	9.20	312.61	4.51	0.00	7.52
95.31 SRM610-5	56.16	59.57	79.12	72.08	4144.18	68.81	0.00	78.32
0.19 AP1-5	1.56	1.70	1.92	2.22	0.23	0.19	0.00	0.11
0.95 AP2-5	14.48	15.72	19.81	16.83	21.43	0.39	0.00	0.21
9.35 AP3-5	197.32	201.55	201.65	201.42	206.03	1.28	0.00	1.32
15.69 AP4-5	360.47	375.63	361.87	376.12	359.58	2.27	0.00	2.18
0.22 GCK1-1	66.37	68.19	76.34	69.57	62.06	1.30	0.00	0.11
0.23 GCK1-2	85.43	87.43	95.78	88.38	81.38	1.38	0.00	0.08
0.22 GCK1-3	83.14	85.52	98.52	87.98	80.19	1.40	0.00	0.10
0.43 GCK1-4	73.83	75.69	85.86	77.89	73.51	1.31	0.00	0.09
0.26 GCK1-5	46.27	48.29	56.63	49.72	47.06	1.14	0.00	0.09
0.27 GCK1-6	41.53	43.50	51.41	44.76	38.10	0.79	0.00	0.06
0.27 GCK1-7	23.22	25.33	28.86	25.91	12.90	0.31	0.00	0.13
0.09 GCK1-8	21.54	23.44	29.13	24.83	13.02	0.23	0.00	0.13
0.13 GCK1-9	21.45	23.67	28.41	25.59	14.43	0.25	0.00	0.06
0.17 GCK1-10	29.08	30.59	38.15	32.18	31.82	0.86	0.00	0.09
0.15 GCK1-11	31.00	32.98	40.03	34.30	30.67	0.90	0.00	0.09
0.16 GCK1-12	30.10	32.08	39.01	33.13	31.69	0.85	0.00	0.07
0.18 GCK1-13	27.23	29.22	35.65	30.51	25.08	0.22	0.00	0.10
0.14 GCK1-14	27.89	29.69	36.73	31.33	26.81	0.19	0.00	0.08
0.13 GCK1-15	25.77	27.90	33.18	29.42	20.85	0.20	0.00	0.08
0.52 GCK1-16	31.79	34.31	41.48	37.06	27.30	0.26	0.00	0.12
0.30 GCK1-17	30.94	33.44	40.74	35.53	27.76	0.23	0.00	0.10
0.34 GCK1-18	34.75	37.80	46.24	40.67	36.43	0.29	0.00	0.10
0.10 SRM614-6	0.21	0.16	0.00	1.96	0.00	0.24	0.00	0.33
6.50 SRM612-6	3.24	3.53	3.41	4.83	296.90	4.49	0.00	8.09
94.50 SRM610-6	52.32	55.54	72.22	63.36	4257.16	70.36	0.00	84.38
0.00 AP1-6	0.15	0.11	0.00	0.00	0.00	0.13	0.00	0.14
0.54 AP2-6	9.84	10.72	12.85	10.01	8.03	0.29	0.00	0.22
6.18 AP3-6	121.90	123.83	132.73	123.77	133.95	0.89	0.00	1.04
9.08 AP4-6	201.36	205.15	214.17	204.82	212.69	1.57	0.00	1.41

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
456.56 blank-1	433.60	821.44	1084.81	4717.63	1421.81	4935.91	1125.57	589.32
2832.26 SRM614-1	8045.21	5079.95	1722.65	11366.50	2135.81	4253.46	1492.85	702.36
11733.99 SRM612-1	17397.54	10445.22	2315.17	15740.37	11702.19	29480.37	13977.00	9484.21
67712.54 SRM610-1	63876.36	36256.16	6385.96	35911.60	60957.42	176804.16	71552.20	39792.47
1308.93 AP1-1	8086.45	5125.87	1299.85	11381.62	1430.85	4650.95	1074.69	576.72
2775.26 AP2-1	77367.72	45469.66	7035.16	38713.66	2500.93	7281.64	976.09	818.28
29498.21 AP3-1	1515348.80	832498.94	93450.77	562435.50	18032.66	22692.21	1222.45	3832.06
32507.58 AP4-1	1660007.10	916467.63	102513.41	616029.94	19797.87	26904.23	1210.01	4256.34
619.68 V2-1	50982.65	30630.09	5059.11	29347.93	1613.21	7355.04	704.96	363.76
664.64 V2-2	39619.30	23558.37	3916.54	25110.66	1447.85	6720.68	742.72	383.44
623.64 V2-3	34039.71	20426.12	3347.46	22799.61	1414.01	5851.59	720.68	314.28
1253.29 V2-4	96735.78	55937.40	8259.97	48564.20	2426.17	13786.16	800.44	470.20
854.60 V2-5	124722.15	71381.48	10616.70	59942.30	2590.57	21380.60	775.20	365.36
946.93 V2-6	135689.77	77430.04	11639.51	64528.96	2808.30	23002.45	755.52	419.12
1659.77 V2-7	83670.99	48646.56	7442.76	43277.65	2101.57	11854.51	745.24	423.32
953.49 V2-8	78669.60	45831.58	6801.44	41694.40	1983.09	9880.82	684.04	372.52
846.60 V2-9	70021.56	40705.59	5946.59	38004.38	1830.01	9258.37	727.16	353.84
1101.85 V2-10	74039.42	42673.92	6462.00	39980.63	1951.85	9997.66	713.48	373.88
826.72 V2-11	55207.99	32093.86	4979.15	32583.90	1719.17	8161.37	730.60	332.96
852.64 V2-12	49860.20	29237.37	4399.74	30620.61	1635.29	8210.37	670.88	322.88
1303.37 V2-13	450238.50	248766.61	34410.51	186118.33	6189.84	86676.45	867.88	436.44
1173.05 V2-14	478330.34	263269.28	35726.96	195363.89	6271.36	86058.20	812.08	444.40
1257.85 V2-15	499187.34	275152.81	37598.53	203360.19	6633.44	90813.83	897.13	453.56
950.89 SRM614-2	2882.70	1913.57	673.04	9817.18	1150.05	3141.50	988.37	536.68
8651.33 SRM612-2	11127.70	6730.92	1427.05	13256.11	9547.61	24656.62	11449.35	7809.00
60498.74 SRM610-2	67215.54	37879.73	6139.43	35959.24	59604.46	181841.22	73889.54	37271.21
551.32 AP1-2	2765.90	1793.29	591.52	7845.60	953.05	3394.22	877.84	446.24
1712.89 AP2-2	37060.41	22058.32	3680.34	21795.12	1617.17	5058.43	869.00	555.68
10580.62 AP3-2	421965.13	230954.89	29283.05	162483.56	6509.80	10199.18	925.73	1678.25
17794.86 AP4-2	848969.31	462742.47	53924.02	315646.09	11176.46	15693.89	1013.41	2598.57

Appendix A. Raw trace element datasheets from laser ablation.

545.12 blank-2	647.16	584.72	308.96	7761.56	806.44	2257.97	666.76	322.56
500.84 blank average	540.38	703.08	696.88	6239.60	1114.13	3596.94	896.17	455.94

blank subtraction								
2331.41 SRM614-1	7504.82	4376.86	1025.77	5126.91	1021.69	656.52	596.68	246.42
11233.14 SRM612-1	16857.15	9742.14	1618.29	9500.77	10588.06	25883.42	13080.83	9028.27
67211.70 SRM610-1	63335.98	35553.08	5689.07	29672.01	59843.30	173207.22	70656.04	39336.52
808.08 AP1-1	7546.06	4422.79	602.96	5142.03	316.72	1054.01	178.52	120.78
2274.41 AP2-1	76827.34	44766.57	6338.28	32474.06	1386.81	3684.70	79.92	362.34
28997.36 AP3-1	1514808.42	831795.86	92753.88	556195.90	16918.54	19095.27	326.28	3376.12
32006.74 AP4-1	1659466.72	915764.55	101816.53	609790.34	18683.74	23307.29	313.84	3800.40
118.84 V2-1	50442.26	29927.01	4362.22	23108.33	499.08	3758.10	-191.20	-92.18
163.80 V2-2	39078.92	22855.29	3219.66	18871.07	333.72	3123.74	-153.44	-72.50
122.80 V2-3	33499.33	19723.03	2650.57	16560.01	299.88	2254.65	-175.48	-141.66
752.44 V2-4	96195.40	55234.31	7563.08	42324.60	1312.05	10189.22	-95.72	14.26
353.76 V2-5	124181.77	70678.40	9919.82	53702.70	1476.45	17783.66	-120.96	-90.58
446.08 V2-6	135149.39	76726.96	10942.62	58289.37	1694.17	19405.51	-140.64	-36.82
1158.93 V2-7	83130.61	47943.47	6745.88	37038.05	987.45	8257.57	-150.92	-32.62
452.64 V2-8	78129.22	45128.49	6104.55	35454.80	868.96	6283.88	-212.12	-83.42
345.76 V2-9	69481.17	40002.51	5249.71	31764.78	715.88	5661.43	-169.00	-102.10
601.00 V2-10	73499.04	41970.84	5765.11	33741.03	837.72	6400.72	-182.68	-82.06
325.88 V2-11	54667.60	31390.78	4282.26	26344.31	605.04	4564.43	-165.56	-122.98
351.80 V2-12	49319.82	28534.28	3702.86	24381.02	521.16	4613.43	-225.28	-133.06
802.52 V2-13	449698.12	248063.53	33713.63	179878.73	5075.71	83079.50	-28.28	-19.50
672.20 V2-14	477789.96	262566.20	35030.08	189124.29	5157.23	82461.26	-84.08	-11.54
757.00 V2-15	498646.96	274449.73	36901.65	197120.59	5519.31	87216.89	0.96	-2.38
450.04 SRM614-2	2342.31	1210.49	-23.84	3577.58	35.92	-455.44	92.20	80.74
8150.49 SRM612-2	10587.32	6027.83	730.16	7016.52	8433.49	21059.68	10553.18	7353.06
59997.90 SRM610-2	66675.16	37176.65	5442.55	29719.65	58490.33	178244.28	72993.37	36815.27
50.48 AP1-2	2225.51	1090.21	-105.36	1606.01	-161.08	-202.72	-18.32	-9.70
1212.05 AP2-2	36520.03	21355.24	2983.46	15555.53	503.04	1461.49	-27.16	99.74
10079.78 AP3-2	421424.75	230251.81	28586.16	156243.96	5395.67	6602.24	29.56	1222.31
17294.02 AP4-2	848428.93	462039.39	53227.14	309406.49	10062.34	12096.95	117.24	2142.63

zero correction								
2331.41 SRM614-1	7504.82	4376.86	1025.77	5126.91	1021.69	656.52	596.68	246.42
11233.14 SRM612-1	16857.15	9742.14	1618.29	9500.77	10588.06	25883.42	13080.83	9028.27
67211.70 SRM610-1	63335.98	35553.08	5689.07	29672.01	59843.30	173207.22	70656.04	39336.52
808.08 AP1-1	7546.06	4422.79	602.96	5142.03	316.72	1054.01	178.52	120.78
2274.41 AP2-1	76827.34	44766.57	6338.28	32474.06	1386.81	3684.70	79.92	362.34
28997.36 AP3-1	1514808.42	831795.86	92753.88	556195.90	16918.54	19095.27	326.28	3376.12
32006.74 AP4-1	1659466.72	915764.55	101816.53	609790.34	18683.74	23307.29	313.84	3800.40
118.84 V2-1	50442.26	29927.01	4362.22	23108.33	499.08	3758.10	0.00	0.00
163.80 V2-2	39078.92	22855.29	3219.66	18871.07	333.72	3123.74	0.00	0.00
122.80 V2-3	33499.33	19723.03	2650.57	16560.01	299.88	2254.65	0.00	0.00
752.44 V2-4	96195.40	55234.31	7563.08	42324.60	1312.05	10189.22	0.00	14.26
353.76 V2-5	124181.77	70678.40	9919.82	53702.70	1476.45	17783.66	0.00	0.00
446.08 V2-6	135149.39	76726.96	10942.62	58289.37	1694.17	19405.51	0.00	0.00
1158.93 V2-7	83130.61	47943.47	6745.88	37038.05	987.45	8257.57	0.00	0.00
452.64 V2-8	78129.22	45128.49	6104.55	35454.80	868.96	6283.88	0.00	0.00
345.76 V2-9	69481.17	40002.51	5249.71	31764.78	715.88	5661.43	0.00	0.00
601.00 V2-10	73499.04	41970.84	5765.11	33741.03	837.72	6400.72	0.00	0.00
325.88 V2-11	54667.60	31390.78	4282.26	26344.31	605.04	4564.43	0.00	0.00
351.80 V2-12	49319.82	28534.28	3702.86	24381.02	521.16	4613.43	0.00	0.00
802.52 V2-13	449698.12	248063.53	33713.63	179878.73	5075.71	83079.50	0.00	0.00
672.20 V2-14	477789.96	262566.20	35030.08	189124.29	5157.23	82461.26	0.00	0.00
757.00 V2-15	498646.96	274449.73	36901.65	197120.59	5519.31	87216.89	0.96	0.00
450.04 SRM614-2	2342.31	1210.49	0.00	3577.58	35.92	0.00	92.20	80.74
8150.49 SRM612-2	10587.32	6027.83	730.16	7016.52	8433.49	21059.68	10553.18	7353.06
59997.90 SRM610-2	66675.16	37176.65	5442.55	29719.65	58490.33	178244.28	72993.37	36815.27
50.48 AP1-2	2225.51	1090.21	0.00	1606.01	-161.08	0.00	0.00	0.00
1212.05 AP2-2	36520.03	21355.24	2983.46	15555.53	503.04	1461.49	0.00	99.74
10079.78 AP3-2	421424.75	230251.81	28586.16	156243.96	5395.67	6602.24	29.56	1222.31
17294.02 AP4-2	848428.93	462039.39	53227.14	309406.49	10062.34	12096.95	117.24	2142.63

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701

Appendix A. Raw trace element datasheets from laser ablation.

0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000930 SRM614-1	0.002993	0.001745	0.000409	0.002045	0.000407	0.000262	0.000238	0.000098
0.005026 SRM612-1	0.007543	0.004359	0.000724	0.004251	0.004738	0.011581	0.005853	0.004040
0.064333 SRM610-1	0.060624	0.034031	0.005445	0.028401	0.057281	0.165790	0.067630	0.037652
0.000047 AP1-1	0.000444	0.000260	0.000035	0.000302	0.000019	0.000062	0.000010	0.000007
0.000132 AP2-1	0.004452	0.002594	0.000367	0.001882	0.000080	0.000214	0.000005	0.000021
0.001380 AP3-1	0.072103	0.039592	0.004415	0.026474	0.000805	0.000909	0.000016	0.000161
0.001594 AP4-1	0.082665	0.045618	0.005072	0.030376	0.000931	0.001161	0.000016	0.000189
0.000013 V2-1	0.005589	0.003316	0.000483	0.002560	0.000055	0.000416	0.000000	0.000000
0.000021 V2-2	0.004906	0.002869	0.000404	0.002369	0.000042	0.000392	0.000000	0.000000
0.000019 V2-3	0.005074	0.002988	0.000402	0.002508	0.000045	0.000342	0.000000	0.000000
0.000090 V2-4	0.011492	0.006599	0.000904	0.005056	0.000157	0.001217	0.000000	0.000002
0.000039 V2-5	0.013773	0.007839	0.001100	0.005956	0.000164	0.001972	0.000000	0.000000
0.000050 V2-6	0.015058	0.008549	0.001219	0.006494	0.000189	0.002162	0.000000	0.000000
0.000188 V2-7	0.013474	0.007771	0.001093	0.006003	0.000160	0.001338	0.000000	0.000000
0.000076 V2-8	0.013069	0.007549	0.001021	0.005931	0.000145	0.001051	0.000000	0.000000
0.000065 V2-9	0.013122	0.007555	0.000991	0.005999	0.000135	0.001069	0.000000	0.000000
0.000118 V2-10	0.014392	0.008218	0.001129	0.006607	0.000164	0.001253	0.000000	0.000000
0.000070 V2-11	0.011766	0.006756	0.000922	0.005670	0.000130	0.000982	0.000000	0.000000
0.000079 V2-12	0.011031	0.006382	0.000828	0.005453	0.000117	0.001032	0.000000	0.000000
0.000045 V2-13	0.025167	0.013883	0.001887	0.010067	0.000284	0.004649	0.000000	0.000000
0.000037 V2-14	0.026013	0.014295	0.001907	0.010297	0.000281	0.004490	0.000000	0.000000
0.000038 V2-15	0.025025	0.013774	0.001852	0.009893	0.000277	0.004377	0.000000	0.000000
0.000298 SRM614-2	0.001549	0.000800	0.000000	0.002366	0.000024	0.000000	0.000061	0.000053
0.004749 SRM612-2	0.006169	0.003512	0.000425	0.004088	0.004914	0.012270	0.006149	0.004284
0.067055 SRM610-2	0.074518	0.041549	0.006083	0.033215	0.065370	0.199209	0.081579	0.041146
0.000004 AP1-2	0.000182	0.000089	0.000000	0.000131	0.000000	0.000000	0.000000	0.000000
0.000097 AP2-2	0.002928	0.001712	0.000239	0.001247	0.000040	0.000117	0.000000	0.000008
0.000781 AP3-2	0.032667	0.017848	0.002216	0.012112	0.000418	0.000512	0.000002	0.000095
0.001166 AP4-2	0.057187	0.031143	0.003588	0.020855	0.000678	0.000815	0.000008	0.000144
standardize signal averages AP								
0.000026 AP1	0.000313	0.000175	0.000018	0.000217	0.000009	0.000031	0.000005	0.000004
0.000114 AP2	0.003690	0.002153	0.000303	0.001564	0.000060	0.000165	0.000002	0.000014
0.001081 AP3	0.052385	0.028720	0.003315	0.019293	0.000612	0.000710	0.000009	0.000128
0.001380 AP4	0.069926	0.038381	0.004330	0.025616	0.000804	0.000988	0.000012	0.000167
linest from std sig ave								
0.020659	0.009179	0.017246	0.151471	0.025776	0.817831	0.004549	0.000000	0.025521
standardize signal averages SRM								
0.000614 srm614-2	0.002271	0.001273	0.000205	0.002205	0.000216	0.000131	0.000149	0.000076
0.004887 srm612-2	0.006856	0.003936	0.000575	0.004170	0.004826	0.011926	0.006001	0.004162
0.065694 srm610-2	0.067571	0.037790	0.005764	0.030808	0.061325	0.182500	0.074605	0.039399
linest from std sig ave								
0.000000	0.078518	0.000000	0.000000	0.000000	0.000000	0.028022	0.066631	0.094052
concentration data								
1.65 SRM614-1	2.36	2.58	5.31	4.52	28.58	0.10	0.00	0.22
8.91 SRM612-1	5.94	6.45	9.41	9.40	332.29	4.52	0.00	8.84
113.98 SRM610-1	47.73	50.33	70.74	62.78	4017.64	64.69	0.00	82.41
0.39 AP1-1	1.62	1.79	2.14	3.11	6.07	0.11	0.00	0.07
1.09 AP2-1	16.30	17.85	22.19	19.35	26.22	0.39	0.00	0.21
11.38 AP3-1	264.04	272.41	266.78	272.23	262.74	1.65	0.00	1.64
13.14 AP4-1	302.72	313.86	306.48	312.36	303.66	2.11	0.00	1.93
0.11 V2-1	20.47	22.81	29.20	26.33	18.04	0.76	0.00	0.00
0.17 V2-2	17.97	19.74	24.43	24.36	13.67	0.71	0.00	0.00
0.15 V2-3	18.58	20.56	24.26	25.79	14.82	0.62	0.00	0.00
0.74 V2-4	42.08	45.40	54.60	52.00	51.14	2.21	0.00	0.02
0.32 V2-5	50.43	53.93	66.48	61.25	53.42	3.58	0.00	0.00
0.41 V2-6	55.14	58.82	73.67	66.78	61.59	3.92	0.00	0.00
1.55 V2-7	49.34	53.47	66.07	61.73	52.22	2.43	0.00	0.00
0.62 V2-8	47.86	51.94	61.71	60.99	47.43	1.91	0.00	0.00
0.54 V2-9	48.05	51.98	59.91	61.69	44.11	1.94	0.00	0.00
0.97 V2-10	52.70	56.54	68.21	67.94	53.52	2.27	0.00	0.00
0.58 V2-11	43.09	46.48	55.69	58.31	42.49	1.78	0.00	0.00
0.65 V2-12	40.40	43.91	50.05	56.08	38.03	1.87	0.00	0.00
0.37 V2-13	92.16	95.52	114.01	103.52	92.68	8.44	0.00	0.00
0.30 V2-14	95.26	98.36	115.25	105.88	91.61	8.15	0.00	0.00
0.31 V2-15	91.64	94.77	111.91	101.73	90.37	7.94	0.00	0.00
0.53 SRM614-2	1.22	1.18	0.00	5.23	1.67	0.00	0.00	0.12
8.41 SRM612-2	4.86	5.19	5.53	9.04	344.64	4.79	0.00	9.38

Appendix A. Raw trace element datasheets from laser ablation.

118.80 SRM610-2	58.66	61.46	79.02	73.43	4585.03	77.73	0.00	90.06
0.03 AP1-2	0.67	0.61	0.00	1.35	0.00	0.00	0.00	0.00
0.80 AP2-2	10.72	11.78	14.45	12.82	13.16	0.21	0.00	0.08
6.44 AP3-2	119.63	122.80	133.90	124.54	136.46	0.93	0.00	0.96
9.61 AP4-2	209.42	214.27	216.79	214.45	221.28	1.48	0.00	1.47
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
336.16 blank-23	322.48	297.24	461.60	3575.22	928.37	1447.53	615.36	321.20
621.40 SRM614-23	1073.29	765.92	685.76	5149.11	1147.65	2315.61	836.36	491.36
7981.09 SRM612-23	8134.53	4717.31	1258.21	7873.48	6677.76	21557.56	8854.41	5407.91
42282.36 SRM610-23	42249.84	23835.41	4228.14	20786.12	28743.84	111945.83	41081.31	20306.04
436.36 AP1-23	1289.85	761.32	538.48	3349.34	871.12	2966.70	705.32	410.76
2215.37 AP2-23	54276.11	31984.58	5073.71	24908.70	1766.05	5319.23	864.56	641.04
9958.94 AP3-23	345637.66	188488.31	23993.98	128519.40	5254.47	10249.74	911.29	1344.49
12159.67 AP4-23	454116.22	243983.89	30402.29	165912.69	6487.76	13194.48	1012.37	1440.21
5000.51 34HP45-494-1	55398.83	32695.31	5730.55	27664.83	9400.13	27184.19	1151.69	1483.85
2937.18 34HP45-494-2	58333.29	33930.31	5820.91	28686.96	6414.52	22855.73	1003.61	1382.37
2965.06 34HP45-494-3	61289.47	35920.32	6081.19	30195.29	8308.21	25149.78	1053.09	1672.77
6267.28 34HP45-494-4	26990.99	15738.05	4654.95	21109.80	4324.30	71898.56	1058.45	987.73
2575.49 34HP45-494-5	33839.07	20117.15	4706.11	22280.69	6107.23	53734.66	1067.37	916.65
3359.30 34HP45-494-6	27022.35	15881.29	4585.99	20259.27	5179.35	65117.29	1052.61	800.72
4144.66 34HP45-494-7	36470.97	21631.88	4676.23	22446.29	5864.71	39409.34	965.21	868.88
6662.44 34HP45-494-8	27960.16	16615.73	5725.75	25515.26	3772.06	111595.86	1030.01	810.00
4729.83 34HP45-494-9	28794.20	17158.94	5699.63	25219.22	4333.02	108436.09	971.33	793.80
7251.60 34HP45-494-10	89924.87	51705.81	9182.33	45261.06	19253.51	59380.45	1418.81	2482.81
5476.63 34HP45-494-11	96605.02	55595.63	10644.94	51050.93	15295.97	98019.36	1237.41	2330.57
8807.49 34HP45-494-12	107278.32	61534.39	10974.70	53537.62	17282.42	77482.88	1305.09	2685.02
2903.74 34HP45-494-13	80628.98	46773.18	7686.28	38867.94	8261.57	33190.83	1017.77	1254.01
3185.10 34HP45-494-14	88847.06	51031.57	8311.89	42258.92	7963.84	33470.63	1042.81	1382.45
2535.73 34HP45-494-15	81753.38	47311.03	7957.68	39744.90	7973.13	35314.88	1075.01	1284.81
3323.26 34HP45-494-16	47795.67	28208.52	6526.00	30944.30	2061.65	77789.88	884.64	899.05
3857.14 34HP45-494-17	48820.36	28594.92	6938.36	32892.90	2135.13	93704.73	959.57	898.13
3083.90 34HP45-494-18	52567.77	30753.05	6299.48	31404.98	2025.85	60174.26	986.93	894.69
737.68 SRM614-24	881.44	695.68	390.40	6086.27	1003.41	2919.82	1039.65	506.88
5818.67 SRM612-24	6633.84	4046.62	908.81	8939.93	6645.44	16764.06	8165.77	5267.91
36949.29 SRM610-24	43861.17	25037.34	4026.26	23760.81	34635.95	102062.65	45036.54	24809.42
499.08 AP1-24	603.88	517.52	326.84	5502.35	912.77	3042.46	858.96	393.36
1743.69 AP2-24	38076.41	22125.81	3502.94	20619.80	1663.33	4590.83	971.77	542.12
8598.89 AP3-24	332857.78	179489.73	22493.85	125333.74	5290.59	9066.49	1021.37	1319.69
10148.62 AP4-24	390649.75	209767.14	25573.94	144379.73	6111.83	11133.50	1089.17	1347.89
687.92 blank-24	349.48	335.84	213.24	4934.83	848.68	2178.53	775.52	306.28
512.04 blank average	335.98	316.54	337.42	4255.02	888.52	1813.03	695.44	313.74

blank subtraction								
109.36 SRM614-23	737.30	449.38	348.34	894.09	259.12	502.58	140.92	177.62
7469.04 SRM612-23	7798.54	4400.76	920.79	3618.46	5789.23	19744.53	8158.97	5094.17
41770.32 SRM610-23	41913.86	23518.87	3890.72	16531.09	27855.32	110132.80	40385.87	19992.29
-75.68 AP1-23	953.87	444.78	201.06	-905.68	-17.40	1153.67	9.88	97.02
1703.33 AP2-23	53940.12	31668.04	4736.29	20653.68	877.52	3506.20	169.12	327.30
9446.89 AP3-23	345301.68	188171.77	23656.55	124264.38	4365.94	8436.71	215.84	1030.75
11647.63 AP4-23	453780.24	243667.35	30064.87	161657.67	5599.23	11381.44	316.92	1126.47
4488.47 34HP45-494-1	55062.85	32378.76	5393.13	23409.81	8511.61	25371.16	456.24	1170.11
2425.13 34HP45-494-2	57997.31	33613.77	5483.49	24431.94	5525.99	21042.70	308.16	1068.63
2453.01 34HP45-494-3	60953.48	35603.78	5743.77	25940.27	7419.68	23336.75	357.64	1359.03
5755.23 34HP45-494-4	26655.01	15421.51	4317.52	16854.78	3435.78	70085.53	363.00	673.98
2063.45 34HP45-494-5	33503.09	19800.61	4368.68	18025.66	5218.71	51921.63	371.92	602.90
2847.26 34HP45-494-6	26686.37	15564.75	4248.56	16004.25	4290.82	63304.25	357.16	486.98
3632.62 34HP45-494-7	36134.98	21315.34	4338.80	18191.26	4976.19	37596.31	269.76	555.14
6150.39 34HP45-494-8	27624.18	16299.19	5388.33	21260.24	2883.54	109782.83	334.56	496.26
4217.78 34HP45-494-9	28458.22	16842.40	5362.21	20964.20	3444.50	106623.06	275.88	480.06
6739.56 34HP45-494-10	89588.89	51389.27	8844.91	41006.03	18364.98	57567.42	723.36	2169.07
4964.59 34HP45-494-11	96269.04	55279.09	10307.52	46795.90	14407.44	96206.33	541.96	2016.83
8295.45 34HP45-494-12	106942.34	61217.85	10637.28	49282.60	16393.89	75669.84	609.64	2371.27
2391.69 34HP45-494-13	80293.00	46456.64	7348.86	34612.91	7373.04	31377.80	322.32	940.27
2673.06 34HP45-494-14	88511.08	50715.02	7974.46	38003.89	7075.32	31657.60	347.36	1068.71
2023.69 34HP45-494-15	81417.40	46994.49	7620.26	35489.88	7084.60	33501.85	379.56	971.07
2811.22 34HP45-494-16	47459.69	27891.98	6188.57	26689.27	1173.13	75976.84	189.20	585.30
3345.10 34HP45-494-17	48484.37	28278.38	6600.94	28637.88	1246.61	91891.70	264.12	584.38

Appendix A. Raw trace element datasheets from laser ablation.

2571.85 34HP45-494-18	52231.79	30436.51	5962.05	27149.95	1137.33	58361.23	291.48	580.94
225.64 SRM614-24	545.46	379.14	52.98	1831.25	114.88	1106.79	344.20	193.14
5306.63 SRM612-24	6297.86	3730.08	571.38	4684.91	5756.91	14951.02	7470.32	4954.17
36437.25 SRM610-24	43525.19	24720.80	3688.84	19505.79	33747.43	100249.62	44341.09	24495.68
-12.96 AP1-24	267.90	200.98	-10.58	1247.33	24.24	1229.43	163.52	79.62
1231.65 AP2-24	37740.43	21809.26	3165.52	16364.77	774.80	2777.80	276.32	228.38
8086.85 AP3-24	332521.80	179173.19	22156.43	121078.72	4402.06	7253.46	325.92	1005.95
9636.57 AP4-24	390313.77	209450.60	25236.52	140124.71	5223.31	9320.47	393.72	1034.15
zero correction								
109.36 SRM614-23	737.30	449.38	348.34	894.09	259.12	502.58	140.92	177.62
7469.04 SRM612-23	7798.54	4400.76	920.79	3618.46	5789.23	19744.53	8158.97	5094.17
41770.32 SRM610-23	41913.86	23518.87	3890.72	16531.09	27855.32	110132.80	40385.87	19992.29
0.00 AP1-23	953.87	444.78	201.06	0.00	0.00	1153.67	9.88	97.02
1703.33 AP2-23	53940.12	31668.04	4736.29	20653.68	877.52	3506.20	169.12	327.30
9446.89 AP3-23	345301.68	188171.77	23656.55	124264.38	4365.94	8436.71	215.84	1030.75
11647.63 AP4-23	453780.24	243667.35	30064.87	161657.67	5599.23	11381.44	316.92	1126.47
4488.47 34HP45-494-1	55062.85	32378.76	5393.13	23409.81	8511.61	25371.16	456.24	1170.11
2425.13 34HP45-494-2	57997.31	33613.77	5483.49	24431.94	5525.99	21042.70	308.16	1068.63
2453.01 34HP45-494-3	60953.48	35603.78	5743.77	25940.27	7419.68	23336.75	357.64	1359.03
5755.23 34HP45-494-4	26655.01	15421.51	4317.52	16854.78	3435.78	70085.53	363.00	673.98
2063.45 34HP45-494-5	33503.09	19800.61	4368.68	18025.66	5218.71	51921.63	371.92	602.90
2847.26 34HP45-494-6	26686.37	15564.75	4248.56	16004.25	4290.82	63304.25	357.16	486.98
3632.62 34HP45-494-7	36134.98	21315.34	4338.80	18191.26	4976.19	37596.31	269.76	555.14
6150.39 34HP45-494-8	27624.18	16299.19	5388.33	21260.24	2883.54	109782.83	334.56	496.26
4217.78 34HP45-494-9	28458.22	16842.40	5362.21	20964.20	3444.50	106623.06	275.88	480.06
6739.56 34HP45-494-10	89588.89	51389.27	8844.91	41006.03	18364.98	57567.42	723.36	2169.07
4964.59 34HP45-494-11	96269.04	55279.09	10307.52	46795.90	14407.44	96206.33	541.96	2016.83
8295.45 34HP45-494-12	106942.34	61217.85	10637.28	49282.60	16393.89	75669.84	609.64	2371.27
2391.69 34HP45-494-13	80293.00	46456.64	7348.86	34612.91	7373.04	31377.80	322.32	940.27
2673.06 34HP45-494-14	88511.08	50715.02	7974.46	38003.89	7075.32	31657.60	347.36	1068.71
2023.69 34HP45-494-15	81417.40	46994.49	7620.26	35489.88	7084.60	33501.85	379.56	971.07
2811.22 34HP45-494-16	47459.69	27891.98	6188.57	26689.27	1173.13	75976.84	189.20	585.30
3345.10 34HP45-494-17	48484.37	28278.38	6600.94	28637.88	1246.61	91891.70	264.12	584.38
2571.85 34HP45-494-18	52231.79	30436.51	5962.05	27149.95	1137.33	58361.23	291.48	580.94
225.64 SRM614-24	545.46	379.14	52.98	1831.25	114.88	1106.79	344.20	193.14
5306.63 SRM612-24	6297.86	3730.08	571.38	4684.91	5756.91	14951.02	7470.32	4954.17
36437.25 SRM610-24	43525.19	24720.80	3688.84	19505.79	33747.43	100249.62	44341.09	24495.68
0.00 AP1-24	267.90	200.98	0.00	1247.33	24.24	1229.43	163.52	79.62
1231.65 AP2-24	37740.43	21809.26	3165.52	16364.77	774.80	2777.80	276.32	228.38
8086.85 AP3-24	332521.80	179173.19	22156.43	121078.72	4402.06	7253.46	325.92	1005.95
9636.57 AP4-24	390313.77	209450.60	25236.52	140124.71	5223.31	9320.47	393.72	1034.15
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000053 SRM614-23	0.000355	0.000216	0.000168	0.000430	0.000125	0.000242	0.000068	0.000085
0.003836 SRM612-23	0.004006	0.002260	0.000473	0.001859	0.002974	0.010142	0.004191	0.002617
0.057639 SRM610-23	0.057837	0.032454	0.005369	0.022811	0.038438	0.151973	0.055729	0.027588
0.000000 AP1-23	0.000094	0.000044	0.000020	0.000000	0.000000	0.000114	0.000001	0.000010
0.000126 AP2-23	0.003976	0.002334	0.000349	0.001523	0.000065	0.000258	0.000012	0.000024
0.000627 AP3-23	0.022911	0.012486	0.001570	0.008245	0.000290	0.000560	0.000014	0.000068
0.000779 AP4-23	0.030349	0.016296	0.002011	0.010812	0.000374	0.000761	0.000021	0.000075
0.000296 34HP45-494-1	0.003626	0.002132	0.000355	0.001542	0.000560	0.001671	0.000030	0.000077
0.000183 34HP45-494-2	0.004367	0.002531	0.000413	0.001840	0.000416	0.001584	0.000023	0.000080
0.000196 34HP45-494-3	0.004858	0.002838	0.000458	0.002068	0.000591	0.001860	0.000029	0.000108
0.000409 34HP45-494-4	0.001896	0.001097	0.000307	0.001199	0.000244	0.004986	0.000026	0.000048
0.000147 34HP45-494-5	0.002385	0.001410	0.000311	0.001283	0.000372	0.003696	0.000026	0.000043
0.000228 34HP45-494-6	0.002135	0.001245	0.000340	0.001280	0.000343	0.005064	0.000029	0.000039
0.000321 34HP45-494-7	0.003194	0.001884	0.000384	0.001608	0.000440	0.003323	0.000024	0.000049
0.000604 34HP45-494-8	0.002711	0.001600	0.000529	0.002087	0.000283	0.010775	0.000033	0.000049
0.000430 34HP45-494-9	0.002904	0.001718	0.000547	0.002139	0.000351	0.010879	0.000028	0.000049

Appendix A. Raw trace element datasheets from laser ablation.

0.000533	34HP45-494-10	0.007090	0.004067	0.000700	0.003245	0.001453	0.004556	0.000057	0.000172
0.000363	34HP45-494-11	0.007046	0.004046	0.000754	0.003425	0.001054	0.007041	0.000040	0.000148
0.000597	34HP45-494-12	0.007699	0.004407	0.000766	0.003548	0.001180	0.005448	0.000044	0.000171
0.000194	34HP45-494-13	0.006529	0.003778	0.000598	0.002815	0.000600	0.002552	0.000026	0.000076
0.000207	34HP45-494-14	0.006847	0.003923	0.000617	0.002940	0.000547	0.002449	0.000027	0.000083
0.000151	34HP45-494-15	0.006087	0.003514	0.000570	0.002654	0.000530	0.002505	0.000028	0.000073
0.000254	34HP45-494-16	0.004287	0.002520	0.000559	0.002411	0.000106	0.006863	0.000017	0.000053
0.000278	34HP45-494-17	0.004024	0.002347	0.000548	0.002377	0.000103	0.007626	0.000022	0.000048
0.000192	34HP45-494-18	0.003908	0.002277	0.000446	0.002031	0.000085	0.004366	0.000022	0.000043
0.000169	SRM614-24	0.000409	0.000284	0.000040	0.001373	0.000086	0.000830	0.000258	0.000145
0.004095	SRM612-24	0.004860	0.002878	0.000441	0.003615	0.004443	0.011538	0.005765	0.003823
0.069330	SRM610-24	0.082816	0.047037	0.007019	0.037114	0.064212	0.190746	0.084368	0.046608
0.000000	AP1-24	0.000031	0.000023	0.000000	0.000143	0.000003	0.000141	0.000019	0.000009
0.000107	AP2-24	0.003268	0.001889	0.000274	0.001417	0.000067	0.000241	0.000024	0.000020
0.000623	AP3-24	0.025622	0.013806	0.001707	0.009329	0.000339	0.000559	0.000025	0.000078
0.000750	AP4-24	0.030362	0.016293	0.001963	0.010900	0.000406	0.000725	0.000031	0.000080
standardize signal averages AP									
0.000000	AP1	0.000063	0.000034	0.000010	0.000072	0.000001	0.000128	0.000010	0.000009
0.000116	AP2	0.003622	0.002112	0.000312	0.001470	0.000066	0.000250	0.000018	0.000022
0.000625	AP3	0.024267	0.013146	0.001638	0.008787	0.000314	0.000559	0.000020	0.000073
0.000764	AP4	0.030355	0.016295	0.001987	0.010856	0.000390	0.000743	0.000026	0.000078
linest from std sig ave									
0.036494		0.020571	0.039316	0.318678	0.058909	1.639219	0.005853	0.000000	0.048573
standardize signal averages SRM									
0.000111	srM614-2	0.000382	0.000250	0.000104	0.000902	0.000105	0.000536	0.000163	0.000115
0.003966	srM612-2	0.004433	0.002569	0.000457	0.002737	0.003708	0.010840	0.004978	0.003220
0.063484	srM610-2	0.070327	0.039745	0.006194	0.029963	0.051325	0.171360	0.070049	0.037098
linest from std sig ave									
0.000000		0.075749	0.000000	0.000000	0.000000	0.000000	0.029847	0.071011	0.100024
concentration data									
0.16	SRM614-23	0.63	0.73	4.58	2.17	17.53	0.12	0.00	0.36
12.01	SRM612-23	7.07	7.62	12.93	9.39	418.05	5.09	0.00	10.90
180.40	SRM610-23	102.04	109.43	146.73	115.25	5403.76	76.28	0.00	114.92
0.00	AP1-23	0.78	0.69	2.53	0.00	0.00	0.27	0.00	0.19
1.83	AP2-23	32.63	36.62	44.39	35.78	42.30	0.60	0.00	0.47
9.13	AP3-23	188.03	195.83	199.55	193.77	189.44	1.31	0.00	1.33
11.34	AP4-23	249.06	255.60	255.63	254.08	244.88	1.78	0.00	1.46
4.30	34HP45-494-1	29.76	33.44	45.15	36.23	366.53	3.90	0.00	1.49
2.66	34HP45-494-2	35.84	39.70	52.49	43.23	272.10	3.70	0.00	1.56
2.85	34HP45-494-3	39.87	44.51	58.20	48.59	386.74	4.34	0.00	2.10
5.96	34HP45-494-4	15.56	17.21	39.05	28.18	159.84	11.64	0.00	0.93
2.14	34HP45-494-5	19.57	22.11	39.54	30.16	242.95	8.63	0.00	0.83
3.32	34HP45-494-6	17.52	19.53	43.21	30.09	224.47	11.82	0.00	0.75
4.67	34HP45-494-7	26.21	29.55	48.76	37.79	287.65	7.76	0.00	0.95
8.79	34HP45-494-8	22.25	25.09	67.24	49.04	185.08	25.16	0.00	0.94
6.27	34HP45-494-9	23.83	26.95	69.55	50.27	229.82	25.40	0.00	0.95
7.77	34HP45-494-10	58.18	63.79	88.99	76.26	950.43	10.64	0.00	3.33
5.29	34HP45-494-11	57.82	63.46	95.91	80.49	689.54	16.44	0.00	2.86
8.69	34HP45-494-12	63.19	69.13	97.36	83.38	771.84	12.72	0.00	3.31
2.83	34HP45-494-13	53.58	59.25	75.98	66.15	392.09	5.96	0.00	1.48
3.01	34HP45-494-14	56.19	61.54	78.43	69.09	357.95	5.72	0.00	1.60
2.20	34HP45-494-15	49.96	55.11	72.43	62.36	346.40	5.85	0.00	1.41
3.70	34HP45-494-16	35.18	39.52	71.07	56.66	69.30	16.03	0.00	1.02
4.04	34HP45-494-17	33.02	36.81	69.64	55.85	67.65	17.81	0.00	0.94
2.80	34HP45-494-18	32.07	35.71	56.70	47.73	55.64	10.19	0.00	0.84
0.53	SRM614-24	0.72	0.96	1.09	6.94	12.11	0.42	0.00	0.60
12.82	SRM612-24	8.57	9.71	12.05	18.27	624.56	5.79	0.00	15.93
216.99	SRM610-24	146.11	158.60	191.83	187.51	9027.15	95.75	0.00	194.16
0.00	AP1-24	0.25	0.36	0.00	3.37	1.82	0.33	0.00	0.18
1.55	AP2-24	26.82	29.62	34.85	33.30	43.88	0.56	0.00	0.38
9.07	AP3-24	210.27	216.54	217.04	219.25	221.81	1.30	0.00	1.50
10.91	AP4-24	249.17	255.55	249.57	256.16	265.71	1.69	0.00	1.56
certified concentration									
	SRM614	1.90					1.12		
	SRM612	37.92					36.24	34.64	37.33
	SRM610	456.30					438.10	426.30	317.40
0.14	STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25	STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94	STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81	STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65

Zn64

Zn66

Zn67

Zn68

Zn70

Ga

Ge

As

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
418.32 blank-21	523.96	370.24	542.88	3322.82	984.29	1246.89	520.04	317.40
746.00 SRM614-21	1261.77	820.08	579.20	4656.11	1095.93	1949.21	755.40	424.32
10677.42 SRM612-21	13113.35	7749.72	1666.13	9777.34	6749.76	22135.05	9022.25	5442.63
56287.60 SRM610-21	58850.33	33222.11	5488.27	27335.72	37821.93	149889.92	56231.08	28492.84
1142.17 AP1-21	4410.82	2571.73	825.16	4349.54	997.45	4157.10	821.00	509.44
1859.41 AP2-21	37847.06	22520.73	3648.26	17991.90	1519.61	4963.71	814.36	592.00
1532.77 AP3-21	28308.60	16771.57	2840.74	13941.28	1260.33	4065.34	820.48	526.04
22893.97 AP4-21	944602.38	506767.09	57097.72	333613.03	11063.34	19010.19	1043.05	2369.45
11190.82 34HP45-671-1	96573.82	56214.72	9965.26	46867.66	9968.06	57376.68	1476.13	1923.17
8020.05 34HP45-671-2	104808.83	61654.87	10447.18	49411.40	9649.41	44265.17	1556.05	1853.85
7664.96 34HP45-671-3	60868.86	36255.41	6456.92	30732.73	3458.98	37738.33	965.89	1610.05
15026.00 34HP45-671-4	129954.61	77828.36	13057.23	63111.91	4490.23	61522.63	1012.53	2261.09
4352.14 34HP45-671-5	76848.56	46080.18	8307.21	38480.62	3046.86	36262.88	876.52	2007.21
6391.32 34HP45-671-6	69929.27	42196.88	7269.40	35790.68	2857.98	33306.31	898.17	1544.13
14690.32 34HP45-671-7	173719.98	103140.73	16373.09	79690.45	6551.40	53899.74	1066.33	2295.85
3010.06 34HP45-671-8	89686.27	52519.82	8720.57	42787.00	3825.54	31392.90	964.49	2212.61
6376.44 34HP45-671-9	82687.91	49240.64	8228.41	40247.75	3669.10	32917.75	951.73	2089.49
21948.52 34HP45-671-10	171667.53	101797.01	15860.89	77834.76	16758.01	46321.10	1433.81	2043.97
5860.19 34HP45-671-11	90979.71	52748.38	8429.41	41896.20	12338.03	25611.18	1258.57	1593.61
7399.24 34HP45-671-12	105011.23	62270.55	10022.46	49449.88	14020.92	30025.13	1360.73	1643.37
2305.93 34HP45-671-13	60012.54	35300.32	5526.59	28782.56	2294.53	19562.59	858.80	756.60
1076.41 34HP45-671-14	44114.53	25664.74	4154.86	21723.60	1483.73	13230.48	824.52	576.84
994.69 34HP45-671-15	45057.09	26214.03	4251.86	22802.33	1414.65	11811.15	777.76	533.56
1618.89 34HP45-671-16	36326.16	21312.16	3605.98	19320.91	1424.05	11131.46	849.28	520.68
1018.77 34HP45-671-17	44391.17	25784.63	4034.06	22221.25	1459.97	9153.25	839.92	525.32
1116.77 34HP45-671-18	46518.34	27155.11	4284.46	23659.45	1519.93	10063.78	781.12	569.52
1109.73 SRM614-22	1352.57	903.25	370.92	5886.51	987.69	2724.14	928.49	416.04
6144.79 SRM612-22	7584.60	4574.39	1105.65	8803.21	5872.07	16200.53	7670.32	4891.71
46798.06 SRM610-22	57687.88	32579.58	5156.19	28489.56	40822.39	128242.13	56324.12	31542.26
622.60 AP1-22	1238.53	799.96	362.56	5096.35	842.08	2943.02	894.89	453.16
1502.25 AP2-22	23824.98	13966.32	2293.41	14256.20	1305.25	3835.94	852.56	473.44
9524.81 AP3-22	396076.06	213409.48	25755.31	146200.50	5932.51	9342.13	1106.73	1370.65
12579.07 AP4-22	539841.25	289671.16	33405.95	195842.02	7368.32	11811.67	1063.21	1614.05
723.32 blank-22	468.92	348.80	237.56	4520.47	768.80	1957.41	783.08	297.68
570.82 blank average	496.44	359.52	390.22	3921.64	876.54	1602.15	651.56	307.54

blank subtraction								
175.18 SRM614-21	765.32	460.56	188.98	734.46	219.38	347.06	103.84	116.78
10106.60 SRM612-21	12616.91	7390.20	1275.91	5855.69	5873.21	20532.90	8370.69	5135.09
55716.77 SRM610-21	58353.89	32862.58	5098.05	23414.07	36945.39	148287.77	55579.51	28185.30
571.34 AP1-21	3914.38	2212.21	434.94	427.90	120.90	2554.95	169.44	201.90
1288.59 AP2-21	37350.61	22161.20	3258.04	14070.26	643.06	3361.56	162.80	284.46
961.95 AP3-21	27812.16	16412.05	2450.51	10019.64	383.78	2463.19	168.92	218.50
22323.15 AP4-21	944105.94	506407.57	56707.50	329691.39	10186.80	17408.04	391.48	2061.91
10620.00 34HP45-671-1	96077.38	55855.20	9575.03	42946.02	9091.51	55774.54	824.56	1615.63
7449.22 34HP45-671-2	104312.39	61295.34	10056.96	45489.76	8772.87	42663.02	904.49	1546.31
7094.14 34HP45-671-3	60372.42	35895.88	6066.69	26811.09	2582.43	36136.18	314.32	1302.51
14455.18 34HP45-671-4	129458.17	77468.84	12667.01	59190.27	3613.68	59920.48	360.96	1953.55
3781.32 34HP45-671-5	76352.11	45720.66	7916.98	34558.98	2170.31	34660.73	224.96	1699.67
5820.49 34HP45-671-6	69432.83	41837.35	6879.18	31869.04	1981.43	31704.16	246.60	1236.59
14119.50 34HP45-671-7	173223.54	102781.21	15982.87	75768.80	5674.85	52297.59	414.76	1988.31
2439.23 34HP45-671-8	89189.82	52160.29	8330.35	38865.36	2949.00	29790.75	312.92	1905.07
5805.61 34HP45-671-9	82191.46	48881.11	7838.18	36326.10	2792.56	31315.60	300.16	1781.95
21377.70 34HP45-671-10	171171.09	101437.49	15470.67	73913.12	15881.47	44718.95	782.24	1736.43
5289.37 34HP45-671-11	90483.27	52388.85	8039.19	37974.55	11461.48	24009.04	607.00	1286.07
6828.42 34HP45-671-12	104514.79	61911.03	9632.23	45528.24	13144.37	28422.98	709.16	1335.83
1735.11 34HP45-671-13	59516.10	34940.80	5136.37	24860.92	1417.99	17960.44	207.24	449.06
505.58 34HP45-671-14	43618.08	25305.22	3764.64	17801.96	607.18	11628.33	172.96	269.30
423.86 34HP45-671-15	44560.65	25854.50	3861.64	18880.69	538.10	10209.00	126.20	226.02
1048.07 34HP45-671-16	35829.72	20952.64	3215.76	15399.27	547.50	9529.31	197.72	213.14
447.94 34HP45-671-17	43894.73	25425.10	3643.84	18299.60	583.42	7551.10	188.36	217.78
545.94 34HP45-671-18	46021.90	26795.59	3894.24	19737.81	643.38	8461.63	129.56	261.98
538.90 SRM614-22	856.12	543.72	-19.30	1964.87	111.14	1121.99	276.92	108.50
5573.97 SRM612-22	7088.16	4214.86	715.42	4881.57	4995.53	14598.38	7018.76	4584.17
46227.24 SRM610-22	57191.44	32220.06	4765.97	24567.92	39945.85	126639.98	55672.55	31234.72
51.78 AP1-22	742.08	440.44	-27.66	1174.71	-34.46	1340.87	243.32	145.62
931.43 AP2-22	23328.53	13606.80	1903.19	10334.56	428.70	2233.79	201.00	165.90
8953.99 AP3-22	395579.62	213049.96	25365.08	142278.86	5055.97	7739.98	455.16	1063.11
12008.25 AP4-22	539344.81	289311.64	33015.73	191920.38	6491.78	10209.52	411.64	1306.51

zero correction								
175.18 SRM614-21	765.32	460.56	188.98	734.46	219.38	347.06	103.84	116.78
10106.60 SRM612-21	12616.91	7390.20	1275.91	5855.69	5873.21	20532.90	8370.69	5135.09
55716.77 SRM610-21	58353.89	32862.58	5098.05	23414.07	36945.39	148287.77	55579.51	28185.30
571.34 AP1-21	3914.38	2212.21	434.94	427.90	120.90	2554.95	169.44	201.90
1288.59 AP2-21	37350.61	22161.20	3258.04	14070.26	643.06	3361.56	162.80	284.46
961.95 AP3-21	27812.16	16412.05	2450.51	10019.64	383.78	2463.19	168.92	218.50

Appendix A. Raw trace element datasheets from laser ablation.

22323.15 AP4-21	944105.94	506407.57	56707.50	329691.39	10186.80	17408.04	391.48	2061.91
10620.00 34HP45-671-1	96077.38	55855.20	9575.03	42946.02	9091.51	55774.54	824.56	1615.63
7449.22 34HP45-671-2	104312.39	61295.34	10056.96	45489.76	8772.87	42663.02	904.49	1546.31
7094.14 34HP45-671-3	60372.42	35895.88	6066.69	26811.09	2582.43	36136.18	314.32	1302.51
14455.18 34HP45-671-4	129458.17	77468.84	12667.01	59190.27	3613.68	59920.48	360.96	1953.55
3781.32 34HP45-671-5	76352.11	45720.66	7916.98	34558.98	2170.31	34660.73	224.96	1699.67
5820.49 34HP45-671-6	69432.83	41837.35	6879.18	31869.04	1981.43	31704.16	246.60	1236.59
14119.50 34HP45-671-7	173223.54	102781.21	15982.87	75768.80	5674.85	52297.59	414.76	1988.31
2439.23 34HP45-671-8	89189.82	52160.29	8330.35	38865.36	2949.00	29790.75	312.92	1905.07
5805.61 34HP45-671-9	82191.46	48881.11	7838.18	36326.10	2792.56	31315.60	300.16	1781.95
21377.70 34HP45-671-10	171171.09	101437.49	15470.67	73913.12	15881.47	44718.95	782.24	1736.43
5289.37 34HP45-671-11	90483.27	52388.85	8039.19	37974.55	11461.48	24009.04	607.00	1286.07
6828.42 34HP45-671-12	104514.79	61911.03	9632.23	45528.24	13144.37	28422.98	709.16	1335.83
1735.11 34HP45-671-13	59516.10	34940.80	5136.37	24860.92	1417.99	17960.44	207.24	449.06
505.58 34HP45-671-14	43618.08	25305.22	3764.64	17801.96	607.18	11628.33	172.96	269.30
423.86 34HP45-671-15	44560.65	25854.50	3861.64	18880.69	538.10	10209.00	126.20	226.02
1048.07 34HP45-671-16	35829.72	20952.64	3215.76	15399.27	547.50	9529.31	197.72	213.14
447.94 34HP45-671-17	43894.73	25425.10	3643.84	18299.60	583.42	7551.10	188.36	217.78
545.94 34HP45-671-18	46021.90	26795.59	3894.24	19737.81	643.38	8461.63	129.56	261.98
538.90 SRM614-22	856.12	543.72	0.00	1964.87	111.14	1121.99	276.92	108.50
5573.97 SRM612-22	7088.16	4214.86	715.42	4881.57	4995.53	14598.38	7018.76	4584.17
46227.24 SRM610-22	57191.44	32220.06	4765.97	24567.92	39945.85	126639.98	55672.55	31234.72
51.78 AP1-22	742.08	440.44	0.00	1174.71	0.00	1340.87	243.32	145.62
931.43 AP2-22	23328.53	13606.80	1903.19	10334.56	428.70	2233.79	201.00	165.90
8953.99 AP3-22	395579.62	213049.96	25365.08	142278.86	5055.97	7739.98	455.16	1063.11
12008.25 AP4-22	539344.81	289311.64	33015.73	191920.38	6491.78	10209.52	411.64	1306.51

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000131 SRM614-21	0.000571	0.000343	0.000141	0.000548	0.000164	0.000259	0.000077	0.000087
0.005122 SRM612-21	0.006394	0.003745	0.000647	0.002968	0.002976	0.010406	0.004242	0.002602
0.054259 SRM610-21	0.056827	0.032003	0.004965	0.022802	0.035979	0.144408	0.054125	0.027448
0.000055 AP1-21	0.000377	0.000213	0.000042	0.000041	0.000012	0.000246	0.000016	0.000019
0.000098 AP2-21	0.002831	0.001680	0.000247	0.001066	0.000049	0.000255	0.000012	0.000022
0.000079 AP3-21	0.002276	0.001343	0.000201	0.000820	0.000031	0.000202	0.000014	0.000018
0.001313 AP4-21	0.055512	0.029776	0.003334	0.019386	0.000599	0.001024	0.000023	0.000121
0.000552 34HP45-671-1	0.004995	0.002904	0.000498	0.002233	0.000473	0.002900	0.000043	0.000084
0.000426 34HP45-671-2	0.005962	0.003503	0.000575	0.002600	0.000501	0.002438	0.000052	0.000088
0.000426 34HP45-671-3	0.003627	0.002157	0.000365	0.001611	0.000155	0.002171	0.000019	0.000078
0.000781 34HP45-671-4	0.006995	0.004186	0.000684	0.003198	0.000195	0.003238	0.000020	0.000106
0.000227 34HP45-671-5	0.004583	0.002744	0.000475	0.002074	0.000130	0.002080	0.000014	0.000102
0.000413 34HP45-671-6	0.004922	0.002966	0.000488	0.002259	0.000140	0.002247	0.000017	0.000088
0.000770 34HP45-671-7	0.009452	0.005608	0.000872	0.004134	0.000310	0.002854	0.000023	0.000108
0.000138 34HP45-671-8	0.005057	0.002958	0.000472	0.002204	0.000167	0.001689	0.000018	0.000108
0.000320 34HP45-671-9	0.004536	0.002698	0.000433	0.002005	0.000154	0.001728	0.000017	0.000098
0.001398 34HP45-671-10	0.011192	0.006632	0.001012	0.004833	0.001038	0.002924	0.000051	0.000114
0.000367 34HP45-671-11	0.006272	0.003632	0.000557	0.002632	0.000795	0.001664	0.000042	0.000089
0.000489 34HP45-671-12	0.007480	0.004431	0.000689	0.003258	0.000941	0.002034	0.000051	0.000096
0.000271 34HP45-671-13	0.009285	0.005451	0.000801	0.003878	0.000221	0.002802	0.000032	0.000070
0.000096 34HP45-671-14	0.008296	0.004813	0.000716	0.003386	0.000115	0.002212	0.000033	0.000051
0.000084 34HP45-671-15	0.008788	0.005099	0.000762	0.003724	0.000106	0.002013	0.000025	0.000045
0.000219 34HP45-671-16	0.007495	0.004383	0.000673	0.003221	0.000115	0.001993	0.000041	0.000045
0.000075 34HP45-671-17	0.007357	0.004261	0.000611	0.003067	0.000098	0.001266	0.000032	0.000037
0.000086 34HP45-671-18	0.007278	0.004237	0.000616	0.003121	0.000102	0.001338	0.000020	0.000041
0.000522 SRM614-22	0.000829	0.000527	0.000000	0.001903	0.000108	0.001087	0.000268	0.000105
0.004621 SRM612-22	0.005876	0.003494	0.000593	0.004047	0.004141	0.012101	0.005818	0.003800
0.068808 SRM610-22	0.085128	0.047959	0.007094	0.036569	0.059459	0.188501	0.082867	0.046492
0.000005 AP1-22	0.000075	0.000045	0.000000	0.000119	0.000000	0.000136	0.000025	0.000015
0.000090 AP2-22	0.002262	0.001319	0.000185	0.001002	0.000042	0.000217	0.000019	0.000016
0.000682 AP3-22	0.030134	0.016229	0.001932	0.010838	0.000385	0.000590	0.000035	0.000081
0.000916 AP4-22	0.041123	0.022059	0.002517	0.014633	0.000495	0.000778	0.000031	0.000100

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP								
0.000030 AP1	0.000226	0.000129	0.000021	0.000080	0.000006	0.000191	0.000020	0.000017
0.000094 AP2	0.002546	0.001499	0.000216	0.001034	0.000045	0.000236	0.000016	0.000019
0.000380 AP3	0.016205	0.008786	0.001066	0.005829	0.000208	0.000396	0.000024	0.000049
0.001114 AP4	0.048318	0.025918	0.002926	0.017009	0.000547	0.000901	0.000027	0.000110

linest from std sig ave								
0.030758	0.015668	0.030054	0.265266	0.045776	1.414524	0.005419	0.000000	0.043529

standardize signal averages SRM								
0.000326 srm614-2	0.000700	0.000435	0.000070	0.001225	0.000136	0.000673	0.000173	0.000096
0.004871 srm612-2	0.006135	0.003620	0.000620	0.003507	0.003559	0.011254	0.005030	0.003201
0.061534 srm610-2	0.070978	0.039981	0.006029	0.029685	0.047719	0.166455	0.068496	0.036970

linest from std sig ave								
0.000000	0.074934	0.000000	0.000000	0.000000	0.000000	0.030720	0.072609	0.100371

concentration data								
0.34 SRM614-21	0.77	0.89	3.21	2.15	19.84	0.12	0.00	0.33
13.51 SRM612-21	8.59	9.65	14.71	11.65	361.08	4.84	0.00	9.71
143.13 SRM610-21	76.36	82.49	112.95	89.52	4364.73	67.11	0.00	102.47
0.67 AP1-21	2.35	2.55	4.43	0.75	6.56	0.53	0.00	0.34
1.20 AP2-21	17.69	20.14	26.13	19.47	27.50	0.55	0.00	0.37
0.97 AP3-21	14.23	16.10	21.22	14.98	17.73	0.44	0.00	0.31
16.11 AP4-21	346.99	357.00	352.85	354.01	338.00	2.21	0.00	2.11
6.77 34HP45-671-1	31.22	34.82	52.68	40.77	266.72	6.27	0.00	1.46
5.22 34HP45-671-2	37.27	42.00	60.83	47.48	282.95	5.27	0.00	1.53
5.23 34HP45-671-3	22.67	25.86	38.57	29.42	87.56	4.69	0.00	1.36
9.58 34HP45-671-4	43.72	50.18	72.43	58.40	110.18	7.00	0.00	1.83
2.79 34HP45-671-5	28.65	32.90	50.29	37.88	73.51	4.50	0.00	1.77
5.06 34HP45-671-6	30.77	35.56	51.61	41.26	79.26	4.86	0.00	1.52
9.45 34HP45-671-7	59.08	67.24	92.29	75.50	174.74	6.17	0.00	1.88
1.70 34HP45-671-8	31.61	35.46	49.99	40.24	94.36	3.65	0.00	1.88
3.93 34HP45-671-9	28.35	32.34	45.78	36.61	86.97	3.74	0.00	1.71
17.15 34HP45-671-10	69.96	79.52	107.04	88.25	585.97	6.32	0.00	1.97
4.50 34HP45-671-11	39.21	43.54	58.97	48.07	448.36	3.60	0.00	1.55
6.00 34HP45-671-12	46.75	53.12	72.95	59.50	530.83	4.40	0.00	1.66
3.32 34HP45-671-13	58.03	65.35	84.79	70.82	124.83	6.06	0.00	1.22
1.18 34HP45-671-14	51.85	57.70	75.77	61.83	65.17	4.78	0.00	0.89
1.03 34HP45-671-15	54.93	61.13	80.60	68.00	59.89	4.35	0.00	0.77
2.69 34HP45-671-16	46.85	52.55	71.18	58.82	64.63	4.31	0.00	0.77
0.92 34HP45-671-17	45.99	51.09	64.63	56.01	55.18	2.74	0.00	0.63
1.06 34HP45-671-18	45.49	50.80	65.17	57.00	57.41	2.89	0.00	0.72
1.38 SRM614-22	1.11	1.36	0.00	7.47	13.06	0.51	0.00	0.39
12.19 SRM612-22	7.90	9.01	13.49	15.89	502.37	5.62	0.00	14.19
181.51 SRM610-22	114.39	123.61	161.39	143.56	7213.14	87.60	0.00	173.56
0.06 AP1-22	0.47	0.53	0.00	2.17	0.00	0.29	0.00	0.26
1.11 AP2-22	14.14	15.82	19.53	18.30	23.45	0.47	0.00	0.28
8.37 AP3-22	188.36	194.58	204.48	197.93	217.34	1.27	0.00	1.41
11.23 AP4-22	257.04	264.47	266.39	267.22	279.31	1.68	0.00	1.73

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
330.44 blank-19	351.20	466.40	453.00	6944.92	999.97	1862.13	681.96	275.48
1210.21 SRM614-19	5085.27	3089.54	958.09	8972.65	1254.09	2666.62	985.77	433.48
10420.46 SRM612-19	20179.88	11952.11	2230.01	13706.92	6824.60	21090.52	9119.85	6297.44
53573.94 SRM610-19	60792.06	34468.20	5622.07	28983.80	36208.00	142534.05	50840.73	27800.56
423.68 AP1-19	1721.81	1007.25	524.96	4114.74	789.52	2952.94	729.72	343.80
5380.99 AP2-19	86852.29	48428.79	7281.16	36654.17	2146.45	6227.23	849.68	617.96
23775.77 AP3-19	1165922.00	619406.56	68115.74	405778.75	12388.15	19583.07	1078.45	2755.30
34981.68 AP4-19	1721302.00	927728.44	97065.63	604703.06	17579.30	27129.51	1194.09	3474.26
1451.09 34HP60-102-1	12190.99	7311.76	2151.89	10151.82	2722.58	29753.93	886.80	1841.97
874.80 34HP60-102-2	13354.84	8000.73	1733.01	9150.09	2246.45	12862.67	805.32	1217.69
757.68 34HP60-102-3	14779.52	8709.93	1756.29	9510.73	1407.61	11152.50	705.60	779.80
583.56 34HP60-102-4	26184.39	15357.01	2560.01	13784.12	1300.37	5434.59	702.28	378.92
810.92 34HP60-102-5	34455.32	20361.75	3377.06	17433.22	1656.09	8811.57	772.56	792.24
1336.13 34HP60-102-6	42845.32	25310.66	4356.34	21512.88	2499.05	17701.26	966.45	2678.30
679.96 34HP60-102-7	25593.95	15086.85	2413.49	13873.32	1290.61	6847.28	729.32	627.56

Appendix A. Raw trace element datasheets from laser ablation.

1110.65	34HP60-102-8	37469.53	21828.24	3623.06	19148.47	2029.09	11339.90	808.64	1773.29
1268.93	34HP60-102-9	44675.57	25681.38	4365.54	22158.21	2701.50	13389.60	896.41	2507.25
1306.89	34HP60-102-10	58096.25	33483.79	5734.47	28529.76	2208.61	24905.38	841.52	5394.27
1154.49	34HP60-102-11	59537.30	34685.56	5738.67	28925.80	1981.97	22191.09	878.84	3767.46
1384.17	34HP60-102-12	68796.55	39799.11	6596.36	33326.67	2388.41	29260.24	891.77	5161.47
1680.29	34HP60-102-13	129799.89	73793.98	11334.98	56389.12	3908.34	30188.33	970.41	9202.77
1630.97	34HP60-102-14	130786.90	74221.86	11197.66	56536.40	3790.82	29438.61	927.25	9537.25
1604.41	34HP60-102-15	115243.97	65202.61	9834.54	50750.41	3295.42	25824.51	931.93	8486.57
1460.29	34HP60-102-16	74328.34	42605.08	6655.84	34011.15	2506.57	17181.78	842.72	4708.31
1268.49	34HP60-102-17	74921.90	43116.88	6764.92	34104.07	2348.25	16459.65	855.92	4772.35
974.53	34HP60-102-18	56871.28	32921.79	5082.35	26979.63	1704.25	10077.66	796.52	1767.21
837.96	SRM614-20	1719.13	1069.77	455.32	5576.91	891.57	2526.29	890.80	376.44
7128.92	SRM612-20	8758.49	5127.87	1099.21	8623.65	6431.24	17915.18	8268.13	5452.51
50114.64	SRM610-20	62347.07	34733.59	5494.87	29456.41	41062.03	135486.05	56425.56	31541.90
515.52	AP1-20	934.57	543.08	302.64	4117.18	804.96	2672.29	787.20	378.24
1598.57	AP2-20	32588.78	19233.91	3037.26	17275.38	1436.81	4069.18	874.56	467.48
9873.58	AP3-20	448336.00	240525.11	28857.64	162156.36	6193.84	9687.17	999.13	1464.77
19061.63	AP4-20	894510.69	475988.00	52095.09	313800.03	10389.10	15564.93	1068.13	2187.09
618.08	blank-20	545.52	348.56	266.60	3981.50	671.36	1803.53	691.32	277.88
474.26	blank average	448.36	407.48	359.80	5463.21	835.66	1832.83	686.64	276.68
blank subtraction									
735.94	SRM614-19	4636.91	2682.06	598.28	3509.44	418.42	833.78	299.12	156.80
9946.20	SRM612-19	19731.51	11544.62	1870.21	8243.71	5988.93	19257.69	8433.21	6020.75
53099.68	SRM610-19	60343.70	34060.71	5262.27	23520.59	35372.34	140701.22	50154.08	27523.88
-50.58	AP1-19	1273.45	599.76	165.16	-1348.47	-46.14	1120.11	43.08	67.12
4906.73	AP2-19	86403.93	48021.31	6921.36	31190.96	1310.79	4394.40	163.04	341.28
23301.51	AP3-19	1165473.64	618999.08	67755.94	400315.54	11552.48	17750.24	391.80	2478.61
34507.41	AP4-19	1720853.64	927320.96	96705.82	599239.85	16743.63	25296.68	507.44	3197.58
976.83	34HP60-102-1	11742.63	6904.28	1792.09	4688.61	1886.91	27921.10	200.16	1565.29
400.54	34HP60-102-2	12906.47	7593.24	1373.21	3686.88	1410.79	11029.84	118.68	941.01
283.42	34HP60-102-3	14331.16	8302.45	1396.49	4047.52	571.94	9319.67	18.96	503.12
109.30	34HP60-102-4	25736.02	14949.52	2200.21	8320.91	464.70	3601.76	15.64	102.24
336.66	34HP60-102-5	34006.95	19954.27	3017.26	11970.01	820.42	6978.74	85.92	515.56
861.86	34HP60-102-6	42396.96	24903.18	3996.54	16049.67	1663.39	15868.43	279.80	2401.61
205.70	34HP60-102-7	25145.58	14679.36	2053.69	8410.11	454.94	5014.45	42.68	350.88
636.38	34HP60-102-8	37021.17	21420.76	3263.26	13685.26	1193.43	9507.07	122.00	1496.61
794.66	34HP60-102-9	44227.21	25273.90	4005.74	16694.99	1865.83	11556.76	209.76	2230.57
832.62	34HP60-102-10	57647.88	33076.31	5374.67	23066.55	1372.95	23072.55	154.88	5117.59
680.22	34HP60-102-11	59088.93	34278.07	5378.87	23462.59	1146.31	20358.26	192.20	3490.78
909.91	34HP60-102-12	68348.18	39391.62	6236.55	27863.46	1552.75	27427.41	205.12	4884.79
1206.03	34HP60-102-13	129351.53	73386.49	10975.18	50925.91	3072.68	28355.50	283.76	8926.09
1156.71	34HP60-102-14	130338.54	73814.38	10837.86	51073.19	2955.16	27605.77	240.60	9260.57
1130.15	34HP60-102-15	114795.61	64795.13	9474.73	45287.20	2459.75	23991.68	245.28	8209.89
986.03	34HP60-102-16	42197.60	6296.04	28547.94	1670.91	15348.95	156.08	4431.63	
794.22	34HP60-102-17	74473.54	42709.40	6405.12	28640.86	1512.59	14626.82	169.28	4495.67
500.26	34HP60-102-18	56422.91	32514.30	4722.55	21516.42	868.58	8244.83	109.88	1490.53
363.70	SRM614-20	1270.77	662.28	95.52	113.70	55.90	693.46	204.16	99.76
6654.66	SRM612-20	8310.13	4720.39	739.40	3160.44	5595.57	16082.35	7581.48	5175.83
49640.38	SRM610-20	61898.71	34326.11	5135.07	23993.20	40226.37	133653.22	55738.92	31265.22
41.26	AP1-20	486.20	135.60	-57.16	-1346.03	-30.70	839.46	100.56	101.56
1124.31	AP2-20	32140.42	18826.43	2677.46	11812.17	601.14	2236.35	187.92	190.80
9399.31	AP3-20	447887.64	240117.63	28497.84	156693.15	5358.17	7854.34	312.48	1188.09
18587.36	AP4-20	894062.33	475580.52	51735.29	308336.82	9553.43	13732.10	381.48	1910.41
zero correction									
735.94	SRM614-19	4636.91	2682.06	598.28	3509.44	418.42	833.78	299.12	156.80
9946.20	SRM612-19	19731.51	11544.62	1870.21	8243.71	5988.93	19257.69	8433.21	6020.75
53099.68	SRM610-19	60343.70	34060.71	5262.27	23520.59	35372.34	140701.22	50154.08	27523.88
0.00	AP1-19	1273.45	599.76	165.16	0.00	0.00	1120.11	43.08	67.12
4906.73	AP2-19	86403.93	48021.31	6921.36	31190.96	1310.79	4394.40	163.04	341.28
23301.51	AP3-19	1165473.64	618999.08	67755.94	400315.54	11552.48	17750.24	391.80	2478.61
34507.41	AP4-19	1720853.64	927320.96	96705.82	599239.85	16743.63	25296.68	507.44	3197.58
976.83	34HP60-102-1	11742.63	6904.28	1792.09	4688.61	1886.91	27921.10	200.16	1565.29
400.54	34HP60-102-2	12906.47	7593.24	1373.21	3686.88	1410.79	11029.84	118.68	941.01
283.42	34HP60-102-3	14331.16	8302.45	1396.49	4047.52	571.94	9319.67	18.96	503.12
109.30	34HP60-102-4	25736.02	14949.52	2200.21	8320.91	464.70	3601.76	15.64	102.24
336.66	34HP60-102-5	34006.95	19954.27	3017.26	11970.01	820.42	6978.74	85.92	515.56
861.86	34HP60-102-6	42396.96	24903.18	3996.54	16049.67	1663.39	15868.43	279.80	2401.61
205.70	34HP60-102-7	25145.58	14679.36	2053.69	8410.11	454.94	5014.45	42.68	350.88
636.38	34HP60-102-8	37021.17	21420.76	3263.26	13685.26	1193.43	9507.07	122.00	1496.61
794.66	34HP60-102-9	44227.21	25273.90	4005.74	16694.99	1865.83	11556.76	209.76	2230.57
832.62	34HP60-102-10	57647.88	33076.31	5374.67	23066.55	1372.95	23072.55	154.88	5117.59
680.22	34HP60-102-11	59088.93	34278.07	5378.87	23462.59	1146.31	20358.26	192.20	3490.78
909.91	34HP60-102-12	68348.18	39391.62	6236.55	27863.46	1552.75	27427.41	205.12	4884.79
1206.03	34HP60-102-13	129351.53	73386.49	10975.18	50925.91	3072.68	28355.50	283.76	8926.09
1156.71	34HP60-102-14	130338.54	73814.38	10837.86	51073.19	2955.16	27605.77	240.60	9260.57
1130.15	34HP60-102-15	114795.61	64795.13	9474.73	45287.20	2459.75	23991.68	245.28	8209.89

Appendix A. Raw trace element datasheets from laser ablation.

986.03	34HP60-102-16	73879.97	42197.60	6296.04	28547.94	1670.91	15348.95	156.08	4431.63
794.22	34HP60-102-17	74473.54	42709.40	6405.12	28640.86	1512.59	14626.82	169.28	4495.67
500.26	34HP60-102-18	56422.91	32514.30	4722.55	21516.42	868.58	8244.83	109.88	1490.53
363.70	SRM614-20	1270.77	662.28	95.52	113.70	55.90	693.46	204.16	99.76
6654.66	SRM612-20	8310.13	4720.39	739.40	3160.44	5595.57	16082.35	7581.48	5175.83
49640.38	SRM610-20	61898.71	34326.11	5135.07	23993.20	40226.37	133653.22	55738.92	31265.22
41.26	AP1-20	486.20	135.60	0.00	0.00	0.00	839.46	100.56	101.56
1124.31	AP2-20	32140.42	18826.43	2677.46	11812.17	601.14	2236.35	187.92	190.80
9399.31	AP3-20	447887.64	240117.63	28497.84	156693.15	5358.17	7854.34	312.48	1188.09
18587.36	AP4-20	894062.33	475580.52	51735.29	308336.82	9553.43	13732.10	381.48	1910.41
certified concentration									
	SRM614	1.90					1.12		
	SRM612	37.92					36.24	34.64	37.33
	SRM610	456.30					438.10	426.30	317.40
0.14	STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25	STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94	STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81	STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration									
0.000000	SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000	SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000	SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000	STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006	STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017	STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032	STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal									
0.000311	SRM614-19	0.001957	0.001132	0.000252	0.001481	0.000177	0.000352	0.000126	0.000066
0.005284	SRM612-19	0.010482	0.006133	0.000993	0.004379	0.003181	0.010230	0.004480	0.003198
0.055241	SRM610-19	0.062777	0.035434	0.005474	0.024469	0.036799	0.146374	0.052176	0.028634
0.000000	AP1-19	0.000110	0.000052	0.000014	0.000000	0.000000	0.000097	0.000004	0.000006
0.000302	AP2-19	0.005322	0.002958	0.000426	0.001921	0.000081	0.000271	0.000010	0.000021
0.001126	AP3-19	0.056299	0.029901	0.003273	0.019337	0.000558	0.000857	0.000019	0.000120
0.001684	AP4-19	0.084000	0.045265	0.004720	0.029251	0.000817	0.001235	0.000025	0.000156
0.000081	34HP60-102-1	0.000979	0.000576	0.000149	0.000391	0.000157	0.002328	0.000017	0.000130
0.000050	34HP60-102-2	0.001608	0.000946	0.000171	0.000459	0.000176	0.001374	0.000015	0.000117
0.000049	34HP60-102-3	0.002485	0.001440	0.000242	0.000702	0.000099	0.001616	0.000003	0.000087
0.000029	34HP60-102-4	0.006759	0.003926	0.000578	0.002185	0.000122	0.000946	0.000004	0.000027
0.000060	34HP60-102-5	0.006047	0.003548	0.000537	0.002129	0.000146	0.001241	0.000015	0.000092
0.000073	34HP60-102-6	0.003595	0.002112	0.000339	0.001361	0.000141	0.001346	0.000024	0.000204
0.000049	34HP60-102-7	0.006013	0.003510	0.000491	0.002011	0.000109	0.001199	0.000010	0.000084
0.000110	34HP60-102-8	0.006400	0.003703	0.000564	0.002366	0.000206	0.001644	0.000021	0.000259
0.000119	34HP60-102-9	0.006650	0.003800	0.000602	0.002510	0.000281	0.001738	0.000032	0.000335
0.000072	34HP60-102-10	0.004979	0.002857	0.000464	0.001992	0.000119	0.001993	0.000013	0.000442
0.000064	34HP60-102-11	0.005576	0.003235	0.000508	0.002214	0.000108	0.001921	0.000018	0.000329
0.000079	34HP60-102-12	0.005964	0.003437	0.000544	0.002431	0.000135	0.002393	0.000018	0.000426
0.000096	34HP60-102-13	0.010270	0.005827	0.000871	0.004043	0.000244	0.002251	0.000023	0.000709
0.000090	34HP60-102-14	0.010169	0.005759	0.000846	0.003985	0.000231	0.002154	0.000019	0.000722
0.000095	34HP60-102-15	0.009637	0.005440	0.000795	0.003802	0.000206	0.002014	0.000021	0.000689
0.000118	34HP60-102-16	0.008851	0.005055	0.000754	0.003420	0.000200	0.001839	0.000019	0.000531
0.000090	34HP60-102-17	0.008471	0.004858	0.000729	0.003258	0.000172	0.001664	0.000019	0.000511
0.000075	34HP60-102-18	0.008503	0.004900	0.000712	0.003243	0.000131	0.001243	0.000017	0.000225
0.000252	SRM614-20	0.000881	0.000459	0.000066	0.000079	0.000039	0.000481	0.000142	0.000069
0.004462	SRM612-20	0.005572	0.003165	0.000496	0.002119	0.003752	0.010783	0.005083	0.003470
0.062900	SRM610-20	0.078432	0.043495	0.006507	0.030402	0.050971	0.169353	0.070627	0.039616
0.000004	AP1-20	0.000048	0.000013	0.000000	0.000000	0.000000	0.000082	0.000010	0.000010
0.000103	AP2-20	0.002955	0.001731	0.000246	0.001086	0.000055	0.000206	0.000017	0.000018
0.000671	AP3-20	0.031956	0.017132	0.002033	0.011180	0.000382	0.000560	0.000022	0.000085
0.001189	AP4-20	0.057201	0.030427	0.003310	0.019727	0.000611	0.000879	0.000024	0.000122
standardize signal averages AP									
0.000002	AP1	0.000079	0.000033	0.000007	0.000000	0.000000	0.000089	0.000007	0.000008
0.000203	AP2	0.004139	0.002344	0.000336	0.001504	0.000068	0.000238	0.000014	0.000019
0.000898	AP3	0.044127	0.023516	0.002653	0.015259	0.000470	0.000709	0.000021	0.000102
0.001437	AP4	0.070600	0.037846	0.004015	0.024489	0.000714	0.001057	0.000025	0.000139
linest from std sig ave									
0.021598		0.009722	0.018719	0.173123	0.028904	0.974645	0.004352	0.000000	0.031093
standardize signal averages SRM									
0.000281	srM614-2	0.001419	0.000795	0.000159	0.000780	0.000108	0.000416	0.000134	0.000068
0.004873	srM612-2	0.008027	0.004649	0.000745	0.003249	0.003467	0.010507	0.004782	0.003334
0.059070	srM610-2	0.070605	0.039464	0.005991	0.027435	0.043885	0.157864	0.061402	0.034125
linest from std sig ave									

Appendix A. Raw trace element datasheets from laser ablation.

0.000000	0.075074	0.000000	0.000000	0.000000	0.000000	0.032393	0.080974	0.108660
concentration data								
0.58 SRM614-19	1.63	1.82	3.75	3.67	14.76	0.13	0.00	0.18
9.79 SRM612-19	8.74	9.85	14.75	10.86	265.93	3.82	0.00	8.53
102.32 SRM610-19	52.34	56.89	81.28	60.66	3075.94	54.63	0.00	76.36
0.00 AP1-19	0.43	0.39	0.98	0.00	0.00	0.17	0.00	0.07
2.60 AP2-19	20.64	22.09	29.44	22.15	31.39	0.47	0.00	0.26
9.70 AP3-19	218.34	223.29	226.05	222.98	216.98	1.49	0.00	1.49
14.51 AP4-19	325.78	338.02	326.02	337.28	317.78	2.14	0.00	1.94
0.70 34HP60-102-1	3.80	4.30	10.32	4.51	61.16	4.04	0.00	1.62
0.43 34HP60-102-2	6.24	7.06	11.82	5.30	68.34	2.39	0.00	1.45
0.42 34HP60-102-3	9.64	10.75	16.72	8.09	38.56	2.81	0.00	1.08
0.25 34HP60-102-4	26.22	29.32	39.91	25.20	47.46	1.64	0.00	0.33
0.52 34HP60-102-5	23.45	26.50	37.06	24.54	56.72	2.15	0.00	1.14
0.63 34HP60-102-6	13.94	15.77	23.41	15.69	54.85	2.34	0.00	2.53
0.42 34HP60-102-7	23.32	26.21	33.92	23.19	42.30	2.08	0.00	1.04
0.95 34HP60-102-8	24.82	27.66	38.96	27.28	80.22	2.85	0.00	3.21
1.03 34HP60-102-9	25.79	28.38	41.60	28.95	109.09	3.02	0.00	4.16
0.62 34HP60-102-10	19.31	21.34	32.06	22.97	46.11	3.46	0.00	5.48
0.55 34HP60-102-11	21.63	24.16	35.06	25.53	42.06	3.34	0.00	4.09
0.68 34HP60-102-12	23.13	25.67	37.58	28.03	52.68	4.15	0.00	5.29
0.83 34HP60-102-13	39.83	43.51	60.18	46.62	94.85	3.91	0.00	8.79
0.78 34HP60-102-14	39.44	43.00	58.40	45.95	89.64	3.74	0.00	8.96
0.82 34HP60-102-15	37.38	40.62	54.93	43.84	80.29	3.50	0.00	8.55
1.02 34HP60-102-16	34.33	37.75	52.09	39.44	77.83	3.19	0.00	6.59
0.78 34HP60-102-17	32.85	36.28	50.32	37.56	66.90	2.89	0.00	6.34
0.65 34HP60-102-18	32.98	36.59	49.15	37.39	50.90	2.16	0.00	2.79
0.47 SRM614-20	0.73	0.74	0.98	0.20	3.24	0.18	0.00	0.18
8.27 SRM612-20	4.65	5.08	7.36	5.25	313.62	4.02	0.00	9.25
116.51 SRM610-20	65.39	69.83	96.61	75.36	4260.59	63.21	0.00	105.64
0.03 AP1-20	0.18	0.10	0.00	0.00	0.00	0.14	0.00	0.12
0.89 AP2-20	11.46	12.93	17.00	12.52	21.49	0.36	0.00	0.22
5.78 AP3-20	123.93	127.93	140.43	128.91	148.64	0.97	0.00	1.05
10.25 AP4-20	221.84	227.22	228.60	227.47	237.65	1.53	0.00	1.52
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
377.32 blank-17	386.12	306.76	392.92	1905.89	998.61	878.84	415.08	263.48
1153.25 SRM614-17	3591.58	2035.49	689.32	4988.07	1078.89	1972.53	681.92	435.32
14928.36 SRM612-17	21834.20	12143.55	2272.49	11747.75	5667.31	20443.56	7469.60	5062.07
73888.73 SRM610-17	89281.02	49412.12	7849.60	37472.41	41464.79	188223.06	63296.28	34423.59
2420.41 AP1-17	13253.44	7076.80	1384.97	6616.56	960.77	3361.46	709.96	467.20
5208.23 AP2-17	81448.10	45137.41	6625.52	32496.70	1950.61	6763.40	782.64	657.36
15254.85 AP3-17	566327.50	303116.47	36754.97	201428.94	7377.08	14951.60	970.33	1697.73
33827.91 AP4-17	1463492.40	778748.88	83762.03	508393.56	15367.05	29177.73	1211.37	3134.10
999.49 34HP60-24-1	29454.61	17530.66	3125.18	14572.28	1549.01	12999.35	840.00	789.28
815.24 34HP60-24-2	31682.38	18673.95	3318.34	15760.29	1388.77	12720.55	764.52	707.28
1002.05 34HP60-24-3	30539.09	17990.18	3196.58	15293.45	1570.21	12356.75	779.12	646.72
1123.73 34HP60-24-4	63481.16	36967.13	6460.88	30506.37	2509.93	32205.90	827.92	1600.13
1477.89 34HP60-24-5	104846.19	59786.66	10516.02	50012.20	4604.79	69941.27	922.09	3675.14
1604.33 34HP60-24-6	103955.63	59863.94	10962.62	50526.00	5040.91	73063.41	977.57	4064.06
1115.85 34HP60-24-7	63464.84	37601.37	6971.48	32282.30	2200.21	43631.37	766.16	1939.77
1106.81 34HP60-24-8	56248.00	32775.82	6048.67	29025.60	1690.25	39724.15	784.40	1871.89
1213.77 34HP60-24-9	59821.18	34884.88	6796.76	31689.54	1995.01	52816.10	756.40	2543.45
1731.93 34HP60-24-10	107847.84	61379.83	10996.78	52391.18	3734.42	72913.29	870.04	3434.70
1694.81 34HP60-24-11	113032.20	64949.37	11544.51	55333.47	4078.26	76683.99	820.52	3919.34
1834.85 34HP60-24-12	108472.93	62323.23	11737.23	54697.83	4600.83	90505.31	926.17	4303.10
719.84 SRM614-18	1640.21	1044.09	445.24	5037.07	798.12	2217.13	870.12	432.96
8077.17 SRM612-18	11345.10	6733.44	1222.09	9490.25	6390.36	19000.15	8438.45	5396.27
49127.16 SRM610-18	64132.96	36162.08	5580.95	29777.45	40978.39	136349.41	55481.23	30898.17
821.96 AP1-18	2763.02	1660.17	484.16	4799.63	750.32	2676.22	840.00	410.52
1931.89 AP2-18	40019.95	23217.21	3687.82	19685.35	1394.01	4361.02	817.28	492.48
8974.13 AP3-18	402236.94	216959.78	26500.67	147078.11	5643.87	9022.89	882.08	1337.85
21100.04 AP4-18	971586.56	516883.91	56585.28	339306.25	11097.86	16838.46	1067.41	2352.13
629.60 blank-18	351.44	273.28	200.40	3249.82	627.08	1627.69	672.08	289.52
503.46 blank average	368.78	290.02	296.66	2577.85	812.84	1253.27	543.58	276.50
blank subtraction								

Appendix A. Raw trace element datasheets from laser ablation.

649.78 SRM614-17	3222.80	1745.47	392.66	2410.21	266.04	719.26	138.34	158.82
14424.90 SRM612-17	21465.42	11853.53	1975.83	9169.89	4854.47	19190.29	6926.02	4785.57
73385.27 SRM610-17	88912.24	49122.10	7552.94	34894.56	40651.95	186969.79	62752.69	34147.09
1916.95 AP1-17	12884.65	6786.78	1088.31	4038.70	147.92	2108.19	166.38	190.70
4704.77 AP2-17	81079.32	44847.39	6328.86	29918.85	1137.77	5510.13	239.06	380.86
14751.38 AP3-17	565958.72	302826.45	36458.30	198851.09	6564.24	13698.34	426.74	1421.23
33324.45 AP4-17	1463123.62	778458.86	83465.37	505815.71	14554.20	27924.46	667.78	2857.60
496.02 34HP60-24-1	29085.82	17240.64	2828.52	11994.43	736.16	11746.09	296.42	512.78
311.78 34HP60-24-2	31313.59	18383.92	3021.68	13182.43	575.92	11467.28	220.94	430.78
498.58 34HP60-24-3	30170.31	17700.16	2899.92	12715.59	757.36	11103.48	235.54	370.22
620.26 34HP60-24-4	63112.38	36677.11	6164.21	27928.52	1697.09	30952.63	284.34	1323.63
974.43 34HP60-24-5	104477.41	59496.63	10219.36	47434.35	3791.94	68688.01	378.50	3398.64
1100.87 34HP60-24-6	103586.85	59573.92	10665.96	47948.15	4228.06	71810.14	433.98	3787.56
612.38 34HP60-24-7	63096.05	37311.35	6674.82	29704.45	1387.37	42378.10	222.58	1663.27
603.34 34HP60-24-8	55879.21	32485.80	5752.01	26447.75	877.40	38470.88	240.82	1595.39
710.30 34HP60-24-9	59452.39	34594.85	6500.10	29111.68	1182.17	51562.83	212.82	2266.95
1228.47 34HP60-24-10	107479.06	61089.81	10700.12	49813.32	2921.58	71660.02	326.46	3158.20
1191.35 34HP60-24-11	112663.42	64659.35	11247.84	52755.62	3265.42	75430.72	276.94	3642.84
1331.39 34HP60-24-12	108104.15	62033.21	11440.57	52119.97	3787.98	89252.05	382.58	4026.60
216.38 SRM614-18	1271.43	754.06	148.58	2459.21	-14.72	963.87	326.54	156.46
7573.70 SRM612-18	10976.32	6443.42	925.43	6912.40	5577.51	17746.88	7894.86	5119.77
48623.69 SRM610-18	63764.18	35872.06	5284.29	27199.59	40165.55	135096.14	54937.65	30621.67
318.50 AP1-18	2394.23	1370.15	187.50	2221.77	-62.52	1422.95	296.42	134.02
1428.43 AP2-18	39651.16	22927.19	3391.16	17107.50	581.16	3107.76	273.70	215.98
8470.67 AP3-18	401868.16	216669.76	26204.01	144500.26	4831.03	7769.62	338.50	1061.35
20596.58 AP4-18	971217.78	516593.89	56288.62	336728.40	10285.02	15585.19	523.82	2075.63

zero correction								
649.78 SRM614-17	3222.80	1745.47	392.66	2410.21	266.04	719.26	138.34	158.82
14424.90 SRM612-17	21465.42	11853.53	1975.83	9169.89	4854.47	19190.29	6926.02	4785.57
73385.27 SRM610-17	88912.24	49122.10	7552.94	34894.56	40651.95	186969.79	62752.69	34147.09
1916.95 AP1-17	12884.65	6786.78	1088.31	4038.70	147.92	2108.19	166.38	190.70
4704.77 AP2-17	81079.32	44847.39	6328.86	29918.85	1137.77	5510.13	239.06	380.86
14751.38 AP3-17	565958.72	302826.45	36458.30	198851.09	6564.24	13698.34	426.74	1421.23
33324.45 AP4-17	1463123.62	778458.86	83465.37	505815.71	14554.20	27924.46	667.78	2857.60
496.02 34HP60-24-1	29085.82	17240.64	2828.52	11994.43	736.16	11746.09	296.42	512.78
311.78 34HP60-24-2	31313.59	18383.92	3021.68	13182.43	575.92	11467.28	220.94	430.78
498.58 34HP60-24-3	30170.31	17700.16	2899.92	12715.59	757.36	11103.48	235.54	370.22
620.26 34HP60-24-4	63112.38	36677.11	6164.21	27928.52	1697.09	30952.63	284.34	1323.63
974.43 34HP60-24-5	104477.41	59496.63	10219.36	47434.35	3791.94	68688.01	378.50	3398.64
1100.87 34HP60-24-6	103586.85	59573.92	10665.96	47948.15	4228.06	71810.14	433.98	3787.56
612.38 34HP60-24-7	63096.05	37311.35	6674.82	29704.45	1387.37	42378.10	222.58	1663.27
603.34 34HP60-24-8	55879.21	32485.80	5752.01	26447.75	877.40	38470.88	240.82	1595.39
710.30 34HP60-24-9	59452.39	34594.85	6500.10	29111.68	1182.17	51562.83	212.82	2266.95
1228.47 34HP60-24-10	107479.06	61089.81	10700.12	49813.32	2921.58	71660.02	326.46	3158.20
1191.35 34HP60-24-11	112663.42	64659.35	11247.84	52755.62	3265.42	75430.72	276.94	3642.84
1331.39 34HP60-24-12	108104.15	62033.21	11440.57	52119.97	3787.98	89252.05	382.58	4026.60
216.38 SRM614-18	1271.43	754.06	148.58	2459.21	0.00	963.87	326.54	156.46
7573.70 SRM612-18	10976.32	6443.42	925.43	6912.40	5577.51	17746.88	7894.86	5119.77
48623.69 SRM610-18	63764.18	35872.06	5284.29	27199.59	40165.55	135096.14	54937.65	30621.67
318.50 AP1-18	2394.23	1370.15	187.50	2221.77	0.00	1422.95	296.42	134.02
1428.43 AP2-18	39651.16	22927.19	3391.16	17107.50	581.16	3107.76	273.70	215.98
8470.67 AP3-18	401868.16	216669.76	26204.01	144500.26	4831.03	7769.62	338.50	1061.35
20596.58 AP4-18	971217.78	516593.89	56288.62	336728.40	10285.02	15585.19	523.82	2075.63

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.0000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000302 SRM614-17	0.001498	0.000812	0.000183	0.001121	0.000124	0.000334	0.000064	0.000074
0.007364 SRM612-17	0.010959	0.006052	0.001009	0.004681	0.002478	0.009797	0.003536	0.002443
0.056849 SRM610-17	0.068877	0.038053	0.005851	0.027031	0.031491	0.144838	0.048612	0.026452
0.000120 AP1-17	0.000808	0.000425	0.000068	0.000253	0.000009	0.000132	0.000010	0.000012

Appendix A. Raw trace element datasheets from laser ablation.

0.000307 AP2-17	0.005283	0.002922	0.000412	0.001949	0.000074	0.000359	0.000016	0.000025	
0.000889 AP3-17	0.034097	0.018244	0.002196	0.011980	0.000395	0.000825	0.000026	0.000086	
0.001632 AP4-17	0.071671	0.038133	0.004089	0.024777	0.000713	0.001368	0.000033	0.000140	
0.000103 34HP60-24-1	0.006061	0.003593	0.000589	0.002500	0.000153	0.002448	0.000062	0.000107	
0.000060 34HP60-24-2	0.006032	0.003541	0.000582	0.002539	0.000111	0.002209	0.000043	0.000083	
0.000089 34HP60-24-3	0.005356	0.003142	0.000515	0.002258	0.000134	0.001971	0.000042	0.000066	
0.000076 34HP60-24-4	0.007740	0.004498	0.000756	0.003425	0.000208	0.003796	0.000035	0.000162	
0.000086 34HP60-24-5	0.009267	0.005277	0.000906	0.004207	0.000336	0.006093	0.000034	0.000301	
0.000095 34HP60-24-6	0.008920	0.005130	0.000918	0.004129	0.000364	0.006184	0.000037	0.000326	
0.000063 34HP60-24-7	0.006480	0.003832	0.000686	0.003051	0.000142	0.004352	0.000023	0.000171	
0.000059 34HP60-24-8	0.005484	0.003188	0.000565	0.002596	0.000086	0.003776	0.000024	0.000157	
0.000063 34HP60-24-9	0.005245	0.003052	0.000573	0.002568	0.000104	0.004549	0.000019	0.000200	
0.000116 34HP60-24-10	0.010113	0.005748	0.001007	0.004687	0.000275	0.006743	0.000031	0.000297	
0.000101 34HP60-24-11	0.009586	0.005501	0.000957	0.004489	0.000278	0.006418	0.000024	0.000310	
0.000103 34HP60-24-12	0.008373	0.004805	0.000886	0.004037	0.000293	0.006913	0.000030	0.000312	
0.000176 SRM614-18	0.001036	0.000614	0.000121	0.002003	0.000000	0.000785	0.000266	0.000127	
0.004998 SRM612-18	0.007243	0.004252	0.000611	0.004561	0.003681	0.011711	0.005210	0.003379	
0.059837 SRM610-18	0.078469	0.044145	0.006503	0.033472	0.049428	0.166252	0.067607	0.037684	
0.000028 AP1-18	0.000212	0.000121	0.000017	0.000196	0.000000	0.000126	0.000026	0.000012	
0.000113 AP2-18	0.003133	0.001812	0.000268	0.001352	0.000046	0.000246	0.000022	0.000017	
0.000608 AP3-18	0.028824	0.015541	0.001879	0.010364	0.000347	0.000557	0.000024	0.000076	
0.001270 AP4-18	0.059869	0.031844	0.003470	0.020757	0.000634	0.000961	0.000032	0.000128	
standardize signal averages AP									
0.000074 AP1	0.000510	0.000273	0.000042	0.000225	0.000005	0.000129	0.000018	0.000012	
0.000210 AP2	0.004208	0.002367	0.000340	0.001651	0.000060	0.000302	0.000019	0.000021	
0.000748 AP3	0.031460	0.016892	0.002038	0.011172	0.000371	0.000691	0.000025	0.000081	
0.001451 AP4	0.065770	0.034988	0.003779	0.022767	0.000673	0.001164	0.000033	0.000134	
linest from std sig ave									
0.022400	0.011111	0.021475	0.194682	0.032915	1.087239	0.004061	0.000000	0.034337	
standardize signal averages SRM									
0.000239 srm614-2	0.001267	0.000713	0.000152	0.001562	0.000062	0.000560	0.000165	0.000101	
0.006181 srm612-2	0.009101	0.005152	0.000810	0.004621	0.003079	0.010754	0.004373	0.002911	
0.058343 srm610-2	0.073673	0.041099	0.006177	0.030252	0.040460	0.155545	0.058110	0.032068	
linest from std sig ave									
0.000000	0.071846	0.000000	0.000000	0.000000	0.000000	0.032872	0.085577	0.115686	
concentration data									
0.58 SRM614-17	1.43	1.49	3.05	3.16	11.53	0.12	0.00	0.22	
14.15 SRM612-17	10.44	11.15	16.84	13.22	231.09	3.41	0.00	7.19	
109.21 SRM610-17	65.63	70.08	97.69	76.31	2936.41	50.44	0.00	77.90	
1.07 AP1-17	3.58	3.65	5.30	3.32	4.02	0.21	0.00	0.16	
2.74 AP2-17	23.42	25.03	32.03	25.60	32.15	0.58	0.00	0.34	
7.94 AP3-17	151.14	156.30	170.59	157.31	171.53	1.34	0.00	1.17	
14.59 AP4-17	317.69	326.69	317.54	325.35	309.23	2.22	0.00	1.92	
0.92 34HP60-24-1	26.87	30.78	45.78	32.82	66.54	3.97	0.00	1.46	
0.54 34HP60-24-2	26.74	30.34	45.21	33.35	48.12	3.58	0.00	1.14	
0.79 34HP60-24-3	23.74	26.92	39.99	29.64	58.32	3.19	0.00	0.90	
0.68 34HP60-24-4	34.31	38.54	58.71	44.98	90.27	6.15	0.00	2.22	
0.77 34HP60-24-5	41.08	45.21	70.40	55.25	145.88	9.87	0.00	4.13	
0.85 34HP60-24-6	39.54	43.95	71.33	54.22	157.92	10.02	0.00	4.47	
0.56 34HP60-24-7	28.72	32.83	53.24	40.06	61.80	7.05	0.00	2.34	
0.53 34HP60-24-8	24.31	27.32	43.85	34.09	37.35	6.12	0.00	2.14	
0.56 34HP60-24-9	23.25	26.15	44.54	33.73	45.24	7.37	0.00	2.74	
1.03 34HP60-24-10	44.83	49.25	78.20	61.55	119.24	10.92	0.00	4.07	
0.91 34HP60-24-11	42.49	47.13	74.33	58.94	120.51	10.40	0.00	4.25	
0.92 34HP60-24-12	37.11	41.16	68.82	53.01	127.25	11.20	0.00	4.27	
0.34 SRM614-18	0.99	1.13	2.02	5.65	0.00	0.27	0.00	0.38	
9.60 SRM612-18	6.90	7.83	10.20	12.88	343.19	4.08	0.00	9.95	
114.96 SRM610-18	74.78	81.30	108.58	94.49	4608.95	57.90	0.00	110.97	
0.25 AP1-18	0.94	1.04	1.29	2.58	0.00	0.20	0.00	0.16	
1.01 AP2-18	13.89	15.52	20.81	17.75	19.92	0.40	0.00	0.23	
5.43 AP3-18	127.77	133.14	145.97	136.09	150.29	0.90	0.00	1.04	
11.35 AP4-18	265.37	272.82	269.48	272.56	274.99	1.56	0.00	1.75	
certified concentration									
SRM614	1.90					1.12			
SRM612	37.92					36.24	34.64	37.33	
SRM610	456.30					438.10	426.30	317.40	
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07	
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38	
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09	
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84	
Cu65		Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
314.64 blank-15	328.20	270.28	398.84	1747.89	704.64	1149.33	468.20	273.76
1101.29 SRM614-15	3212.78	2062.85	744.84	5378.47	1031.25	2676.26	934.05	570.44
18945.99 SRM612-15	31398.42	17842.38	3149.38	16721.01	10472.38	33597.31	14751.92	10152.90
113606.23 SRM610-15	159762.06	87804.98	13332.20	64612.56	77213.12	301970.59	114989.20	68300.59
327.08 AP1-15	1120.33	601.44	386.68	1854.17	801.60	2746.02	827.24	480.08
1855.61 AP2-15	34373.07	20325.04	3292.18	15577.25	1331.73	4422.38	941.89	581.48
12343.67 AP3-15	458616.06	248966.84	30319.81	165939.73	6406.68	13207.95	1002.09	1501.17
15592.09 AP4-15	616394.63	330398.00	38905.18	220109.95	7868.56	16749.06	1073.85	1711.69
491.88 34BV166-1	7085.92	4280.50	996.25	4851.47	797.56	5532.51	705.24	386.56
496.32 34BV166-2	9891.86	5865.63	1207.85	6153.95	808.40	4969.87	703.28	366.76
460.04 34BV166-3	10016.98	5899.43	1156.57	6505.88	799.44	4492.59	746.20	339.80
581.84 34BV166-4	11222.70	6680.16	1254.85	7633.48	917.65	5340.71	635.08	358.96
504.04 34BV166-5	13565.76	8044.25	1488.77	8582.73	915.13	6361.24	630.72	356.00
518.44 34BV166-6	17524.98	10491.50	1971.09	10966.58	953.77	8185.81	653.88	375.44
616.88 SRM614-16	1171.73	823.96	459.84	5397.75	927.29	2380.29	974.77	484.00
10228.30 SRM612-16	12572.43	7261.04	1496.57	10503.18	9145.69	25995.11	11769.55	7702.20
62777.40 SRM610-16	77571.76	43214.40	6641.52	35002.60	52434.66	177203.64	71834.24	38638.74
395.80 AP1-16	774.80	489.12	390.36	3733.30	725.12	2702.50	761.68	400.36
1432.81 AP2-16	24356.18	14406.36	2447.49	13554.80	1214.85	3820.74	801.88	515.48
9110.21 AP3-16	328809.50	177624.72	22070.89	121389.60	4962.23	9949.74	926.85	1165.45
10591.66 AP4-16	397604.06	214193.53	25731.42	145730.78	5689.07	12130.99	961.85	1326.29
430.20 blank-16	311.76	286.52	256.40	3527.86	648.36	1621.21	622.40	285.48
372.42 blank average	319.98	278.40	327.62	2637.87	676.50	1385.27	545.30	279.62
blank subtraction								
728.86 SRM614-15	2892.80	1784.45	417.22	2740.60	354.74	1290.99	388.74	290.82
18573.56 SRM612-15	31078.43	17563.98	2821.76	14083.14	9795.88	32212.04	14206.62	9873.28
113233.81 SRM610-15	159442.08	87526.58	13004.57	61974.69	76536.61	300585.32	114443.90	68020.96
-45.34 AP1-15	800.34	323.04	59.06	-783.70	125.10	1360.75	281.94	200.46
1483.19 AP2-15	34053.09	20046.63	2964.56	12939.37	655.22	3037.12	396.58	301.86
11971.25 AP3-15	458296.08	248688.44	29992.19	163301.86	5730.17	11822.69	456.78	1221.55
15219.67 AP4-15	616074.65	330119.60	38577.56	217472.08	7192.06	15363.79	528.54	1432.07
119.46 34BV166-1	6765.94	4002.10	668.62	2213.59	121.06	4147.24	159.94	106.94
123.90 34BV166-2	9571.87	5587.23	880.22	3516.08	131.90	3584.60	157.98	87.14
87.62 34BV166-3	9697.00	5621.03	828.94	3868.00	122.94	3107.32	200.90	60.18
209.42 34BV166-4	10902.72	6401.76	927.23	4995.61	241.14	3955.44	89.78	79.34
131.62 34BV166-5	13245.77	7765.84	1161.15	5944.85	238.62	4975.97	85.42	76.38
146.02 34BV166-6	17205.00	10213.10	1643.47	8328.71	277.26	6800.54	108.58	95.82
244.46 SRM614-16	851.74	545.56	132.22	2759.88	250.78	995.03	429.46	204.38
9855.88 SRM612-16	12252.45	6982.64	1168.95	7865.30	8469.19	24609.84	11224.24	7422.58
62404.97 SRM610-16	77251.78	42936.00	6313.90	32364.72	51758.15	175818.37	71288.94	38359.12
23.38 AP1-16	454.82	210.72	62.74	1095.43	48.62	1317.23	216.38	120.74
1060.39 AP2-16	24036.20	14127.96	2119.87	10916.92	538.34	2435.47	256.58	235.86
8737.79 AP3-16	328489.52	177346.32	21743.26	118751.73	4285.72	8564.47	381.54	885.82
10219.24 AP4-16	397284.08	213915.13	25403.80	143092.91	5012.57	10745.72	416.54	1046.67
zero correction								
728.86 SRM614-15	2892.80	1784.45	417.22	2740.60	354.74	1290.99	388.74	290.82
18573.56 SRM612-15	31078.43	17563.98	2821.76	14083.14	9795.88	32212.04	14206.62	9873.28
113233.81 SRM610-15	159442.08	87526.58	13004.57	61974.69	76536.61	300585.32	114443.90	68020.96
0.00 AP1-15	800.34	323.04	59.06	0.00	125.10	1360.75	281.94	200.46
1483.19 AP2-15	34053.09	20046.63	2964.56	12939.37	655.22	3037.12	396.58	301.86
11971.25 AP3-15	458296.08	248688.44	29992.19	163301.86	5730.17	11822.69	456.78	1221.55
15219.67 AP4-15	616074.65	330119.60	38577.56	217472.08	7192.06	15363.79	528.54	1432.07
119.46 34BV166-1	6765.94	4002.10	668.62	2213.59	121.06	4147.24	159.94	106.94
123.90 34BV166-2	9571.87	5587.23	880.22	3516.08	131.90	3584.60	157.98	87.14
87.62 34BV166-3	9697.00	5621.03	828.94	3868.00	122.94	3107.32	200.90	60.18
209.42 34BV166-4	10902.72	6401.76	927.23	4995.61	241.14	3955.44	89.78	79.34
131.62 34BV166-5	13245.77	7765.84	1161.15	5944.85	238.62	4975.97	85.42	76.38
146.02 34BV166-6	17205.00	10213.10	1643.47	8328.71	277.26	6800.54	108.58	95.82
244.46 SRM614-16	851.74	545.56	132.22	2759.88	250.78	995.03	429.46	204.38
9855.88 SRM612-16	12252.45	6982.64	1168.95	7865.30	8469.19	24609.84	11224.24	7422.58
62404.97 SRM610-16	77251.78	42936.00	6313.90	32364.72	51758.15	175818.37	71288.94	38359.12
23.38 AP1-16	454.82	210.72	62.74	1095.43	48.62	1317.23	216.38	120.74
1060.39 AP2-16	24036.20	14127.96	2119.87	10916.92	538.34	2435.47	256.58	235.86
8737.79 AP3-16	328489.52	177346.32	21743.26	118751.73	4285.72	8564.47	381.54	885.82
10219.24 AP4-16	397284.08	213915.13	25403.80	143092.91	5012.57	10745.72	416.54	1046.67
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000256 SRM614-15	0.001016	0.000627	0.000147	0.000962	0.000125	0.000453	0.000137	0.000102
0.006087 SRM612-15	0.010185	0.005756	0.000925	0.004615	0.003210	0.010557	0.004656	0.003236
0.060821 SRM610-15	0.085641	0.047013	0.006985	0.033288	0.041110	0.161453	0.061471	0.036536
0.000000 AP1-15	0.000060	0.000024	0.000004	0.000000	0.000009	0.000101	0.000021	0.000015
0.000105 AP2-15	0.002403	0.001414	0.000209	0.000913	0.000046	0.000214	0.000028	0.000021
0.000641 AP3-15	0.024539	0.013316	0.001606	0.008744	0.000307	0.000633	0.000024	0.000065
0.000897 AP4-15	0.036300	0.019451	0.002273	0.012814	0.000424	0.000905	0.000031	0.000084
0.000029 34BV166-1	0.001627	0.000962	0.000161	0.000532	0.000029	0.000997	0.000038	0.000026
0.000035 34BV166-2	0.002699	0.001575	0.000248	0.000991	0.000037	0.001011	0.000045	0.000025
0.000027 34BV166-3	0.002985	0.001731	0.000255	0.001191	0.000038	0.000957	0.000062	0.000019
0.000072 34BV166-4	0.003744	0.002199	0.000318	0.001716	0.000083	0.001358	0.000031	0.000027
0.000043 34BV166-5	0.004308	0.002526	0.000378	0.001933	0.000078	0.001618	0.000028	0.000025
0.000034 34BV166-6	0.004056	0.002408	0.000387	0.001963	0.000065	0.001603	0.000026	0.000023
0.000142 SRM614-16	0.000495	0.000317	0.000077	0.001603	0.000146	0.000578	0.000249	0.000119
0.004255 SRM612-16	0.005290	0.003015	0.000505	0.003396	0.003656	0.010625	0.004846	0.003205
0.055984 SRM610-16	0.069303	0.038518	0.005664	0.029035	0.046433	0.157729	0.063954	0.034412
0.000002 AP1-16	0.000038	0.000018	0.000005	0.000091	0.000004	0.000110	0.000018	0.000010
0.000089 AP2-16	0.002006	0.001179	0.000177	0.000911	0.000045	0.000203	0.000021	0.000020
0.000536 AP3-16	0.020157	0.010883	0.001334	0.007287	0.000263	0.000526	0.000023	0.000054
0.000703 AP4-16	0.027347	0.014725	0.001749	0.009850	0.000345	0.000740	0.000029	0.000072
standardize signal averages AP								
0.000001 AP1	0.000049	0.000021	0.000005	0.000046	0.000007	0.000106	0.000020	0.000013
0.000097 AP2	0.002204	0.001297	0.000193	0.000912	0.000046	0.000209	0.000025	0.000020
0.000589 AP3	0.022348	0.012099	0.001470	0.008015	0.000285	0.000579	0.000024	0.000060
0.000800 AP4	0.031823	0.017088	0.002011	0.011332	0.000384	0.000822	0.000030	0.000078
linest from std sig ave								
0.036620	0.020727	0.039659	0.332903	0.059836	1.731180	0.005488	0.000000	0.053105
standardize signal averages SRM								
0.000199 srm614-2	0.000755	0.000472	0.000112	0.001283	0.000135	0.000516	0.000193	0.000110
0.005171 srm612-2	0.007738	0.004385	0.000715	0.004006	0.003433	0.010591	0.004751	0.003220
0.058403 srm610-2	0.077472	0.042766	0.006325	0.031162	0.043771	0.159591	0.062713	0.035474
linest from std sig ave								
0.000000	0.068558	0.000000	0.000000	0.000000	0.000000	0.032043	0.079293	0.104578
concentration data								
0.80 SRM614-15	1.81	2.13	4.18	4.94	18.49	0.21	0.00	0.47
19.12 SRM612-15	18.11	19.58	26.40	23.69	476.65	4.97	0.00	14.74
191.02 SRM610-15	152.24	159.90	199.43	170.83	6103.64	75.99	0.00	166.40
0.00 AP1-15	0.49	0.38	0.58	0.00	6.44	0.22	0.00	0.32
1.53 AP2-15	19.87	22.38	27.78	21.79	31.93	0.47	0.00	0.45
9.36 AP3-15	202.91	210.67	213.28	208.72	211.90	1.39	0.00	1.39
13.10 AP4-15	300.16	307.74	301.87	305.87	292.66	1.98	0.00	1.79
0.42 34BV166-1	13.45	15.23	21.35	12.71	20.10	2.18	0.00	0.54
0.51 34BV166-2	22.32	24.92	32.96	23.67	25.69	2.21	0.00	0.52
0.39 34BV166-3	24.69	27.38	33.89	28.43	26.14	2.09	0.00	0.39
1.05 34BV166-4	30.96	34.78	42.29	40.95	57.19	2.97	0.00	0.58
0.63 34BV166-5	35.62	39.96	50.15	46.15	53.60	3.54	0.00	0.53
0.50 34BV166-6	33.54	38.09	51.45	46.87	45.14	3.51	0.00	0.48
0.45 SRM614-16	0.88	1.08	2.19	8.23	21.62	0.27	0.00	0.54
13.36 SRM612-16	9.40	10.25	14.41	17.43	542.88	5.00	0.00	14.60
175.83 SRM610-16	123.20	131.01	161.72	149.00	6893.93	74.24	0.00	156.73
0.03 AP1-16	0.31	0.28	0.70	2.18	2.80	0.24	0.00	0.21
1.29 AP2-16	16.59	18.66	23.50	21.75	31.03	0.45	0.00	0.42
7.83 AP3-16	166.68	172.18	177.20	173.95	181.63	1.15	0.00	1.15
10.28 AP4-16	226.13	232.96	232.23	235.12	238.29	1.62	0.00	1.53
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
356.92 blank-13	236.92	215.04	455.84	2158.25	898.37	1344.29	550.32	365.16
778.40 SRM614-13	1285.61	772.28	615.52	4856.95	1171.53	2656.34	1012.69	583.60
12151.83 SRM612-13	12139.67	6936.96	1612.93	9297.57	9818.13	31549.90	13550.52	7883.88
74345.10 SRM610-13	79118.37	44297.09	7105.04	34728.91	52521.98	209065.86	78234.00	39443.62
506.00 AP1-13	2163.29	1156.69	530.40	2620.17	918.53	3298.82	859.80	547.68
2034.13 AP2-13	41914.91	24406.54	3954.66	19043.19	1572.21	4971.91	927.93	656.88
10532.18 AP3-13	353793.56	191251.19	24298.50	130276.89	5360.99	11748.55	898.77	1364.53
14578.56 AP4-13	544209.69	292661.56	35000.92	196369.14	7398.56	15335.77	996.49	1620.89
2377.17 W3-1	51745.25	30275.41	4681.87	23296.89	1394.65	8439.33	680.32	413.56
923.53 W3-2	56141.64	32607.22	5028.11	25434.94	1432.13	8780.49	677.08	409.44
962.29 W3-3	54883.07	31866.14	4856.71	24951.02	1486.45	8257.97	649.60	408.56
1536.37 W3-4	59823.46	34676.32	5285.15	27566.84	1489.61	9846.50	678.84	372.44
1639.33 W3-5	76228.15	43601.97	6589.56	33631.27	1724.09	11089.98	667.92	371.92
1285.89 W3-6	71772.45	41505.99	6157.83	32603.86	1649.37	10925.26	724.20	423.76
3449.98 W3-7	71945.20	41160.39	6105.63	32372.30	1692.49	9000.41	665.40	375.20
2337.33 W3-8	90772.99	52112.17	7402.72	39652.22	1919.21	9463.85	694.16	384.04
1602.25 W3-9	89596.78	51340.89	7445.88	39626.70	1862.33	9723.97	722.60	390.32
2010.65 W3-10	123437.85	69511.11	10358.74	53841.98	2495.05	24839.22	709.64	390.20
2289.77 W3-11	117971.83	66856.18	9975.50	51861.65	2528.33	22118.40	694.04	397.20
1599.85 W3-12	106346.48	60752.82	9032.81	46991.95	2262.17	17588.54	746.52	340.68
767.04 SRM614-14	1083.01	775.44	475.24	6459.96	1081.77	2899.18	1082.41	551.36
11349.26 SRM612-14	13026.23	7775.32	1626.01	11426.58	10937.46	29771.53	14495.44	9477.29
60501.50 SRM610-14	75394.55	42152.12	6568.64	35021.04	51645.77	166501.14	71605.48	38730.18
427.24 AP1-14	797.96	532.00	376.52	4363.86	749.88	2968.98	805.28	424.00
1526.93 AP2-14	26848.55	15916.01	2670.70	14884.80	1275.13	4151.82	791.60	509.56
8936.33 AP3-14	335747.44	181405.34	22230.85	124603.62	5127.71	9658.41	953.89	1186.65
11491.67 AP4-14	467300.25	251218.94	29668.85	169021.55	6437.88	12627.11	935.25	1395.57
551.64 blank-14	458.16	358.80	224.52	4388.42	658.84	1799.25	632.96	317.68
454.28 blank average	347.54	286.92	340.18	3273.34	778.60	1571.77	591.64	341.42
blank subtraction								
324.12 SRM614-13	938.07	485.36	275.34	1583.61	392.92	1084.57	421.04	242.18
11697.55 SRM612-13	11792.13	6650.04	1272.75	6024.23	9039.53	29978.13	12958.87	7542.46
73890.82 SRM610-13	78770.83	44010.17	6764.86	31455.58	51743.37	207494.09	77642.36	39102.20
51.72 AP1-13	1815.75	869.76	190.22	-653.16	139.92	1727.05	268.16	206.26
1579.85 AP2-13	41567.37	24119.62	3614.48	15769.85	793.60	3400.14	336.28	315.46
10077.90 AP3-13	353446.02	190964.27	23958.31	127003.55	4582.39	10176.78	307.12	1023.11
14124.28 AP4-13	543862.15	292374.64	34660.74	193095.80	6619.96	13764.00	404.84	1279.47
1922.89 W3-1	51397.71	29988.49	4341.68	20023.55	616.04	6867.56	88.68	72.14
469.24 W3-2	55794.10	32320.30	4687.93	22161.60	653.52	7208.72	85.44	68.02
508.00 W3-3	54535.53	31579.22	4516.53	21677.68	707.84	6686.20	57.96	67.14
1082.09 W3-4	59475.92	34389.39	4944.97	24293.50	711.00	8274.73	87.20	31.02
1185.05 W3-5	75880.61	43315.04	6249.38	30357.93	945.49	9518.21	76.28	30.50
831.60 W3-6	71424.90	41219.07	5817.65	29330.52	870.76	9353.49	132.56	82.34
2995.70 W3-7	71597.66	40873.47	5765.45	29098.96	913.89	7428.64	73.76	33.78
1883.05 W3-8	90425.45	51825.25	7062.54	36378.88	1140.61	7892.08	102.52	42.62
1147.97 W3-9	89249.24	51053.97	7105.70	36353.36	1083.73	8152.21	130.96	48.90
1556.37 W3-10	123090.31	69224.19	10018.56	50568.65	1716.45	23267.45	118.00	48.78
1835.49 W3-11	117624.29	66569.26	9635.31	48588.31	1749.73	20546.64	102.40	55.78
1145.57 W3-12	105998.94	60465.90	8692.63	43718.61	1483.57	16016.77	154.88	-0.74
312.76 SRM614-14	735.46	488.52	135.06	3186.62	303.16	1327.41	490.76	209.94
10894.98 SRM612-14	12678.69	7488.40	1285.83	8153.25	10158.86	28199.76	13903.80	9135.87
60047.22 SRM610-14	75047.01	41865.20	6228.46	31747.70	50867.17	164929.37	71013.84	38388.75
-27.04 AP1-14	450.42	245.08	36.34	1090.53	-28.72	1397.21	213.64	82.58
1072.65 AP2-14	26501.01	15629.09	2330.51	11611.47	496.52	2580.05	199.96	168.14
8482.05 AP3-14	335399.90	181118.42	21890.66	121330.28	4349.10	8086.65	362.24	845.22
11037.38 AP4-14	466952.71	250932.02	29328.67	165748.21	5659.27	11055.34	343.60	1054.15
zero correction								
324.12 SRM614-13	938.07	485.36	275.34	1583.61	392.92	1084.57	421.04	242.18
11697.55 SRM612-13	11792.13	6650.04	1272.75	6024.23	9039.53	29978.13	12958.87	7542.46
73890.82 SRM610-13	78770.83	44010.17	6764.86	31455.58	51743.37	207494.09	77642.36	39102.20
51.72 AP1-13	1815.75	869.76	190.22	0.00	139.92	1727.05	268.16	206.26
1579.85 AP2-13	41567.37	24119.62	3614.48	15769.85	793.60	3400.14	336.28	315.46
10077.90 AP3-13	353446.02	190964.27	23958.31	127003.55	4582.39	10176.78	307.12	1023.11
14124.28 AP4-13	543862.15	292374.64	34660.74	193095.80	6619.96	13764.00	404.84	1279.47
1922.89 W3-1	51397.71	29988.49	4341.68	20023.55	616.04	6867.56	88.68	72.14
469.24 W3-2	55794.10	32320.30	4687.93	22161.60	653.52	7208.72	85.44	68.02
508.00 W3-3	54535.53	31579.22	4516.53	21677.68	707.84	6686.20	57.96	67.14
1082.09 W3-4	59475.92	34389.39	4944.97	24293.50	711.00	8274.73	87.20	31.02
1185.05 W3-5	75880.61	43315.04	6249.38	30357.93	945.49	9518.21	76.28	30.50
831.60 W3-6	71424.90	41219.07	5817.65	29330.52	870.76	9353.49	132.56	82.34
2995.70 W3-7	71597.66	40873.47	5765.45	29098.96	913.89	7428.64	73.76	33.78
1883.05 W3-8	90425.45	51825.25	7062.54	36378.88	1140.61	7892.08	102.52	42.62
1147.97 W3-9	89249.24	51053.97	7105.70	36353.36	1083.73	8152.21	130.96	48.90

Appendix A. Raw trace element datasheets from laser ablation.

1556.37 W3-10	123090.31	69224.19	10018.56	50568.65	1716.45	23267.45	118.00	48.78
1835.49 W3-11	117624.29	66569.26	9635.31	48588.31	1749.73	20546.64	102.40	55.78
1145.57 W3-12	105998.94	60465.90	8692.63	43718.61	1483.57	16016.77	154.88	0.00
312.76 SRM614-14	735.46	488.52	135.06	3186.62	303.16	1327.41	490.76	209.94
10894.98 SRM612-14	12678.69	7488.40	1285.83	8153.25	10158.86	28199.76	13903.80	9135.87
60047.22 SRM610-14	75047.01	41865.20	6228.46	31747.70	50867.17	164929.37	71013.84	38388.75
0.00 AP1-14	450.42	245.08	36.34	1090.53	0.00	1397.21	213.64	82.58
1072.65 AP2-14	26501.01	15629.09	2330.51	11611.47	496.52	2580.05	199.96	168.14
8482.05 AP3-14	335399.90	181118.42	21890.66	121330.28	4349.10	8086.65	362.24	845.22
11037.38 AP4-14	466952.71	250932.02	29328.67	165748.21	5659.27	11055.34	343.60	1054.15
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000111 SRM614-13	0.000322	0.000167	0.000094	0.000543	0.000135	0.000372	0.000144	0.000083
0.004017 SRM612-13	0.004049	0.002283	0.000437	0.002068	0.003104	0.010293	0.004450	0.002590
0.062429 SRM610-13	0.066552	0.037184	0.005716	0.026576	0.043717	0.175309	0.065599	0.033037
0.000003 AP1-13	0.000116	0.000056	0.000012	0.000000	0.000009	0.000110	0.000017	0.000013
0.000096 AP2-13	0.002539	0.001473	0.000221	0.000963	0.000048	0.000208	0.000021	0.000019
0.000583 AP3-13	0.020434	0.011040	0.001385	0.007343	0.000265	0.000588	0.000018	0.000059
0.000808 AP4-13	0.031103	0.016721	0.001982	0.011043	0.000379	0.000787	0.000023	0.000073
0.000319 W3-1	0.008527	0.004975	0.000720	0.003322	0.000102	0.001139	0.000015	0.000012
0.000073 W3-2	0.008635	0.005002	0.000726	0.003430	0.000101	0.001116	0.000013	0.000011
0.000081 W3-3	0.008695	0.005035	0.000720	0.003456	0.000113	0.001066	0.000009	0.000011
0.000187 W3-4	0.010294	0.005952	0.000856	0.004205	0.000123	0.001432	0.000015	0.000005
0.000188 W3-5	0.012042	0.006874	0.000992	0.004818	0.000150	0.001511	0.000012	0.000005
0.000130 W3-6	0.011130	0.006423	0.000907	0.004571	0.000136	0.001458	0.000021	0.000013
0.000569 W3-7	0.013598	0.007763	0.001095	0.005527	0.000174	0.001411	0.000014	0.000006
0.000313 W3-8	0.015046	0.008623	0.001175	0.006053	0.000190	0.001313	0.000017	0.000007
0.000184 W3-9	0.014333	0.008199	0.001141	0.005838	0.000174	0.001309	0.000021	0.000008
0.000178 W3-10	0.014070	0.007913	0.001145	0.005780	0.000196	0.002660	0.000013	0.000006
0.000209 W3-11	0.013398	0.007583	0.001098	0.005535	0.000199	0.002340	0.000012	0.000006
0.000128 W3-12	0.011873	0.006773	0.000974	0.004897	0.000166	0.001794	0.000017	0.000000
0.000133 SRM614-14	0.000312	0.000207	0.000057	0.001350	0.000128	0.000562	0.000208	0.000089
0.004344 SRM612-14	0.005055	0.002986	0.000513	0.003251	0.004050	0.011243	0.005543	0.003642
0.064342 SRM610-14	0.080414	0.044859	0.006674	0.034018	0.054505	0.176725	0.076093	0.041134
0.000000 AP1-14	0.000035	0.000019	0.000003	0.000085	0.000000	0.000109	0.000017	0.000006
0.000080 AP2-14	0.001980	0.001168	0.000174	0.000867	0.000037	0.000193	0.000015	0.000013
0.000583 AP3-14	0.023044	0.012444	0.001504	0.008336	0.000299	0.000556	0.000025	0.000058
0.000751 AP4-14	0.031770	0.017073	0.001995	0.011277	0.000385	0.000752	0.000023	0.000072
standardize signal averages AP								
0.000002 AP1	0.000076	0.000037	0.000007	0.000043	0.000004	0.000110	0.000017	0.000010
0.000088 AP2	0.002259	0.001320	0.000197	0.000915	0.000043	0.000200	0.000018	0.000016
0.000583 AP3	0.021739	0.011742	0.001445	0.007839	0.000282	0.000572	0.000021	0.000059
0.000779 AP4	0.031437	0.016897	0.001989	0.011160	0.000382	0.000770	0.000023	0.000072
linest from std sig ave								
0.037346	0.021108	0.040397	0.337485	0.060922	1.746103	0.005751	0.000000	0.056566
standardize signal averages SRM								
0.000122 srm614-2	0.000317	0.000187	0.000076	0.000947	0.000132	0.000467	0.000176	0.000086
0.004180 srm612-2	0.004552	0.002634	0.000475	0.002660	0.003577	0.010768	0.004996	0.003116
0.063386 srm610-2	0.073483	0.041022	0.006195	0.030297	0.049111	0.176017	0.070846	0.037086
linest from std sig ave								
0.000000	0.072498	0.000000	0.000000	0.000000	0.000000	0.029059	0.070214	0.100072
concentration data								
0.36 SRM614-13	0.58	0.58	2.73	2.84	20.19	0.18	0.00	0.40
12.86 SRM612-13	7.33	7.91	12.65	10.81	464.80	5.08	0.00	12.56
199.96 SRM610-13	120.48	128.83	165.43	138.86	6546.71	86.46	0.00	160.27

Appendix A. Raw trace element datasheets from laser ablation.

0.05 AP1-13	0.98	0.90	1.64	0.00	6.23	0.25	0.00	0.30
1.44 AP2-13	21.38	23.74	29.72	23.41	33.76	0.48	0.00	0.43
8.68 AP3-13	172.07	177.93	186.49	178.45	184.54	1.35	0.00	1.33
12.03 AP4-13	261.91	269.47	266.88	268.39	263.72	1.81	0.00	1.65
4.75 W3-1	71.81	80.18	96.98	80.74	71.20	2.61	0.00	0.27
1.08 W3-2	72.71	80.61	97.68	83.36	70.45	2.56	0.00	0.24
1.21 W3-3	73.22	81.14	96.95	84.00	78.61	2.45	0.00	0.24
2.79 W3-4	86.68	95.92	115.23	102.19	85.72	3.29	0.00	0.12
2.80 W3-5	101.41	110.78	133.53	117.09	104.52	3.47	0.00	0.11
1.93 W3-6	93.72	103.51	122.05	111.08	94.52	3.34	0.00	0.29
8.48 W3-7	114.51	125.11	147.43	134.32	120.91	3.24	0.00	0.14
4.67 W3-8	126.70	138.97	158.22	147.12	132.20	3.01	0.00	0.16
2.75 W3-9	120.70	132.14	153.64	141.89	121.24	3.00	0.00	0.18
2.65 W3-10	118.48	127.52	154.18	140.48	136.67	6.10	0.00	0.13
3.11 W3-11	112.82	122.20	147.77	134.51	138.83	5.37	0.00	0.14
1.91 W3-12	99.98	109.15	131.09	119.01	115.75	4.12	0.00	0.00
0.42 SRM614-14	0.56	0.72	1.66	7.05	19.23	0.28	0.00	0.43
13.91 SRM612-14	9.15	10.34	14.84	16.98	606.53	5.54	0.00	17.67
206.08 SRM610-14	145.57	155.42	193.17	177.74	8162.22	87.16	0.00	199.55
0.00 AP1-14	0.30	0.31	0.38	2.07	0.00	0.25	0.00	0.15
1.19 AP2-14	16.67	18.82	23.44	21.08	25.84	0.44	0.00	0.28
8.68 AP3-14	194.04	200.54	202.49	202.60	208.14	1.27	0.00	1.31
11.19 AP4-14	267.53	275.14	268.66	274.08	268.21	1.73	0.00	1.62

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
369.96 blank-11	1370.53	898.85	534.60	3172.86	935.33	1733.57	610.32	443.08
868.84 SRM614-11	1439.17	919.57	719.08	5820.91	1299.85	3237.42	1201.81	736.68
11631.91 SRM612-11	21390.52	12394.99	2498.09	13200.63	10758.02	34137.19	14067.84	8096.85
71267.72 SRM610-11	83487.43	46413.46	7352.84	37216.25	58006.01	212580.59	80547.89	37210.33
764.96 AP1-11	20399.27	11852.43	2056.49	10862.30	1219.21	7664.88	842.88	627.16
2690.86 AP2-11	75581.34	43329.77	6626.40	32839.39	2136.33	10182.54	925.85	789.76
18363.02 AP3-11	773777.06	413949.78	46995.39	273398.53	9549.93	18915.83	1056.89	2258.41
14440.12 AP4-11	580314.75	312094.97	36399.88	208558.78	7782.12	16061.49	943.85	1775.57
1125.45 W1-1	96799.91	56252.32	8922.37	44746.25	2113.29	36153.96	768.64	547.84
900.93 W1-2	76267.71	43391.37	7027.84	35746.76	1728.09	26038.39	715.04	456.48
1287.49 W1-3	55080.31	32248.18	5270.79	27286.11	1476.85	20853.04	709.08	427.20
1793.53 W1-4	123607.81	70874.12	11591.91	57873.25	2555.01	60473.06	852.40	630.96
1312.37 W1-5	123380.13	69745.03	11324.78	57220.12	2396.85	55611.43	833.36	557.60
993.17 W1-6	94703.09	54800.11	9355.69	45887.38	2029.29	51036.41	810.52	559.04
2071.17 W1-7	293138.63	160765.27	22675.29	118931.39	4281.62	72850.13	963.65	623.88
1273.25 W1-8	262416.41	143801.97	20665.88	107362.05	3848.90	68301.23	933.61	503.84
1614.13 W1-9	264104.38	145499.42	20727.40	108253.05	3944.58	67319.26	861.08	513.24
1917.13 W1-10	221573.89	122596.53	18307.90	93822.97	3648.22	72006.97	937.73	572.48
1380.61 W1-11	226186.72	124866.14	18620.34	95053.98	3555.06	71189.60	934.85	564.20
1507.37 W1-12	226706.52	125529.99	18641.47	95418.45	3595.10	69936.99	922.69	600.12
1582.65 W1-13	137476.13	78007.72	12342.15	62184.79	2705.26	52678.58	875.80	576.12
1245.93 W1-14	113006.88	64588.12	10682.18	52392.90	2430.89	50395.08	887.92	505.28
1172.61 W1-15	133695.91	75929.51	12084.11	60326.66	2558.81	52278.90	960.09	509.92
1682.53 W1-16	91614.27	52385.66	8763.13	43303.08	2169.89	38801.86	828.52	499.96
1243.29 W1-17	93634.88	53704.30	8766.09	43941.45	2113.45	36931.81	844.68	487.04
1077.57 W1-18	101563.17	57929.85	8948.13	47014.95	2157.97	34971.92	792.36	469.68
819.36 SRM614-12	1285.09	864.00	458.20	6239.36	1167.09	3114.30	1114.17	588.68
9150.01 SRM612-12	10506.90	6224.63	1398.49	10008.50	10190.94	25723.15	12589.79	8228.57
56220.68 SRM610-12	70079.99	39506.94	6162.55	33603.79	55740.95	165059.73	71981.69	40192.63
496.12 AP1-12	1067.73	752.52	386.64	4499.71	782.24	3268.70	880.16	467.16
1568.25 AP2-12	30579.69	18190.06	2907.58	16554.29	1444.81	4263.70	838.20	552.36
8625.41 AP3-12	364914.53	196627.86	23694.77	134395.03	5352.43	9565.29	967.85	1432.73
13305.27 AP4-12	585430.31	314059.25	35856.20	210319.31	7759.88	12685.79	987.61	1724.81
625.96 blank-12	666.40	527.40	273.80	4421.98	697.68	2020.13	718.00	333.36
497.96 blank average	1018.47	713.12	404.20	3797.42	816.50	1876.85	664.16	388.22
blank subtraction								
370.88 SRM614-11	420.70	206.44	314.88	2023.49	483.34	1360.57	537.64	348.46
11133.94 SRM612-11	20372.05	11681.87	2093.89	9403.21	9941.52	32260.34	13403.68	7708.62
70769.76 SRM610-11	82468.96	45700.34	6948.64	33418.83	57189.50	210703.74	79883.73	36822.11
267.00 AP1-11	19380.81	11139.30	1652.29	7064.88	402.70	5788.03	178.72	238.94
2192.89 AP2-11	74562.88	42616.64	6222.20	29041.97	1319.83	8305.69	261.68	401.54
17865.06 AP3-11	772758.59	413236.66	46591.18	269601.11	8733.43	17038.98	392.72	1870.19

Appendix A. Raw trace element datasheets from laser ablation.

13942.16 AP4-11	579296.28	311381.85	35995.68	204761.36	6965.62	14184.64	279.68	1387.35
627.48 W1-1	95781.44	55539.19	8518.17	40948.83	1296.79	34277.11	104.48	159.62
402.96 W1-2	75249.25	42678.24	6623.64	31949.34	911.59	24161.54	50.88	68.26
789.52 W1-3	54061.84	31535.06	4866.59	23488.69	660.34	18976.19	44.92	38.98
1295.57 W1-4	122589.34	70160.99	11187.70	54075.82	1738.51	58596.21	188.24	242.74
814.40 W1-5	122361.66	69031.91	10920.58	53422.70	1580.35	53734.58	169.20	169.38
495.20 W1-6	93684.63	54086.99	8951.49	42089.96	1212.79	49159.56	146.36	170.82
1573.21 W1-7	292120.16	160052.15	22271.08	115133.97	3465.12	70973.28	299.48	235.66
775.28 W1-8	261397.94	143088.85	20261.67	103564.63	3032.40	66424.38	269.44	115.62
1116.17 W1-9	263085.91	144786.30	20323.19	104455.63	3128.08	65442.41	196.92	125.02
1419.17 W1-10	220555.42	121883.41	17903.70	90025.55	2831.72	70130.12	273.56	184.26
882.65 W1-11	225168.25	124153.02	18216.14	91256.56	2738.56	69312.75	270.68	175.98
1009.41 W1-12	225688.05	124816.87	18237.26	91621.03	2778.60	68060.14	258.52	211.90
1084.69 W1-13	136457.66	77294.60	11937.95	58387.37	1888.75	50801.73	211.64	187.90
747.96 W1-14	111988.41	63875.00	10277.98	48595.47	1614.39	48518.23	223.76	117.06
674.64 W1-15	132677.44	75216.38	11679.91	56529.24	1741.51	50402.04	295.92	121.70
1184.57 W1-16	90595.81	51672.53	8358.93	39505.66	1353.39	36925.01	164.36	111.74
745.32 W1-17	92616.42	52991.18	8361.89	40144.03	1296.95	35054.96	180.52	98.82
579.60 W1-18	100544.70	57216.72	8543.93	43217.52	1341.47	33095.07	128.20	81.46
321.40 SRM614-12	266.62	150.88	54.00	2441.93	350.58	1237.45	450.00	200.46
8652.05 SRM612-12	9488.43	5511.51	994.29	6211.07	9374.43	23846.29	11925.63	7840.34
55722.71 SRM610-12	69061.53	38793.82	5758.35	29806.37	54924.45	163182.88	71317.52	39804.40
-1.84 AP1-12	49.26	39.40	-17.56	702.28	-34.26	1391.85	216.00	78.94
1070.29 AP2-12	29561.23	17476.94	2503.37	12756.87	628.30	2386.85	174.04	164.14
8127.45 AP3-12	363896.06	195914.74	23290.57	130597.61	4535.93	7688.44	303.68	1044.51
12807.31 AP4-12	584411.84	313346.13	35452.00	206521.89	6943.38	10808.94	323.44	1336.59

zero correction								
370.88 SRM614-11	420.70	206.44	314.88	2023.49	483.34	1360.57	537.64	348.46
11133.94 SRM612-11	20372.05	11681.87	2093.89	9403.21	9941.52	32260.34	13403.68	7708.62
70769.76 SRM610-11	82468.96	45700.34	6948.64	33418.83	57189.50	210703.74	79883.73	36822.11
267.00 AP1-11	19380.81	11139.30	1652.29	7064.88	402.70	5788.03	178.72	238.94
2192.89 AP2-11	74562.88	42616.64	6222.20	29041.97	1319.83	8305.69	261.68	401.54
17865.06 AP3-11	772758.59	413236.66	46591.18	269601.11	8733.43	17038.98	392.72	1870.19
13942.16 AP4-11	579296.28	311381.85	35995.68	204761.36	6965.62	14184.64	279.68	1387.35
627.48 W1-1	95781.44	55539.19	8518.17	40948.83	1296.79	34277.11	104.48	159.62
402.96 W1-2	75249.25	42678.24	6623.64	31949.34	911.59	24161.54	50.88	68.26
789.52 W1-3	54061.84	31535.06	4866.59	23488.69	660.34	18976.19	44.92	38.98
1295.57 W1-4	122589.34	70160.99	11187.70	54075.82	1738.51	58596.21	188.24	242.74
814.40 W1-5	122361.66	69031.91	10920.58	53422.70	1580.35	53734.58	169.20	169.38
495.20 W1-6	93684.63	54086.99	8951.49	42089.96	1212.79	49159.56	146.36	170.82
1573.21 W1-7	292120.16	160052.15	22271.08	115133.97	3465.12	70973.28	299.48	235.66
775.28 W1-8	261397.94	143088.85	20261.67	103564.63	3032.40	66424.38	269.44	115.62
1116.17 W1-9	263085.91	144786.30	20323.19	104455.63	3128.08	65442.41	196.92	125.02
1419.17 W1-10	220555.42	121883.41	17903.70	90025.55	2831.72	70130.12	273.56	184.26
882.65 W1-11	225168.25	124153.02	18216.14	91256.56	2738.56	69312.75	270.68	175.98
1009.41 W1-12	225688.05	124816.87	18237.26	91621.03	2778.60	68060.14	258.52	211.90
1084.69 W1-13	136457.66	77294.60	11937.95	58387.37	1888.75	50801.73	211.64	187.90
747.96 W1-14	111988.41	63875.00	10277.98	48595.47	1614.39	48518.23	223.76	117.06
674.64 W1-15	132677.44	75216.38	11679.91	56529.24	1741.51	50402.04	295.92	121.70
1184.57 W1-16	90595.81	51672.53	8358.93	39505.66	1353.39	36925.01	164.36	111.74
745.32 W1-17	92616.42	52991.18	8361.89	40144.03	1296.95	35054.96	180.52	98.82
579.60 W1-18	100544.70	57216.72	8543.93	43217.52	1341.47	33095.07	128.20	81.46
321.40 SRM614-12	266.62	150.88	54.00	2441.93	350.58	1237.45	450.00	200.46
8652.05 SRM612-12	9488.43	5511.51	994.29	6211.07	9374.43	23846.29	11925.63	7840.34
55722.71 SRM610-12	69061.53	38793.82	5758.35	29806.37	54924.45	163182.88	71317.52	39804.40
0.00 AP1-12	49.26	39.40	0.00	702.28	0.00	1391.85	216.00	78.94
1070.29 AP2-12	29561.23	17476.94	2503.37	12756.87	628.30	2386.85	174.04	164.14
8127.45 AP3-12	363896.06	195914.74	23290.57	130597.61	4535.93	7688.44	303.68	1044.51
12807.31 AP4-12	584411.84	313346.13	35452.00	206521.89	6943.38	10808.94	323.44	1336.59

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
0.000106 SRM614-11	0.000120	0.000059	0.000090	0.000579	0.000138	0.000389	0.000154	0.000100
0.003628 SRM612-11	0.006638	0.003806	0.000682	0.003064	0.003239	0.010511	0.004367	0.002512
0.053242 SRM610-11	0.062043	0.034381	0.005228	0.025142	0.043025	0.158517	0.060098	0.027702
0.000015 AP1-11	0.001055	0.000606	0.000090	0.000385	0.000022	0.000315	0.000010	0.000013
0.000125 AP2-11	0.004244	0.002425	0.000354	0.001653	0.000075	0.000473	0.000015	0.000023
0.000967 AP3-11	0.041839	0.022374	0.002523	0.014597	0.000473	0.000923	0.000021	0.000101
0.000859 AP4-11	0.035692	0.019185	0.002218	0.012616	0.000429	0.000874	0.000017	0.000085
0.000048 W1-1	0.007393	0.004287	0.000657	0.003160	0.000100	0.002646	0.000008	0.000012
0.000039 W1-2	0.007332	0.004158	0.000645	0.003113	0.000089	0.002354	0.000005	0.000007
0.000093 W1-3	0.006384	0.003724	0.000575	0.002774	0.000078	0.002241	0.000005	0.000005
0.000071 W1-4	0.006714	0.003843	0.000613	0.002962	0.000095	0.003209	0.000010	0.000013
0.000049 W1-5	0.007369	0.004158	0.000658	0.003217	0.000095	0.003236	0.000010	0.000010
0.000029 W1-6	0.005557	0.003208	0.000531	0.002497	0.000072	0.002916	0.000009	0.000010
0.000085 W1-7	0.015795	0.008654	0.001204	0.006225	0.000187	0.003838	0.000016	0.000013
0.000045 W1-8	0.015185	0.008312	0.001177	0.006016	0.000176	0.003859	0.000016	0.000007
0.000064 W1-9	0.015068	0.008292	0.001164	0.005982	0.000179	0.003748	0.000011	0.000007
0.000069 W1-10	0.010695	0.005910	0.000868	0.004365	0.000137	0.003401	0.000013	0.000009
0.000042 W1-11	0.010791	0.005950	0.000873	0.004373	0.000131	0.003322	0.000013	0.000008
0.000052 W1-12	0.011615	0.006424	0.000939	0.004715	0.000143	0.003503	0.000013	0.000011
0.000058 W1-13	0.007271	0.004119	0.000636	0.003111	0.000101	0.002707	0.000011	0.000010
0.000038 W1-14	0.005750	0.003280	0.000528	0.002495	0.000083	0.002491	0.000011	0.000006
0.000036 W1-15	0.007032	0.003987	0.000619	0.002996	0.000092	0.002671	0.000016	0.000006
0.000086 W1-16	0.006557	0.003740	0.000605	0.002859	0.000098	0.002672	0.000012	0.000008
0.000054 W1-17	0.006704	0.003836	0.000605	0.002906	0.000094	0.002538	0.000013	0.000007
0.000043 W1-18	0.007480	0.004257	0.000636	0.003215	0.000100	0.002462	0.000010	0.000006
0.000140 SRM614-12	0.000116	0.000066	0.000023	0.001060	0.000152	0.000537	0.000195	0.000087
0.003927 SRM612-12	0.004307	0.002502	0.000451	0.002819	0.004255	0.010823	0.005413	0.003559
0.056748 SRM610-12	0.070332	0.039508	0.005864	0.030355	0.055935	0.166185	0.072630	0.040537
0.000000 AP1-12	0.000004	0.000003	0.000000	0.000054	0.000000	0.000107	0.000017	0.000006
0.000088 AP2-12	0.002420	0.001431	0.000205	0.001044	0.000051	0.000195	0.000014	0.000013
0.000623 AP3-12	0.027872	0.015006	0.001784	0.010003	0.000347	0.000589	0.000023	0.000080
0.000939 AP4-12	0.042831	0.022965	0.002598	0.015136	0.000509	0.000792	0.000024	0.000098
standardize signal averages AP								
0.000007 AP1	0.000529	0.000305	0.000045	0.000219	0.000011	0.000211	0.000013	0.000010
0.000106 AP2	0.003332	0.001928	0.000280	0.001349	0.000063	0.000334	0.000015	0.000018
0.000795 AP3	0.034855	0.018690	0.002153	0.012300	0.000410	0.000756	0.000022	0.000091
0.000899 AP4	0.039262	0.021075	0.002408	0.013876	0.000469	0.000833	0.000020	0.000092
linest from std sig ave								
0.029830	0.015062	0.028948	0.252249	0.043982	1.310564	0.004735	0.000000	0.040435
standardize signal averages SRM								
0.000123 srm614-2	0.000118	0.000062	0.000057	0.000820	0.000145	0.000463	0.000175	0.000093
0.003777 srm612-2	0.005472	0.003154	0.000567	0.002941	0.003747	0.010667	0.004890	0.003035
0.054995 srm610-2	0.066188	0.036944	0.005546	0.027748	0.049480	0.162351	0.066364	0.034119
linest from std sig ave								
0.000000	0.080388	0.000000	0.000000	0.000000	0.000000	0.031499	0.074941	0.108742
concentration data								
0.27 SRM614-11	0.16	0.15	1.95	2.18	15.55	0.16	0.00	0.35
9.28 SRM612-11	8.57	9.45	14.76	11.56	364.07	4.27	0.00	8.71
136.21 SRM610-11	80.15	85.36	113.09	94.84	4835.91	64.38	0.00	96.07
0.17 AP1-11	6.34	7.00	9.05	6.75	11.46	0.60	0.00	0.21
1.49 AP2-11	25.50	28.01	35.64	29.00	39.27	0.89	0.00	0.37
11.51 AP3-11	251.40	258.38	253.85	256.12	247.22	1.74	0.00	1.63
10.22 AP4-11	214.47	221.55	223.18	221.36	224.38	1.65	0.00	1.38
0.58 W1-1	44.42	49.50	66.16	55.45	52.33	5.00	0.00	0.20
0.47 W1-2	44.06	48.02	64.95	54.62	46.44	4.45	0.00	0.11
1.11 W1-3	38.36	43.01	57.83	48.67	40.77	4.23	0.00	0.07
0.84 W1-4	40.34	44.38	61.66	51.97	49.78	6.06	0.00	0.21
0.58 W1-5	44.28	48.01	66.19	56.45	49.76	6.11	0.00	0.16
0.35 W1-6	33.39	37.05	53.44	43.81	37.61	5.51	0.00	0.16
1.01 W1-7	94.91	99.94	121.18	109.23	97.96	7.25	0.00	0.21
0.54 W1-8	91.24	95.99	118.44	105.56	92.10	7.29	0.00	0.11
0.76 W1-9	90.54	95.76	117.13	104.97	93.67	7.08	0.00	0.12
0.82 W1-10	64.26	68.25	87.36	76.60	71.79	6.42	0.00	0.14
0.50 W1-11	64.84	68.71	87.85	76.73	68.62	6.28	0.00	0.14
0.62 W1-12	69.79	74.18	94.45	82.74	74.77	6.62	0.00	0.18
0.69 W1-13	43.69	47.56	64.01	54.59	52.62	5.11	0.00	0.16
0.46 W1-14	34.55	37.87	53.11	43.78	43.34	4.71	0.00	0.10
0.43 W1-15	42.26	46.04	62.30	52.57	48.26	5.05	0.00	0.10
1.02 W1-16	39.40	43.19	60.88	50.17	51.21	5.05	0.00	0.13
0.64 W1-17	40.29	44.30	60.91	50.99	49.09	4.79	0.00	0.12
0.51 W1-18	44.95	49.16	63.97	56.42	52.18	4.65	0.00	0.10

Appendix A. Raw trace element datasheets from laser ablation.

0.36 SRM614-12	0.15	0.16	0.51	4.00	17.11	0.22	0.00	0.30
10.05 SRM612-12	5.56	6.21	9.76	10.63	478.23	4.40	0.00	12.34
145.18 SRM610-12	90.85	98.08	126.87	114.50	6286.98	67.49	0.00	140.58
0.00 AP1-12	0.02	0.03	0.00	0.94	0.00	0.20	0.00	0.10
1.04 AP2-12	14.54	16.52	20.62	18.32	26.89	0.37	0.00	0.22
7.41 AP3-12	167.48	173.29	179.51	175.51	181.64	1.11	0.00	1.29
11.17 AP4-12	257.37	265.21	261.47	265.57	266.06	1.50	0.00	1.58

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
455.24 blank-9	289.96	332.68	501.00	3773.02	1061.89	1685.01	647.84	458.96
897.61 SRM614-9	1234.73	794.48	723.24	5664.43	1222.21	2825.86	1072.85	672.32
12622.71 SRM612-9	13305.11	7927.32	1827.01	10758.74	10924.82	34093.87	14779.00	8197.97
68187.34 SRM610-9	68516.83	37764.13	6421.96	31442.90	53899.63	205820.52	74324.18	33298.95
564.28 AP1-9	5551.83	3261.18	865.08	4806.99	960.25	4612.27	941.85	605.48
2681.74 AP2-9	62403.59	36230.13	5590.95	27819.72	1813.25	6647.12	917.61	724.92
14040.40 AP3-9	504906.63	272295.13	33230.35	183377.47	6937.16	13790.76	928.77	1751.85
18487.58 AP4-9	712343.94	384467.28	44006.09	255827.03	9208.09	17950.78	1075.69	2000.49
1801.81 T2-1	151557.86	85564.60	14484.86	69883.88	2757.58	83206.35	774.00	555.44
1042.53 T2-2	205769.28	115214.89	18019.14	89705.51	3226.58	81150.86	783.84	560.76
1178.13 T2-3	189419.94	105678.76	16242.93	82012.78	3075.94	67560.26	788.36	500.04
1651.73 T2-4	200347.05	110805.51	17252.86	86371.88	3276.26	79359.05	863.92	572.48
1545.05 T2-5	172776.25	96432.58	14995.21	74993.06	2892.50	66018.61	866.16	557.80
1718.17 T2-6	168209.66	93719.00	14241.96	72575.84	2810.82	58755.97	867.60	553.76
1288.77 T2-7	166422.17	93474.52	14392.56	71631.13	2942.90	48015.79	906.81	533.00
1469.41 T2-8	178060.77	99921.77	14977.32	76420.43	3009.10	54034.66	808.00	519.20
1254.21 T2-9	184297.41	103681.27	15234.05	77546.56	2951.74	45143.77	870.92	494.28
1721.97 T2-10	67403.70	38844.78	5896.59	30003.41	1547.73	7917.92	739.80	376.52
1591.13 T2-11	79404.16	45633.10	6669.96	34316.88	1711.25	8109.09	758.00	399.12
957.85 T2-12	79047.81	45000.73	6655.56	34821.96	1732.41	8321.25	747.04	433.48
2551.01 T2-13	105545.35	59710.22	8499.29	44722.37	2067.93	6633.40	793.12	411.60
2274.25 T2-14	116585.02	66192.09	9173.53	48855.27	2202.53	6599.12	789.96	435.96
2267.01 T2-15	132777.22	74621.50	10648.10	54967.99	2384.93	7129.80	766.72	420.28
3645.70 T2-16	173779.34	97361.83	13280.27	69464.27	2974.58	7627.80	844.40	419.72
3410.90 T2-17	202587.66	112691.55	15000.60	80265.85	3217.42	7577.92	874.24	447.60
4544.35 T2-18	226354.03	125259.55	16492.97	88662.14	3400.86	8030.37	881.04	488.84
767.56 SRM614-10	1072.61	747.72	385.52	5449.55	1005.93	2758.10	1016.25	531.60
9321.53 SRM612-10	10081.18	6068.51	1288.93	9759.34	9594.77	25149.78	12304.83	8158.73
59580.54 SRM610-10	70476.08	39852.75	6156.03	33096.34	57174.00	172594.41	74503.30	39300.86
534.32 AP1-10	884.12	629.96	346.24	4244.94	823.52	3125.78	867.00	479.96
1859.65 AP2-10	37851.17	22139.76	3480.38	19417.43	1526.37	4582.51	884.89	565.00
9757.62 AP3-10	366537.34	198697.77	24072.26	135753.09	5654.47	10107.90	974.21	1346.89
13817.56 AP4-10	597829.56	320160.88	36762.41	215713.81	8032.77	13713.00	1007.25	1789.57
720.28 blank-10	590.76	425.96	209.20	3874.90	710.76	1850.65	722.12	323.56
587.76 blank average	440.36	379.32	355.10	3823.96	886.32	1767.83	684.98	391.26

blank subtraction								
309.84 SRM614-9	794.36	415.16	368.14	1840.47	335.88	1058.03	387.86	281.06
12034.95 SRM612-9	12864.75	7548.00	1471.91	6934.78	10038.50	32326.04	14094.02	7806.70
67599.58 SRM610-9	68076.47	37384.81	6066.85	27618.93	53013.30	204052.69	73639.20	32907.69
-23.48 AP1-9	5111.47	2881.86	509.98	983.03	73.92	2844.44	256.86	214.22
2093.97 AP2-9	61963.23	35850.80	5235.85	23995.76	926.93	4879.29	232.62	333.66
13452.64 AP3-9	504466.27	271915.81	32875.25	179553.51	6050.83	12022.93	243.78	1360.59
17899.82 AP4-9	711903.58	384087.96	43650.99	252003.07	8321.77	16182.95	390.70	1609.23
1214.05 T2-1	151117.50	85185.28	14129.58	66059.91	1871.25	81438.52	89.02	164.18
454.76 T2-2	205328.92	114835.57	17664.04	85881.55	2340.25	79383.03	98.86	169.50
590.36 T2-3	188979.58	105299.44	15887.83	78188.82	2189.61	65792.43	103.38	108.78
1063.97 T2-4	199906.69	110426.19	16897.75	82547.92	2389.93	77591.22	178.94	181.22
957.29 T2-5	172335.89	96053.26	14640.10	71169.10	2006.17	64250.78	181.18	166.54
1130.41 T2-6	167769.30	93339.68	13886.86	68751.88	1924.49	56988.14	182.62	162.50
701.00 T2-7	165981.81	93095.20	14037.46	67807.16	2056.57	46247.96	221.82	141.74
881.64 T2-8	177620.41	99542.44	14622.22	72596.47	2122.77	52266.83	123.02	127.94
666.44 T2-9	183857.05	103301.95	14878.94	73722.59	2065.41	43375.94	185.94	103.02
1134.21 T2-10	66963.34	38465.45	5541.49	26179.45	661.40	6150.09	54.82	-14.74
1003.37 T2-11	78963.80	45253.78	6314.86	30492.91	824.92	6341.26	73.02	7.86
370.08 T2-12	78607.44	44621.41	6300.46	30998.00	846.08	6553.42	62.06	42.22
1963.25 T2-13	105104.99	59330.89	8144.19	40898.41	1181.61	4865.57	108.14	20.34
1866.49 T2-14	116144.66	65812.77	8818.43	45031.31	1316.21	4831.29	104.98	44.70
1679.25 T2-15	132336.86	74242.18	10293.00	51144.03	1498.61	5361.97	81.74	29.02

Appendix A. Raw trace element datasheets from laser ablation.

3057.94 T2-16	173338.98	96982.51	12925.17	65640.31	2088.25	5859.97	159.42	28.46
2823.14 T2-17	202147.30	112312.23	14645.50	76441.89	2331.09	5810.09	189.26	56.34
3956.58 T2-18	225913.67	124880.23	16137.87	84838.18	2514.53	6262.54	196.06	97.58
179.80 SRM614-10	632.24	368.40	30.42	1625.59	119.60	990.27	331.26	140.34
8733.77 SRM612-10	9640.81	5689.19	933.83	5935.37	8708.45	23381.95	11619.85	7767.46
58992.77 SRM610-10	70035.72	39473.42	5800.93	29272.38	56287.68	170826.58	73818.31	38909.60
-53.44 AP1-10	443.76	250.64	-8.86	420.98	-62.80	1357.95	182.02	88.70
1271.89 AP2-10	37410.81	21760.44	3125.28	15593.47	640.04	2814.68	199.90	173.74
9169.85 AP3-10	366096.98	198318.45	23717.15	131929.13	4768.15	8340.07	289.22	955.63
13229.79 AP4-10	597389.20	319781.56	36407.30	211889.85	7146.44	11945.17	322.26	1398.31

zero correction								
309.84 SRM614-9	794.36	415.16	368.14	1840.47	335.88	1058.03	387.86	281.06
12034.95 SRM612-9	12864.75	7548.00	1471.91	6934.78	10038.50	32326.04	14094.02	7806.70
67599.58 SRM610-9	68076.47	37384.81	6066.85	27618.93	53013.30	204052.69	73639.20	32907.69
0.00 AP1-9	5111.47	2881.86	509.98	983.03	73.92	2844.44	256.86	214.22
2093.97 AP2-9	61963.23	35850.80	5235.85	23995.76	926.93	4879.29	232.62	333.66
13452.64 AP3-9	504466.27	271915.81	32875.25	179553.51	6050.83	12022.93	243.78	1360.59
17899.82 AP4-9	711903.58	384087.96	43650.99	252003.07	8321.77	16182.95	390.70	1609.23
1214.05 T2-1	151117.50	85185.28	14129.58	66059.91	1871.25	81438.52	89.02	164.18
454.76 T2-2	205328.92	114835.57	17664.04	85881.55	2340.25	79383.03	98.86	169.50
590.36 T2-3	188979.58	105299.44	15887.83	78188.82	2189.61	65792.43	103.38	108.78
1063.97 T2-4	199906.69	110426.19	16897.75	82547.92	2389.93	77591.22	178.94	181.22
957.29 T2-5	172335.89	96053.26	14640.10	71169.10	2006.17	64250.78	181.18	166.54
1130.41 T2-6	167769.30	93339.68	13886.86	68751.88	1924.49	56988.14	182.62	162.50
701.00 T2-7	165981.81	93095.20	14037.46	67807.16	2056.57	46247.96	221.82	141.74
881.64 T2-8	177620.41	99542.44	14622.22	72596.47	2122.77	52266.83	123.02	127.94
666.44 T2-9	183857.05	103301.95	14878.94	73722.59	2065.41	43375.94	185.94	103.02
1134.21 T2-10	66963.34	38465.45	5541.49	26179.45	661.40	6150.09	54.82	0.00
1003.37 T2-11	78963.80	45253.78	6314.86	30492.91	824.92	6341.26	73.02	7.86
370.08 T2-12	78607.44	44621.41	6300.46	30998.00	846.08	6553.42	62.06	42.22
1963.25 T2-13	105104.99	59330.89	8144.19	40898.41	1181.61	4865.57	108.14	20.34
1686.49 T2-14	116144.66	65812.77	8818.43	45031.31	1316.21	4831.29	104.98	44.70
1679.25 T2-15	132336.86	74242.18	10293.00	51144.03	1498.61	5361.97	81.74	29.02
3057.94 T2-16	173338.98	96982.51	12925.17	65640.31	2088.25	5859.97	159.42	28.46
2823.14 T2-17	202147.30	112312.23	14645.50	76441.89	2331.09	5810.09	189.26	56.34
3956.58 T2-18	225913.67	124880.23	16137.87	84838.18	2514.53	6262.54	196.06	97.58
179.80 SRM614-10	632.24	368.40	30.42	1625.59	119.60	990.27	331.26	140.34
8733.77 SRM612-10	9640.81	5689.19	933.83	5935.37	8708.45	23381.95	11619.85	7767.46
58992.77 SRM610-10	70035.72	39473.42	5800.93	29272.38	56287.68	170826.58	73818.31	38909.60
0.00 AP1-10	443.76	250.64	0.00	420.98	0.00	1357.95	182.02	88.70
1271.89 AP2-10	37410.81	21760.44	3125.28	15593.47	640.04	2814.68	199.90	173.74
9169.85 AP3-10	366096.98	198318.45	23717.15	131929.13	4768.15	8340.07	289.22	955.63
13229.79 AP4-10	597389.20	319781.56	36407.30	211889.85	7146.44	11945.17	322.26	1398.31

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000115 SRM614-9	0.000296	0.000155	0.000137	0.000686	0.000125	0.000394	0.000144	0.000105
0.003978 SRM612-9	0.004252	0.002495	0.000486	0.002292	0.003318	0.010684	0.004658	0.002580
0.050914 SRM610-9	0.051274	0.028157	0.004569	0.020802	0.039928	0.153688	0.055463	0.024785
0.000000 AP1-9	0.000279	0.000157	0.000028	0.000054	0.000004	0.000155	0.000014	0.000012
0.000113 AP2-9	0.003335	0.001930	0.000282	0.001292	0.000050	0.000263	0.000013	0.000018
0.000729 AP3-9	0.027344	0.014739	0.001782	0.009732	0.000328	0.000652	0.000013	0.000074
0.000965 AP4-9	0.038378	0.020706	0.002353	0.013585	0.000449	0.000872	0.000021	0.000087
0.000055 T2-1	0.006838	0.003854	0.000639	0.002989	0.000085	0.003685	0.000004	0.000007
0.000023 T2-2	0.010560	0.005906	0.000908	0.004417	0.000120	0.004083	0.000005	0.000009
0.000036 T2-3	0.011601	0.006464	0.000975	0.004800	0.000134	0.004039	0.000006	0.000007
0.000060 T2-4	0.011270	0.006225	0.000953	0.004654	0.000135	0.004374	0.000010	0.000010
0.000060 T2-5	0.010849	0.006047	0.000922	0.004480	0.000126	0.004045	0.000011	0.000010
0.000080 T2-6	0.011911	0.006627	0.000986	0.004881	0.000137	0.004046	0.000013	0.000012
0.000043 T2-7	0.010114	0.005673	0.000855	0.004132	0.000125	0.002818	0.000014	0.000009

Appendix A. Raw trace element datasheets from laser ablation.

0.000052 T2-8	0.010552	0.005914	0.000869	0.004313	0.000126	0.003105	0.000007	0.000008
0.000041 T2-9	0.011322	0.006361	0.000916	0.004540	0.000127	0.002671	0.000011	0.000006
0.000151 T2-10	0.008897	0.005111	0.000736	0.003478	0.000088	0.000817	0.000007	0.000000
0.000117 T2-11	0.009195	0.005270	0.000735	0.003551	0.000096	0.000738	0.000009	0.000001
0.000040 T2-12	0.008530	0.004842	0.000684	0.003364	0.000092	0.000711	0.000007	0.000005
0.000198 T2-13	0.010581	0.005973	0.000820	0.004117	0.000119	0.000490	0.000011	0.000002
0.000157 T2-14	0.010814	0.006128	0.000821	0.004193	0.000123	0.000450	0.000010	0.000004
0.000147 T2-15	0.011546	0.006477	0.000898	0.004462	0.000131	0.000468	0.000007	0.000003
0.000214 T2-16	0.012148	0.006797	0.000906	0.004600	0.000146	0.000411	0.000011	0.000002
0.000179 T2-17	0.012851	0.007140	0.000931	0.004860	0.000148	0.000369	0.000012	0.000004
0.000232 T2-18	0.013265	0.007333	0.000948	0.004981	0.000148	0.000368	0.000012	0.000006
0.000096 SRM614-10	0.000339	0.000197	0.000016	0.000871	0.000064	0.000531	0.000178	0.000075
0.004108 SRM612-10	0.004535	0.002676	0.000439	0.002792	0.004096	0.010998	0.005466	0.003654
0.057164 SRM610-10	0.067865	0.038250	0.005621	0.028365	0.054543	0.165532	0.071530	0.037704
0.000000 AP1-10	0.000032	0.000018	0.000000	0.000031	0.000000	0.000098	0.000013	0.000006
0.000089 AP2-10	0.002623	0.001526	0.000219	0.001093	0.000045	0.000197	0.000014	0.000012
0.000656 AP3-10	0.026206	0.014196	0.001698	0.009444	0.000341	0.000597	0.000021	0.000068
0.000940 AP4-10	0.042435	0.022715	0.002586	0.015051	0.000508	0.000849	0.000023	0.000099
standardize signal averages AP								
0.000000 AP1	0.000156	0.000088	0.000014	0.000042	0.000002	0.000127	0.000014	0.000009
0.000101 AP2	0.002979	0.001728	0.000250	0.001192	0.000047	0.000230	0.000013	0.000015
0.000693 AP3	0.026775	0.014467	0.001740	0.009588	0.000335	0.000624	0.000017	0.000071
0.000952 AP4	0.040407	0.021711	0.002470	0.014318	0.000478	0.000860	0.000022	0.000093
linest from std sig ave								
0.030917	0.016677	0.031921	0.275067	0.048324	1.424330	0.005181	0.000000	0.045589
standardize signal averages SRM								
0.000106 srm614-2	0.000317	0.000176	0.000077	0.000778	0.000095	0.000462	0.000161	0.000090
0.004043 srm612-2	0.004393	0.002585	0.000463	0.002542	0.003707	0.010841	0.005062	0.003117
0.054039 srm610-2	0.059569	0.033204	0.005095	0.024583	0.047236	0.159610	0.063497	0.031244
linest from std sig ave								
0.000000	0.089377	0.000000	0.000000	0.000000	0.000000	0.032037	0.078291	0.118658
concentration data								
0.31 SRM614-9	0.42	0.42	3.23	2.84	15.28	0.18	0.00	0.41
10.55 SRM612-9	6.08	6.83	11.48	9.50	405.28	4.75	0.00	10.09
135.00 SRM610-9	73.34	77.08	107.80	86.21	4877.45	68.29	0.00	96.91
0.00 AP1-9	1.86	2.00	3.05	1.03	2.29	0.32	0.00	0.21
1.39 AP2-9	22.19	24.57	30.93	24.90	28.35	0.54	0.00	0.33
8.99 AP3-9	181.92	187.69	195.54	187.62	186.36	1.35	0.00	1.34
11.90 AP4-9	255.33	263.68	258.23	261.90	254.91	1.80	0.00	1.58
0.68 T2-1	45.49	49.08	70.16	57.62	48.11	7.62	0.00	0.14
0.29 T2-2	70.26	75.21	99.69	85.15	68.39	8.44	0.00	0.16
0.45 T2-3	77.18	82.32	107.03	92.53	76.38	8.35	0.00	0.12
0.74 T2-4	74.98	79.27	104.53	89.71	76.56	9.04	0.00	0.19
0.74 T2-5	72.18	77.00	101.13	86.37	71.76	8.36	0.00	0.19
0.99 T2-6	79.24	84.39	108.19	94.10	77.63	8.36	0.00	0.21
0.53 T2-7	67.29	72.24	93.86	79.65	71.21	5.82	0.00	0.16
0.65 T2-8	70.21	75.31	95.33	83.15	71.66	6.42	0.00	0.14
0.51 T2-9	75.32	81.01	100.54	87.52	72.27	5.52	0.00	0.12
1.86 T2-10	59.19	65.08	80.80	67.06	49.93	1.69	0.00	0.00
1.44 T2-11	61.17	67.10	80.69	68.45	54.58	1.53	0.00	0.02
0.50 T2-12	56.75	61.66	75.03	64.85	52.17	1.47	0.00	0.08
2.44 T2-13	70.40	76.06	89.97	79.38	67.59	1.01	0.00	0.04
1.94 T2-14	71.95	78.03	90.10	80.83	69.63	0.93	0.00	0.08
1.81 T2-15	76.81	82.48	98.54	86.02	74.29	0.97	0.00	0.05
2.64 T2-16	80.82	86.55	99.40	88.68	83.16	0.85	0.00	0.04
2.21 T2-17	85.50	90.93	102.17	93.69	84.21	0.76	0.00	0.07
2.87 T2-18	88.25	93.38	103.98	96.03	83.90	0.76	0.00	0.10
0.26 SRM614-10	0.48	0.54	0.38	3.61	7.83	0.24	0.00	0.29
10.89 SRM612-10	6.49	7.33	10.36	11.57	500.37	4.89	0.00	14.29
151.57 SRM610-10	97.06	104.71	132.61	117.56	6662.69	73.55	0.00	147.42
0.00 AP1-10	0.21	0.23	0.00	0.59	0.00	0.20	0.00	0.12
1.10 AP2-10	17.45	19.43	24.05	21.08	25.50	0.41	0.00	0.22
8.10 AP3-10	174.35	180.78	186.30	182.06	193.94	1.23	0.00	1.24
11.59 AP4-10	282.32	289.27	283.79	290.16	288.45	1.75	0.00	1.81
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
273.80 blank-1	265.08	227.88	291.12	1546.61	900.85	654.72	274.20	237.36
830.32 SRM614-1	1318.89	708.72	475.64	4836.67	942.81	2391.29	579.52	410.20
12051.75 SRM612-1	14209.20	8044.37	1770.21	10104.10	6701.20	31660.10	9361.41	6336.76
68678.66 SRM610-1	66718.22	36963.49	6383.72	30282.29	32767.94	199188.59	51778.89	27710.64
829.44 AP1-1	4447.35	2082.69	588.00	2985.62	695.84	2163.85	402.36	390.32
2535.61 AP2-1	54484.86	31376.26	4772.87	23246.33	1502.61	6101.75	460.12	616.84
29402.65 AP3-1	1280736.80	682644.94	73094.02	444414.22	12332.83	23980.62	627.28	2807.38
14749.84 AP4-1	497466.31	266515.91	32621.70	177474.92	6011.59	15996.89	571.32	1381.09
667.44 41LU1-REDO-1	35704.64	21273.52	3464.74	16180.33	1100.97	6905.72	432.60	2552.73
549.04 41LU1-REDO-2	47047.55	27135.91	4338.90	20418.80	1125.17	6839.32	430.96	3011.94
557.44 41LU1-REDO-3	53958.18	31246.78	5126.99	23205.81	1199.81	7058.28	450.68	3643.94
1041.85 41LU1-REDO-4	31624.54	18479.42	3029.58	14410.28	935.17	5482.15	436.84	3211.86
691.08 41LU1-REDO-5	39607.66	23442.01	3749.26	17949.10	963.21	8042.73	424.24	4536.83
523.32 41LU1-REDO-6	38152.77	22422.01	3581.38	17002.10	955.09	5769.07	483.28	3453.62
799.28 41LU1-REDO-7	24638.42	14757.12	2434.65	11740.23	836.04	5288.91	529.36	2755.78
1063.85 41LU1-REDO-8	32243.74	19051.39	3010.46	14335.96	835.16	5209.31	509.80	2892.86
1218.17 41LU1-REDO-9	28485.40	16795.54	2761.34	12963.19	814.64	4945.59	529.28	2984.82
1033.61 41LU1-REDO-10	29904.41	17595.18	3044.46	13764.44	822.08	6214.67	568.56	4251.02
1066.53 41LU1-REDO-11	33578.43	19448.67	3167.34	15092.49	938.69	5848.27	574.72	4099.10
903.01 41LU1-REDO-12	31514.46	18278.10	3052.38	14020.12	868.76	5176.83	580.44	3359.98
2203.89 41LU1-REDO-13	31831.54	18898.99	3040.14	14505.28	899.05	4600.79	505.56	3282.34
1317.97 41LU1-REDO-14	36442.41	21229.28	3418.18	16429.85	949.29	4927.19	501.40	3695.06
687.96 41LU1-REDO-15	34773.91	20716.16	3304.98	15817.89	917.21	5222.47	469.16	3594.42
877.36 SRM614-2	1331.61	764.00	438.28	4377.90	816.24	2546.65	928.17	471.84
11643.51 SRM612-2	12027.67	6785.88	1434.01	8740.01	8116.81	29541.45	11982.15	8097.65
71404.36 SRM610-2	85421.64	47715.59	7616.28	36876.57	46585.82	202584.58	69290.31	39395.22
509.88 AP1-2	1609.25	754.56	340.40	1829.21	483.28	2111.37	569.32	318.68
1927.41 AP2-2	43302.88	24878.22	3987.78	18721.31	1252.61	4867.43	654.40	479.32
18346.26 AP3-2	798403.31	423800.75	48223.99	277647.13	8884.69	16750.77	877.72	2025.69
12833.83 AP4-2	472605.75	253743.83	31085.06	168436.95	6072.23	14939.84	777.00	1315.69
484.96 blank-2	308.32	178.56	177.76	1314.49	417.88	903.41	474.56	227.64
379.38 blank average	286.70	203.22	234.44	1430.55	659.36	779.06	374.38	232.50
blank subtraction								
450.94 SRM614-1	1032.19	505.50	241.20	3406.12	283.44	1612.23	205.14	177.70
11672.37 SRM612-1	13922.50	7841.14	1535.77	8673.55	6041.83	30881.03	8987.03	6104.25
68299.28 SRM610-1	66431.52	36760.27	6149.27	28851.74	32108.58	198409.53	51404.51	27478.14
450.06 AP1-1	4160.64	1879.47	353.56	1555.07	36.48	1384.79	27.98	157.82
2156.23 AP2-1	54198.16	31173.04	4538.43	21815.78	843.24	5322.69	85.74	384.34
29023.26 AP3-1	1280450.10	682441.72	72859.57	442983.67	11673.47	23201.55	252.90	2574.87
14370.46 AP4-1	497179.61	266312.69	32387.26	176044.37	5352.23	15217.83	196.94	1148.59
288.06 41LU1-REDO-1	35417.94	21070.30	3230.30	14749.78	441.60	6126.65	58.22	2320.23
169.66 41LU1-REDO-2	46760.85	26932.69	4104.46	18988.25	465.80	6060.25	56.58	2779.44
178.06 41LU1-REDO-3	53671.48	31043.55	4892.55	21775.26	540.44	6279.22	76.30	3411.44
662.46 41LU1-REDO-4	31337.84	18276.20	2795.14	12979.73	275.80	4703.09	62.46	2979.36
311.70 41LU1-REDO-5	39320.96	23238.79	3514.82	16518.55	303.84	7263.66	49.86	4304.32
143.94 41LU1-REDO-6	37866.07	22218.78	3346.94	15571.55	295.72	4990.01	108.90	3221.12
419.90 41LU1-REDO-7	24351.72	14553.90	2200.21	10309.68	176.68	4509.85	154.98	2523.27
684.46 41LU1-REDO-8	31957.04	18848.17	2776.02	12905.41	175.80	4430.24	135.42	2660.35
838.78 41LU1-REDO-9	28198.70	16592.31	2526.89	11532.64	155.28	4166.52	154.90	2752.32
654.22 41LU1-REDO-10	29617.70	17391.96	2810.02	12333.89	162.72	5435.61	194.18	4018.52
687.14 41LU1-REDO-11	33291.73	19245.45	2932.90	13661.94	279.32	5069.21	200.34	3866.60
523.62 41LU1-REDO-12	31227.76	18074.88	2817.94	12589.57	209.40	4397.76	206.06	3127.48
1824.51 41LU1-REDO-13	31544.84	18695.76	2805.70	13074.73	239.68	3821.72	131.18	3049.84
938.59 41LU1-REDO-14	36155.70	21026.06	3183.74	14999.30	289.92	4148.12	127.02	3462.56
308.58 41LU1-REDO-15	34487.21	20512.93	3070.54	14387.34	257.84	4443.40	94.78	3361.92
497.98 SRM614-2	1044.91	560.78	203.84	2947.36	156.88	1767.59	553.78	239.34
11264.12 SRM612-2	11740.97	6582.66	1199.57	7309.46	7457.44	28762.38	11607.76	7865.14
71024.98 SRM610-2	85134.94	47512.37	7381.84	35446.02	45926.46	201805.52	68915.93	39162.72
130.50 AP1-2	1322.55	551.34	105.96	398.66	-176.08	1332.31	194.94	86.18
1548.03 AP2-2	43016.18	24675.00	3753.34	17290.76	593.24	4088.36	280.02	246.82
17966.88 AP3-2	798116.61	423597.53	47989.55	276216.58	8225.33	15971.71	503.34	1793.19
12454.45 AP4-2	472319.05	253540.61	30850.61	167006.40	5412.87	14160.78	402.62	1083.19
zero correction								
450.94 SRM614-1	1032.19	505.50	241.20	3406.12	283.44	1612.23	205.14	177.70
11672.37 SRM612-1	13922.50	7841.14	1535.77	8673.55	6041.83	30881.03	8987.03	6104.25
68299.28 SRM610-1	66431.52	36760.27	6149.27	28851.74	32108.58	198409.53	51404.51	27478.14
450.06 AP1-1	4160.64	1879.47	353.56	1555.07	36.48	1384.79	27.98	157.82
2156.23 AP2-1	54198.16	31173.04	4538.43	21815.78	843.24	5322.69	85.74	384.34
29023.26 AP3-1	1280450.10	682441.72	72859.57	442983.67	11673.47	23201.55	252.90	2574.87
14370.46 AP4-1	497179.61	266312.69	32387.26	176044.37	5352.23	15217.83	196.94	1148.59
288.06 41LU1-REDO-1	35417.94	21070.30	3230.30	14749.78	441.60	6126.65	58.22	2320.23
169.66 41LU1-REDO-2	46760.85	26932.69	4104.46	18988.25	465.80	6060.25	56.58	2779.44
178.06 41LU1-REDO-3	53671.48	31043.55	4892.55	21775.26	540.44	6279.22	76.30	3411.44

Appendix A. Raw trace element datasheets from laser ablation.

662.46	41LU1-REDO-4	31337.84	18276.20	2795.14	12979.73	275.80	4703.09	62.46	2979.36
311.70	41LU1-REDO-5	39320.96	23238.79	3514.82	16518.55	303.84	7263.66	49.86	4304.32
143.94	41LU1-REDO-6	37866.07	22218.78	3346.94	15571.55	295.72	4990.01	108.90	3221.12
419.90	41LU1-REDO-7	24351.72	14553.90	2200.21	10309.68	176.68	4509.85	154.98	2523.27
684.46	41LU1REDO-8	31957.04	18848.17	2776.02	12905.41	175.80	4430.24	135.42	2660.35
838.78	41LU1-REDO-9	28198.70	16592.31	2526.89	11532.64	155.28	4166.52	154.90	2752.32
654.22	41LU1REDO-10	29617.70	17391.96	2810.02	12333.89	162.72	5435.61	194.18	4018.52
687.14	41LU1-REDO-11	33291.73	19245.45	2932.90	13661.94	279.32	5069.21	200.34	3866.60
523.62	41LU1REDO-12	31227.76	18074.88	2817.94	12589.57	209.40	4397.76	206.06	3127.48
1824.51	41LU1-REDO-13	31544.84	18695.76	2805.70	13074.73	239.68	3821.72	131.18	3049.84
938.59	41LU1-REDO-14	36155.70	21026.06	3183.74	14999.30	289.92	4148.12	127.02	3462.56
308.58	41LU1-REDO-15	34487.21	20512.93	3070.54	14387.34	257.84	4443.40	94.78	3361.92
497.98	SRM614-2	1044.91	560.78	203.84	2947.36	156.88	1767.59	553.78	239.34
11264.12	SRM612-2	11740.97	6582.66	1199.57	7309.46	7457.44	28762.38	11607.76	7865.14
71024.98	SRM610-2	85134.94	47512.37	7381.84	35446.02	45926.46	201805.52	68915.93	39162.72
130.50	AP1-2	1322.55	551.34	105.96	398.66	0.00	1332.31	194.94	86.18
1548.03	AP2-2	43016.18	24675.00	3753.34	17290.76	593.24	4088.36	280.02	246.82
17966.88	AP3-2	798116.61	423597.53	47989.55	276216.58	8225.33	15971.71	503.34	1793.19
12454.45	AP4-2	472319.05	253540.61	30850.61	167006.40	5412.87	14160.78	402.62	1083.19

certified concentration									
SRM614	1.90					1.12			
SRM612	37.92					36.24	34.64	37.33	
SRM610	456.30					438.10	426.30	317.40	
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07	
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38	
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09	
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84	

standardized concentration									
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000	
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435	
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701	
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001	
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003	
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005	

standardized signal									
0.000140 SRM614-1	0.000321	0.000157	0.000075	0.001061	0.000088	0.000502	0.000064	0.000055	
0.003935 SRM612-1	0.004693	0.002643	0.000518	0.002924	0.002037	0.010410	0.003030	0.002058	
0.047507 SRM610-1	0.046207	0.025569	0.004277	0.020068	0.022334	0.138007	0.035755	0.019113	
0.000049 AP1-1	0.000457	0.000206	0.000039	0.000171	0.000004	0.000152	0.000003	0.000017	
0.000142 AP2-1	0.003564	0.002050	0.000298	0.001435	0.000055	0.000350	0.000006	0.000025	
0.001324 AP3-1	0.058405	0.031128	0.003323	0.020206	0.000532	0.001058	0.000012	0.000117	
0.000961 AP4-1	0.033254	0.017812	0.002166	0.011775	0.000358	0.001018	0.000013	0.000077	
0.000051 41LU1-REDO-1	0.006314	0.003756	0.000576	0.002629	0.000079	0.001092	0.000010	0.000014	
0.000025 41LU1-REDO-2	0.006881	0.003963	0.000604	0.002794	0.000069	0.000892	0.000008	0.000409	
0.000022 41LU1-REDO-3	0.006742	0.003900	0.000615	0.002736	0.000068	0.000789	0.000010	0.000429	
0.000134 41LU1-REDO-4	0.006346	0.003701	0.000566	0.002629	0.000056	0.000952	0.000013	0.000603	
0.000053 41LU1-REDO-5	0.006671	0.003943	0.000596	0.002803	0.000052	0.001232	0.000008	0.000730	
0.000027 41LU1-REDO-6	0.007059	0.004142	0.000624	0.002903	0.000055	0.000930	0.000020	0.000600	
0.000103 41LU1-REDO-7	0.005963	0.003564	0.000539	0.002525	0.000043	0.001104	0.000038	0.000618	
0.000156 41LU1REDO-8	0.007294	0.004302	0.000634	0.002946	0.000040	0.001011	0.000031	0.000607	
0.000198 41LU1-REDO-9	0.006657	0.003917	0.000597	0.002723	0.000037	0.000984	0.000037	0.000650	
0.000138 41LU1REDO-10	0.006254	0.003673	0.000593	0.002605	0.000034	0.001148	0.000041	0.000849	
0.000149 41LU1-REDO-11	0.007223	0.004175	0.000636	0.002964	0.000061	0.001100	0.000043	0.000839	
0.000124 41LU1REDO-12	0.007409	0.004288	0.000669	0.002987	0.000050	0.001043	0.000049	0.000742	
0.000424 41LU1-REDO-13	0.007324	0.004341	0.000651	0.003036	0.000056	0.000887	0.000030	0.000708	
0.000196 41LU1-REDO-14	0.007539	0.004384	0.000664	0.003128	0.000060	0.000865	0.000026	0.000722	
0.000051 41LU1-REDO-15	0.005744	0.003416	0.000511	0.002396	0.000043	0.000740	0.000016	0.000560	
0.000171 SRM614-2	0.000360	0.000193	0.000070	0.001015	0.000054	0.000609	0.000191	0.000082	
0.003985 SRM612-2	0.004153	0.002329	0.000424	0.002586	0.002638	0.010174	0.004106	0.002782	
0.052580 SRM610-2	0.063026	0.035174	0.005465	0.026241	0.034000	0.149397	0.051019	0.028992	
0.000013 AP1-2	0.000132	0.000055	0.000011	0.000040	0.000000	0.000133	0.000019	0.000009	
0.000097 AP2-2	0.002700	0.001549	0.000236	0.001085	0.000037	0.000257	0.000018	0.000015	
0.000829 AP3-2	0.036811	0.019537	0.002213	0.012740	0.000379	0.000737	0.000023	0.000083	
0.000761 AP4-2	0.028841	0.015482	0.001884	0.010198	0.000331	0.000865	0.000025	0.000066	

standardize signal averages AP									
0.000031 AP1	0.000295	0.000131	0.000025	0.000105	0.000002	0.000143	0.000011	0.000013	
0.000119 AP2	0.003132	0.001799	0.000267	0.001260	0.000046	0.000303	0.000012	0.000020	
0.001076 AP3	0.047608	0.025333	0.002768	0.016473	0.000456	0.000897	0.000017	0.000100	
0.000861 AP4	0.031047	0.016647	0.002025	0.010986	0.000344	0.000941	0.000019	0.000071	

linest from std sig ave									
0.024570	0.012580	0.024401	0.221214	0.037498	1.337418	0.004183	0.000000	0.039744	

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
0.000156	srM614-2	0.000341	0.000175	0.000073	0.001038	0.000071	0.000555	0.000127	0.000069
0.003960	srM612-2	0.004423	0.002486	0.000471	0.002755	0.002337	0.010292	0.003568	0.002420
0.050043	srM610-2	0.054617	0.030371	0.004871	0.023155	0.028167	0.143702	0.043387	0.024053

linest from std sig ave									
0.000000		0.097430	0.000000	0.000000	0.000000	0.000000	0.035576	0.114556	0.154126

concentration data									
0.30	SRM614-1	0.35	0.33	1.42	3.41	10.12	0.18	0.00	0.19
8.29	SRM612-1	5.06	5.53	9.82	9.40	233.62	3.73	0.00	7.01
100.11	SRM610-1	49.85	53.51	81.15	64.54	2561.69	49.51	0.00	65.15
0.48	AP1-1	2.29	2.01	3.43	2.56	2.14	0.25	0.00	0.27
1.39	AP2-1	17.89	19.95	26.34	21.46	29.59	0.58	0.00	0.40
12.98	AP3-1	293.12	303.01	293.29	302.26	284.09	1.77	0.00	1.86
9.42	AP4-1	166.89	173.39	191.17	176.14	191.00	1.70	0.00	1.22
0.50	41LU1-REDO-1	31.69	36.56	50.82	39.33	42.00	1.82	0.00	6.56
0.24	41LU1-REDO-2	34.54	38.58	53.30	41.80	36.57	1.49	0.00	6.49
0.22	41LU1-REDO-3	33.84	37.96	54.24	40.92	36.22	1.32	0.00	6.79
1.31	41LU1-REDO-4	31.85	36.03	49.95	39.32	29.80	1.59	0.00	9.57
0.52	41LU1-REDO-5	33.48	38.38	52.63	41.92	27.50	2.06	0.00	11.58
0.26	41LU1-REDO-6	35.43	40.32	55.06	43.42	29.41	1.55	0.00	9.52
1.01	41LU1-REDO-7	29.93	34.69	47.55	37.77	23.08	1.84	0.00	9.80
1.53	41LU1REDO-8	36.61	41.88	55.92	44.06	21.41	1.69	0.00	9.63
1.94	41LU1-REDO-9	33.41	38.13	52.64	40.73	19.56	1.64	0.00	10.30
1.35	41LU1REDO-10	31.39	35.75	52.37	38.96	18.33	1.92	0.00	13.45
1.46	41LU1-REDO-11	36.25	40.64	56.15	44.34	32.33	1.84	0.00	13.30
1.22	41LU1REDO-12	37.18	41.74	59.00	44.68	26.51	1.74	0.00	11.76
4.15	41LU1-REDO-13	36.76	42.26	57.49	45.41	29.69	1.48	0.00	11.23
1.92	41LU1-REDO-14	37.84	42.68	58.59	46.79	32.25	1.44	0.00	11.45
0.50	41LU1-REDO-15	28.83	33.25	45.13	35.84	22.91	1.23	0.00	8.88
0.36	SRM614-2	0.39	0.40	1.33	3.26	6.20	0.22	0.00	0.28
8.40	SRM612-2	4.48	4.87	8.05	8.32	302.58	3.65	0.00	9.48
110.80	SRM610-2	68.00	73.61	103.68	84.39	3899.78	53.60	0.00	98.82
0.13	AP1-2	0.66	0.54	0.94	0.60	0.00	0.22	0.00	0.14
0.95	AP2-2	13.55	15.07	20.79	16.23	19.86	0.43	0.00	0.25
8.12	AP3-2	184.75	190.18	195.33	190.58	202.41	1.23	0.00	1.31
7.45	AP4-2	144.75	150.70	166.25	152.55	176.35	1.44	0.00	1.05

certified concentration									
	SRM614	1.90					1.12		
	SRM612	37.92					36.24	34.64	37.33
	SRM610	456.30					438.10	426.30	317.40
0.14	STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25	STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94	STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81	STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As	
raw data									
297.04	blank-17	445.40	280.04	353.96	1324.77	835.88	749.84	314.08	230.36
507.44	SRM614-17	828.24	404.52	446.60	3216.02	793.96	1408.05	467.92	320.24
10581.26	SRM612-17	8482.01	4786.19	1200.81	6734.80	6539.44	25581.31	9563.89	6129.11
58747.37	SRM610-17	55204.79	30479.69	5324.15	24348.62	32375.94	160436.58	50280.60	26944.59
600.20	AP1-17	3435.50	1545.17	497.76	1883.13	808.16	2236.25	455.76	415.96
1840.49	AP2-17	31051.57	17710.10	2815.10	13197.35	1204.65	4149.98	459.36	477.60
7841.84	AP3-17	262450.00	143482.25	18525.66	96979.27	3971.66	12088.43	547.24	1092.81
8513.21	AP4-17	264952.94	144027.94	18594.63	97373.75	3979.18	9255.13	486.80	934.93
1065.37	41LU1-1	31490.90	18364.70	3146.42	14193.52	4121.06	6599.72	555.32	6157.51
1306.33	41LU1-2	32626.26	19234.59	3271.26	14689.56	7372.68	7753.08	674.80	6357.44
791.32	41LU1-3	25877.07	15565.97	2604.61	12156.27	2686.98	5150.39	563.64	4519.27
1539.89	41LU1-4	27849.76	16461.29	2961.06	13181.15	11926.71	11367.66	904.01	8458.21
1061.57	41LU1-5	22202.32	12924.31	2303.17	10297.14	6018.15	7521.60	685.64	6584.04
1093.21	41LU1-6	21705.92	12776.87	2293.81	10449.30	6736.96	7681.68	685.08	7581.84
6846.64	41LU1-7	85884.84	49496.40	10002.78	44211.61	97078.98	87480.85	3919.74	50796.61
1690.53	41LU1-8	54539.67	31528.14	5865.27	26423.23	27289.31	33317.27	1530.37	26908.51
2086.41	41LU1-9	59602.34	34323.40	6450.28	28524.68	30509.97	36612.48	1633.73	29644.65
3118.94	41LU1-10	76182.47	43539.00	8717.65	38131.70	74213.46	69713.31	2382.65	57856.93
8316.85	41LU1-11	109223.62	61403.47	12940.91	56677.72	184233.72	128337.60	5172.71	84523.20
5895.59	41LU1-12	99090.00	56295.92	11752.23	51607.89	161724.27	109413.49	4511.19	78235.76
745.24	SRM614-18	729.24	484.20	313.40	2991.90	760.16	2064.53	886.45	533.88
11065.82	SRM612-18	10151.26	5882.83	1206.33	7543.24	8575.33	27224.71	12570.63	8534.65
69023.19	SRM610-18	80261.13	45013.09	7114.08	34266.79	51857.25	197609.83	74537.26	43324.61
515.08	AP1-18	1234.33	609.88	314.56	1587.97	700.60	2838.86	857.28	460.12
1540.45	AP2-18	29119.36	17303.94	2730.14	13116.75	1215.05	4077.02	820.40	548.04
7759.64	AP3-18	304803.44	164509.56	20915.76	111071.47	4396.22	7957.68	842.16	1251.01
6906.16	AP4-18	217911.03	119650.07	15737.41	81467.54	3559.46	8934.81	905.37	969.85
601.84	blank-18	232.92	121.16	167.80	1114.65	467.40	1156.17	559.12	315.72

Appendix A. Raw trace element datasheets from laser ablation.

449.44 blank average	339.16	200.60	260.88	1219.71	651.64	953.01	436.60	273.04
blank subtraction								
58.00 SRM614-17	489.08	203.92	185.72	1996.31	142.32	455.04	31.32	47.20
10131.82 SRM612-17	8142.85	4585.59	939.93	5515.09	5887.79	24628.30	9127.29	5856.07
58297.93 SRM610-17	54865.63	30279.09	5063.27	23128.91	31724.30	159483.57	49844.00	26671.55
150.76 AP1-17	3096.34	1344.57	236.88	663.42	156.52	1283.25	19.16	142.92
1391.05 AP2-17	30712.41	17509.50	2554.21	11977.65	553.00	3196.98	22.76	204.56
7392.40 AP3-17	262110.84	143281.65	18264.78	95759.56	3320.02	11135.42	110.64	819.76
8063.77 AP4-17	264613.78	143827.34	18333.74	96154.04	3327.54	8302.13	50.20	661.88
615.92 41LU1-1	31151.74	18164.10	2885.54	12973.81	3469.42	5646.71	118.72	5884.47
856.88 41LU1-2	32287.10	19033.99	3010.38	13469.86	6721.04	6800.08	238.20	6084.39
341.88 41LU1-3	25537.90	15365.37	2343.73	10936.56	2035.33	4197.38	127.04	4246.22
1090.45 41LU1-4	27510.60	16260.69	2700.18	11961.45	11275.06	10414.66	467.40	8185.17
612.12 41LU1-5	21863.16	12723.71	2042.29	9077.43	5366.51	6568.60	249.04	6311.00
643.76 41LU1-6	21366.76	12576.27	2032.93	9229.59	6085.31	6728.68	248.48	7308.80
6397.20 41LU1-7	85545.68	49295.80	9741.89	42991.90	96427.34	86527.85	3483.14	50523.56
1241.09 41LU1-8	54200.51	31327.54	5604.39	25203.52	26637.67	32364.26	1093.77	26635.47
1636.97 41LU1-9	59263.17	34122.79	6189.39	27304.97	29858.33	35659.48	1197.13	29371.60
2669.49 41LU1-10	75843.31	43338.40	8456.77	36911.99	73561.82	68760.31	1946.05	57583.88
7867.40 41LU1-11	108884.46	61202.86	12680.03	55458.01	183582.08	127384.59	4736.11	84250.15
5446.15 41LU1-12	98750.84	56095.32	11491.34	50388.18	161072.63	108460.48	4074.58	77962.72
295.80 SRM614-18	390.08	283.60	52.52	1772.19	108.52	1111.53	449.84	260.84
10616.38 SRM612-18	9812.10	5682.23	945.45	6323.54	7923.68	26271.71	12134.03	8261.61
68573.75 SRM610-18	79921.97	44812.49	6853.20	33047.09	51205.61	196656.82	74100.66	43051.56
65.64 AP1-18	895.16	409.28	53.68	368.26	48.96	1885.85	420.68	187.08
1091.01 AP2-18	28780.20	17103.34	2469.25	11897.05	563.40	3124.02	383.80	275.00
7310.20 AP3-18	304464.28	164308.96	20654.88	109851.76	3744.58	7004.68	405.56	977.97
6456.72 AP4-18	217571.87	119449.47	15476.53	80247.83	2907.82	7981.81	468.76	696.80
zero correction								
58.00 SRM614-17	489.08	203.92	185.72	1996.31	142.32	455.04	31.32	47.20
10131.82 SRM612-17	8142.85	4585.59	939.93	5515.09	5887.79	24628.30	9127.29	5856.07
58297.93 SRM610-17	54865.63	30279.09	5063.27	23128.91	31724.30	159483.57	49844.00	26671.55
150.76 AP1-17	3096.34	1344.57	236.88	663.42	156.52	1283.25	19.16	142.92
1391.05 AP2-17	30712.41	17509.50	2554.21	11977.65	553.00	3196.98	22.76	204.56
7392.40 AP3-17	262110.84	143281.65	18264.78	95759.56	3320.02	11135.42	110.64	819.76
8063.77 AP4-17	264613.78	143827.34	18333.74	96154.04	3327.54	8302.13	50.20	661.88
615.92 41LU1-1	31151.74	18164.10	2885.54	12973.81	3469.42	5646.71	118.72	5884.47
856.88 41LU1-2	32287.10	19033.99	3010.38	13469.86	6721.04	6800.08	238.20	6084.39
341.88 41LU1-3	25537.90	15365.37	2343.73	10936.56	2035.33	4197.38	127.04	4246.22
1090.45 41LU1-4	27510.60	16260.69	2700.18	11961.45	11275.06	10414.66	467.40	8185.17
612.12 41LU1-5	21863.16	12723.71	2042.29	9077.43	5366.51	6568.60	249.04	6311.00
643.76 41LU1-6	21366.76	12576.27	2032.93	9229.59	6085.31	6728.68	248.48	7308.80
6397.20 41LU1-7	85545.68	49295.80	9741.89	42991.90	96427.34	86527.85	3483.14	50523.56
1241.09 41LU1-8	54200.51	31327.54	5604.39	25203.52	26637.67	32364.26	1093.77	26635.47
1636.97 41LU1-9	59263.17	34122.79	6189.39	27304.97	29858.33	35659.48	1197.13	29371.60
2669.49 41LU1-10	75843.31	43338.40	8456.77	36911.99	73561.82	68760.31	1946.05	57583.88
7867.40 41LU1-11	108884.46	61202.86	12680.03	55458.01	183582.08	127384.59	4736.11	84250.15
5446.15 41LU1-12	98750.84	56095.32	11491.34	50388.18	161072.63	108460.48	4074.58	77962.72
295.80 SRM614-18	390.08	283.60	52.52	1772.19	108.52	1111.53	449.84	260.84
10616.38 SRM612-18	9812.10	5682.23	945.45	6323.54	7923.68	26271.71	12134.03	8261.61
68573.75 SRM610-18	79921.97	44812.49	6853.20	33047.09	51205.61	196656.82	74100.66	43051.56
65.64 AP1-18	895.16	409.28	53.68	368.26	48.96	1885.85	420.68	187.08
1091.01 AP2-18	28780.20	17103.34	2469.25	11897.05	563.40	3124.02	383.80	275.00
7310.20 AP3-18	304464.28	164308.96	20654.88	109851.76	3744.58	7004.68	405.56	977.97
6456.72 AP4-18	217571.87	119449.47	15476.53	80247.83	2907.82	7981.81	468.76	696.80
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000031 SRM614-17	0.000259	0.000108	0.000098	0.001056	0.000075	0.000241	0.000017	0.000025

Appendix A. Raw trace element datasheets from laser ablation.

0.004183 SRM612-17	0.003362	0.001893	0.000388	0.002277	0.002431	0.010169	0.003768	0.002418
0.049360 SRM610-17	0.046454	0.025637	0.004287	0.019583	0.026861	0.135033	0.042202	0.022583
0.000011 AP1-17	0.000233	0.000101	0.000018	0.000050	0.000012	0.000096	0.000001	0.000011
0.000111 AP2-17	0.002441	0.001391	0.000203	0.000952	0.000044	0.000254	0.000002	0.000016
0.000640 AP3-17	0.022681	0.012399	0.001580	0.008286	0.000287	0.000964	0.000010	0.000071
0.000741 AP4-17	0.024332	0.013225	0.001686	0.008842	0.000306	0.000763	0.000005	0.000061
0.000092 41LU1-1	0.004674	0.002725	0.000433	0.001946	0.000520	0.000847	0.000018	0.000883
0.000134 41LU1-2	0.005065	0.002986	0.000472	0.002113	0.001054	0.001067	0.000037	0.000954
0.000064 41LU1-3	0.004761	0.002864	0.000437	0.002039	0.000379	0.000782	0.000024	0.000792
0.000198 41LU1-4	0.004985	0.002947	0.000489	0.002168	0.002043	0.001887	0.000085	0.001483
0.000142 41LU1-5	0.005075	0.002953	0.000474	0.002107	0.001246	0.001525	0.000058	0.001465
0.000164 41LU1-6	0.005428	0.003195	0.000516	0.002345	0.001546	0.001709	0.000063	0.001857
0.000437 41LU1-7	0.005840	0.003365	0.000665	0.002935	0.006582	0.005907	0.000238	0.003449
0.000119 41LU1-8	0.005205	0.003008	0.000538	0.002420	0.002558	0.003108	0.000105	0.002558
0.000157 41LU1-9	0.005668	0.003264	0.000592	0.002612	0.002856	0.003411	0.000114	0.002809
0.000182 41LU1-10	0.005169	0.002954	0.000576	0.002516	0.005013	0.004686	0.000133	0.003924
0.000391 41LU1-11	0.005411	0.003041	0.000630	0.002756	0.009123	0.006330	0.000235	0.004187
0.000287 41LU1-12	0.005210	0.002960	0.000606	0.002658	0.008498	0.005722	0.000215	0.004113
0.000174 SRM614-18	0.000229	0.000167	0.000031	0.001042	0.000064	0.000654	0.000265	0.000153
0.004808 SRM612-18	0.004444	0.002573	0.000428	0.002864	0.003589	0.011898	0.005495	0.003742
0.052032 SRM610-18	0.060642	0.034002	0.005200	0.025075	0.038853	0.149217	0.056225	0.032666
0.000004 AP1-18	0.000060	0.000027	0.000004	0.000025	0.000003	0.000126	0.000028	0.000013
0.000080 AP2-18	0.002108	0.001253	0.000181	0.000871	0.000041	0.000229	0.000028	0.000020
0.000547 AP3-18	0.022785	0.012296	0.001546	0.008221	0.000280	0.000524	0.000030	0.000073
0.000522 AP4-18	0.017593	0.009659	0.001251	0.006489	0.000235	0.000645	0.000038	0.000056
standardize signal averages AP								
0.000008 AP1	0.000146	0.000064	0.000011	0.000037	0.000008	0.000111	0.000015	0.000012
0.000095 AP2	0.002274	0.001322	0.000192	0.000912	0.000043	0.000241	0.000015	0.000018
0.000593 AP3	0.022733	0.012347	0.001563	0.008254	0.000284	0.000744	0.000020	0.000072
0.000632 AP4	0.020962	0.011442	0.001469	0.007665	0.000271	0.000704	0.000021	0.000059
linest from std sig ave								
0.040960	0.024876	0.047170	0.371072	0.070523	2.033095	0.005264	0.000000	0.053469
standardize signal averages SRM								
0.000102 srm614-2	0.000244	0.000137	0.000065	0.001049	0.000070	0.000447	0.000141	0.000089
0.004496 srm612-2	0.003903	0.002233	0.000408	0.002570	0.003010	0.011033	0.004632	0.003080
0.050696 srm610-2	0.053548	0.029820	0.004744	0.022329	0.032857	0.142125	0.049214	0.027624
linest from std sig ave								
0.000000	0.099432	0.000000	0.000000	0.000000	0.000000	0.035956	0.100880	0.134061
concentration data								
0.11 SRM614-17	0.55	0.44	3.13	6.38	13.12	0.11	0.00	0.11
14.70 SRM612-17	7.17	7.66	12.35	13.77	423.87	4.59	0.00	11.09
173.39 SRM610-17	99.11	103.71	136.43	118.44	4683.54	60.96	0.00	103.56
0.19 AP1-17	2.31	1.90	2.64	1.40	9.54	0.20	0.00	0.23
1.81 AP2-17	24.22	26.18	30.05	26.78	35.64	0.53	0.00	0.35
10.45 AP3-17	225.08	233.31	233.97	233.13	233.01	2.02	0.00	1.51
12.12 AP4-17	241.47	248.87	249.56	248.75	248.17	1.60	0.00	1.30
1.51 41LU1-1	46.38	51.28	64.08	54.76	422.16	1.78	0.00	18.83
2.20 41LU1-2	50.26	56.19	69.91	59.45	855.14	2.24	0.00	20.36
1.04 41LU1-3	47.24	53.90	64.68	57.36	307.74	1.64	0.00	16.88
3.23 41LU1-4	49.47	55.45	72.43	60.98	1657.16	3.96	0.00	31.64
2.32 41LU1-5	50.36	55.57	70.17	59.28	1010.28	3.20	0.00	31.25
2.67 41LU1-6	53.86	60.12	76.45	65.96	1253.81	3.59	0.00	39.60
7.14 41LU1-7	57.95	63.32	98.45	82.57	5338.89	12.40	0.00	73.57
1.95 41LU1-8	51.65	56.61	79.67	68.09	2074.69	6.53	0.00	54.56
2.56 41LU1-9	56.25	61.41	87.63	73.47	2316.22	7.16	0.00	59.92
2.97 41LU1-10	51.29	55.58	85.32	70.77	4066.18	9.84	0.00	83.71
6.39 41LU1-11	53.69	57.23	93.28	77.53	7399.10	13.29	0.00	89.30
4.70 41LU1-12	51.70	55.69	89.75	74.79	6892.62	12.02	0.00	87.74
0.61 SRM614-18	0.49	0.67	0.98	6.30	11.13	0.30	0.00	0.70
16.89 SRM612-18	9.48	10.41	13.63	17.32	625.72	5.37	0.00	17.16
182.78 SRM610-18	129.38	137.55	165.49	151.66	6774.60	67.36	0.00	149.79
0.07 AP1-18	0.59	0.52	0.53	0.69	2.66	0.27	0.00	0.27
1.31 AP2-18	20.92	23.57	26.77	24.52	33.47	0.48	0.00	0.43
8.94 AP3-18	226.11	231.39	228.82	231.29	227.29	1.10	0.00	1.56
8.53 AP4-18	174.59	181.75	185.25	182.56	190.70	1.36	0.00	1.20
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09

Appendix A. Raw trace element datasheets from laser ablation.

12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77	1.84	
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
397.24 blank-19	623.52	580.16	650.36	4559.75	1107.21	2189.37	680.76	549.56
612.04 SRM614-19	1003.01	767.28	694.68	5769.75	1198.93	3152.38	897.53	686.24
8209.09 SRM612-19	10016.14	6057.39	1606.09	9557.93	8004.33	26033.51	10493.06	5978.87
54867.83 SRM610-19	59653.41	33568.11	5746.71	29269.92	46301.06	161080.78	63467.23	30822.17
587.16 AP1-19	1276.45	1017.05	612.04	4976.51	980.21	4761.35	823.96	676.80
1573.41 AP2-19	42911.80	24825.14	3973.62	21838.80	1692.17	5824.27	781.16	712.20
5586.43 AP3-19	180642.94	99547.96	13459.12	71811.48	3601.38	8626.09	878.48	1125.53
6327.68 AP4-19	200610.69	111047.66	14922.08	79300.48	4038.58	9936.90	816.52	1173.89
1621.97 THEO-1	126675.39	71288.56	10673.82	56906.80	2761.86	36858.69	778.44	721.56
1082.09 THEO-2	152776.63	84850.23	12398.47	65697.29	3087.30	46685.38	735.52	876.68
917.97 THEO-2	155712.92	86851.73	12304.27	65611.17	2982.46	19114.43	779.36	763.00
1626.25 THEO-3	160281.75	89274.74	13238.12	70199.04	3543.66	48226.03	820.08	1333.33
1893.17 THEO-4	230257.73	125763.74	17712.90	95274.06	5399.55	60902.42	866.92	1670.29
1240.45 THEO-5	203955.19	111322.71	15503.97	82699.63	4014.10	30815.09	802.52	1292.97
1975.45 THEO-6	159834.98	89067.78	12767.47	68388.66	7156.04	28052.84	892.13	1750.29
1396.85 THEO-7	156888.17	87890.34	12627.91	66905.22	6852.92	25706.42	841.12	1902.09
836.28 THEO-8	82452.87	47523.35	7512.36	40484.55	3060.10	23525.21	818.64	1581.33
1226.25 THEO-9	157865.00	88846.74	12829.59	68759.87	7543.68	33733.35	869.04	1775.81
1252.81 THEO-10	187086.41	103934.02	14517.88	78158.48	5698.27	21726.24	847.20	2113.93
1548.81 THEO-11	162802.44	90540.07	12874.31	68857.95	5436.99	23782.33	905.41	2038.97
2197.69 THEO-12	159405.42	88035.34	12734.15	68454.83	5360.75	30721.57	927.05	1852.49
1505.41 THEO-13	185095.31	103318.70	23018.45	111221.98	4286.94	367834.03	892.49	1987.61
1684.65 THEO-14	158481.02	89367.70	21413.24	100685.56	4059.46	379822.03	819.52	1644.13
2719.74 THEO-15	210685.83	118699.75	49547.20	215997.97	5659.63	1493967.40	984.09	1939.09
2373.81 THEO-16	177878.08	99908.08	14062.44	76228.47	6270.72	29439.61	927.61	1988.25
1703.29 THEO-17	197363.83	109234.21	15073.73	81542.02	7240.68	24786.66	961.05	2369.33
1499.77 THEO-18	185941.77	102733.14	15189.41	80343.29	7194.08	60767.34	999.93	2252.33
595.72 SRM614-20	929.01	745.16	515.60	7260.68	1068.33	3280.86	1042.53	586.80
6223.31 SRM612-20	7334.28	4501.99	1055.21	9771.81	6815.00	18033.74	8718.77	6009.19
43971.49 SRM610-20	56616.04	32366.94	5071.71	29068.08	42835.12	131087.42	56742.84	32512.39
353.04 AP1-20	600.72	523.96	383.64	5100.91	960.89	3286.54	898.37	487.80
1048.13 AP2-20	21333.68	12830.91	2108.17	13513.88	1375.25	3866.06	954.49	549.68
6556.12 AP3-20	258263.38	139295.47	17553.10	97645.91	4435.71	7337.40	1037.37	1222.45
5086.11 AP4-20	157136.17	87544.33	12038.31	63670.76	3401.34	7436.36	1052.93	868.80
490.92 blank-20	431.72	433.52	296.92	6486.28	948.33	2551.77	791.48	351.12
444.08 blank average	527.62	506.84	473.64	5523.01	1027.77	2370.57	736.12	450.34
blank subtraction								
167.96 SRM614-19	475.38	260.44	221.04	246.74	171.16	781.80	161.40	235.90
7765.00 SRM612-19	9488.51	5550.55	1132.45	4034.92	6976.56	23662.93	9756.94	5528.53
54423.75 SRM610-19	59125.79	33061.27	5273.07	23746.91	45273.30	158710.21	62731.11	30371.83
143.08 AP1-19	748.82	510.20	138.40	-546.50	-47.56	2390.77	87.84	226.46
1129.33 AP2-19	42384.18	24318.30	3499.98	16315.79	664.40	3453.70	45.04	261.86
5142.35 AP3-19	180115.32	99041.12	12985.47	66288.47	2573.61	6255.52	142.36	675.18
5883.59 AP4-19	200083.07	110540.82	14448.44	73777.47	3010.82	7566.32	80.40	723.54
1177.89 THEO-1	126147.77	70781.72	10200.18	51383.79	1734.09	34488.11	42.32	271.22
638.00 THEO-2	152249.01	84343.39	11924.83	60174.28	2059.53	44314.81	-0.60	426.34
473.88 THEO-2	155185.30	86344.88	11830.63	60088.16	1954.69	16743.85	43.24	312.66
1182.17 THEO-3	160294.13	88767.90	12764.47	64676.03	2515.89	45855.46	83.96	882.98
1449.09 THEO-4	229730.11	125256.90	17239.26	89751.04	4371.78	58531.85	130.80	1219.95
796.36 THEO-5	203427.57	110815.87	15030.32	77176.61	2986.34	28444.52	66.40	842.62
1531.37 THEO-6	159307.36	88560.94	12293.83	62865.65	6128.27	25682.26	156.00	1299.95
952.77 THEO-7	156360.55	87383.49	12154.27	61382.21	5825.15	23335.85	105.00	1451.75
392.20 THEO-8	81925.24	47016.51	7038.72	34961.54	2032.33	21154.64	82.52	1130.99
782.16 THEO-9	157337.38	88339.90	12355.95	63236.86	6515.92	31362.78	132.92	1325.47
808.72 THEO-10	186558.79	103427.18	14044.24	72635.47	4670.51	19355.67	111.08	1663.59
1104.73 THEO-11	162274.82	90033.23	12400.67	63334.93	4409.22	21411.76	169.28	1588.63
1753.61 THEO-12	158877.80	87528.49	12260.51	62931.82	4332.98	28351.00	190.92	1402.15
1061.33 THEO-13	184567.69	102811.86	22544.81	105698.97	3259.18	365463.46	156.36	1537.27
1240.57 THEO-14	157953.40	88860.86	20939.60	95162.55	3031.70	377451.46	83.40	1193.79
2275.65 THEO-15	210158.21	118192.91	49073.56	210474.96	4631.87	1491596.83	247.96	1488.75
1929.73 THEO-16	177350.46	99401.24	13588.80	70705.46	5242.95	27069.03	191.48	1537.91
1259.21 THEO-17	196836.21	108727.37	14600.08	76019.01	6212.91	22416.09	224.92	1918.99
1055.69 THEO-18	185414.15	102226.30	14715.76	74820.28	6166.31	58396.77	263.80	1801.99
151.64 SRM614-20	401.38	238.32	41.96	1737.67	40.56	910.29	306.40	136.46
5779.23 SRM612-20	6806.66	3995.14	581.56	4248.80	5787.23	15663.17	7982.64	5558.85
43527.41 SRM610-20	56088.42	31860.10	4598.07	23545.07	41807.36	128716.85	56006.72	32062.04
-91.04 AP1-20	73.10	17.12	-90.00	-422.10	-66.88	915.97	162.24	37.46
604.04 AP2-20	20806.06	12324.07	1634.53	7990.87	347.48	1495.49	218.36	99.34
6112.03 AP3-20	257735.76	138788.63	17079.46	92122.90	3407.94	4966.83	301.24	772.10
4642.03 AP4-20	156608.55	87037.49	11564.67	58147.75	2373.57	5065.79	316.80	418.46
zero correction								
167.96 SRM614-19	475.38	260.44	221.04	246.74	171.16	781.80	161.40	235.90

Appendix A. Raw trace element datasheets from laser ablation.

7765.00 SRM612-19	9488.51	5550.55	1132.45	4034.92	6976.56	23662.93	9756.94	5528.53
54423.75 SRM610-19	59125.79	33061.27	5273.07	23746.91	45273.30	158710.21	62731.11	30371.83
143.08 AP1-19	748.82	510.20	138.40	0.00	0.00	2390.77	87.84	226.46
1129.33 AP2-19	42384.18	24318.30	3499.98	16315.79	664.40	3453.70	45.04	261.86
5142.35 AP3-19	180115.32	99041.12	12985.47	66288.47	2573.61	6255.52	142.36	675.18
5883.59 AP4-19	200083.07	110540.82	14448.44	73777.47	3010.82	7566.32	80.40	723.54
1177.89 THEO-1	126147.77	70781.72	10200.18	51383.79	1734.09	34488.11	42.32	271.22
638.00 THEO-2	152249.01	84343.39	11924.83	60174.28	2059.53	44314.81	0.00	426.34
473.88 THEO-2	155185.30	86344.88	11830.63	60088.16	1954.69	16743.85	43.24	312.66
1182.17 THEO-3	160294.13	88767.90	12764.47	64676.03	2515.89	45855.46	83.96	882.98
1449.09 THEO-4	229730.11	125256.90	17239.26	89751.04	4371.78	58531.85	130.80	1219.95
796.36 THEO-5	203427.57	110815.87	15030.32	77176.61	2986.34	28444.52	66.40	842.62
1531.37 THEO-6	159307.36	88560.94	12293.83	62865.65	6128.27	25682.26	156.00	1299.95
952.77 THEO-7	156360.55	87383.49	12154.27	61382.21	5825.15	23335.85	105.00	1451.75
392.20 THEO-8	81925.24	47016.51	7038.72	34961.54	2032.33	21154.64	82.52	1130.99
782.16 THEO-9	157337.38	88339.90	12355.95	63236.86	6515.92	31362.78	132.92	1325.47
808.72 THEO-10	186558.79	103427.18	14044.24	72635.47	4670.51	19355.67	111.08	1663.59
1104.73 THEO-11	162274.82	90033.23	12400.67	63334.93	4409.22	21411.76	169.28	1588.63
1753.61 THEO-12	158877.80	87528.49	12260.51	62931.82	4332.98	28351.00	190.92	1402.15
1061.33 THEO-13	184567.69	102811.86	22544.81	105698.97	3259.18	365463.46	156.36	1537.27
1240.57 THEO-14	157953.40	88860.86	20939.60	95162.55	3031.70	377451.46	83.40	1193.79
2275.65 THEO-15	210158.21	118192.91	49073.56	210474.96	4631.87	1491596.83	247.96	1488.75
1929.73 THEO-16	177350.46	99401.24	13588.80	70705.46	5242.95	27069.03	191.48	1537.91
1259.21 THEO-17	196836.21	108727.37	14600.08	76019.01	6212.91	22416.09	224.92	1918.99
1055.69 THEO-18	185414.15	102226.30	14715.76	74820.28	6166.31	58396.77	263.80	1801.99
151.64 SRM614-20	401.38	238.32	41.96	1737.67	40.56	910.29	306.40	136.46
5779.23 SRM612-20	6806.66	3995.14	581.56	4248.80	5787.23	15663.17	7982.64	5558.85
43527.41 SRM610-20	56088.42	31860.10	4598.07	23545.07	41807.36	128716.85	56006.72	32062.04
0.00 AP1-20	73.10	17.12	0.00	0.00	0.00	915.97	162.24	37.46
604.04 AP2-20	20806.06	12324.07	1634.53	7990.87	347.48	1495.49	218.36	99.34
6112.03 AP3-20	257735.76	138788.63	17079.46	92122.90	3407.94	4966.83	301.24	772.10
4642.03 AP4-20	156608.55	87037.49	11564.67	58147.75	2373.57	5065.79	316.80	418.46

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000093 SRM614-19	0.000265	0.000145	0.000123	0.000137	0.000095	0.000435	0.000090	0.000131
0.004328 SRM612-19	0.005289	0.003094	0.000631	0.002249	0.003889	0.013189	0.005438	0.003082
0.058894 SRM610-19	0.063983	0.035777	0.005706	0.025698	0.048992	0.171747	0.067884	0.032867
0.000011 AP1-19	0.000059	0.000040	0.000011	0.000000	0.000000	0.000189	0.000007	0.000018
0.000118 AP2-19	0.004416	0.002534	0.000365	0.001700	0.000069	0.000360	0.000005	0.000027
0.000384 AP3-19	0.013467	0.007405	0.000971	0.004956	0.000192	0.000468	0.000011	0.000050
0.000456 AP4-19	0.015506	0.008567	0.001120	0.005718	0.000233	0.000586	0.000006	0.000056
0.000257 THEO-1	0.027556	0.015462	0.002228	0.011225	0.000379	0.007534	0.000009	0.000059
0.000101 THEO-2	0.024021	0.013307	0.001881	0.009494	0.000325	0.006992	0.000000	0.000067
0.000063 THEO-2	0.020505	0.011409	0.001563	0.007940	0.000258	0.002212	0.000006	0.000041
0.000209 THEO-3	0.028284	0.015663	0.002252	0.011412	0.000444	0.008091	0.000015	0.000156
0.000234 THEO-4	0.037138	0.020249	0.002787	0.014509	0.000707	0.009462	0.000021	0.000197
0.000102 THEO-5	0.026129	0.014234	0.001931	0.009913	0.000384	0.003654	0.000009	0.000108
0.000296 THEO-6	0.030810	0.017128	0.002378	0.012158	0.001185	0.004967	0.000030	0.000251
0.000146 THEO-7	0.023905	0.013359	0.001858	0.009384	0.000891	0.003568	0.000016	0.000222
0.000072 THEO-8	0.014987	0.008601	0.001288	0.006395	0.000372	0.003870	0.000015	0.000207
0.000122 THEO-9	0.024441	0.013723	0.001919	0.009823	0.001012	0.004872	0.000021	0.000206
0.000115 THEO-10	0.026507	0.014695	0.001995	0.010320	0.000664	0.002750	0.000016	0.000236
0.000166 THEO-11	0.024452	0.013566	0.001869	0.009543	0.000664	0.003226	0.000026	0.000239
0.000330 THEO-12	0.029890	0.016467	0.002307	0.011839	0.000815	0.005334	0.000036	0.000264
0.000177 THEO-13	0.030767	0.017139	0.003758	0.017620	0.000543	0.0060923	0.000026	0.000256
0.000223 THEO-14	0.028352	0.015950	0.003759	0.017081	0.000544	0.0067750	0.000015	0.000214
0.000395 THEO-15	0.036468	0.020509	0.008515	0.036522	0.000804	0.258828	0.000043	0.000258
0.000360 THEO-16	0.033082	0.018542	0.002535	0.013189	0.000978	0.005049	0.000036	0.000287
0.000180 THEO-17	0.028184	0.015568	0.002091	0.010885	0.000890	0.003210	0.000032	0.000275
0.000155 THEO-18	0.027263	0.015031	0.002164	0.011002	0.000907	0.008587	0.000039	0.000265

Appendix A. Raw trace element datasheets from laser ablation.

0.000101 SRM614-20	0.000267	0.000159	0.000028	0.001158	0.000027	0.000606	0.000204	0.000091
0.004203 SRM612-20	0.004951	0.002906	0.000423	0.003090	0.004209	0.011392	0.005806	0.004043
0.056425 SRM610-20	0.072707	0.041300	0.005960	0.030521	0.054195	0.166856	0.072602	0.041562
0.000000 AP1-20	0.000007	0.000002	0.000000	0.000000	0.000000	0.000085	0.000015	0.000003
0.000078 AP2-20	0.002679	0.001587	0.000210	0.001029	0.000045	0.000193	0.000028	0.000013
0.000489 AP3-20	0.020609	0.011098	0.001366	0.007366	0.000273	0.000397	0.000024	0.000062
0.000430 AP4-20	0.014506	0.008062	0.001071	0.005386	0.000220	0.000469	0.000029	0.000039
standardize signal averages AP								
0.000006 AP1	0.000033	0.000021	0.000005	0.000000	0.000000	0.000137	0.000011	0.000011
0.000098 AP2	0.003548	0.002060	0.000288	0.001364	0.000057	0.000276	0.000016	0.000020
0.000437 AP3	0.017038	0.009251	0.001168	0.006161	0.000232	0.000432	0.000017	0.000056
0.000443 AP4	0.015006	0.008314	0.001095	0.005552	0.000227	0.000528	0.000018	0.000047
linest from std sig ave								
0.056427	0.033477	0.063152	0.492753	0.094771	2.447106	0.007536	0.000000	0.066425
standardize signal averages SRM								
0.000097 srm614-2	0.000266	0.000152	0.000075	0.000647	0.000061	0.000521	0.000147	0.000111
0.004266 srm612-2	0.005120	0.003000	0.000527	0.002670	0.004049	0.012291	0.005622	0.003562
0.057659 srm610-2	0.068345	0.038539	0.005833	0.028110	0.051594	0.169302	0.070243	0.037214
linest from std sig ave								
0.000000	0.077895	0.000000	0.000000	0.000000	0.000000	0.030195	0.070771	0.099654
concentration data								
0.45 SRM614-19	0.76	0.79	5.20	1.12	19.99	0.28	0.00	0.75
20.95 SRM612-19	15.18	16.76	26.67	18.28	816.11	8.52	0.00	17.55
285.01 SRM610-19	183.70	193.77	241.14	208.87	10282.06	111.00	0.00	187.24
0.25 AP1-19	0.79	1.01	2.15	0.00	0.00	0.57	0.00	0.47
2.65 AP2-19	58.98	63.83	71.69	64.27	67.58	1.08	0.00	0.72
8.66 AP3-19	179.86	186.57	190.86	187.39	187.86	1.41	0.00	1.34
10.26 AP4-19	207.08	215.82	220.11	216.17	227.79	1.76	0.00	1.49
5.79 THEO-1	368.02	389.54	438.01	424.38	369.80	22.65	0.00	1.57
2.27 THEO-2	320.80	335.26	369.85	358.94	317.22	21.02	0.00	1.78
1.41 THEO-2	273.85	287.43	307.29	300.18	252.14	6.65	0.00	1.09
4.70 THEO-3	377.74	394.62	442.76	431.47	433.39	24.33	0.00	4.13
5.27 THEO-4	495.99	510.15	547.84	548.56	689.95	28.45	0.00	5.23
2.30 THEO-5	348.96	358.60	379.50	374.78	374.46	10.98	0.00	2.87
6.67 THEO-6	411.48	431.51	467.39	459.68	1157.06	14.93	0.00	6.66
3.28 THEO-7	319.25	336.57	365.27	354.80	869.40	10.73	0.00	5.88
1.62 THEO-8	200.15	216.68	253.11	241.80	362.94	11.63	0.00	5.48
2.74 THEO-9	326.40	345.72	377.30	371.39	988.12	14.65	0.00	5.46
2.59 THEO-10	354.00	370.23	392.26	390.19	647.83	8.27	0.00	6.26
3.75 THEO-11	326.55	341.78	367.31	360.81	648.60	9.70	0.00	6.34
7.43 THEO-12	399.18	414.86	453.42	447.62	795.80	16.03	0.00	6.99
3.98 THEO-13	410.90	431.79	738.78	666.17	530.39	183.15	0.00	6.79
5.01 THEO-14	378.64	401.84	738.84	645.80	531.24	203.68	0.00	5.68
8.89 THEO-15	487.03	516.70	1673.94	1380.83	784.64	778.12	0.00	6.85
8.10 THEO-16	441.81	467.13	498.28	498.64	954.75	15.18	0.00	7.60
4.06 THEO-17	376.40	392.22	410.95	411.53	868.47	9.65	0.00	7.28
3.49 THEO-18	364.10	378.69	425.35	415.94	885.15	25.81	0.00	7.02
0.49 SRM614-20	0.77	0.86	1.18	9.41	5.67	0.39	0.00	0.52
20.34 SRM612-20	14.21	15.74	17.88	25.12	883.40	7.36	0.00	23.03
273.06 SRM610-20	208.75	223.69	251.89	248.08	11373.95	107.84	0.00	236.77
0.00 AP1-20	0.09	0.04	0.00	0.00	0.00	0.26	0.00	0.09
1.75 AP2-20	35.78	39.98	41.37	38.90	43.68	0.58	0.00	0.34
11.00 AP3-20	275.23	279.59	268.46	278.50	266.03	1.19	0.00	1.64
9.68 AP4-20	193.73	203.11	210.57	203.64	214.63	1.41	0.00	1.03
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65								
	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
392.96 blank-15	277.80	277.40	438.60	3284.98	853.52	1150.17	449.00	282.24
574.44 SRM614-15	830.64	566.16	545.12	4283.02	911.85	2093.49	617.40	388.72
7288.68 SRM612-15	8300.69	4762.23	1139.65	7130.60	5830.27	17661.50	8196.37	5218.39
49403.64 SRM610-15	52606.18	29211.53	5043.11	24817.86	36963.53	138725.66	53700.50	27167.55
439.64 AP1-15	1418.05	909.29	456.44	3088.10	743.12	2667.94	701.36	449.84
1619.81 AP2-15	30291.25	17784.46	2981.74	14733.76	1261.97	4477.03	704.92	568.36
10539.66 AP3-15	380298.44	204903.39	25246.30	138777.02	5393.43	9618.65	853.56	1374.21

Appendix A. Raw trace element datasheets from laser ablation.

9107.25	AP4-15	312212.56	169744.52	21532.40	115491.41	4815.03	10407.42	856.00	1222.41
771.24	LA3324-2-1	7493.20	4460.39	1015.09	6077.15	981.93	5837.31	672.08	962.13
666.84	LA3324-2-2	9170.57	5595.63	1144.61	7107.92	1011.89	6880.12	665.28	1171.89
1016.57	LA3324-2-3	12247.63	7448.08	1508.21	8797.81	1623.41	8332.93	668.80	3463.94
725.80	LA3324-2-4	32502.66	19175.59	3219.54	17527.46	1308.25	7730.68	649.64	1024.93
606.84	LA3324-2-5	29536.33	17385.30	3006.42	16138.13	1292.69	7823.88	616.56	1077.01
1000.81	LA3324-2-6	30314.21	18137.26	2981.30	16651.29	1638.33	8033.85	639.12	1233.57
1306.05	LA3324-2-7	29503.05	17630.02	3075.14	16619.90	3454.78	10535.30	737.76	2179.93
1002.93	LA3324-2-8	34861.28	20783.28	3416.78	18633.74	2676.98	8956.45	695.12	1606.97
973.29	LA3324-2-9	40854.31	23975.65	3730.42	21035.20	3117.10	8883.01	733.96	1537.49
953.97	LA3324-2-10	39663.06	23145.21	3944.78	21354.44	2298.37	12097.55	662.80	2283.25
760.04	LA3324-2-11	46721.98	27392.64	4443.63	24578.02	2280.65	14141.84	744.92	2521.81
1585.33	LA3324-2-12	66758.38	38941.14	6816.24	35574.04	9242.73	41207.75	862.28	8624.25
620.64	SRM614-16	927.85	660.72	391.64	5913.15	874.08	2487.33	953.85	451.04
6256.24	SRM612-16	7636.36	4539.39	1003.49	8726.05	6513.92	17720.42	8475.01	5974.43
48852.27	SRM610-16	61282.23	34688.64	5397.43	30032.65	44199.37	140835.70	60137.34	35312.40
462.72	AP1-16	1048.33	761.60	347.24	4767.39	853.36	2824.54	810.08	426.20
1419.45	AP2-16	25444.98	14815.48	2428.53	14635.40	1280.13	3883.98	823.80	521.52
9834.78	AP3-16	391550.69	210038.55	24938.38	142597.36	5648.35	9088.77	1001.49	1369.01
8438.09	AP4-16	311509.59	167797.83	20718.76	115230.93	4978.27	9881.42	1004.17	1274.33
527.36	blank-16	347.08	280.32	259.52	4757.79	677.96	1831.09	634.40	308.64
460.16	blank average	312.44	278.86	349.06	4021.38	765.74	1490.63	541.70	295.44

blank subtraction									
114.28	SRM614-15	518.20	287.30	196.06	261.64	146.10	602.86	75.70	93.28
6828.52	SRM612-15	7988.24	4483.37	790.58	3109.22	5064.53	16170.87	7654.66	4922.95
48943.47	SRM610-15	52293.73	28932.66	4694.05	20796.48	36197.78	137235.03	53158.80	26872.11
-20.52	AP1-15	1105.61	630.42	107.38	-933.29	-22.62	1177.31	159.66	154.40
1159.65	AP2-15	29978.81	17505.60	2632.67	10712.38	496.22	2986.40	163.22	272.92
10079.50	AP3-15	379986.00	204624.53	24897.24	134755.64	4627.69	8128.03	311.86	1078.77
8647.09	AP4-15	311900.12	169465.66	21183.34	111470.03	4049.28	8916.79	314.30	926.97
311.08	LA3324-2-1	7180.76	4181.52	666.02	2055.77	216.18	4346.68	130.38	666.68
206.68	LA3324-2-2	8858.13	5316.77	795.54	3086.54	246.14	5389.49	123.58	876.44
556.40	LA3324-2-3	11935.19	7169.22	1159.15	4776.43	857.66	6842.30	127.10	3168.50
265.64	LA3324-2-4	32190.22	18896.73	2870.48	13506.08	542.50	6240.06	107.94	729.48
146.68	LA3324-2-5	29223.88	17106.44	2657.36	12116.75	526.94	6333.26	74.86	781.56
540.64	LA3324-2-6	30001.77	17858.40	2632.23	12629.91	872.58	6543.22	97.42	938.13
845.88	LA3324-2-7	29190.61	17351.16	2726.08	12598.51	2689.04	9044.67	196.06	1884.49
542.76	LA3324-2-8	34548.84	20504.42	3067.72	14612.36	1911.23	7465.82	153.42	1311.53
513.12	LA3324-2-9	40541.87	23696.79	3381.36	17013.82	2351.35	7392.38	192.26	1242.05
493.80	LA3324-2-10	39350.62	22866.35	3595.72	17333.06	1532.63	10606.92	121.10	1987.81
299.88	LA3324-2-11	46409.54	27113.77	4094.56	20556.64	1514.91	12651.21	203.22	2226.37
1125.17	LA3324-2-12	66445.93	38662.28	6467.18	31552.66	8476.99	39717.12	320.58	8328.81
160.48	SRM614-16	615.40	381.86	42.58	1891.77	108.34	996.71	412.14	155.60
5796.07	SRM612-16	7323.92	4260.52	654.42	4704.67	5748.17	16229.79	7933.30	5678.99
48392.11	SRM610-16	60969.79	34409.78	5048.37	26011.27	43433.62	139345.07	59595.64	35016.96
2.56	AP1-16	735.88	482.74	-1.82	746.00	87.62	1333.91	268.38	130.76
959.29	AP2-16	25132.54	14536.62	2079.47	10614.02	514.38	2393.35	282.10	226.08
9374.61	AP3-16	391238.25	209759.69	24589.32	138575.98	4882.61	7598.14	459.78	1073.57
7977.93	AP4-16	311197.15	167518.97	20369.69	111209.55	4212.52	8390.79	462.46	978.89

zero correction									
114.28	SRM614-15	518.20	287.30	196.06	261.64	146.10	602.86	75.70	93.28
6828.52	SRM612-15	7988.24	4483.37	790.58	3109.22	5064.53	16170.87	7654.66	4922.95
48943.47	SRM610-15	52293.73	28932.66	4694.05	20796.48	36197.78	137235.03	53158.80	26872.11
0.00	AP1-15	1105.61	630.42	107.38	0.00	0.00	1177.31	159.66	154.40
1159.65	AP2-15	29978.81	17505.60	2632.67	10712.38	496.22	2986.40	163.22	272.92
10079.50	AP3-15	379986.00	204624.53	24897.24	134755.64	4627.69	8128.03	311.86	1078.77
8647.09	AP4-15	311900.12	169465.66	21183.34	111470.03	4049.28	8916.79	314.30	926.97
311.08	LA3324-2-1	7180.76	4181.52	666.02	2055.77	216.18	4346.68	130.38	666.68
206.68	LA3324-2-2	8858.13	5316.77	795.54	3086.54	246.14	5389.49	123.58	876.44
556.40	LA3324-2-3	11935.19	7169.22	1159.15	4776.43	857.66	6842.30	127.10	3168.50
265.64	LA3324-2-4	32190.22	18896.73	2870.48	13506.08	542.50	6240.06	107.94	729.48
146.68	LA3324-2-5	29223.88	17106.44	2657.36	12116.75	526.94	6333.26	74.86	781.56
540.64	LA3324-2-6	30001.77	17858.40	2632.23	12629.91	872.58	6543.22	97.42	938.13
845.88	LA3324-2-7	29190.61	17351.16	2726.08	12598.51	2689.04	9044.67	196.06	1884.49
542.76	LA3324-2-8	34548.84	20504.42	3067.72	14612.36	1911.23	7465.82	153.42	1311.53
513.12	LA3324-2-9	40541.87	23696.79	3381.36	17013.82	2351.35	7392.38	192.26	1242.05
493.80	LA3324-2-10	39350.62	22866.35	3595.72	17333.06	1532.63	10606.92	121.10	1987.81
299.88	LA3324-2-11	46409.54	27113.77	4094.56	20556.64	1514.91	12651.21	203.22	2226.37
1125.17	LA3324-2-12	66445.93	38662.28	6467.18	31552.66	8476.99	39717.12	320.58	8328.81
160.48	SRM614-16	615.40	381.86	42.58	1891.77	108.34	996.71	412.14	155.60
5796.07	SRM612-16	7323.92	4260.52	654.42	4704.67	5748.17	16229.79	7933.30	5678.99
48392.11	SRM610-16	60969.79	34409.78	5048.37	26011.27	43433.62	139345.07	59595.64	35016.96
2.56	AP1-16	735.88	482.74	0.00	746.00	87.62	1333.91	268.38	130.76
959.29	AP2-16	25132.54	14536.62	2079.47	10614.02	514.38	2393.35	282.10	226.08
9374.61	AP3-16	391238.25	209759.69	24589.32	138575.98	4882.61	7598.14	459.78	1073.57
7977.93	AP4-16	311197.15	167518.97	20369.69	111209.55	4212.52	8390.79	462.46	978.89

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration									
SRM614	1.90					1.12			
SRM612	37.92					36.24	34.64	37.33	
SRM610	456.30					438.10	426.30	317.40	
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07	
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38	
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09	
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84	
standardized concentration									
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000	
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435	
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701	
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001	
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003	
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005	
standardized signal									
0.000084 SRM614-15	0.000381	0.000211	0.000144	0.000192	0.000107	0.000443	0.000056	0.000069	
0.004762 SRM612-15	0.005571	0.003127	0.000551	0.002168	0.003532	0.011278	0.005339	0.003433	
0.063056 SRM610-15	0.067372	0.037275	0.006047	0.026793	0.046635	0.176804	0.068486	0.034620	
0.000000 AP1-15	0.000096	0.000055	0.000009	0.000000	0.000000	0.000102	0.000014	0.000013	
0.000094 AP2-15	0.002435	0.001422	0.000214	0.000870	0.000040	0.000243	0.000013	0.000022	
0.000604 AP3-15	0.022772	0.012263	0.001492	0.008076	0.000277	0.000487	0.000019	0.000065	
0.000573 AP4-15	0.020679	0.011236	0.001404	0.007391	0.000268	0.000591	0.000021	0.000061	
0.000081 LA3324-2-1	0.001871	0.001090	0.000174	0.000536	0.000056	0.001133	0.000034	0.000174	
0.000044 LA3324-2-2	0.001899	0.001140	0.000171	0.000662	0.000053	0.001156	0.000026	0.000188	
0.000106 LA3324-2-3	0.002264	0.001360	0.000220	0.000906	0.000163	0.001298	0.000024	0.000601	
0.000037 LA3324-2-4	0.004543	0.002667	0.000405	0.001906	0.000077	0.000881	0.000015	0.000103	
0.000020 LA3324-2-5	0.004031	0.002360	0.000367	0.001672	0.000073	0.000874	0.000010	0.000108	
0.000075 LA3324-2-6	0.004158	0.002475	0.000365	0.001750	0.000121	0.000907	0.000014	0.000130	
0.000177 LA3324-2-7	0.006096	0.003624	0.000569	0.002631	0.000562	0.001889	0.000041	0.000394	
0.000101 LA3324-2-8	0.006447	0.003826	0.000572	0.002727	0.000357	0.001393	0.000029	0.000245	
0.000094 LA3324-2-9	0.007399	0.004325	0.000617	0.003105	0.000429	0.001349	0.000035	0.000227	
0.000090 LA3324-2-10	0.007161	0.004161	0.000654	0.003154	0.000279	0.001930	0.000022	0.000362	
0.000044 LA3324-2-11	0.006844	0.003998	0.000604	0.003031	0.000223	0.001866	0.000030	0.000328	
0.000116 LA3324-2-12	0.006848	0.003984	0.000666	0.003252	0.000874	0.004093	0.000033	0.000858	
0.000119 SRM614-16	0.000455	0.000283	0.000032	0.001400	0.000080	0.000738	0.000305	0.000115	
0.004099 SRM612-16	0.005179	0.003013	0.000463	0.003327	0.004065	0.011477	0.005610	0.004016	
0.058421 SRM610-16	0.073605	0.041541	0.006095	0.031402	0.052435	0.168223	0.071946	0.042274	
0.000000 AP1-16	0.000068	0.000045	0.000000	0.000069	0.000008	0.000123	0.000025	0.000012	
0.000083 AP2-16	0.002177	0.001259	0.000180	0.000919	0.000045	0.000207	0.000024	0.000020	
0.000591 AP3-16	0.024657	0.013220	0.001550	0.008734	0.000308	0.000479	0.000029	0.000068	
0.000549 AP4-16	0.021430	0.011536	0.001403	0.007658	0.000290	0.000578	0.000032	0.000067	
standardize signal averages AP									
0.000000 AP1	0.000082	0.000050	0.000005	0.000035	0.000004	0.000113	0.000019	0.000013	
0.000089 AP2	0.002306	0.001340	0.000197	0.000895	0.000042	0.000225	0.000019	0.000021	
0.000597 AP3	0.023715	0.012741	0.001521	0.008405	0.000293	0.000483	0.000024	0.000066	
0.000561 AP4	0.021055	0.011386	0.001404	0.007524	0.000279	0.000585	0.000026	0.000064	
linest from std sig ave									
0.042527	0.024098	0.046187	0.383436	0.069985	1.972108	0.007102	0.000000	0.054763	
standardize signal averages SRM									
0.000101 srm614-2	0.000418	0.000247	0.000088	0.000796	0.000094	0.000590	0.000180	0.000092	
0.004430 srm612-2	0.005375	0.003070	0.000507	0.002748	0.003798	0.011377	0.005474	0.003725	
0.060738 srm610-2	0.070488	0.039408	0.006071	0.029097	0.049535	0.172514	0.070216	0.038447	
linest from std sig ave									
0.000000	0.075519	0.000000	0.000000	0.000000	0.000000	0.029643	0.070809	0.096451	
concentration data									
0.31 SRM614-15	0.79	0.84	4.74	1.15	18.16	0.27	0.00	0.32	
17.37 SRM612-15	11.51	12.39	18.13	13.02	597.41	6.87	0.00	16.13	
229.98 SRM610-15	139.24	147.65	198.87	160.81	7887.53	107.68	0.00	162.60	
0.00 AP1-15	0.92	1.01	1.42	0.00	0.00	0.29	0.00	0.29	
1.60 AP2-15	23.41	26.20	32.71	24.29	31.71	0.69	0.00	0.48	
10.25 AP3-15	218.93	225.96	228.24	225.48	218.19	1.38	0.00	1.41	
9.73 AP4-15	198.81	207.03	214.84	206.34	211.22	1.67	0.00	1.34	
1.38 LA3324-2-1	17.99	20.08	26.55	14.96	44.32	3.21	0.00	3.80	
0.75 LA3324-2-2	18.26	21.01	26.09	18.48	41.52	3.27	0.00	4.11	
1.79 LA3324-2-3	21.77	25.06	33.64	25.30	128.01	3.68	0.00	13.13	
0.64 LA3324-2-4	43.67	49.14	61.97	53.22	60.23	2.49	0.00	2.25	
0.34 LA3324-2-5	38.76	43.48	56.07	46.67	57.19	2.48	0.00	2.36	
1.27 LA3324-2-6	39.97	45.60	55.80	48.87	95.14	2.57	0.00	2.84	

Appendix A. Raw trace element datasheets from laser ablation.

3.00 LA3324-2-7	58.61	66.77	87.09	73.46	441.84	5.35	0.00	8.60
1.72 LA3324-2-8	61.98	70.50	87.56	76.13	280.58	3.95	0.00	5.35
1.59 LA3324-2-9	71.13	79.69	94.40	86.69	337.62	3.82	0.00	4.95
1.52 LA3324-2-10	68.85	76.68	100.10	88.07	219.44	5.47	0.00	7.90
0.75 LA3324-2-11	65.80	73.67	92.36	84.64	175.76	5.29	0.00	7.17
1.97 LA3324-2-12	65.83	73.42	101.95	90.79	687.30	11.60	0.00	18.75
0.43 SRM614-16	0.94	1.12	1.04	8.40	13.56	0.45	0.00	0.54
14.95 SRM612-16	10.70	11.93	15.22	19.97	687.48	6.99	0.00	18.86
213.07 SRM610-16	152.12	164.55	200.42	188.48	8868.50	102.46	0.00	198.55
0.00 AP1-16	0.65	0.82	0.00	1.93	6.38	0.35	0.00	0.26
1.41 AP2-16	20.93	23.20	27.55	25.67	35.05	0.59	0.00	0.43
10.02 AP3-16	237.05	243.59	237.05	243.84	242.10	1.36	0.00	1.48
9.32 AP4-16	206.02	212.55	214.57	213.81	228.22	1.64	0.00	1.47

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
376.08 blank-13	241.20	258.80	475.88	3308.22	788.84	1335.25	454.48	308.00
594.92 SRM614-13	812.32	514.08	579.40	4620.19	944.01	2300.81	721.52	436.28
7169.84 SRM612-13	7509.16	4467.50	1160.93	6927.40	6694.92	19971.95	9117.21	5466.43
55823.91 SRM610-13	60361.22	33893.51	5584.79	28030.20	43236.00	158929.38	61411.07	30729.33
468.04 AP1-13	1788.53	1073.05	518.44	3400.82	773.68	3190.58	739.60	622.40
1461.09 AP2-13	26520.27	15648.89	2681.18	13706.92	1165.33	3926.10	664.80	601.92
7404.64 AP3-13	234668.72	127292.20	16863.10	89406.98	3955.86	8295.25	819.84	1215.97
13070.63 AP4-13	540322.19	288542.75	33563.39	191892.69	7113.72	13209.52	817.56	1787.69
1553.81 LA3324-1-1	74462.34	42763.12	6862.24	34369.95	2180.01	16675.90	697.88	8051.97
1089.65 LA3324-1-2	61194.54	35666.00	5597.51	28863.96	1744.29	13273.35	627.00	6264.08
1328.45 LA3324-1-3	53711.26	31446.98	5007.07	25952.87	1669.81	11893.11	622.36	5453.31
3470.94 LA3324-1-4	72169.81	41899.75	7686.28	37964.33	3178.62	52190.45	756.12	31671.10
2308.69 LA3324-1-5	53431.02	31465.90	5826.91	29165.24	2254.77	39296.18	769.08	24742.86
2573.93 LA3324-1-6	75430.87	43583.41	7617.84	37840.89	2914.06	42848.88	728.64	24721.58
2850.66 LA3324-1-7	61856.59	36317.32	6469.92	32600.30	2695.50	37313.53	710.92	18364.02
3696.38 LA3324-1-8	96066.06	54896.67	9222.45	45993.54	3721.46	44538.89	792.08	24183.62
4208.38 LA3324-1-9	111553.34	63584.36	10170.34	51733.77	4675.23	45101.45	812.56	25228.50
2430.65 LA3324-1-10	47133.95	27936.56	4496.23	24210.98	3143.14	11794.03	796.88	3239.06
2306.73 LA3324-1-11	40276.95	23573.25	3728.26	20766.84	2147.17	7370.60	672.80	1825.77
1799.01 LA3324-1-12	42068.28	24407.50	3883.26	21914.72	2182.25	7601.56	763.08	1967.17
2250.09 LA3324-1-13	48540.15	28228.12	4687.27	24863.06	2353.05	12958.15	769.08	5352.11
2132.09 LA3324-1-14	59228.34	30964.05	4777.15	26383.15	2619.05	9651.29	692.88	3104.94
2196.69 LA3324-1-15	55207.43	31919.50	5038.75	27173.91	2612.97	9995.98	762.96	3059.10
1570.45 LA3324-1-16	45287.18	26764.75	4160.06	23661.09	1959.45	10538.02	722.64	3648.22
1547.49 LA3324-1-17	53808.78	31056.22	4928.83	27097.87	2044.41	11355.54	707.80	4266.90
1668.69 LA3324-1-18	57231.24	33661.51	5167.79	28776.68	2105.49	11251.26	750.76	4497.07
608.80 SRM614-14	760.96	619.24	392.48	6214.75	971.05	2661.34	983.81	490.20
6073.31 SRM612-14	7010.12	4224.58	964.29	8801.97	6860.44	17628.82	8680.49	6048.03
47104.15 SRM610-14	59816.34	33602.99	5292.43	29925.21	46850.06	140286.03	60826.54	35956.04
465.56 AP1-14	683.68	518.84	353.20	4615.79	893.21	3030.34	871.36	477.68
1246.61 AP2-14	19295.67	11590.87	2009.73	12313.99	1202.09	3704.54	857.04	508.04
6076.51 AP3-14	213833.13	117330.42	14881.72	82301.14	3817.10	7250.80	1009.77	1021.41
7635.68 AP4-14	284969.00	154156.83	19340.71	106628.45	4753.71	9049.37	906.45	1220.13
605.00 blank-14	361.16	376.40	229.96	5527.35	755.88	2053.53	746.00	362.40
490.54 blank average	301.18	317.60	352.92	4417.78	772.36	1694.39	600.24	335.20

blank subtraction								
104.38 SRM614-13	511.14	196.48	226.48	202.40	171.64	606.42	121.28	101.08
6679.30 SRM612-13	7207.98	4149.90	808.00	2509.61	5922.55	18277.56	8516.97	5131.23
55333.37 SRM610-13	60060.04	33575.91	5231.87	23612.41	42463.64	157234.99	60810.82	30394.13
-22.50 AP1-13	1487.35	755.44	165.52	-1016.97	1.32	1496.19	139.36	287.20
970.55 AP2-13	26219.09	15331.29	2328.25	9289.13	392.96	2231.71	64.56	266.72
6914.10 AP3-13	234367.54	126974.60	16510.17	84989.20	3183.50	6600.86	219.60	880.77
12580.09 AP4-13	540021.01	288225.15	33210.47	187474.91	6341.36	11515.13	217.32	1452.49
1063.27 LA3324-1-1	74161.15	42445.52	6509.32	29952.17	1407.65	14981.51	97.64	7716.76
599.10 LA3324-1-2	60893.36	35348.40	5244.59	24446.18	971.93	11578.96	26.76	5928.87
837.90 LA3324-1-3	53410.08	31129.38	4654.15	21535.08	897.44	10198.72	22.12	5118.11
2980.40 LA3324-1-4	71868.62	41582.15	7333.36	33546.55	2406.25	50496.06	155.88	31335.90
1818.15 LA3324-1-5	53129.84	31148.29	5473.99	24747.46	1482.41	37601.79	168.84	24407.66
2083.39 LA3324-1-6	75129.69	43265.80	7264.92	33423.11	2141.69	41154.49	128.40	24386.38
2360.11 LA3324-1-7	61555.41	35999.72	6116.99	28182.52	1923.13	35619.14	110.68	18028.82
3205.84 LA3324-1-8	95764.88	54579.07	8869.53	41575.75	2949.10	42844.50	191.84	23848.42
3717.84 LA3324-1-9	111252.16	63266.76	9817.42	47315.99	3902.86	43407.06	212.32	24893.30

Appendix A. Raw trace element datasheets from laser ablation.

1940.11 LA3324-1-10	46832.76	27618.96	4143.30	19793.19	2370.77	10099.64	196.64	2903.86
1816.19 LA3324-1-11	39975.76	23255.65	3375.34	16349.05	1374.81	5676.21	72.56	1490.57
1308.47 LA3324-1-12	41767.10	24089.90	3530.34	17496.94	1409.89	5907.17	162.84	1631.97
1759.55 LA3324-1-13	48238.97	27910.52	4334.34	20445.28	1580.69	11263.76	168.84	5016.91
1641.55 LA3324-1-14	52627.16	30646.45	4424.23	21965.36	1846.69	7956.90	92.64	2769.74
1706.15 LA3324-1-15	54906.25	31601.90	4685.83	22756.13	1840.61	8301.59	162.72	2723.90
1079.91 LA3324-1-16	44985.99	26447.15	3807.14	19243.31	1187.09	8843.63	122.40	3313.02
1056.95 LA3324-1-17	53507.60	30738.61	4575.91	22680.09	1272.05	9661.15	107.56	3931.70
1178.15 LA3324-1-18	56930.06	33343.91	4814.87	24358.90	1333.13	9556.87	150.52	4161.86
118.26 SRM614-14	459.78	301.64	39.56	1796.97	198.68	966.95	383.56	155.00
5582.77 SRM612-14	6708.94	3906.98	611.36	4384.18	6088.07	15934.43	8080.25	5712.83
46613.60 SRM610-14	59515.15	33285.39	4939.51	25507.42	46077.70	138591.64	60226.30	35620.84
-24.98 AP1-14	382.50	201.24	0.28	198.00	120.84	1335.95	271.12	142.48
756.06 AP2-14	18994.49	11273.26	1656.81	7896.20	429.72	2010.15	256.80	172.84
5585.97 AP3-14	213531.95	117012.82	14528.80	77883.36	3044.74	5556.41	409.52	686.20
7145.14 AP4-14	284667.82	153839.23	18987.79	102210.67	3981.34	7354.98	306.20	884.92
zero correction								
104.38 SRM614-13	511.14	196.48	226.48	202.40	171.64	606.42	121.28	101.08
6679.30 SRM612-13	7207.98	4149.90	808.00	2509.61	5922.55	18277.56	8516.97	5131.23
55333.37 SRM610-13	60060.04	33575.91	5231.87	23612.41	42463.64	157234.99	60810.82	30394.13
0.00 AP1-13	1487.35	755.44	165.52	0.00	1.32	1496.19	139.36	287.20
970.55 AP2-13	26219.09	15331.29	2328.25	9289.13	392.96	2231.71	64.56	266.72
6914.10 AP3-13	234367.54	126974.60	16510.17	84989.20	3183.50	6600.86	219.60	880.77
12580.09 AP4-13	540021.01	288225.15	33210.47	187474.91	6341.36	11515.13	217.32	1452.49
1063.27 LA3324-1-1	74161.15	42445.52	6509.32	29952.17	1407.65	14981.51	97.64	7716.76
599.10 LA3324-1-2	60893.36	35348.40	5244.59	24446.18	971.93	11578.96	26.76	5928.87
837.90 LA3324-1-3	53410.08	31129.38	4654.15	21535.08	897.44	10198.72	22.12	5118.11
2980.40 LA3324-1-4	71868.62	41582.15	7333.36	33546.55	2406.25	50496.06	155.88	31335.90
1818.15 LA3324-1-5	53129.84	31148.29	5473.99	24747.46	1482.41	37601.79	168.84	24407.66
2083.39 LA3324-1-6	75129.69	43265.80	7264.92	33423.11	2141.69	41154.49	128.40	24386.38
2360.11 LA3324-1-7	61555.41	35999.72	6116.99	28182.52	1923.13	35619.14	110.68	18028.82
3205.84 LA3324-1-8	95764.88	54579.07	8869.53	41575.75	2949.10	42844.50	191.84	23848.42
3717.84 LA3324-1-9	111252.16	63266.76	9817.42	47315.99	3902.86	43407.06	212.32	24893.30
1940.11 LA3324-1-10	46832.76	27618.96	4143.30	19793.19	2370.77	10099.64	196.64	2903.86
1816.19 LA3324-1-11	39975.76	23255.65	3375.34	16349.05	1374.81	5676.21	72.56	1490.57
1308.47 LA3324-1-12	41767.10	24089.90	3530.34	17496.94	1409.89	5907.17	162.84	1631.97
1759.55 LA3324-1-13	48238.97	27910.52	4334.34	20445.28	1580.69	11263.76	168.84	5016.91
1641.55 LA3324-1-14	52627.16	30646.45	4424.23	21965.36	1846.69	7956.90	92.64	2769.74
1706.15 LA3324-1-15	54906.25	31601.90	4685.83	22756.13	1840.61	8301.59	162.72	2723.90
1079.91 LA3324-1-16	44985.99	26447.15	3807.14	19243.31	1187.09	8843.63	122.40	3313.02
1056.95 LA3324-1-17	53507.60	30738.61	4575.91	22680.09	1272.05	9661.15	107.56	3931.70
1178.15 LA3324-1-18	56930.06	33343.91	4814.87	24358.90	1333.13	9556.87	150.52	4161.86
118.26 SRM614-14	459.78	301.64	39.56	1796.97	198.68	966.95	383.56	155.00
5582.77 SRM612-14	6708.94	3906.98	611.36	4384.18	6088.07	15934.43	8080.25	5712.83
46613.60 SRM610-14	59515.15	33285.39	4939.51	25507.42	46077.70	138591.64	60226.30	35620.84
0.00 AP1-14	382.50	201.24	0.28	198.00	120.84	1335.95	271.12	142.48
756.06 AP2-14	18994.49	11273.26	1656.81	7896.20	429.72	2010.15	256.80	172.84
5585.97 AP3-14	213531.95	117012.82	14528.80	77883.36	3044.74	5556.41	409.52	686.20
7145.14 AP4-14	284667.82	153839.23	18987.79	102210.67	3981.34	7354.98	306.20	884.92
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000054 SRM614-13	0.000264	0.000101	0.000117	0.000105	0.000089	0.000313	0.000063	0.000052
0.003864 SRM612-13	0.004170	0.002401	0.000467	0.001452	0.003426	0.010574	0.004927	0.002968
0.057354 SRM610-13	0.062254	0.034802	0.005423	0.024475	0.044014	0.162977	0.063032	0.031504
0.000000 AP1-13	0.000099	0.000050	0.000011	0.000000	0.000000	0.000100	0.000009	0.000019
0.000080 AP2-13	0.002161	0.001264	0.000192	0.000766	0.000032	0.000184	0.000005	0.000022
0.000385 AP3-13	0.013050	0.007070	0.000919	0.004732	0.000177	0.000368	0.000012	0.000049
0.000791 AP4-13	0.033953	0.018122	0.002088	0.011787	0.000399	0.000724	0.000014	0.000091
0.000129 LA3324-1-1	0.009009	0.005156	0.000791	0.003639	0.000171	0.001820	0.000012	0.000937

Appendix A. Raw trace element datasheets from laser ablation.

0.000085 LA3324-1-2	0.008676	0.005036	0.000747	0.003483	0.000138	0.001650	0.000004	0.000845
0.000144 LA3324-1-3	0.009200	0.005362	0.000802	0.003709	0.000155	0.001757	0.000004	0.000882
0.000257 LA3324-1-4	0.006197	0.003585	0.000632	0.002892	0.000207	0.004354	0.000013	0.002702
0.000186 LA3324-1-5	0.005436	0.003187	0.000560	0.002532	0.000152	0.003847	0.000017	0.002497
0.000195 LA3324-1-6	0.007039	0.004054	0.000681	0.003132	0.000201	0.003856	0.000012	0.002285
0.000212 LA3324-1-7	0.005517	0.003226	0.000548	0.002526	0.000172	0.003192	0.000010	0.001616
0.000252 LA3324-1-8	0.007533	0.004293	0.000698	0.003271	0.000232	0.003370	0.000015	0.001876
0.000301 LA3324-1-9	0.008993	0.005114	0.000794	0.003825	0.000315	0.003509	0.000017	0.002012
0.000341 LA3324-1-10	0.008243	0.004861	0.000729	0.003484	0.000417	0.001778	0.000035	0.000511
0.000369 LA3324-1-11	0.008132	0.004731	0.000687	0.003326	0.000280	0.001155	0.000015	0.000303
0.000261 LA3324-1-12	0.008344	0.004813	0.000705	0.003495	0.000282	0.001180	0.000033	0.000326
0.000245 LA3324-1-13	0.006718	0.003887	0.000604	0.002847	0.000220	0.001569	0.000024	0.000699
0.000227 LA3324-1-14	0.007285	0.004242	0.000612	0.003041	0.000256	0.001101	0.000013	0.000383
0.000240 LA3324-1-15	0.007711	0.004438	0.000658	0.003196	0.000258	0.001166	0.000023	0.000383
0.000169 LA3324-1-16	0.007059	0.004150	0.000597	0.003019	0.000186	0.001388	0.000019	0.000520
0.000148 LA3324-1-17	0.007483	0.004299	0.000640	0.003172	0.000178	0.001351	0.000015	0.000550
0.000162 LA3324-1-18	0.007819	0.004580	0.000661	0.003345	0.000183	0.001313	0.000021	0.000572
0.000089 SRM614-14	0.000348	0.000228	0.000030	0.001359	0.000150	0.000731	0.000290	0.000117
0.004127 SRM612-14	0.004960	0.002888	0.000452	0.003241	0.004501	0.011780	0.005973	0.004223
0.056930 SRM610-14	0.072686	0.040652	0.006033	0.031152	0.056275	0.169263	0.073555	0.043504
0.000000 AP1-14	0.000031	0.000016	0.000000	0.000016	0.000010	0.000107	0.000022	0.000011
0.000080 AP2-14	0.002012	0.001194	0.000175	0.000836	0.000046	0.000213	0.000027	0.000018
0.000383 AP3-14	0.014643	0.008024	0.000996	0.005341	0.000209	0.000381	0.000028	0.000047
0.000571 AP4-14	0.022762	0.012301	0.001518	0.008173	0.000318	0.000588	0.000024	0.000071
standardize signal averages AP								
0.000000 AP1	0.000065	0.000033	0.000006	0.000008	0.000005	0.000104	0.000016	0.000015
0.000080 AP2	0.002086	0.001229	0.000184	0.000801	0.000039	0.000198	0.000016	0.000020
0.000384 AP3	0.013847	0.007547	0.000958	0.005037	0.000193	0.000374	0.000020	0.000048
0.000681 AP4	0.028357	0.015211	0.001803	0.009980	0.000359	0.000656	0.000019	0.000081
linest from std sig ave								
0.046938	0.025690	0.049183	0.409398	0.074728	2.052515	0.007193	0.000000	0.055362
standardize signal averages SRM								
0.000072 srm614-2	0.000306	0.000165	0.000073	0.000732	0.000119	0.000522	0.000176	0.000085
0.003996 srm612-2	0.004565	0.002645	0.000460	0.002346	0.003963	0.011177	0.005450	0.003596
0.057142 srm610-2	0.067470	0.037727	0.005728	0.027814	0.050145	0.166120	0.068293	0.037504
linest from std sig ave								
0.000000	0.078939	0.000000	0.000000	0.000000	0.000000	0.030782	0.072792	0.098883
concentration data								
0.22 SRM614-13	0.58	0.43	4.11	0.67	15.60	0.19	0.00	0.25
15.55 SRM612-13	9.19	10.13	16.41	9.30	603.12	6.52	0.00	14.09
230.88 SRM610-13	137.16	146.80	190.41	156.86	7747.86	100.55	0.00	149.58
0.00 AP1-13	1.02	0.99	1.80	0.00	0.07	0.29	0.00	0.42
1.50 AP2-13	22.15	24.79	31.34	22.82	26.52	0.53	0.00	0.49
7.21 AP3-13	133.75	138.72	150.15	141.08	145.15	1.05	0.00	1.08
14.81 AP4-13	347.97	355.56	341.03	351.39	326.46	2.08	0.00	2.02
2.42 LA3324-1-1	92.33	101.17	129.15	108.47	140.02	5.22	0.00	20.70
1.60 LA3324-1-2	88.92	98.81	122.04	103.83	113.39	4.73	0.00	18.66
2.70 LA3324-1-3	94.29	105.21	130.93	110.58	126.57	5.04	0.00	19.47
4.81 LA3324-1-4	63.51	70.35	103.27	86.23	169.88	12.49	0.00	59.67
3.48 LA3324-1-5	55.71	62.53	91.47	75.48	124.19	11.04	0.00	55.15
3.66 LA3324-1-6	72.14	79.54	111.17	93.36	164.31	11.07	0.00	50.46
3.96 LA3324-1-7	56.54	63.30	89.54	75.30	141.13	9.16	0.00	35.69
4.72 LA3324-1-8	77.21	84.24	113.96	97.50	189.96	9.67	0.00	41.43
5.63 LA3324-1-9	92.17	100.35	129.62	114.03	258.34	10.07	0.00	44.44
6.39 LA3324-1-10	84.48	95.38	119.11	103.86	341.69	5.10	0.00	11.29
6.92 LA3324-1-11	83.34	92.82	112.14	99.15	229.00	3.31	0.00	6.70
4.89 LA3324-1-12	85.52	94.43	115.19	104.20	230.63	3.39	0.00	7.20
4.59 LA3324-1-13	68.85	76.27	98.59	84.88	180.25	4.50	0.00	15.43
4.25 LA3324-1-14	74.66	83.23	100.02	90.64	209.31	3.16	0.00	8.47
4.49 LA3324-1-15	79.02	87.08	107.47	95.27	211.65	3.35	0.00	8.45
3.17 LA3324-1-16	72.34	81.42	97.57	90.02	152.52	3.98	0.00	11.48
2.77 LA3324-1-17	76.69	84.35	104.52	94.56	145.67	3.88	0.00	12.14
3.03 LA3324-1-18	80.13	89.85	108.00	99.73	149.92	3.77	0.00	12.62
0.36 SRM614-14	0.77	0.96	1.05	0.71	26.46	0.45	0.00	0.56
16.61 SRM612-14	10.93	12.18	15.87	20.77	792.26	7.27	0.00	20.05
229.17 SRM610-14	160.15	171.47	211.81	199.65	9906.08	104.42	0.00	206.56
0.00 AP1-14	0.31	0.32	0.00	0.47	7.94	0.31	0.00	0.25
1.50 AP2-14	20.62	23.43	28.66	24.93	37.27	0.61	0.00	0.40
7.17 AP3-14	150.08	157.44	162.73	159.22	170.97	1.09	0.00	1.04
10.70 AP4-14	233.28	241.35	247.96	243.64	260.67	1.69	0.00	1.56
certified concentration								
SRM614	1.90					1.12		

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65		Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data									
312.88	blank-11	305.00	253.68	327.52	1587.37	739.16	821.92	311.72	223.76
499.20	SRM614-11	875.28	454.40	437.96	3297.06	864.12	1491.81	470.08	319.40
7120.68	SRM612-11	7676.56	4314.06	1087.33	6174.15	4933.79	18892.79	6926.20	4351.58
51126.01	SRM610-11	49585.24	27987.00	4826.59	22319.25	28652.80	142711.25	44224.53	22428.25
500.44	AP1-11	2626.09	1229.57	442.24	2018.45	597.92	2635.85	460.04	317.96
1376.05	AP2-11	24625.26	14204.40	2366.89	10892.50	882.45	3330.18	490.08	366.64
8372.93	AP3-11	258373.38	140659.44	18036.90	95673.46	3721.34	8503.65	502.24	916.29
9038.93	AP4-11	289790.88	157874.72	20232.19	106387.60	4141.10	10846.06	544.04	944.13
510.48	M17-24-141-1	10301.94	6057.19	1145.25	5175.95	684.44	2583.77	464.32	260.76
455.24	M17-24-141-2	11694.59	6909.48	1265.05	5981.27	715.84	2773.54	484.00	254.28
440.60	M17-24-141-3	13371.08	7755.24	1329.41	6756.88	773.28	2875.90	484.36	249.48
480.36	M17-24-141-4	15511.33	9215.81	1599.45	7645.08	779.52	3177.66	507.88	296.76
450.76	M17-24-141-5	14454.40	8688.89	1511.89	7439.84	798.12	3290.30	503.28	279.80
505.32	M17-24-141-6	15604.81	9267.01	1642.53	8025.09	791.76	3136.30	531.88	241.56
554.12	M17-24-141-7	16191.01	9653.89	1665.89	8137.29	782.64	3467.34	533.44	251.12
530.72	M17-24-141-8	14189.28	8391.33	1498.05	7513.60	728.04	3263.62	493.96	267.28
524.24	M17-24-141-9	15876.85	9351.81	1629.05	8278.73	793.80	3336.02	546.16	283.28
854.76	M17-24-141-10	36501.97	21565.84	3382.94	16769.57	1825.17	5667.23	631.64	368.76
998.89	M17-24-141-11	51945.77	30024.61	4702.31	22995.01	3181.82	7183.96	776.88	474.60
1264.01	M17-24-141-12	53959.06	31637.82	5027.55	23912.02	4813.71	8648.21	986.25	655.08
3143.06	M17-24-141-13	97157.51	55436.79	8757.13	41847.08	8576.69	25519.54	1315.25	1115.41
2904.22	M17-24-141-14	100763.16	57538.89	8837.37	42733.88	9454.61	19524.79	1288.41	1156.65
2675.78	M17-24-141-15	102655.98	58388.97	8927.37	43020.00	10101.02	20378.15	1389.29	1081.21
5315.63	M17-24-141-16	112061.71	63311.88	9706.54	46744.38	2935.70	20576.04	806.44	670.92
4813.79	M17-24-141-17	115013.17	65317.25	9931.70	47980.51	2926.58	20541.44	794.60	481.56
5318.99	M17-24-141-18	114631.77	64878.41	9890.42	47692.27	2809.94	20873.76	817.24	531.80
665.20	SRM614-12	747.32	425.24	321.88	3063.70	705.64	1991.25	864.56	359.24
8120.13	SRM612-12	9355.53	5475.91	1160.97	6830.00	6785.52	21317.64	9454.69	6640.44
59395.54	SRM610-12	73436.62	41105.55	6461.44	31803.74	43345.81	169011.95	63288.84	36636.45
507.84	AP1-12	798.24	416.20	275.72	1809.41	645.56	2647.01	786.16	351.44
1470.21	AP2-12	25991.15	15168.73	2484.09	12333.43	1123.25	3754.14	803.04	464.88
7850.16	AP3-12	286349.84	155765.80	19554.47	105242.43	4318.58	8981.69	939.85	1060.45
11939.83	AP4-12	470251.00	250370.45	29454.77	166388.25	6139.03	13259.99	964.25	1408.29
536.32	blank-12	277.24	167.16	182.08	1271.73	470.36	1278.85	614.84	247.48
424.60	blank average	291.12	210.42	254.80	1429.55	604.76	1050.39	463.28	235.62

blank subtraction									
74.60	SRM614-11	584.16	243.98	183.16	1867.51	259.36	441.42	6.80	83.78
6696.08	SRM612-11	7385.44	4103.64	832.52	4744.61	4329.02	17842.40	6462.92	4115.96
50701.41	SRM610-11	49294.12	27776.58	4571.79	20889.70	28048.04	141660.86	43761.24	22192.62
75.84	AP1-11	2334.97	1019.15	187.44	588.90	-6.84	1585.47	-3.24	82.34
951.45	AP2-11	24334.14	13993.98	2112.09	9462.95	277.68	2279.79	26.80	131.02
7948.32	AP3-11	258082.26	140449.02	17782.10	94243.91	3116.58	7453.26	38.96	680.66
8614.33	AP4-11	289499.76	157664.30	19977.39	104958.05	3536.34	9795.68	80.76	708.50
85.88	M17-24-141-1	10010.82	5846.77	890.45	3746.40	79.68	1533.39	1.04	25.14
30.64	M17-24-141-2	11403.46	6699.06	1010.25	4551.73	111.08	1723.15	20.72	18.66
16.00	M17-24-141-3	13079.95	7544.82	1074.61	5327.33	168.52	1825.51	21.08	13.86
55.76	M17-24-141-4	15220.21	9005.39	1344.65	6215.53	174.76	2127.27	44.60	61.14
26.16	M17-24-141-5	14163.28	8478.47	1257.09	6010.29	193.36	2239.91	40.00	44.18
80.72	M17-24-141-6	15313.69	9056.59	1387.73	6595.54	187.00	2085.91	68.60	5.94
129.52	M17-24-141-7	15899.89	9443.47	1411.09	6707.74	177.88	2416.95	70.16	15.50
106.12	M17-24-141-8	13898.16	8180.91	1243.25	6084.05	123.28	2213.23	30.68	31.66
99.64	M17-24-141-9	15585.73	9141.39	1374.25	6849.18	189.04	2285.63	82.88	47.66
430.16	M17-24-141-10	36210.84	21355.42	3128.14	15340.03	1220.41	4616.85	168.36	133.14
574.28	M17-24-141-11	51654.65	29814.19	4447.51	21565.46	2577.05	6133.57	313.60	238.98
839.40	M17-24-141-12	53667.94	31427.40	4772.75	22482.47	4208.94	7597.82	522.96	419.46
2718.46	M17-24-141-13	96866.39	55226.37	8502.33	40417.53	7971.93	24469.16	851.96	879.78
2479.61	M17-24-141-14	100472.04	57328.47	8582.57	41304.33	8849.85	18474.40	825.12	921.03
2251.17	M17-24-141-15	102364.86	58178.55	8672.57	41590.45	9496.25	19327.77	926.01	845.58
4891.03	M17-24-141-16	111770.59	63101.45	9451.73	45314.83	2330.93	19525.65	343.16	435.30
4389.18	M17-24-141-17	114722.05	65106.82	9676.89	46550.96	2321.81	19491.05	331.32	245.94
4894.39	M17-24-141-18	114340.65	64667.98	9635.61	46262.72	2205.17	19823.37	353.96	296.18
240.60	SRM614-12	456.20	214.82	67.08	1634.15	100.88	940.87	401.28	123.62
7695.52	SRM612-12	9064.41	5265.49	906.17	5400.45	6180.75	20267.26	8991.41	6404.82
58970.93	SRM610-12	73145.50	40895.13	6206.64	30374.19	42741.04	167961.56	62825.55	36400.82
83.24	AP1-12	507.12	205.78	20.92	379.86	40.80	1596.63	322.88	115.82
1045.61	AP2-12	25700.02	14958.30	2229.29	10903.88	518.48	2703.76	339.76	229.26
7425.56	AP3-12	286058.72	155555.38	19299.67	103812.88	3713.82	7931.30	476.56	824.82
11515.22	AP4-12	469959.88	250160.03	29199.96	164958.70	5534.27	12209.61	500.96	1172.67

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
74.60 SRM614-11	584.16	243.98	183.16	1867.51	259.36	441.42	6.80	83.78
6696.08 SRM612-11	7385.44	4103.64	832.52	4744.61	4329.02	17842.40	6462.92	4115.96
50701.41 SRM610-11	49294.12	27776.58	4571.79	20889.70	28048.04	141660.86	43761.24	22192.62
75.84 AP1-11	2334.97	1019.15	187.44	588.90	0.00	1585.47	0.00	82.34
951.45 AP2-11	24334.14	13993.98	2112.09	9462.95	277.68	2279.79	26.80	131.02
7948.32 AP3-11	258082.26	140449.02	17782.10	94243.91	3116.58	7453.26	38.96	680.66
8614.33 AP4-11	289499.76	157664.30	19977.39	104958.05	3536.34	9795.68	80.76	708.50
85.88 M17-24-141-1	10010.82	5846.77	890.45	3746.40	79.68	1533.39	1.04	25.14
30.64 M17-24-141-2	11403.46	6699.06	1010.25	4551.73	111.08	1723.15	20.72	18.66
16.00 M17-24-141-3	13079.95	7544.82	1074.61	5327.33	168.52	1825.51	21.08	13.86
55.76 M17-24-141-4	15220.21	9005.39	1344.65	6215.53	174.76	2127.27	44.60	61.14
26.16 M17-24-141-5	14163.28	8478.47	1257.09	6010.29	193.36	2239.91	40.00	44.18
80.72 M17-24-141-6	15313.69	9056.59	1387.73	6595.54	187.00	2085.91	68.60	5.94
129.52 M17-24-141-7	15899.89	9443.47	1411.09	6707.74	177.88	2416.95	70.16	15.50
106.12 M17-24-141-8	13898.16	8180.91	1243.25	6084.05	123.28	2213.23	30.68	31.66
99.64 M17-24-141-9	15585.73	9141.39	1374.25	6849.18	189.04	2285.63	82.88	47.66
430.16 M17-24-141-10	36210.84	21355.42	3128.14	15340.03	1220.41	4616.85	168.36	133.14
574.28 M17-24-141-11	51654.65	29814.19	4447.51	21565.46	2577.05	6133.57	313.60	238.98
839.40 M17-24-141-12	53667.94	31427.40	4772.75	22482.47	4208.94	7597.82	522.96	419.46
2718.46 M17-24-141-13	96866.39	55226.37	8502.33	40417.53	7971.93	24469.16	851.96	879.78
2479.61 M17-24-141-14	100472.04	57328.47	8582.57	41304.33	8849.85	18474.40	825.12	921.03
2251.17 M17-24-141-15	102364.86	58178.55	8672.57	41590.45	9496.25	19327.77	926.01	845.58
4891.03 M17-24-141-16	111770.59	63101.45	9451.73	45314.83	2330.93	19325.65	343.16	435.30
4389.18 M17-24-141-17	114722.05	65106.82	9676.89	46550.96	2321.81	19491.05	331.32	245.94
4894.39 M17-24-141-18	114340.65	64667.98	9635.61	46262.72	2205.17	19823.37	353.96	296.18
240.60 SRM614-12	456.20	214.82	67.08	1634.15	100.88	940.87	401.28	123.62
7695.52 SRM612-12	9064.41	5265.49	906.17	5400.45	6180.75	20267.26	8991.41	6404.82
58970.93 SRM610-12	73145.50	40895.13	6206.64	30374.19	42741.04	167961.56	62825.55	36400.82
83.24 AP1-12	507.12	205.78	20.92	379.86	40.80	1596.63	322.88	115.82
1045.61 AP2-12	25700.02	14958.30	2229.29	10903.88	518.48	3397.76	339.76	229.26
7425.56 AP3-12	286058.72	155555.38	19299.67	103812.88	3713.82	7931.30	476.56	824.82
11515.22 AP4-12	469959.88	250160.03	29199.96	164958.70	5534.27	12209.61	500.96	1172.67
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000040 SRM614-11	0.000314	0.000131	0.000098	0.001004	0.000139	0.000237	0.000004	0.000045
0.003462 SRM612-11	0.003819	0.002122	0.000430	0.002453	0.002238	0.009226	0.003342	0.002128
0.049603 SRM610-11	0.048226	0.027175	0.004473	0.020437	0.027440	0.138592	0.042813	0.021712
0.000007 AP1-11	0.000204	0.000089	0.000016	0.000051	0.000000	0.000138	0.000000	0.000007
0.000089 AP2-11	0.002267	0.001303	0.000197	0.000881	0.000026	0.000212	0.000002	0.000012
0.000558 AP3-11	0.018133	0.009868	0.001249	0.006622	0.000219	0.000524	0.000003	0.000048
0.000634 AP4-11	0.021317	0.011609	0.001471	0.007728	0.000260	0.000721	0.000006	0.000052
0.000039 M17-24-141-1	0.004557	0.002662	0.000405	0.001705	0.000036	0.000698	0.000000	0.000011
0.000013 M17-24-141-2	0.004661	0.002738	0.000413	0.001860	0.000045	0.000704	0.000008	0.000008
0.000006 M17-24-141-3	0.004868	0.002808	0.000400	0.001983	0.000063	0.000679	0.000008	0.000005
0.000017 M17-24-141-4	0.004515	0.002671	0.000399	0.001844	0.000052	0.000631	0.000013	0.000018
0.000008 M17-24-141-5	0.004436	0.002655	0.000394	0.001882	0.000061	0.000702	0.000013	0.000014
0.000026 M17-24-141-6	0.004859	0.002873	0.000440	0.002093	0.000059	0.000662	0.000022	0.000002
0.000044 M17-24-141-7	0.005387	0.003200	0.000478	0.002273	0.000060	0.000819	0.000024	0.000005
0.000037 M17-24-141-8	0.004902	0.002886	0.000439	0.002146	0.000043	0.000781	0.000011	0.000011
0.000033 M17-24-141-9	0.005142	0.003016	0.000453	0.002260	0.000062	0.000754	0.000027	0.000016
0.000093 M17-24-141-10	0.007794	0.004597	0.000673	0.003302	0.000263	0.000994	0.000036	0.000029
0.000090 M17-24-141-11	0.008081	0.004664	0.000696	0.003374	0.000403	0.000960	0.000049	0.000037
0.000113 M17-24-141-12	0.007249	0.004245	0.000645	0.003037	0.000569	0.001026	0.000071	0.000057
0.000163 M17-24-141-13	0.005791	0.003301	0.000508	0.002416	0.000477	0.001463	0.000051	0.000053
0.000147 M17-24-141-14	0.005976	0.003410	0.000510	0.002457	0.000526	0.001099	0.000049	0.000055
0.000133 M17-24-141-15	0.006033	0.003429	0.000511	0.002451	0.000560	0.001139	0.000055	0.000050
0.000274 M17-24-141-16	0.006259	0.003534	0.000529	0.002538	0.000131	0.001093	0.000019	0.000024
0.000239 M17-24-141-17	0.006239	0.003541	0.000526	0.002532	0.000126	0.001060	0.000018	0.000013

Appendix A. Raw trace element datasheets from laser ablation.

0.000264 M17-24-141-18	0.006162	0.003485	0.000519	0.002493	0.000119	0.001068	0.000019	0.000016
0.000163 SRM614-12	0.000310	0.000146	0.000046	0.001110	0.000069	0.000639	0.000273	0.000084
0.004072 SRM612-12	0.004796	0.002786	0.000479	0.002858	0.003270	0.010724	0.004758	0.003389
0.058499 SRM610-12	0.072560	0.040568	0.006157	0.030131	0.042399	0.166618	0.062323	0.036110
0.000007 AP1-12	0.000042	0.000017	0.000002	0.000032	0.000003	0.000132	0.000027	0.000010
0.000086 AP2-12	0.002110	0.001228	0.000183	0.000895	0.000043	0.000222	0.000028	0.000019
0.000448 AP3-12	0.017256	0.009384	0.001164	0.006262	0.000224	0.000478	0.000029	0.000050
0.000713 AP4-12	0.029102	0.015491	0.001808	0.010215	0.000343	0.000756	0.000031	0.000073
standardize signal averages AP								
0.000007 AP1	0.000123	0.000053	0.000009	0.000041	0.000002	0.000135	0.000013	0.000008
0.000087 AP2	0.002188	0.001266	0.000190	0.000888	0.000034	0.000217	0.000015	0.000016
0.000503 AP3	0.017695	0.009626	0.001207	0.006442	0.000222	0.000501	0.000016	0.000049
0.000674 AP4	0.025210	0.013550	0.001640	0.008972	0.000302	0.000739	0.000018	0.000062
linest from std sig ave								
0.043200	0.026186	0.049970	0.407124	0.075157	2.215547	0.006122	0.000000	0.066395
standardize signal averages SRM								
0.000102 srm614-2	0.000312	0.000139	0.000072	0.001057	0.000104	0.000438	0.000138	0.000065
0.003767 srm612-2	0.004308	0.002454	0.000455	0.002655	0.002754	0.009975	0.004050	0.002759
0.054051 srm610-2	0.060393	0.033871	0.005315	0.025284	0.034920	0.152605	0.052568	0.028911
linest from std sig ave								
0.000000	0.088170	0.000000	0.000000	0.000000	0.000000	0.033512	0.094587	0.128279
concentration data								
0.15 SRM614-11	0.71	0.56	3.44	6.47	26.49	0.12	0.00	0.26
12.83 SRM612-11	8.58	9.09	15.03	15.81	425.34	4.84	0.00	12.12
183.78 SRM610-11	108.31	116.46	156.17	131.73	5213.99	72.76	0.00	123.63
0.11 AP1-11	2.13	1.77	2.65	1.54	0.00	0.34	0.00	0.19
1.53 AP2-11	23.68	25.98	31.95	26.43	22.86	0.52	0.00	0.32
9.62 AP3-11	189.43	196.72	202.92	198.54	193.54	1.28	0.00	1.27
10.93 AP4-11	222.69	231.43	238.91	231.72	230.15	1.76	0.00	1.38
0.67 M17-24-141-1	47.61	53.06	65.84	51.13	32.06	1.70	0.00	0.30
0.22 M17-24-141-2	48.69	54.58	67.07	55.78	40.13	1.72	0.00	0.20
0.10 M17-24-141-3	50.86	55.98	64.96	59.45	55.44	1.66	0.00	0.14
0.29 M17-24-141-4	47.17	53.26	64.79	55.28	45.82	1.54	0.00	0.48
0.14 M17-24-141-5	46.34	52.93	63.94	56.44	53.52	1.71	0.00	0.37
0.44 M17-24-141-6	50.76	57.28	71.51	62.74	52.44	1.62	0.00	0.05
0.76 M17-24-141-7	56.28	63.78	77.65	68.14	53.27	2.00	0.00	0.14
0.65 M17-24-141-8	51.21	57.53	71.23	64.35	38.44	1.91	0.00	0.30
0.57 M17-24-141-9	53.71	60.12	73.63	67.75	55.12	1.84	0.00	0.42
1.60 M17-24-141-10	81.42	91.63	109.36	99.00	232.18	2.43	0.00	0.76
1.55 M17-24-141-11	84.42	92.98	113.01	101.16	356.35	2.34	0.00	0.99
1.95 M17-24-141-12	75.73	84.62	104.70	91.05	502.48	2.51	0.00	1.50
2.80 M17-24-141-13	60.49	65.81	82.55	72.44	421.20	3.57	0.00	1.39
2.54 M17-24-141-14	62.43	67.97	82.91	73.66	465.25	2.68	0.00	1.45
2.29 M17-24-141-15	63.02	68.35	83.01	73.49	494.65	2.78	0.00	1.32
4.72 M17-24-141-16	65.39	70.44	85.97	76.09	115.37	2.67	0.00	0.65
4.11 M17-24-141-17	65.18	70.59	85.48	75.91	111.61	2.59	0.00	0.35
4.55 M17-24-141-18	64.37	69.47	84.33	74.75	105.03	2.61	0.00	0.42
0.61 SRM614-12	0.70	0.63	1.59	7.15	13.02	0.34	0.00	0.48
15.09 SRM612-12	10.77	11.94	16.74	18.42	621.43	5.63	0.00	19.30
216.74 SRM610-12	162.96	173.86	214.98	194.22	8056.34	87.48	0.00	205.62
0.12 AP1-12	0.44	0.34	0.28	0.94	2.99	0.32	0.00	0.25
1.48 AP2-12	22.05	24.49	29.73	26.85	37.63	0.54	0.00	0.50
7.72 AP3-12	180.27	187.06	189.09	187.77	198.02	1.17	0.00	1.32
12.29 AP4-12	304.02	308.81	293.68	306.28	302.91	1.85	0.00	1.92
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65								
	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
391.40 blank-9	275.60	297.24	500.72	3968.54	979.37	1496.45	572.96	335.48
669.04 SRM614-9	918.81	584.36	643.20	5245.23	1039.93	2917.82	905.97	576.56
7403.96 SRM612-9	7410.64	4200.18	1205.93	7106.76	6705.00	21734.20	8772.85	5116.83
59358.41 SRM610-9	66530.57	37421.25	6123.35	30421.37	47579.71	174564.11	67221.58	33776.27
403.16 AP1-9	1395.33	818.04	555.24	3402.54	845.76	4212.66	708.32	513.48
1544.45 AP2-9	28638.20	16902.81	2860.86	14447.08	1313.45	4641.27	749.40	579.36
7214.28 AP3-9	235867.02	128178.48	16621.17	89249.58	4183.74	9749.73	808.12	1156.69

Appendix A. Raw trace element datasheets from laser ablation.

13462.64	AP4-9	555913.88	295149.56	33824.35	196880.16	7176.72	13946.76	896.53	1610.93
1226.13	M17-24-97-1	54337.27	31423.78	5115.79	25836.51	4861.67	14446.84	1297.77	1203.21
775.40	M17-24-97-2	51798.97	29904.17	4618.11	24636.66	4293.82	8357.65	1179.05	1018.25
995.13	M17-24-97-3	54352.75	31442.54	4937.87	26042.47	4213.66	9259.77	1129.13	1040.61
1244.73	M17-24-97-4	43377.45	24985.58	4019.86	21544.76	1506.45	10217.54	650.40	576.44
868.68	M17-24-97-5	42750.24	24820.82	3862.98	21251.44	1279.29	6538.32	641.52	449.12
895.33	M17-24-97-6	44783.97	25953.27	4060.30	22664.05	1358.29	7609.04	659.96	434.28
1108.65	M17-24-97-7	36091.36	21105.04	3373.66	19281.31	1326.21	8694.09	615.52	462.56
913.93	M17-24-97-8	37338.77	21955.20	3386.14	19571.35	1217.81	5675.27	698.44	417.92
849.72	M17-24-97-9	40543.95	23788.49	3752.26	20999.36	1278.01	6305.96	653.76	449.64
962.73	M17-24-97-10	28514.40	17103.18	3337.54	18378.78	1208.49	25568.02	633.64	426.76
855.88	M17-24-97-11	35493.44	20742.88	3538.38	20474.28	1264.13	13813.40	658.28	436.36
882.80	M17-24-97-12	38945.34	22850.13	3819.02	22154.92	1323.05	17221.18	691.52	463.36
1385.93	M17-24-97-13	35755.68	20856.00	3916.42	21596.12	1736.21	25381.22	765.68	626.36
976.45	M17-24-97-14	37615.49	22221.60	3740.74	21527.80	1438.29	13569.60	621.40	470.60
883.80	M17-24-97-15	38116.18	22052.32	3681.22	21171.32	1352.57	12762.03	703.48	428.48
1317.13	M17-24-97-16	42747.88	25082.42	4769.75	26076.79	1768.77	41895.16	742.08	640.72
1007.21	M17-24-97-17	45020.34	26464.23	4128.22	23973.10	1577.69	11320.10	663.68	478.88
1100.77	M17-24-97-18	45600.70	26617.31	4464.46	24816.94	1731.53	16588.25	716.52	567.52
636.12	SRM614-10	1016.37	769.96	479.36	7117.92	1105.05	3296.94	1082.93	575.08
5991.23	SRM612-10	7217.76	4472.51	1113.13	9290.41	7025.32	17698.86	8962.97	6177.11
44976.37	SRM610-10	58908.97	33339.07	5315.79	29936.45	45981.22	138190.94	59657.22	35415.64
387.68	AP1-10	682.28	532.44	353.32	4859.11	905.73	3167.66	900.53	464.60
1233.01	AP2-10	20441.52	12413.95	2104.45	12840.79	1352.41	3936.18	773.04	529.52
7051.92	AP3-10	273954.06	147286.34	18030.10	102376.86	4567.19	8278.77	968.13	1146.89
10938.94	AP4-10	481682.13	257185.77	29277.29	172547.58	6708.96	11532.87	1035.93	1496.21
607.08	blank-10	402.12	400.44	285.40	6239.20	803.84	2197.93	704.20	302.16
499.24	blank average	338.86	348.84	393.06	5103.87	891.61	1847.19	638.58	318.82
blank subtraction									
169.80	SRM614-9	579.94	235.52	250.14	141.36	148.32	1070.63	267.38	257.74
6904.72	SRM612-9	7071.78	3851.34	812.86	2002.89	5813.39	19887.01	8134.27	4798.01
58859.17	SRM610-9	66191.71	37072.41	5730.29	25317.50	46688.10	172716.92	66582.99	33457.45
-96.08	AP1-9	1056.47	469.20	162.18	-1701.33	-45.84	2365.47	69.74	194.66
1045.21	AP2-9	28299.34	16553.97	2467.79	9343.21	421.84	2794.08	110.82	260.54
6715.04	AP3-9	235528.16	127829.64	16228.11	84145.71	3292.14	7902.54	169.54	837.86
12963.39	AP4-9	555575.02	294800.72	33431.29	191776.29	6285.12	12099.57	257.94	1292.11
726.88	M17-24-97-1	53998.40	31074.94	4722.73	20732.64	3970.06	12599.65	659.18	884.38
276.16	M17-24-97-2	51460.11	29555.33	4225.04	19532.79	3402.22	6510.46	540.46	699.42
495.88	M17-24-97-3	54013.88	31093.70	4544.81	20938.60	3322.06	7412.58	490.54	721.78
745.48	M17-24-97-4	43038.58	24636.74	3626.80	16440.89	614.84	8370.35	11.82	257.62
369.44	M17-24-97-5	42411.38	24471.98	3469.92	16147.57	387.68	4691.13	2.94	130.30
396.08	M17-24-97-6	44445.11	25604.42	3667.24	17560.18	466.68	5761.85	21.38	115.46
609.40	M17-24-97-7	35752.50	20756.20	2980.60	14177.44	434.60	6846.90	-23.06	143.74
414.68	M17-24-97-8	36999.91	21606.36	2993.08	14467.48	326.20	3828.08	59.86	99.10
350.48	M17-24-97-9	40205.09	23439.65	3359.20	15895.49	386.40	4458.77	15.18	130.82
463.48	M17-24-97-10	28175.54	16754.33	2944.48	13274.91	316.88	23720.83	-4.94	107.94
356.64	M17-24-97-11	35154.58	20394.04	3145.32	15370.41	372.52	11966.21	19.70	117.54
383.56	M17-24-97-12	38606.48	22501.29	3425.96	17051.06	431.44	15373.99	52.94	144.54
886.69	M17-24-97-13	35416.82	20507.16	3523.36	16492.25	844.60	23534.03	127.10	307.54
477.20	M17-24-97-14	37276.63	21872.76	3347.68	16423.93	546.68	11722.41	-17.18	151.78
384.56	M17-24-97-15	37777.31	21703.48	3288.16	16067.45	460.96	10914.84	64.90	109.66
817.88	M17-24-97-16	42409.02	24733.58	4376.68	20972.92	877.16	40047.97	103.50	321.90
507.96	M17-24-97-17	44681.47	26115.39	3735.16	18869.23	686.08	9472.91	25.10	160.06
601.52	M17-24-97-18	45261.83	26268.47	4071.40	19713.07	839.92	14741.06	77.94	248.70
136.88	SRM614-10	677.50	421.12	86.30	2014.05	213.44	1449.75	444.34	256.26
5491.99	SRM612-10	6878.90	4123.66	720.06	4186.54	6133.71	15851.67	8324.39	5858.29
44477.13	SRM610-10	58570.11	32990.22	4922.73	24832.58	45089.61	136343.75	59018.63	35096.82
-111.56	AP1-10	343.42	183.60	-39.74	-244.76	14.12	1320.47	261.94	145.78
733.76	AP2-10	20102.65	12065.11	1711.39	7736.92	460.80	2088.99	134.46	210.70
6552.68	AP3-10	273615.20	146937.50	17637.04	97272.99	3675.58	6431.58	329.54	828.06
10439.70	AP4-10	481343.27	256836.93	28884.22	167443.71	5817.35	9685.67	397.34	1177.39
zero correction									
169.80	SRM614-9	579.94	235.52	250.14	141.36	148.32	1070.63	267.38	257.74
6904.72	SRM612-9	7071.78	3851.34	812.86	2002.89	5813.39	19887.01	8134.27	4798.01
58859.17	SRM610-9	66191.71	37072.41	5730.29	25317.50	46688.10	172716.92	66582.99	33457.45
0.00	AP1-9	1056.47	469.20	162.18	0.00	0.00	2365.47	69.74	194.66
1045.21	AP2-9	28299.34	16553.97	2467.79	9343.21	421.84	2794.08	110.82	260.54
6715.04	AP3-9	235528.16	127829.64	16228.11	84145.71	3292.14	7902.54	169.54	837.86
12963.39	AP4-9	555575.02	294800.72	33431.29	191776.29	6285.12	12099.57	257.94	1292.11
726.88	M17-24-97-1	53998.40	31074.94	4722.73	20732.64	3970.06	12599.65	659.18	884.38
276.16	M17-24-97-2	51460.11	29555.33	4225.04	19532.79	3402.22	6510.46	540.46	699.42
495.88	M17-24-97-3	54013.88	31093.70	4544.81	20938.60	3322.06	7412.58	490.54	721.78
745.48	M17-24-97-4	43038.58	24636.74	3626.80	16440.89	614.84	8370.35	11.82	257.62
369.44	M17-24-97-5	42411.38	24471.98	3469.92	16147.57	387.68	4691.13	2.94	130.30
396.08	M17-24-97-6	44445.11	25604.42	3667.24	17560.18	466.68	5761.85	21.38	115.46
609.40	M17-24-97-7	35752.50	20756.20	2980.60	14177.44	434.60	6846.90	0.00	143.74

Appendix A. Raw trace element datasheets from laser ablation.

414.68	M17-24-97-8	36999.91	21606.36	2993.08	14467.48	326.20	3828.08	59.86	99.10
350.48	M17-24-97-9	40205.09	23439.65	3359.20	15895.49	386.40	4458.77	15.18	130.82
463.48	M17-24-97-10	28175.54	16754.33	2944.48	13274.91	316.88	23720.83	0.00	107.94
356.64	M17-24-97-11	35154.58	20394.04	3145.32	15370.41	372.52	11966.21	19.70	117.54
383.56	M17-24-97-12	38606.48	22501.29	3425.96	17051.06	431.44	15373.99	52.94	144.54
886.69	M17-24-97-13	35416.82	20507.16	3523.36	16492.25	844.60	23534.03	127.10	307.54
477.20	M17-24-97-14	37276.63	21872.76	3347.68	16423.93	546.68	11722.41	0.00	151.78
384.56	M17-24-97-15	37777.31	21703.48	3288.16	16067.45	460.96	10914.84	64.90	109.66
817.88	M17-24-97-16	42409.02	24733.58	4376.68	20972.92	877.16	40047.97	103.50	321.90
507.96	M17-24-97-17	44681.47	26115.39	3735.16	18869.23	686.08	9472.91	25.10	160.06
601.52	M17-24-97-18	45261.83	26268.47	4071.40	19713.07	839.92	14741.06	77.94	248.70
136.88	SRM614-10	677.50	421.12	86.30	2014.05	213.44	1449.75	444.34	256.26
5491.99	SRM612-10	6878.90	4123.66	720.06	4186.54	6133.71	15851.67	8324.39	5858.29
44477.13	SRM610-10	58570.11	32990.22	4922.73	24832.58	45089.61	136343.75	59018.63	35096.82
0.00	AP1-10	343.42	183.60	0.00	0.00	14.12	1320.47	261.94	145.78
733.76	AP2-10	20102.65	12065.11	1711.39	7736.92	460.80	2088.99	134.46	210.70
6552.68	AP3-10	273615.20	146937.50	17637.04	97272.99	3675.58	6431.58	329.54	828.06
10439.70	AP4-10	481343.27	256836.93	28884.22	167443.71	5817.35	9685.67	397.34	1177.39

certified concentration									
SRM614	1.90						1.12		
SRM612	37.92						36.24	34.64	37.33
SRM610	456.30						438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration									
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal									
0.000072 SRM614-9	0.000247	0.000100	0.000106	0.000060	0.000063	0.000455	0.000114	0.000110	
0.003817 SRM612-9	0.003909	0.002129	0.000449	0.001107	0.003214	0.010993	0.004497	0.002652	
0.058645 SRM610-9	0.065951	0.036938	0.005709	0.025226	0.046519	0.172090	0.066341	0.033336	
0.000000 AP1-9	0.000083	0.000037	0.000013	0.000000	0.000000	0.000186	0.000005	0.000015	
0.000078 AP2-9	0.002110	0.001234	0.000184	0.000696	0.000031	0.000208	0.000008	0.000019	
0.000376 AP3-9	0.013180	0.007153	0.000908	0.004709	0.000184	0.000442	0.000009	0.000047	
0.000799 AP4-9	0.034233	0.018165	0.002060	0.011817	0.000387	0.000746	0.000016	0.000080	
0.000097 M17-24-97-1	0.007192	0.004139	0.000629	0.002761	0.000529	0.001678	0.000088	0.000118	
0.000040 M17-24-97-2	0.007429	0.004267	0.000610	0.002820	0.000491	0.000940	0.000078	0.000101	
0.000064 M17-24-97-3	0.007018	0.004040	0.000591	0.002721	0.000432	0.000963	0.000064	0.000094	
0.000138 M17-24-97-4	0.007987	0.004572	0.000673	0.003051	0.000114	0.001553	0.000002	0.000048	
0.000068 M17-24-97-5	0.007830	0.004518	0.000641	0.002981	0.000072	0.000866	0.000001	0.000024	
0.000069 M17-24-97-6	0.007738	0.004458	0.000638	0.003057	0.000081	0.001003	0.000004	0.000020	
0.000123 M17-24-97-7	0.007220	0.004191	0.000602	0.002863	0.000088	0.001383	0.000000	0.000029	
0.000091 M17-24-97-8	0.008105	0.004733	0.000656	0.003169	0.000071	0.000839	0.000013	0.000022	
0.000068 M17-24-97-9	0.007772	0.004531	0.000649	0.003073	0.000075	0.000862	0.000003	0.000025	
0.000115 M17-24-97-10	0.006994	0.004159	0.000731	0.003295	0.000079	0.005889	0.000000	0.000027	
0.000077 M17-24-97-11	0.007577	0.004396	0.000678	0.003313	0.000080	0.002579	0.000004	0.000025	
0.000077 M17-24-97-12	0.007787	0.004539	0.000691	0.003439	0.000087	0.003101	0.000011	0.000029	
0.000204 M17-24-97-13	0.008129	0.004707	0.000809	0.003785	0.000194	0.005402	0.000029	0.000071	
0.000101 M17-24-97-14	0.007887	0.004628	0.000708	0.003475	0.000116	0.002480	0.000000	0.000032	
0.000082 M17-24-97-15	0.008104	0.004656	0.000705	0.003447	0.000099	0.002342	0.000014	0.000024	
0.000152 M17-24-97-16	0.007884	0.004598	0.000814	0.003899	0.000163	0.007445	0.000019	0.000060	
0.000086 M17-24-97-17	0.007544	0.004409	0.000631	0.003186	0.000116	0.001599	0.000004	0.000027	
0.000100 M17-24-97-18	0.007544	0.004379	0.000679	0.003286	0.000140	0.002457	0.000013	0.000041	
0.000069 SRM614-10	0.000343	0.000213	0.000044	0.001019	0.000108	0.000733	0.000225	0.000130	
0.004021 SRM612-10	0.005037	0.003019	0.000527	0.003066	0.004491	0.011607	0.006095	0.004290	
0.055443 SRM610-10	0.073010	0.041124	0.006136	0.030955	0.056206	0.169959	0.073570	0.043750	
0.000000 AP1-10	0.000033	0.000018	0.000000	0.000000	0.000001	0.000127	0.000025	0.000014	
0.000068 AP2-10	0.001860	0.001117	0.000158	0.000716	0.000043	0.000193	0.000012	0.000019	
0.000448 AP3-10	0.018719	0.010052	0.001207	0.006655	0.000251	0.000440	0.000023	0.000057	
0.000760 AP4-10	0.035040	0.018697	0.002103	0.012189	0.000423	0.000705	0.000029	0.000086	

standardize signal averages AP									
0.000000 AP1	0.000058	0.000027	0.000006	0.000000	0.000001	0.000156	0.000015	0.000015	
0.000073 AP2	0.001985	0.001175	0.000171	0.000706	0.000037	0.000201	0.000010	0.000019	
0.000412 AP3	0.015950	0.008603	0.001057	0.005682	0.000218	0.000441	0.000016	0.000052	
0.000779 AP4	0.034636	0.018431	0.002081	0.012003	0.000405	0.000725	0.000022	0.000083	

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

0.041662	0.021219	0.040985	0.357883	0.062779	1.816533	0.006397	0.000000	0.053797
standardize signal averages SRM								
0.000071 srm614-2	0.000295	0.000157	0.000075	0.000539	0.000086	0.000594	0.000169	0.000120
0.003919 srm612-2	0.004473	0.002574	0.000488	0.002086	0.003852	0.011300	0.005296	0.003471
0.057044 srm610-2	0.069481	0.039031	0.005923	0.028090	0.051362	0.171024	0.069955	0.038543
linest from std sig ave								
0.000000	0.076667	0.000000	0.000000	0.000000	0.000000	0.029901	0.071084	0.096256
concentration data								
0.26 SRM614-9	0.45	0.35	3.27	0.32	9.83	0.25	0.00	0.51
13.64 SRM612-9	7.11	7.48	13.79	5.96	500.65	6.03	0.00	12.24
209.54 SRM610-9	120.02	129.84	175.24	135.82	7247.19	94.41	0.00	153.81
0.00 AP1-9	0.70	0.60	1.82	0.00	0.00	0.47	0.00	0.33
1.29 AP2-9	17.86	20.18	26.26	17.44	22.79	0.53	0.00	0.42
6.25 AP3-9	111.57	116.96	129.66	117.93	133.51	1.13	0.00	1.01
13.28 AP4-9	289.78	297.00	294.10	295.95	280.64	1.90	0.00	1.71
1.61 M17-24-97-1	60.88	67.67	89.80	69.16	383.17	4.28	0.00	2.53
0.66 M17-24-97-2	62.89	69.76	87.08	70.62	355.94	2.40	0.00	2.17
1.07 M17-24-97-3	59.41	66.06	84.31	68.14	312.82	2.46	0.00	2.01
2.30 M17-24-97-4	67.61	74.76	96.10	76.42	82.69	3.96	0.00	1.03
1.13 M17-24-97-5	66.28	73.87	91.46	74.66	51.87	2.21	0.00	0.52
1.15 M17-24-97-6	65.50	72.89	91.16	76.57	58.88	2.56	0.00	0.43
2.05 M17-24-97-7	61.11	68.53	85.93	71.70	63.60	3.53	0.00	0.62
1.51 M17-24-97-8	68.61	77.38	93.60	79.37	51.78	2.14	0.00	0.47
1.13 M17-24-97-9	65.79	74.09	92.71	76.96	54.13	2.20	0.00	0.54
1.91 M17-24-97-10	59.21	68.00	104.36	82.53	57.01	15.03	0.00	0.58
1.28 M17-24-97-11	64.14	71.87	96.79	82.97	58.18	6.58	0.00	0.54
1.29 M17-24-97-12	65.92	74.21	98.66	86.13	63.06	7.91	0.00	0.63
3.38 M17-24-97-13	68.81	76.96	115.46	94.80	140.48	13.78	0.00	1.51
1.68 M17-24-97-14	66.76	75.67	101.12	87.03	83.82	6.33	0.00	0.69
1.37 M17-24-97-15	68.60	76.13	100.71	86.33	71.66	5.98	0.00	0.50
2.53 M17-24-97-16	66.74	75.18	116.17	97.65	118.18	19.00	0.00	1.28
1.43 M17-24-97-17	63.86	72.09	90.03	79.79	83.94	4.08	0.00	0.58
1.67 M17-24-97-18	63.86	71.59	96.89	82.29	101.46	6.27	0.00	0.89
0.25 SRM614-10	0.62	0.75	1.34	5.49	16.82	0.40	0.00	0.60
14.37 SRM612-10	9.17	10.61	16.18	16.51	699.71	6.37	0.00	19.79
198.10 SRM610-10	132.86	144.55	188.35	166.67	8756.46	93.24	0.00	201.85
0.00 AP1-10	0.28	0.29	0.00	0.00	0.98	0.32	0.00	0.30
1.13 AP2-10	15.75	18.26	22.61	17.93	30.90	0.49	0.00	0.42
7.45 AP3-10	158.45	164.36	172.27	166.67	182.23	1.12	0.00	1.22
12.63 AP4-10	296.61	305.70	300.20	305.28	306.89	1.80	0.00	1.84
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
258.92 blank-7	286.44	227.04	307.56	1701.17	749.44	704.96	299.16	190.64
495.44 SRM614-7	808.92	417.88	423.76	3638.86	851.24	1939.37	466.68	288.12
6292.36 SRM612-7	6063.91	3491.70	980.65	5618.15	4188.50	18028.34	5951.07	3764.90
43001.12 SRM610-7	40951.03	23216.49	4164.66	18978.99	23864.09	121789.89	36495.05	19262.07
413.84 AP1-7	2005.97	905.93	396.96	1771.21	516.92	1979.93	440.72	259.60
1534.61 AP2-7	30650.69	17755.78	2839.02	13557.40	1030.93	3724.06	496.24	406.36
12149.47 AP3-7	449099.44	239516.91	28711.44	159030.41	5619.11	12070.39	621.52	1269.41
12329.07 AP4-7	448907.13	238422.34	28727.36	158587.53	5629.31	12903.75	615.48	1260.21
663.00 34HP45-837-1	34668.43	20105.59	3293.06	15474.41	2383.57	6003.63	495.16	562.56
768.32 34HP45-837-2	36235.76	21200.76	3345.38	16060.01	2547.97	6326.68	516.28	623.36
793.60 34HP45-837-3	34470.52	19806.15	3069.02	15219.77	2438.93	5482.15	563.16	550.28
1197.53 34HP45-837-4	92770.00	53367.10	7839.40	38616.38	5622.63	10805.74	691.96	941.53
1070.73 34HP45-837-5	78247.20	45045.49	6667.28	32916.55	3869.38	9684.13	638.68	1004.89
1150.77 34HP45-837-6	75850.55	43768.45	6522.04	32180.26	3858.62	9049.01	644.12	935.85
1781.01 34HP45-837-7	122513.77	69055.71	9983.06	50491.13	4843.19	17455.98	667.64	977.41
1333.45 34HP45-837-8	105495.39	60055.46	8816.17	43471.16	5827.83	14304.80	686.88	904.33
1378.49 34HP45-837-9	71902.48	41139.31	6379.88	31033.06	6498.40	11812.95	790.12	791.12
1014.17 34HP45-837-10	76613.23	44352.65	6505.72	32643.42	1694.33	11444.55	631.12	592.16
984.61 34HP45-837-11	91783.20	52033.57	7785.12	38735.14	1764.93	11437.19	606.40	572.24
1039.05 34HP45-837-12	99916.72	56700.12	8292.81	41501.35	1927.17	12976.43	630.80	614.68
1868.73 34HP45-837-13	98182.43	55233.95	7717.32	40949.35	1988.41	15724.65	647.76	1315.37
1179.53 34HP45-837-14	73612.85	41612.56	5922.19	31266.18	1561.25	11217.70	625.56	797.00
1165.53 34HP45-837-15	76342.55	43214.81	6152.75	32161.98	1577.45	11882.47	615.88	875.64

Appendix A. Raw trace element datasheets from laser ablation.

694.40	SRM614-8	1037.41	638.20	420.64	4313.82	850.64	2479.61	959.93	475.48
7215.52	SRM612-8	7930.92	4729.31	1116.61	7247.20	6825.88	20064.43	9036.37	5889.95
63235.07	SRM610-8	76225.79	42463.36	6707.64	34012.91	51019.93	188187.09	70843.20	39125.74
473.44	AP1-8	1081.21	608.84	366.56	2811.46	690.24	3149.10	760.88	409.24
1780.09	AP2-8	38245.50	22900.65	3497.98	18009.02	1386.73	4582.59	864.64	553.24
12021.83	AP3-8	536067.19	284353.44	32451.34	189063.42	6804.24	11797.55	1001.29	1699.97
13167.55	AP4-8	568321.56	301994.38	34189.11	200273.13	7126.76	13922.56	1009.61	1634.69
528.92	blank-8	294.80	214.12	203.96	2427.09	597.04	1418.49	606.04	264.28
393.92	blank average	290.62	220.58	255.76	2064.13	673.24	1061.73	452.60	227.46

blank subtraction									
101.52	SRM614-7	518.30	197.30	168.00	1574.73	178.00	877.64	14.08	60.66
5898.43	SRM612-7	5773.29	3271.12	724.88	3554.02	3515.26	16966.62	5498.47	3537.44
42607.20	SRM610-7	40660.41	22995.91	3908.90	16914.85	23190.85	120728.16	36042.44	19034.61
19.92	AP1-7	1715.35	685.34	141.20	-292.92	-156.32	918.21	-11.88	32.14
1140.69	AP2-7	30360.07	17535.20	2583.25	11493.26	357.68	2662.34	43.64	178.90
11755.55	AP3-7	448808.82	239296.33	28455.68	156966.28	4945.87	11008.66	168.92	1041.95
11935.15	AP4-7	448616.51	238201.76	28471.60	156523.40	4956.07	11842.03	162.88	1032.75
269.08	34HP45-837-1	34377.81	19885.01	3037.30	13410.28	1710.33	4941.91	42.56	335.10
374.40	34HP45-837-2	35945.14	20980.18	3089.62	13995.88	1874.73	5264.95	63.68	395.90
399.68	34HP45-837-3	34179.89	19585.57	2813.26	13155.63	1765.69	4420.42	110.56	322.82
803.60	34HP45-837-4	92479.38	53146.52	7583.64	36552.25	4949.39	9744.02	239.36	714.06
676.80	34HP45-837-5	77956.58	44824.91	6411.52	30852.42	3196.14	8622.41	186.08	777.42
756.84	34HP45-837-6	75559.93	43547.86	6266.28	30116.13	3185.38	7987.28	191.52	708.38
1387.09	34HP45-837-7	122223.15	68835.13	9727.30	48426.99	4169.94	16394.25	215.04	749.94
939.53	34HP45-837-8	105204.77	59834.88	8560.41	41407.03	5154.59	13243.08	234.28	676.86
984.57	34HP45-837-9	71611.86	40918.73	6124.11	28968.92	5825.15	10751.22	337.52	563.66
620.24	34HP45-837-10	76322.61	44132.07	6249.96	30579.29	1021.09	10382.82	178.52	364.70
590.68	34HP45-837-11	91492.57	51812.99	7529.36	36671.01	1091.69	10375.46	153.80	344.78
645.12	34HP45-837-12	99626.10	56479.54	8037.05	39437.22	1253.93	11914.71	178.20	387.22
1474.81	34HP45-837-13	97891.81	55013.37	7461.56	38885.22	1315.17	14662.92	195.16	1087.91
785.60	34HP45-837-14	73322.23	41391.97	5666.43	29202.04	888.00	10155.98	172.96	569.54
771.60	34HP45-837-15	76051.93	42994.22	5896.99	30097.85	904.21	10820.74	163.28	648.18
300.48	SRM614-8	746.78	417.62	164.88	2249.69	177.40	1417.89	507.32	248.02
6821.60	SRM612-8	7640.30	4508.73	860.84	5183.07	6152.63	19002.71	8583.77	5662.49
62841.15	SRM610-8	75935.17	42242.78	6451.88	31948.78	50346.68	187125.36	70390.59	38898.28
79.52	AP1-8	790.58	388.26	110.80	747.32	17.00	2087.37	308.28	181.78
1386.17	AP2-8	37954.87	22680.07	3242.22	15944.89	713.48	3520.86	412.04	325.78
11627.91	AP3-8	535776.57	284132.86	32195.58	186999.29	6130.99	10735.82	548.68	1472.51
12773.63	AP4-8	568030.94	301773.80	33933.35	198209.00	6453.52	12860.83	557.00	1407.23

zero correction									
101.52	SRM614-7	518.30	197.30	168.00	1574.73	178.00	877.64	14.08	60.66
5898.43	SRM612-7	5773.29	3271.12	724.88	3554.02	3515.26	16966.62	5498.47	3537.44
42607.20	SRM610-7	40660.41	22995.91	3908.90	16914.85	23190.85	120728.16	36042.44	19034.61
19.92	AP1-7	1715.35	685.34	141.20	0.00	0.00	918.21	0.00	32.14
1140.69	AP2-7	30360.07	17535.20	2583.25	11493.26	357.68	2662.34	43.64	178.90
11755.55	AP3-7	448808.82	239296.33	28455.68	156966.28	4945.87	11008.66	168.92	1041.95
11935.15	AP4-7	448616.51	238201.76	28471.60	156523.40	4956.07	11842.03	162.88	1032.75
269.08	34HP45-837-1	34377.81	19885.01	3037.30	13410.28	1710.33	4941.91	42.56	335.10
374.40	34HP45-837-2	35945.14	20980.18	3089.62	13995.88	1874.73	5264.95	63.68	395.90
399.68	34HP45-837-3	34179.89	19585.57	2813.26	13155.63	1765.69	4420.42	110.56	322.82
803.60	34HP45-837-4	92479.38	53146.52	7583.64	36552.25	4949.39	9744.02	239.36	714.06
676.80	34HP45-837-5	77956.58	44824.91	6411.52	30852.42	3196.14	8622.41	186.08	777.42
756.84	34HP45-837-6	75559.93	43547.86	6266.28	30116.13	3185.38	7987.28	191.52	708.38
1387.09	34HP45-837-7	122223.15	68835.13	9727.30	48426.99	4169.94	16394.25	215.04	749.94
939.53	34HP45-837-8	105204.77	59834.88	8560.41	41407.03	5154.59	13243.08	234.28	676.86
984.57	34HP45-837-9	71611.86	40918.73	6124.11	28968.92	5825.15	10751.22	337.52	563.66
620.24	34HP45-837-10	76322.61	44132.07	6249.96	30579.29	1021.09	10382.82	178.52	364.70
590.68	34HP45-837-11	91492.57	51812.99	7529.36	36671.01	1091.69	10375.46	153.80	344.78
645.12	34HP45-837-12	99626.10	56479.54	8037.05	39437.22	1253.93	11914.71	178.20	387.22
1474.81	34HP45-837-13	97891.81	55013.37	7461.56	38885.22	1315.17	14662.92	195.16	1087.91
785.60	34HP45-837-14	73322.23	41391.97	5666.43	29202.04	888.00	10155.98	172.96	569.54
771.60	34HP45-837-15	76051.93	42994.22	5896.99	30097.85	904.21	10820.74	163.28	648.18
300.48	SRM614-8	746.78	417.62	164.88	2249.69	177.40	1417.89	507.32	248.02
6821.60	SRM612-8	7640.30	4508.73	860.84	5183.07	6152.63	19002.71	8583.77	5662.49
62841.15	SRM610-8	75935.17	42242.78	6451.88	31948.78	50346.68	187125.36	70390.59	38898.28
79.52	AP1-8	790.58	388.26	110.80	747.32	17.00	2087.37	308.28	181.78
1386.17	AP2-8	37954.87	22680.07	3242.22	15944.89	713.48	3520.86	412.04	325.78
11627.91	AP3-8	535776.57	284132.86	32195.58	186999.29	6130.99	10735.82	548.68	1472.51
12773.63	AP4-8	568030.94	301773.80	33933.35	198209.00	6453.52	12860.83	557.00	1407.23

certified concentration									
SRM614		1.90					1.12		
SRM612		37.92					36.24	34.64	37.33
SRM610		456.30					438.10	426.30	317.40
0.14 STD AP1		1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2		54.67	55.86	55.86	55.86	55.86	0.63		0.38

Appendix A. Raw trace element datasheets from laser ablation.

6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23	1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77	1.84
standardized concentration							
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000
standardized signal							
0.000046 SRM614-7	0.000234	0.000089	0.000076	0.000710	0.000080	0.000395	0.000006
0.003173 SRM612-7	0.003105	0.001760	0.000390	0.001912	0.001891	0.009126	0.002958
0.044004 SRM610-7	0.041994	0.023750	0.004037	0.017470	0.023951	0.124687	0.037224
0.000002 AP1-7	0.000165	0.000066	0.000014	0.000000	0.000000	0.000088	0.000000
0.000095 AP2-7	0.002517	0.001454	0.000214	0.000953	0.000030	0.000221	0.000004
0.000714 AP3-7	0.027268	0.014539	0.001729	0.009537	0.000300	0.000669	0.000010
0.000825 AP4-7	0.031002	0.016461	0.001968	0.010817	0.000342	0.000818	0.000011
0.000066 34HP45-837-1	0.008435	0.004879	0.000745	0.003290	0.000420	0.001213	0.000010
0.000094 34HP45-837-2	0.009042	0.005278	0.000777	0.003521	0.000472	0.001324	0.000016
0.000121 34HP45-837-3	0.010322	0.005914	0.000850	0.003973	0.000533	0.001335	0.000033
0.000087 34HP45-837-4	0.010047	0.005774	0.000824	0.003971	0.000538	0.001059	0.000026
0.000079 34HP45-837-5	0.009139	0.005255	0.000752	0.003617	0.000375	0.001011	0.000022
0.000095 34HP45-837-6	0.009534	0.005495	0.000791	0.003800	0.000402	0.001008	0.000024
0.000175 34HP45-837-7	0.015431	0.008691	0.001228	0.006114	0.000526	0.002070	0.000027
0.000117 34HP45-837-8	0.013123	0.007464	0.001068	0.005165	0.000643	0.001652	0.000029
0.000153 34HP45-837-9	0.011105	0.006345	0.000950	0.004492	0.000903	0.001667	0.000052
0.000128 34HP45-837-10	0.015709	0.009084	0.001286	0.006294	0.000210	0.002137	0.000037
0.000111 34HP45-837-11	0.017224	0.009754	0.001417	0.006904	0.000206	0.001953	0.000029
0.000113 34HP45-837-12	0.017427	0.009880	0.001406	0.006898	0.000219	0.002084	0.000031
0.000408 34HP45-837-13	0.027107	0.015233	0.002066	0.010768	0.000364	0.004060	0.000054
0.000213 34HP45-837-14	0.019890	0.011228	0.001537	0.007921	0.000241	0.002755	0.000047
0.000193 34HP45-837-15	0.019027	0.010756	0.001475	0.007530	0.000226	0.002707	0.000041
0.000168 SRM614-8	0.000417	0.000233	0.000092	0.001256	0.000099	0.000791	0.000283
0.004180 SRM612-8	0.004681	0.002763	0.000527	0.003176	0.003770	0.011643	0.005259
0.063461 SRM610-8	0.076684	0.042659	0.006516	0.032264	0.050843	1.88971	0.071085
0.000006 AP1-8	0.000060	0.000029	0.000008	0.000056	0.000001	0.000157	0.000023
0.000089 AP2-8	0.002435	0.001455	0.000208	0.001023	0.000046	0.000226	0.000026
0.000597 AP3-8	0.027511	0.014590	0.001653	0.009602	0.000315	0.000551	0.000028
0.000757 AP4-8	0.033661	0.017883	0.002011	0.011746	0.000382	0.000762	0.000033
standardize signal averages AP							
0.000004 AP1	0.000112	0.000048	0.000011	0.000028	0.000001	0.000123	0.000012
0.000092 AP2	0.002476	0.001454	0.000211	0.000988	0.000038	0.000223	0.000015
0.000656 AP3	0.027390	0.014564	0.001691	0.009569	0.000308	0.000610	0.000019
0.000791 AP4	0.032331	0.017172	0.001989	0.011281	0.000362	0.000790	0.000022
linest from std sig ave							
0.035077	0.018752	0.036382	0.313822	0.055381	1.723645	0.005505	0.000000
standardize signal averages SRM							
0.000107 srm614-2	0.000325	0.000161	0.000084	0.000983	0.000090	0.000593	0.000145
0.003676 srm612-2	0.003893	0.002261	0.000459	0.002544	0.002830	0.010385	0.004109
0.053733 srm610-2	0.059339	0.033205	0.005276	0.024867	0.037397	0.156829	0.054155
linest from std sig ave							
0.000000	0.089764	0.000000	0.000000	0.000000	0.000000	0.032607	0.091823
concentration data							
0.14 SRM614-7	0.38	0.28	2.04	3.37	11.86	0.19	0.00
9.54 SRM612-7	4.99	5.49	10.49	9.08	279.52	4.31	0.00
132.38 SRM610-7	67.54	74.11	108.66	82.97	3540.61	58.87	0.00
0.03 AP1-7	1.23	0.95	1.70	0.00	0.00	0.19	0.00
1.32 AP2-7	18.83	21.10	26.82	21.06	20.39	0.48	0.00
9.99 AP3-7	203.99	211.02	216.44	210.70	206.62	1.47	0.00
11.54 AP4-7	231.93	238.92	246.33	238.98	235.51	1.80	0.00
0.92 34HP45-837-1	63.10	70.81	93.30	72.69	288.56	2.66	0.00
1.32 34HP45-837-2	67.65	76.60	97.30	77.79	324.29	2.91	0.00
1.69 34HP45-837-3	77.22	85.84	106.36	87.77	366.64	2.93	0.00
1.22 34HP45-837-4	75.16	83.80	103.15	87.74	369.74	2.32	0.00
1.11 34HP45-837-5	68.37	76.27	94.10	79.91	257.64	2.22	0.00
1.34 34HP45-837-6	71.33	79.75	98.99	83.96	276.38	2.21	0.00
2.45 34HP45-837-7	115.44	126.14	153.75	135.08	362.01	4.55	0.00
1.64 34HP45-837-8	98.17	108.33	133.68	114.11	442.12	3.63	0.00
2.14 34HP45-837-9	83.08	92.10	118.90	99.25	621.16	3.66	0.00
1.79 34HP45-837-10	117.52	131.84	161.05	139.06	144.52	4.69	0.00

Appendix A. Raw trace element datasheets from laser ablation.

1.56 34HP45-837-11	128.85	141.57	177.46	152.52	141.32	4.29	0.00	1.31
1.58 34HP45-837-12	130.37	143.39	176.01	152.41	150.82	4.58	0.00	1.36
5.71 34HP45-837-13	202.79	221.10	258.67	237.89	250.42	8.92	0.00	6.06
2.98 34HP45-837-14	148.79	162.97	192.44	175.01	165.64	6.05	0.00	3.11
2.70 34HP45-837-15	142.34	156.12	184.70	166.36	155.55	5.95	0.00	3.26
0.50 SRM614-8	0.67	0.73	2.48	5.96	14.64	0.37	0.00	0.60
12.57 SRM612-8	7.53	8.62	14.20	15.08	557.28	5.50	0.00	15.01
190.91 SRM610-8	123.33	133.11	175.36	153.24	7515.89	89.21	0.00	169.90
0.08 AP1-8	0.45	0.42	1.05	1.24	0.88	0.35	0.00	0.28
1.24 AP2-8	18.21	21.12	26.04	22.60	31.47	0.50	0.00	0.42
8.36 AP3-8	205.81	211.76	206.97	212.14	216.48	1.21	0.00	1.52
10.59 AP4-8	251.82	259.55	251.75	259.50	262.97	1.67	0.00	1.68

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
384.32 blank-5	515.76	370.56	344.44	2260.45	934.41	851.68	368.48	250.96
533.80 SRM614-5	827.28	516.36	453.28	3596.70	911.21	2850.14	543.40	304.56
6850.96 SRM612-5	7475.52	4349.14	1839.41	9014.41	4609.15	47902.63	6332.04	4094.30
53266.90 SRM610-5	51469.93	29136.28	5468.71	25483.34	29745.45	167856.55	44957.73	23357.01
602.40 AP1-5	3126.82	1530.89	625.24	2891.58	645.12	7104.24	557.36	356.88
1941.29 AP2-5	38013.18	21966.88	3750.06	17322.62	1258.65	11390.18	580.96	454.72
14423.88 AP3-5	504688.53	270555.66	33076.19	179875.45	6307.20	22731.49	709.92	1411.09
10352.50 AP4-5	329560.13	178924.56	22968.93	121309.96	4961.07	15154.05	717.52	1127.53
2428.37 34HP45-718-1	66591.66	38440.34	7818.36	34731.56	2306.09	69452.47	651.12	886.80
1617.73 34HP45-718-2	104430.19	59216.29	10172.70	47744.71	3755.14	57462.29	708.12	1174.05
2562.69 34HP45-718-3	106899.84	60671.58	11216.62	51330.37	4528.43	82050.46	871.24	1193.05
4150.34 34HP45-718-4	139763.14	79176.48	19276.07	84511.88	13743.52	284466.75	1155.45	5342.03
3346.38 34HP45-718-5	129262.33	73667.98	16081.65	71205.32	8949.73	193954.97	982.65	4498.71
4202.34 34HP45-718-6	143533.84	81595.18	17015.30	76867.31	9390.97	195907.55	1024.25	4888.39
4042.90 34HP45-718-7	122109.45	69539.35	20002.99	85894.96	9195.57	377961.91	1072.41	4148.34
3767.98 34HP45-718-8	129971.77	73780.94	21485.84	93119.28	9626.65	427522.91	1049.57	4522.99
4424.71 34HP45-718-9	146826.42	83697.79	28046.40	118161.91	13133.23	640581.50	1250.21	5140.47
6183.36 34HP45-718-10	184135.83	103787.19	34837.80	152105.81	7022.72	843287.94	1062.33	3804.46
4870.39 34HP45-718-11	194927.81	109705.54	40108.86	173049.14	6776.68	1015338.90	920.85	3904.70
5436.99 34HP45-718-12	225035.75	125136.87	29006.80	133421.03	6721.88	483098.19	986.21	3765.86
26014.55 34HP45-718-13	87900.66	59075.25	245241.38	973370.56	11257.94	10206706.00	1544.93	1834.97
14143.96 34HP45-718-14	56513.32	38484.42	168647.42	669256.63	8434.53	7231734.50	1394.89	1609.57
8352.61 34HP45-718-15	57344.08	34950.48	63831.96	247444.47	4861.83	2668043.80	1109.37	1471.45
3605.78 34HP45-718-16	152360.89	85288.52	15176.69	71702.05	3415.58	124204.22	839.96	2139.45
2902.90 34HP45-718-17	168469.95	94179.17	16081.01	77639.23	3297.14	119137.71	795.96	2431.45
3076.90 34HP45-718-18	171634.69	94923.86	15763.49	77220.72	3447.18	106108.60	782.20	2021.77
767.36 SRM614-6	933.25	553.20	408.36	3349.10	711.52	4083.54	792.68	416.52
6905.16 SRM612-6	7704.72	4696.43	1055.09	6732.60	6497.40	22056.65	8584.85	5736.47
63709.76 SRM610-6	79490.89	43902.09	6780.24	34554.88	51910.01	190140.67	72270.52	40460.71
715.60 AP1-6	1058.33	635.04	348.44	2364.53	687.72	3528.94	723.00	410.12
1809.93 AP2-6	35115.76	20542.72	3339.42	16268.45	1293.85	5115.39	836.68	537.00
13462.72 AP3-6	629443.13	332304.16	36919.49	218496.16	7648.44	13737.24	1007.85	1735.41
8977.09 AP4-6	324742.78	173194.94	21545.00	117746.78	4955.59	12199.51	975.69	1120.41
628.12 blank-6	262.24	170.72	208.04	1752.73	581.32	1883.21	618.52	274.04
506.22 blank average	389.00	270.64	276.24	2006.59	757.86	1367.45	493.50	262.50

blank subtraction								
27.58 SRM614-5	438.28	245.72	177.04	1590.11	153.34	1482.69	49.90	42.06
6344.74 SRM612-5	7086.52	4078.50	1563.17	7007.82	3851.28	46535.19	5838.53	3831.80
52760.68 SRM610-5	51080.93	28865.64	5192.47	23476.75	28987.58	166489.10	44464.23	23094.51
96.18 AP1-5	2737.82	1260.25	349.00	884.98	-112.74	5736.79	63.86	94.38
1435.07 AP2-5	37624.17	21696.24	3473.82	15316.03	500.78	10022.74	87.46	192.22
13917.66 AP3-5	504299.53	270285.02	32799.95	177868.86	5549.33	21364.04	216.42	1148.59
9846.28 AP4-5	329171.13	178653.92	22692.69	119303.37	4203.20	13786.60	224.02	865.02
1922.15 34HP45-718-1	66202.65	38169.69	7542.12	32724.96	1548.23	68085.02	157.62	624.30
1111.51 34HP45-718-2	104041.19	58945.65	9896.46	45738.12	2997.28	56094.84	214.62	911.55
2056.47 34HP45-718-3	106510.84	60400.94	10940.38	49323.78	3770.56	80683.01	377.74	930.55
3644.12 34HP45-718-4	139374.14	78905.84	18999.83	82505.28	12985.65	283099.30	661.94	5079.53
2840.16 34HP45-718-5	128873.33	73397.34	15805.41	69198.73	8191.87	192587.52	489.14	4236.20
3696.12 34HP45-718-6	143144.84	81324.54	16739.05	74860.72	8633.11	194540.10	530.74	4625.89
3536.68 34HP45-718-7	121720.45	69268.71	19726.75	83888.37	8437.71	376594.46	578.90	3885.84
3261.76 34HP45-718-8	129582.77	73510.30	21209.60	91112.69	8868.79	426155.46	556.06	4260.48
3918.48 34HP45-718-9	146437.42	83427.15	27770.16	116155.32	12375.37	639214.05	756.70	4877.97
5677.13 34HP45-718-10	183746.83	103516.55	34561.56	150099.22	6264.86	841920.49	568.82	3541.96

Appendix A. Raw trace element datasheets from laser ablation.

4364.16	34HP45-718-11	194538.81	109434.90	39832.62	171042.55	6018.81	1013971.45	427.34	3642.20
4930.77	34HP45-718-12	224646.75	124866.23	28730.56	131414.44	5964.01	481730.74	492.70	3503.36
25508.32	34HP45-718-13	87511.65	58804.61	244965.14	971363.97	10500.08	10205338.55	1051.43	1572.47
13637.74	34HP45-718-14	56124.32	38213.78	168371.18	667250.04	7676.66	7230367.05	901.39	1347.07
7846.38	34HP45-718-15	56955.08	34679.84	63555.72	245437.88	4103.96	2666676.35	615.86	1208.95
3099.56	34HP45-718-16	151971.89	85017.88	14900.44	69695.46	2657.71	122836.77	346.46	1876.95
2396.67	34HP45-718-17	168080.95	93908.53	15804.77	75632.64	2539.27	117770.26	302.46	2168.95
2570.67	34HP45-718-18	171245.69	94653.22	15487.25	75214.13	2689.32	104741.15	288.70	1759.27
261.14	SRM614-6	544.24	282.56	132.12	1342.51	-46.34	2716.10	299.18	154.02
6398.94	SRM612-6	7315.72	4425.78	778.84	4726.01	5739.53	20689.20	8091.35	5473.97
63203.54	SRM610-6	79101.89	43631.44	6504.00	32548.28	51152.15	188773.22	71777.02	40198.21
209.38	AP1-6	669.32	364.40	72.20	357.94	0.00	2161.49	229.50	147.62
1303.71	AP2-6	34726.76	20272.07	3063.18	14261.86	535.98	3747.94	343.18	274.50
12956.49	AP3-6	629054.13	332033.52	36643.25	216489.57	6890.58	12369.79	514.34	1472.91
8470.87	AP4-6	324353.78	172924.30	21268.76	115740.19	4197.72	10832.06	482.18	857.90
zero correction									
27.58	SRM614-5	438.28	245.72	177.04	1590.11	153.34	1482.69	49.90	42.06
6344.74	SRM612-5	7086.52	4078.50	1563.17	7007.82	3851.28	46535.19	5838.53	3831.80
52760.68	SRM610-5	51080.93	28865.64	5192.47	23476.75	28987.58	166489.10	44464.23	23094.51
96.18	AP1-5	2737.82	1260.25	349.00	884.98	0.00	5736.79	63.86	94.38
1435.07	AP2-5	37624.17	21696.24	3473.82	15316.03	500.78	10022.74	87.46	192.22
13917.66	AP3-5	504299.53	270285.02	32799.95	177868.86	5549.33	21364.04	216.42	1148.59
9846.28	AP4-5	329171.13	178653.92	22692.69	119303.37	4203.20	13786.60	224.02	865.02
1922.15	34HP45-718-1	66202.65	38169.69	7542.12	32724.96	1548.23	68085.02	157.62	624.30
1111.51	34HP45-718-2	104041.19	58945.65	9896.46	45738.12	2997.28	56094.84	214.62	911.55
2056.47	34HP45-718-3	106510.84	60400.94	10940.38	49323.78	3770.56	80683.01	377.74	930.55
3644.12	34HP45-718-4	139374.14	78905.84	18999.83	82505.28	12985.65	283099.30	661.94	5079.53
2840.16	34HP45-718-5	128873.33	73397.34	15805.41	69198.73	8191.87	192587.52	489.14	4236.20
3696.12	34HP45-718-6	143144.84	81324.54	16739.05	74860.72	8633.11	194540.10	530.74	4625.89
3536.68	34HP45-718-7	121720.45	69268.71	19726.75	83888.37	8437.71	376594.46	578.90	3885.84
3261.76	34HP45-718-8	129582.77	73510.30	21209.60	91112.69	8868.79	426155.46	556.06	4260.48
3918.48	34HP45-718-9	146437.42	83427.15	27770.16	116155.32	12375.37	639214.05	756.70	4877.97
5677.13	34HP45-718-10	183746.83	103516.55	34561.56	150099.22	6264.86	841920.49	568.82	3541.96
4364.16	34HP45-718-11	194538.81	109434.90	39832.62	171042.55	6018.81	1013971.45	427.34	3642.20
4930.77	34HP45-718-12	224646.75	124866.23	28730.56	131414.44	5964.01	481730.74	492.70	3503.36
25508.32	34HP45-718-13	87511.65	58804.61	244965.14	971363.97	10500.08	10205338.55	1051.43	1572.47
13637.74	34HP45-718-14	56124.32	38213.78	168371.18	667250.04	7676.66	7230367.05	901.39	1347.07
7846.38	34HP45-718-15	56955.08	34679.84	63555.72	245437.88	4103.96	2666676.35	615.86	1208.95
3099.56	34HP45-718-16	151971.89	85017.88	14900.44	69695.46	2657.71	122836.77	346.46	1876.95
2396.67	34HP45-718-17	168080.95	93908.53	15804.77	75632.64	2539.27	117770.26	302.46	2168.95
2570.67	34HP45-718-18	171245.69	94653.22	15487.25	75214.13	2689.32	104741.15	288.70	1759.27
261.14	SRM614-6	544.24	282.56	132.12	1342.51	0.00	2716.10	299.18	154.02
6398.94	SRM612-6	7315.72	4425.78	778.84	4726.01	5739.53	20689.20	8091.35	5473.97
63203.54	SRM610-6	79101.89	43631.44	6504.00	32548.28	51152.15	188773.22	71777.02	40198.21
209.38	AP1-6	669.32	364.40	72.20	357.94	0.00	2161.49	229.50	147.62
1303.71	AP2-6	34726.76	20272.07	3063.18	14261.86	535.98	3747.94	343.18	274.50
12956.49	AP3-6	629054.13	332033.52	36643.25	216489.57	6890.58	12369.79	514.34	1472.91
8470.87	AP4-6	324353.78	172924.30	21268.76	115740.19	4197.72	10832.06	482.18	857.90
certified concentration									
SRM614		1.90					1.12		
SRM612		37.92					36.24	34.64	37.33
SRM610		456.30					438.10	426.30	317.40
0.14 STD AP1		1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2		54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3		153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4		282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration									
0.000000 SRM614		0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612		0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610		0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1		0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2		0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3		0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4		0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal									
0.000018 SRM614-5		0.000292	0.000163	0.000118	0.001058	0.000102	0.000986	0.000033	0.000028
0.003655 SRM612-5		0.004083	0.002350	0.000901	0.004037	0.002219	0.026810	0.003364	0.002208
0.049529 SRM610-5		0.047952	0.027098	0.004874	0.022039	0.027212	0.156291	0.041741	0.021680
0.000007 AP1-5		0.000209	0.000096	0.000027	0.000068	0.000000	0.000438	0.000005	0.000007
0.000102 AP2-5		0.002662	0.001535	0.000246	0.001084	0.000035	0.000709	0.000006	0.000014
0.000809 AP3-5		0.029298	0.015703	0.001906	0.010334	0.000322	0.001241	0.000013	0.000067
0.000592 AP4-5		0.019787	0.010739	0.001364	0.007172	0.000253	0.000829	0.000013	0.000052
0.000227 34HP45-718-1		0.007824	0.004511	0.000891	0.003868	0.000183	0.000847	0.000019	0.000074
0.000087 34HP45-718-2		0.008190	0.004640	0.000779	0.003600	0.000236	0.004415	0.000017	0.000072

Appendix A. Raw trace element datasheets from laser ablation.

0.000137 34HP45-718-3	0.007105	0.004029	0.000730	0.003290	0.000252	0.005382	0.000025	0.000062
0.000172 34HP45-718-4	0.006581	0.003726	0.000897	0.003896	0.000613	0.013367	0.000031	0.000240
0.000172 34HP45-718-5	0.007814	0.004451	0.000958	0.004196	0.000497	0.011678	0.000030	0.000257
0.000235 34HP45-718-6	0.009091	0.005165	0.001063	0.004754	0.000548	0.012355	0.000034	0.000294
0.000205 34HP45-718-7	0.007060	0.004018	0.001144	0.004866	0.000489	0.021842	0.000034	0.000225
0.000179 34HP45-718-8	0.007117	0.004037	0.001165	0.005004	0.000487	0.023405	0.000031	0.000234
0.000205 34HP45-718-9	0.007673	0.004372	0.001455	0.006087	0.000648	0.033495	0.000040	0.000256
0.000358 34HP45-718-10	0.011576	0.006521	0.002177	0.009456	0.000395	0.053039	0.000036	0.000223
0.000257 34HP45-718-11	0.011462	0.006448	0.002347	0.010078	0.000355	0.059741	0.000025	0.000215
0.000271 34HP45-718-12	0.012349	0.006864	0.001579	0.007224	0.000328	0.026481	0.000027	0.000193
0.001605 34HP45-718-13	0.005505	0.003699	0.015411	0.061108	0.000661	0.642012	0.000066	0.000099
0.000844 34HP45-718-14	0.003473	0.002365	0.010419	0.041290	0.000475	0.447422	0.000056	0.000083
0.000439 34HP45-718-15	0.003190	0.001942	0.003560	0.013747	0.000230	0.149366	0.000034	0.000068
0.000194 34HP45-718-16	0.009534	0.005334	0.000935	0.004372	0.000167	0.007706	0.000022	0.000118
0.000129 34HP45-718-17	0.009026	0.005043	0.000849	0.004061	0.000136	0.006324	0.000016	0.000116
0.000153 34HP45-718-18	0.010176	0.005624	0.000920	0.004469	0.000160	0.006224	0.000017	0.000105
0.000215 SRM614-6	0.000448	0.000233	0.000109	0.001106	0.000000	0.002237	0.000246	0.000127
0.004242 SRM612-6	0.004850	0.002934	0.000516	0.003133	0.003805	0.013717	0.005364	0.003629
0.063083 SRM610-6	0.078951	0.043548	0.006492	0.032486	0.051054	0.188413	0.071640	0.040121
0.000015 AP1-6	0.000048	0.000026	0.000005	0.000026	0.000000	0.000155	0.000016	0.000011
0.000086 AP2-6	0.002284	0.001333	0.000201	0.000938	0.000035	0.000246	0.000023	0.000018
0.000695 AP3-6	0.033728	0.017803	0.001965	0.011608	0.000369	0.000663	0.000028	0.000079
0.000499 AP4-6	0.019088	0.010176	0.001252	0.006811	0.000247	0.000637	0.000028	0.000050
standardize signal averages AP								
0.000011 AP1	0.000128	0.000061	0.000016	0.000047	0.000000	0.000296	0.000011	0.000009
0.000094 AP2	0.002473	0.001434	0.000224	0.001011	0.000035	0.000478	0.000014	0.000016
0.000752 AP3	0.031513	0.016753	0.001935	0.010971	0.000346	0.000952	0.000020	0.000073
0.000545 AP4	0.019437	0.010458	0.001308	0.006991	0.000250	0.000733	0.000021	0.000051
linest from std sig ave								
0.035714	0.019063	0.037016	0.319166	0.056491	1.773444	0.004085	0.000000	0.054666
standardize signal averages SRM								
0.000117 srm614-2	0.000370	0.000198	0.000113	0.001082	0.000051	0.001612	0.000140	0.000077
0.003949 srm612-2	0.004466	0.002642	0.000708	0.003585	0.003012	0.020263	0.004364	0.002918
0.056306 srm610-2	0.063451	0.035323	0.005683	0.027262	0.039133	0.172352	0.056690	0.030901
linest from std sig ave								
0.000000	0.083925	0.000000	0.000000	0.000000	0.000000	0.029517	0.087709	0.120027
concentration data								
0.06 SRM614-5	0.48	0.52	3.22	5.13	15.52	0.35	0.00	0.13
11.20 SRM612-5	6.67	7.46	24.65	19.56	337.47	9.39	0.00	10.35
151.70 SRM610-5	78.40	86.02	133.43	106.77	4138.84	54.75	0.00	101.64
0.10 AP1-5	1.59	1.42	3.39	1.52	0.00	0.71	0.00	0.16
1.45 AP2-5	20.24	22.67	31.30	24.42	25.07	1.16	0.00	0.30
11.52 AP3-5	222.81	231.88	242.63	232.88	228.09	2.02	0.00	1.46
8.43 AP4-5	150.48	158.59	173.69	161.62	178.76	1.35	0.00	1.13
3.24 34HP45-718-1	59.50	66.62	113.50	87.16	129.46	13.11	0.00	1.61
1.25 34HP45-718-2	62.28	68.52	99.19	81.14	166.92	7.20	0.00	1.56
1.95 34HP45-718-3	54.04	59.50	92.93	74.15	177.96	8.77	0.00	1.35
2.45 34HP45-718-4	50.05	55.02	114.23	87.79	433.79	21.78	0.00	5.23
2.45 34HP45-718-5	59.43	65.72	122.03	94.56	351.43	19.03	0.00	5.60
3.34 34HP45-718-6	69.14	76.27	135.36	107.15	387.91	20.13	0.00	6.41
2.92 34HP45-718-7	53.69	59.33	145.68	109.65	346.24	35.59	0.00	4.92
2.55 34HP45-718-8	54.12	59.62	148.32	112.77	344.61	38.14	0.00	5.10
2.93 34HP45-718-9	58.36	64.56	185.28	137.17	458.79	54.58	0.00	5.57
5.10 34HP45-718-10	88.03	96.30	277.23	213.10	279.23	86.43	0.00	4.87
3.66 34HP45-718-11	87.17	95.21	298.82	227.11	250.89	97.35	0.00	4.68
3.86 34HP45-718-12	93.91	101.36	201.09	162.80	231.94	43.15	0.00	4.20
22.86 34HP45-718-13	41.87	54.63	1962.19	1377.15	467.34	1046.20	0.00	2.16
12.02 34HP45-718-14	26.41	34.92	1326.61	930.53	336.09	729.10	0.00	1.82
6.26 34HP45-718-15	24.26	28.68	453.27	309.82	162.63	243.40	0.00	1.48
2.77 34HP45-718-16	72.51	78.76	119.02	98.54	117.96	12.56	0.00	2.57
1.83 34HP45-718-17	68.64	74.47	108.06	91.53	96.47	10.31	0.00	2.54
2.18 34HP45-718-18	77.38	83.06	117.18	100.72	113.06	10.14	0.00	2.28
0.66 SRM614-6	0.73	0.74	2.98	5.36	0.00	0.78	0.00	0.59
12.99 SRM612-6	7.93	9.31	14.13	15.18	578.76	4.81	0.00	17.01
193.22 SRM610-6	129.07	138.25	177.69	157.39	7765.17	66.00	0.00	188.10
0.21 AP1-6	0.36	0.39	0.66	0.58	0.00	0.25	0.00	0.23
1.22 AP2-6	17.37	19.69	25.65	21.14	24.94	0.40	0.00	0.39
9.90 AP3-6	256.50	262.89	250.16	261.59	261.39	1.08	0.00	1.72
7.10 AP4-6	145.16	150.27	159.37	153.50	174.77	1.04	0.00	1.10
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
260.92 blank-3	254.64	225.84	333.56	1746.21	828.44	744.92	362.40	215.04
935.53 SRM614-3	1452.05	763.00	545.44	4246.02	907.85	2289.41	543.44	324.68
11549.67 SRM612-3	17134.94	9894.86	2067.37	10946.30	6257.68	29481.13	8716.21	5780.63
51946.33 SRM610-3	50201.28	28287.36	5077.99	23679.41	29655.73	146732.75	43077.12	23227.77
1092.97 AP1-3	8304.41	4552.39	1158.25	5135.11	828.04	9056.57	657.32	434.88
2556.17 AP2-3	54298.15	31309.10	4923.91	23567.65	1608.49	11160.94	712.48	584.00
30602.17 AP3-3	1359640.60	724401.25	77964.00	472506.66	13682.40	28087.36	951.77	3070.54
15070.13 AP4-3	520419.69	279684.34	34102.23	186564.53	6716.80	21294.88	839.92	1476.45
7156.60 34HP45-856-1	307277.81	168613.55	27179.43	133183.06	5188.31	183011.16	832.40	2485.13
4602.23 34HP45-856-2	298249.72	164026.45	27886.48	134584.75	5066.63	226492.88	766.08	2480.85
4877.95 34HP45-856-3	246696.47	137245.09	28447.08	131571.06	4358.78	382683.00	828.52	2148.93
8722.33 34HP45-856-4	215142.81	119692.47	20371.36	98560.23	4337.22	152446.73	914.13	1691.93
9609.73 34HP45-856-5	229344.09	126203.35	20818.00	101260.13	4688.59	129406.93	965.01	1770.85
8572.61 34HP45-856-6	218092.47	121068.28	26287.15	119391.84	4667.99	366672.38	994.05	1822.29
7944.28 34HP45-856-7	131638.78	74211.58	14843.32	67833.14	3690.78	154538.55	943.85	1524.13
10165.58 34HP45-856-8	152459.86	85974.13	15713.25	73202.89	4187.54	127850.64	1043.37	1642.85
9429.89 34HP45-856-9	147455.88	82408.10	16331.25	74727.42	4340.10	165057.28	1125.85	1653.17
4213.18 34HP45-856-10	149735.77	84288.71	14824.32	69497.75	2991.90	105871.84	891.85	2031.17
3529.34 34HP45-856-11	149842.48	84461.27	14929.60	70517.48	3028.22	107924.48	922.17	1966.45
4469.67 34HP45-856-12	169446.39	94442.94	16316.73	77768.80	3620.14	111532.11	980.45	2143.89
7281.40 34HP45-856-13	188594.55	105769.99	16901.34	82787.95	3433.22	90274.95	903.41	1845.49
8184.29 34HP45-856-14	184853.13	103603.14	16057.01	79857.85	3446.18	78576.52	915.21	1523.09
7319.04 34HP45-856-15	151263.73	85343.16	13376.04	65165.25	2862.70	55136.59	852.56	1193.73
4371.66 34HP45-856-16	109087.89	62078.19	9472.69	46627.10	3105.86	21706.52	852.76	713.96
2567.65 34HP45-856-17	116682.90	65946.06	9604.65	48497.95	2675.54	18569.55	838.68	624.24
2346.57 34HP45-856-18	96603.11	54970.59	8274.61	40986.43	2467.89	16287.73	776.36	618.40
762.16 SRM614-4	1216.01	756.80	414.84	3920.14	855.40	2403.17	955.97	426.80
8941.69 SRM612-4	10630.46	6240.68	1256.13	8336.25	8002.13	24214.74	10575.14	7042.00
77669.96 SRM610-4	90894.99	50188.12	7696.80	39686.18	65019.45	236158.97	88875.78	48550.27
693.28 AP1-4	2348.25	1326.13	461.52	3110.06	812.20	3409.34	905.57	434.04
2091.17 AP2-4	45075.90	26353.51	4128.06	20476.96	1550.85	5379.31	989.85	569.72
24379.46 AP3-4	1262830.10	674644.06	70578.95	442788.81	13355.20	19474.15	1278.33	3192.90
17313.74 AP4-4	798478.94	424962.47	46980.74	281458.16	9609.49	19354.03	1222.57	2078.69
684.12 blank-4	472.24	298.12	225.96	2097.73	658.68	1558.57	699.48	304.00
472.52 blank average	363.44	261.98	279.76	1921.97	743.56	1151.75	530.94	259.52

blank subtraction								
463.00 SRM614-3	1088.61	501.02	265.68	2324.05	164.28	1137.67	12.50	65.16
11077.14 SRM612-3	16771.50	9632.87	1787.61	9024.33	5514.11	28329.38	8185.27	5521.11
51473.81 SRM610-3	49837.84	28025.38	4798.23	21757.44	28912.16	145581.00	42546.18	22968.25
620.44 AP1-3	7940.96	4290.40	878.48	3213.14	84.48	7904.82	126.38	175.36
2083.65 AP2-3	53934.70	31047.11	4644.15	21645.68	864.92	10009.20	181.54	324.48
30129.65 AP3-3	1359277.16	724139.27	77684.24	470584.69	12938.83	26935.61	420.82	2811.02
14597.60 AP4-3	520056.25	279422.36	33822.47	184642.56	5973.23	20143.13	308.98	1216.93
6684.08 34HP45-856-1	306914.37	168351.57	26899.67	131261.09	4444.74	181859.41	301.46	2225.61
4129.70 34HP45-856-2	297886.28	163764.47	27606.72	132662.78	4323.06	225341.13	235.14	2221.33
4405.42 34HP45-856-3	246333.03	136983.11	28167.32	129649.09	3615.22	381531.25	297.58	1889.41
8249.81 34HP45-856-4	214779.37	119430.49	20091.59	96638.26	3593.66	151294.98	383.18	1432.41
9137.21 34HP45-856-5	228980.65	125941.37	20538.24	99338.16	3945.02	128255.18	434.06	1511.33
8100.09 34HP45-856-6	217729.03	120806.30	26007.39	117469.87	3924.42	365520.63	463.10	1562.77
7471.76 34HP45-856-7	131275.34	73949.60	14563.56	65911.17	2947.22	153386.80	412.90	1264.61
9693.05 34HP45-856-8	152096.42	85712.14	15433.49	71280.92	3443.98	126698.89	512.42	1383.33
8957.37 34HP45-856-9	147092.44	82146.12	16051.49	72805.45	3596.54	163905.53	594.90	1393.65
3740.66 34HP45-856-10	149372.33	84026.73	14544.56	67575.78	2248.33	104720.09	360.90	1771.65
3056.82 34HP45-856-11	149479.04	84199.29	14649.84	68595.51	2284.65	106772.73	391.22	1706.93
3997.14 34HP45-856-12	169082.95	94180.96	16036.97	75846.83	2876.58	110380.36	449.50	1884.37
6808.88 34HP45-856-13	188231.11	105508.01	16621.57	80865.97	2689.66	89123.20	372.46	1585.97
7711.76 34HP45-856-14	184489.69	103341.16	15777.25	77935.88	2702.62	77424.78	384.26	1263.57
6846.52 34HP45-856-15	150900.29	85081.17	13096.27	63243.28	2119.13	53984.84	321.62	934.21
3899.14 34HP45-856-16	108724.45	61816.21	9192.93	44705.13	2362.29	20554.77	321.82	454.44
2095.13 34HP45-856-17	116319.46	65684.07	9324.89	46575.98	1931.97	17417.80	307.74	364.72
1874.05 34HP45-856-18	96239.67	54708.61	7994.84	39064.46	1724.33	15135.98	245.42	358.88
289.64 SRM614-4	852.56	494.82	139.08	1998.17	111.84	1251.43	425.02	167.28
8469.17 SRM612-4	10267.02	5978.69	976.37	6414.28	7258.56	23062.99	10044.20	6782.48
77197.44 SRM610-4	90531.55	49926.14	7417.04	37764.21	64275.88	235007.22	88344.84	48290.75
220.76 AP1-4	1984.81	1064.15	181.76	1188.09	68.64	2257.59	374.62	174.52
1618.65 AP2-4	44712.45	26091.53	3848.30	18554.98	807.28	4227.56	458.90	310.20
23906.93 AP3-4	1262466.66	674382.08	70299.19	440866.84	12611.63	18322.40	747.38	2933.38
16841.22 AP4-4	798115.50	424700.49	46700.98	279536.19	8865.93	18202.28	691.62	1819.17

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
463.00 SRM614-3	1088.61	501.02	265.68	2324.05	164.28	1137.67	12.50	65.16
11077.14 SRM612-3	16771.50	9632.87	1787.61	9024.33	5514.11	28329.38	8185.27	5521.11
51473.81 SRM610-3	49837.84	28025.38	4798.23	21757.44	28912.16	145581.00	42546.18	22968.25
620.44 AP1-3	7940.96	4290.40	878.48	3213.14	84.48	7904.82	126.38	175.36
2083.65 AP2-3	53934.70	31047.11	4644.15	21645.68	864.92	10009.20	181.54	324.48
30129.65 AP3-3	1359277.16	724139.27	77684.24	470584.69	12938.83	26935.61	420.82	2811.02
14597.60 AP4-3	520056.25	279422.36	33822.47	184642.56	5973.23	20143.13	308.98	1216.93
6684.08 34HP45-856-1	306914.37	168351.57	26899.67	131261.09	4444.74	181859.41	301.46	2225.61
4129.70 34HP45-856-2	297886.28	163764.47	27606.72	132662.78	4323.06	225341.13	235.14	2221.33
4405.42 34HP45-856-3	246333.03	136983.11	28167.32	129649.09	3615.22	381531.25	297.58	1889.41
8249.81 34HP45-856-4	214779.37	119430.49	20091.59	96638.26	3593.66	151294.98	383.18	1432.41
9137.21 34HP45-856-5	228980.65	125941.37	20538.24	99338.16	3945.02	128255.18	434.06	1511.33
8100.09 34HP45-856-6	217729.03	120806.30	26007.39	117469.87	3924.42	365520.63	463.10	1562.77
7471.76 34HP45-856-7	131275.34	73949.60	14563.56	65911.17	2947.22	153386.80	412.90	1264.61
9693.05 34HP45-856-8	152096.42	85712.14	15433.49	71280.92	3443.98	126698.89	512.42	1383.33
8957.37 34HP45-856-9	147092.44	82146.12	16051.49	72805.45	3596.54	163905.53	594.90	1393.65
3740.66 34HP45-856-10	149372.33	84026.73	14544.56	67575.78	2248.33	104720.09	360.90	1771.65
3056.82 34HP45-856-11	149479.04	84199.29	14649.84	68595.51	2284.65	106772.73	391.22	1706.93
3997.14 34HP45-856-12	169082.95	94180.96	16036.97	75846.83	2876.58	110380.36	449.50	1884.37
6808.88 34HP45-856-13	188231.11	105508.01	16621.57	80865.97	2689.66	89123.20	372.46	1585.97
7711.76 34HP45-856-14	184489.69	103341.16	15777.25	77935.88	2702.62	77424.78	384.26	1263.57
6846.52 34HP45-856-15	150900.29	85081.17	13096.27	63243.28	2119.13	53984.84	321.62	934.21
3899.14 34HP45-856-16	108724.45	61816.21	9192.93	44705.13	2362.29	20554.77	321.82	454.44
2095.13 34HP45-856-17	116319.46	65684.07	9324.89	46575.98	1931.97	17417.80	307.74	364.72
1874.05 34HP45-856-18	96239.67	54708.61	7994.84	39064.46	1724.33	15135.98	245.42	358.88
289.64 SRM614-4	852.56	494.82	139.08	1998.17	111.84	1251.43	425.02	167.28
8469.17 SRM612-4	10267.02	5978.69	976.37	6414.28	7258.56	23062.99	10044.20	6782.48
77197.44 SRM610-4	90531.55	49926.14	7417.04	37764.21	64275.88	235007.22	88344.84	48290.75
220.76 AP1-4	1984.81	1064.15	181.76	1188.09	68.64	2257.59	374.62	174.52
1618.65 AP2-4	44712.45	26091.53	3848.30	18554.98	807.28	4227.56	458.90	310.20
23906.93 AP3-4	1262466.66	674382.08	70299.19	440866.84	12611.63	18322.40	747.38	2933.38
16841.22 AP4-4	798115.50	424700.49	46700.98	279536.19	8865.93	18202.28	691.62	1819.17

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000195 SRM614-3	0.000460	0.000211	0.000112	0.000981	0.000069	0.000480	0.000005	0.000028
0.004482 SRM612-3	0.006786	0.003898	0.000723	0.003652	0.002231	0.011463	0.003312	0.002234
0.037219 SRM610-3	0.036036	0.020264	0.003469	0.015732	0.020905	0.105264	0.030763	0.016607
0.000041 AP1-3	0.000523	0.000283	0.000058	0.000212	0.000006	0.000521	0.000008	0.000012
0.000128 AP2-3	0.003312	0.001906	0.000285	0.001329	0.000053	0.000615	0.000011	0.000020
0.001350 AP3-3	0.060918	0.032453	0.003482	0.021090	0.000580	0.001207	0.000019	0.000126
0.000775 AP4-3	0.027622	0.014841	0.001796	0.009807	0.000317	0.001070	0.000016	0.000065
0.000393 34HP45-856-1	0.018048	0.009900	0.001582	0.007719	0.000261	0.010694	0.000018	0.000131
0.000252 34HP45-856-2	0.018143	0.009974	0.001681	0.008080	0.000263	0.013724	0.000014	0.000135
0.000291 34HP45-856-3	0.016291	0.009059	0.001863	0.008574	0.000239	0.025232	0.000020	0.000125
0.000649 34HP45-856-4	0.016896	0.009395	0.001581	0.007602	0.000283	0.011902	0.000030	0.000113
0.000634 34HP45-856-5	0.015896	0.008743	0.001426	0.006896	0.000274	0.008903	0.000030	0.000105
0.000517 34HP45-856-6	0.013910	0.007718	0.001662	0.007505	0.000251	0.023352	0.000030	0.000100
0.000553 34HP45-856-7	0.009722	0.005477	0.001079	0.004881	0.000218	0.011359	0.000031	0.000094
0.000698 34HP45-856-8	0.010950	0.006171	0.001111	0.005132	0.000248	0.009121	0.000037	0.000100
0.000666 34HP45-856-9	0.010943	0.006111	0.001194	0.005417	0.000268	0.012194	0.000044	0.000104
0.000252 34HP45-856-10	0.010046	0.005651	0.000978	0.004545	0.000151	0.007043	0.000024	0.000119
0.000201 34HP45-856-11	0.009851	0.005549	0.000965	0.004521	0.000151	0.007037	0.000026	0.000112
0.000262 34HP45-856-12	0.011080	0.006172	0.001051	0.004970	0.000189	0.007233	0.000029	0.000123
0.000433 34HP45-856-13	0.011980	0.006715	0.001058	0.005147	0.000171	0.005672	0.000024	0.000101
0.000536 34HP45-856-14	0.012814	0.007178	0.001096	0.005413	0.000188	0.005378	0.000027	0.000088
0.000546 34HP45-856-15	0.012041	0.006789	0.001045	0.005047	0.000169	0.004308	0.000026	0.000075
0.000413 34HP45-856-16	0.011527	0.006554	0.000975	0.004739	0.000250	0.002179	0.000034	0.000048
0.000218 34HP45-856-17	0.012088	0.006826	0.000969	0.004840	0.000201	0.001810	0.000032	0.000038
0.000238 34HP45-856-18	0.012226	0.006950	0.001016	0.004963	0.000219	0.001923	0.000031	0.000046

Appendix A. Raw trace element datasheets from laser ablation.

0.000195 SRM614-4	0.000574	0.000333	0.000094	0.001345	0.000075	0.000842	0.000286	0.000113
0.004492 SRM612-4	0.005446	0.003171	0.000518	0.003402	0.003850	0.012233	0.005328	0.003598
0.062344 SRM610-4	0.073112	0.040320	0.005990	0.030498	0.051909	0.189790	0.071347	0.038999
0.000014 AP1-4	0.000129	0.000069	0.000012	0.000077	0.000004	0.000146	0.000024	0.000011
0.000096 AP2-4	0.002660	0.001552	0.000229	0.001104	0.000048	0.000251	0.000027	0.000018
0.001034 AP3-4	0.054614	0.029173	0.003041	0.019072	0.000546	0.000793	0.000032	0.000127
0.000818 AP4-4	0.038747	0.020619	0.002267	0.013571	0.000430	0.000884	0.000034	0.000088
standardize signal averages AP								
0.000028 AP1	0.000326	0.000176	0.000035	0.000144	0.000005	0.000334	0.000016	0.000011
0.000112 AP2	0.002986	0.001729	0.000257	0.001216	0.000051	0.000433	0.000019	0.000019
0.001192 AP3	0.057766	0.030813	0.003261	0.020081	0.000563	0.001000	0.000026	0.000126
0.000796 AP4	0.033185	0.017730	0.002032	0.011689	0.000374	0.000977	0.000025	0.000076
linest from std sig ave								
0.022691	0.010383	0.020107	0.190086	0.030867	1.098577	0.003719	0.000000	0.032140
standardize signal averages SRM								
0.000195 srm614-2	0.000517	0.000272	0.000103	0.001163	0.000072	0.000661	0.000146	0.000070
0.004487 srm612-2	0.006116	0.003535	0.000621	0.003527	0.003041	0.011848	0.004320	0.002916
0.049781 srm610-2	0.054574	0.030292	0.004730	0.023115	0.036407	0.147527	0.051055	0.027803
linest from std sig ave								
0.000000	0.097173	0.000000	0.000000	0.000000	0.000000	0.034632	0.097331	0.133285
concentration data								
0.38 SRM614-3	0.41	0.36	1.83	2.60	6.53	0.15	0.00	0.08
8.72 SRM612-3	6.04	6.72	11.79	9.67	210.22	3.66	0.00	6.16
72.43 SRM610-3	32.09	34.94	56.56	41.65	1969.64	33.57	0.00	45.78
0.37 AP1-3	2.17	2.27	4.39	2.61	2.44	0.77	0.00	0.15
1.16 AP2-3	13.72	15.29	21.63	16.37	23.28	0.91	0.00	0.26
12.22 AP3-3	252.34	260.32	264.01	259.70	254.13	1.79	0.00	1.62
7.02 AP4-3	114.42	119.05	136.23	120.76	139.04	1.59	0.00	0.83
3.56 34HP45-856-1	74.76	79.41	119.95	95.05	114.55	15.87	0.00	1.68
2.28 34HP45-856-2	75.15	80.01	127.50	99.49	115.39	20.36	0.00	1.73
2.64 34HP45-856-3	67.48	72.67	141.26	105.58	104.78	37.43	0.00	1.60
5.87 34HP45-856-4	69.99	75.36	119.85	93.61	123.90	17.66	0.00	1.44
5.74 34HP45-856-5	65.84	70.13	108.12	84.92	120.02	13.21	0.00	1.35
4.68 34HP45-856-6	57.62	61.91	126.00	92.42	109.88	34.65	0.00	1.28
5.01 34HP45-856-7	40.27	43.93	81.79	60.11	95.66	16.85	0.00	1.20
6.32 34HP45-856-8	45.36	49.50	84.26	63.19	108.66	13.53	0.00	1.28
6.03 34HP45-856-9	45.33	49.02	90.56	66.70	117.27	18.09	0.00	1.33
2.28 34HP45-856-10	41.61	45.33	74.18	55.96	66.27	10.45	0.00	1.53
1.82 34HP45-856-11	40.81	44.51	73.21	55.67	65.99	10.44	0.00	1.44
2.37 34HP45-856-12	45.90	49.51	79.69	61.21	82.62	10.73	0.00	1.58
3.92 34HP45-856-13	49.62	53.86	80.22	63.38	75.02	8.42	0.00	1.29
4.85 34HP45-856-14	53.08	57.57	83.10	66.66	82.27	7.98	0.00	1.13
4.95 34HP45-856-15	49.88	54.46	79.25	62.14	74.11	6.39	0.00	0.96
3.74 34HP45-856-16	47.75	52.57	73.91	58.36	109.76	3.23	0.00	0.62
1.97 34HP45-856-17	50.07	54.75	73.48	59.60	87.99	2.69	0.00	0.49
2.16 34HP45-856-18	50.64	55.75	77.02	61.11	96.01	2.85	0.00	0.58
0.38 SRM614-4	0.51	0.57	1.53	3.56	7.09	0.27	0.00	0.31
8.74 SRM612-4	4.85	5.47	8.44	9.01	362.74	3.90	0.00	9.92
121.32 SRM610-4	65.11	69.53	97.65	80.74	4890.69	60.53	0.00	107.50
0.03 AP1-4	0.11	0.12	0.19	0.20	0.42	0.05	0.00	0.03
0.19 AP2-4	2.37	2.68	3.73	2.92	4.52	0.08	0.00	0.05
2.01 AP3-4	48.63	50.31	49.58	50.49	51.40	0.25	0.00	0.35
7.40 AP4-4	160.50	165.39	171.93	167.11	188.64	1.31	0.00	1.13
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65								
	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
391.36 blank-1	343.12	352.76	346.44	3292.70	799.44	1077.61	398.92	253.80
757.48 SRM614-1	1025.85	628.96	534.04	5016.87	971.21	1948.21	646.16	403.80
10000.78 SRM612-1	10404.22	5939.67	1474.97	8814.29	6906.12	25656.71	9854.42	5858.87
88124.54 SRM610-1	94435.81	52038.77	8404.53	41851.23	55175.03	246631.88	83376.87	44070.49
604.80 AP1-1	2824.34	1448.61	589.52	2953.42	768.40	3520.86	701.00	450.16
2340.81 AP2-1	47428.51	27709.96	4390.66	21243.80	1599.93	6444.52	821.60	619.04
15958.29 AP3-1	607666.00	325097.00	39025.62	215276.13	7732.56	18726.71	947.97	1825.49
21241.92 AP4-1	848574.00	451054.75	51846.85	298934.16	10499.42	25130.42	1075.21	2151.85

Appendix A. Raw trace element datasheets from laser ablation.

2551.33	34HP45-695-1	175062.70	97803.51	14062.60	70020.56	3046.98	21869.84	732.48	797.72
2276.65	34HP45-695-2	154140.03	87124.97	12552.23	62674.20	2923.02	19928.99	750.04	651.72
1818.77	34HP45-695-3	155222.44	88061.26	12684.27	63367.36	3364.58	21254.40	791.60	656.52
6128.51	34HP45-695-4	76948.16	42714.88	9417.85	41610.47	2825.30	104910.31	1063.25	1196.85
5490.31	34HP45-695-5	56626.00	31469.38	7649.68	33122.07	2436.61	94859.53	967.61	1092.97
6494.92	34HP45-695-6	44389.29	24709.74	6512.92	27486.56	2348.01	88214.30	909.21	1416.85
4518.99	34HP45-695-7	121466.37	68050.70	12146.75	56456.04	2992.94	82085.46	875.80	1070.17
3914.98	34HP45-695-8	113938.72	64202.60	11321.22	53528.10	2756.50	74203.30	949.89	1016.57
4935.15	34HP45-695-9	91192.11	51698.09	9827.86	45198.57	2796.02	76163.19	997.49	1013.09
3668.22	34HP45-695-10	102452.26	58353.29	9732.58	46850.47	2543.05	50116.64	862.32	1155.01
2810.18	34HP45-695-11	113745.04	64819.41	9869.70	49180.64	2765.14	30687.89	849.92	1459.61
2767.30	34HP45-695-12	111654.43	63416.16	9759.01	48127.51	2895.98	28592.32	897.13	1178.77
5097.19	34HP45-695-13	119712.67	68441.11	10812.26	52866.26	3014.30	44362.41	939.65	868.40
2561.81	34HP45-695-14	111914.19	64241.60	10041.10	49167.92	2570.45	30775.05	851.00	675.48
3792.14	34HP45-695-15	96069.58	54603.75	8958.61	43514.89	2536.17	39699.90	891.17	767.08
3215.30	34HP45-695-16	116012.09	65909.65	13097.75	62488.35	2717.18	153893.42	840.44	809.88
2206.89	34HP45-695-17	114655.60	65075.81	10987.54	54473.19	2560.05	70612.52	773.68	761.64
1990.01	34HP45-695-18	124119.74	70454.44	11878.63	58257.09	2741.46	78028.88	810.20	805.76
870.60	SRM614-2	976.77	577.12	395.20	4280.66	912.85	2273.93	978.29	450.40
8129.17	SRM612-2	9557.53	5758.87	1158.93	8035.81	8462.37	22733.65	10883.10	7650.24
75188.23	SRM610-2	101001.13	56019.80	8555.61	44020.29	68916.67	226057.80	93217.88	54288.07
613.48	AP1-2	1157.12	718.04	352.84	3042.66	748.76	2273.93	978.29	450.40
1876.73	AP2-2	35052.52	20512.60	3312.30	17100.90	1401.21	5071.79	901.89	569.00
12438.75	AP3-2	541253.94	291311.84	33807.87	193980.25	7383.12	13489.28	1019.65	1716.65
18725.99	AP4-2	873705.88	466844.75	51541.05	309673.97	10638.78	19349.27	1126.13	2278.89
614.16	blank-2	387.76	285.64	206.48	2511.49	618.00	1595.57	695.84	296.16
502.76	blank average	365.44	319.20	276.46	2902.10	708.72	1336.59	547.38	274.98

blank subtraction									
254.72	SRM614-1	660.40	309.76	257.58	2114.77	262.48	611.62	98.78	128.82
9498.01	SRM612-1	10038.78	5620.47	1198.51	5912.19	6197.39	24320.12	9307.03	5583.89
87621.78	SRM610-1	94070.37	51719.57	8128.07	38949.14	54466.31	245295.29	82829.48	43795.51
102.04	AP1-1	2458.89	1129.41	313.06	51.32	59.68	2184.27	153.62	175.18
1838.05	AP2-1	47063.07	27390.76	4114.20	18341.70	891.21	5107.93	274.22	344.06
15455.53	AP3-1	607300.56	324777.80	38749.16	212374.03	7023.84	17390.12	400.58	1550.51
20739.16	AP4-1	848208.56	450735.55	51570.39	296032.06	9790.70	23793.83	527.82	1876.87
2048.57	34HP45-695-1	174697.26	97484.31	13786.14	67118.46	2338.25	20533.26	185.10	522.74
1773.89	34HP45-695-2	153774.59	86805.77	12275.77	59772.10	2214.29	18592.40	202.66	376.74
1316.01	34HP45-695-3	154857.00	87742.06	12407.81	60465.26	2655.85	19917.81	244.22	381.54
5625.75	34HP45-695-4	76582.71	42395.68	9141.39	38708.38	2116.57	103573.72	515.86	921.87
4987.55	34HP45-695-5	56260.56	31150.18	7373.22	30219.97	1727.89	93522.94	420.22	817.98
5992.15	34HP45-695-6	44023.85	24390.54	6236.45	24584.46	1639.29	86877.71	361.82	1141.87
4016.22	34HP45-695-7	121100.93	67731.50	11870.29	53553.94	2284.21	80748.87	328.42	795.18
3412.22	34HP45-695-8	113573.28	63883.40	11044.76	50626.01	2047.77	72866.71	402.50	741.58
4432.39	34HP45-695-9	90826.67	51378.89	9551.39	42296.48	2087.29	74826.60	450.10	738.10
3165.46	34HP45-695-10	102086.82	58034.09	9456.11	43948.37	1834.33	48780.05	314.94	880.02
2307.41	34HP45-695-11	113379.60	64500.20	9593.23	46278.54	2056.41	29351.31	302.54	1184.63
2264.53	34HP45-695-12	111288.99	63096.95	9482.55	45225.42	2187.25	27255.73	349.74	903.79
4594.43	34HP45-695-13	119347.23	68121.91	10535.80	49964.16	2305.57	43025.82	392.26	593.42
2059.05	34HP45-695-14	111548.75	63922.40	9764.64	46265.82	1861.73	29438.47	303.62	400.50
3289.38	34HP45-695-15	95704.14	54284.54	8682.15	40612.79	1827.45	38363.31	343.78	492.10
2712.54	34HP45-695-16	115646.65	65590.45	12821.29	59586.26	2008.45	152556.83	293.06	534.90
1704.13	34HP45-695-17	114290.16	64756.60	10711.08	51571.09	1851.33	69275.93	226.30	486.66
1487.25	34HP45-695-18	123754.30	70135.24	11602.17	55354.99	2032.73	76692.30	262.82	530.78
367.84	SRM614-2	611.32	257.92	118.74	1378.57	204.12	937.35	430.90	175.42
7626.40	SRM612-2	9192.09	5439.67	882.46	5133.71	7753.64	21397.06	10335.72	7375.26
74685.46	SRM610-2	100635.69	55700.60	8279.15	41118.19	68207.95	224721.21	92670.50	54013.08
110.72	AP1-2	791.68	398.84	76.38	140.56	40.04	1939.95	285.14	180.38
1373.97	AP2-2	34687.07	20193.39	3035.84	14198.80	692.48	3735.20	354.50	294.02
11935.99	AP3-2	540888.50	290992.64	33531.41	191078.15	6674.40	12152.69	472.26	1441.67
18223.22	AP4-2	873340.44	466525.55	51264.59	306771.87	9930.06	18012.68	578.74	2003.91

zero correction									
254.72	SRM614-1	660.40	309.76	257.58	2114.77	262.48	611.62	98.78	128.82
9498.01	SRM612-1	10038.78	5620.47	1198.51	5912.19	6197.39	24320.12	9307.03	5583.89
87621.78	SRM610-1	94070.37	51719.57	8128.07	38949.14	54466.31	245295.29	82829.48	43795.51
102.04	AP1-1	2458.89	1129.41	313.06	51.32	59.68	2184.27	153.62	175.18
1838.05	AP2-1	47063.07	27390.76	4114.20	18341.70	891.21	5107.93	274.22	344.06
15455.53	AP3-1	607300.56	324777.80	38749.16	212374.03	7023.84	17390.12	400.58	1550.51
20739.16	AP4-1	848208.56	450735.55	51570.39	296032.06	9790.70	23793.83	527.82	1876.87
2048.57	34HP45-695-1	174697.26	97484.31	13786.14	67118.46	2338.25	20533.26	185.10	522.74
1773.89	34HP45-695-2	153774.59	86805.77	12275.77	59772.10	2214.29	18592.40	202.66	376.74
1316.01	34HP45-695-3	154857.00	87742.06	12407.81	60465.26	2655.85	19917.81	244.22	381.54
5625.75	34HP45-695-4	76582.71	42395.68	9141.39	38708.38	2116.57	103573.72	515.86	921.87
4987.55	34HP45-695-5	56260.56	31150.18	7373.22	30219.97	1727.89	93522.94	420.22	817.98
5992.15	34HP45-695-6	44023.85	24390.54	6236.45	24584.46	1639.29	86877.71	361.82	1141.87
4016.22	34HP45-695-7	121100.93	67731.50	11870.29	53553.94	2284.21	80748.87	328.42	795.18
3412.22	34HP45-695-8	113573.28	63883.40	11044.76	50626.01	2047.77	72866.71	402.50	741.58

Appendix A. Raw trace element datasheets from laser ablation.

4432.39	34HP45-695-9	90826.67	51378.89	9551.39	42296.48	2087.29	74826.60	450.10	738.10
3165.46	34HP45-695-10	102086.82	58034.09	9456.11	43948.37	1834.33	48780.05	314.94	880.02
2307.41	34HP45-695-11	113379.60	64500.20	9593.23	46278.54	2056.41	29351.31	302.54	1184.63
2264.53	34HP45-695-12	111288.99	63096.95	9482.55	45225.42	2187.25	27255.73	349.74	903.79
4594.43	34HP45-695-13	119347.23	68121.91	10535.80	49964.16	2305.57	43025.82	392.26	593.42
2059.05	34HP45-695-14	111548.75	63922.40	9764.64	46265.82	1861.73	29438.47	303.62	400.50
3289.38	34HP45-695-15	95704.14	54284.54	8682.15	40612.79	1827.45	38363.31	343.78	492.10
2712.54	34HP45-695-16	115646.65	65590.45	12821.29	59586.26	2008.45	152556.83	293.06	534.90
1704.13	34HP45-695-17	114290.16	64756.60	10711.08	51571.09	1851.33	69275.93	226.30	486.66
1487.25	34HP45-695-18	123754.30	70135.24	11602.17	55354.99	2032.73	76692.30	262.82	530.78
367.84	SRM614-2	611.32	257.92	118.74	1378.57	204.12	937.35	430.90	175.42
7626.40	SRM612-2	9192.09	5439.67	882.46	5133.71	7753.64	21397.06	10335.72	7375.26
74685.46	SRM610-2	100635.69	55700.60	8279.15	41118.19	68207.95	224721.21	92670.50	54013.08
110.72	AP1-2	791.68	398.84	76.38	140.56	40.04	1939.95	285.14	180.38
1373.97	AP2-2	34687.07	20193.39	3035.84	14198.80	692.48	3735.20	354.50	294.02
11935.99	AP3-2	540888.50	290992.64	33531.41	191078.15	6674.40	12152.69	472.26	1441.67
18223.22	AP4-2	873340.44	466525.55	51264.59	306771.87	9930.06	18012.68	578.74	2003.91

certified concentration									
SRM614	1.90					1.12			
SRM612	37.92					36.24	34.64	37.33	
SRM610	456.30					438.10	426.30	317.40	
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07	
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38	
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09	
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84	

standardized concentration									
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435	
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701	
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001	
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003	
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005	

standardized signal									
0.000125 SRM614-1	0.000324	0.000152	0.000126	0.001037	0.000129	0.000300	0.000048	0.000063	
0.004115 SRM612-1	0.004350	0.002435	0.000519	0.002562	0.002685	0.010537	0.004033	0.002419	
0.057070 SRM610-1	0.061270	0.033686	0.005294	0.025369	0.035475	0.159767	0.053949	0.028525	
0.000006 AP1-1	0.000155	0.000071	0.000020	0.000003	0.000004	0.000138	0.000010	0.000011	
0.000104 AP2-1	0.002652	0.001543	0.000232	0.001034	0.000050	0.000288	0.000015	0.000019	
0.000691 AP3-1	0.027144	0.014516	0.001732	0.009492	0.000314	0.000777	0.000018	0.000069	
0.000917 AP4-1	0.037520	0.019938	0.002281	0.013095	0.000433	0.001053	0.000023	0.000083	
0.000186 34HP45-695-1	0.015833	0.008835	0.001249	0.006083	0.000212	0.001861	0.000017	0.000047	
0.000214 34HP45-695-2	0.018527	0.010459	0.001479	0.007201	0.000267	0.002240	0.000024	0.000045	
0.000152 34HP45-695-3	0.017868	0.010124	0.001432	0.006977	0.000306	0.002298	0.000028	0.000044	
0.000337 34HP45-695-4	0.004582	0.002537	0.000547	0.002316	0.000127	0.006197	0.000031	0.000055	
0.000338 34HP45-695-5	0.003816	0.002113	0.000500	0.002050	0.000117	0.006344	0.000029	0.000055	
0.000498 34HP45-695-6	0.003660	0.002028	0.000518	0.002044	0.000136	0.007222	0.000030	0.000095	
0.000262 34HP45-695-7	0.007885	0.004410	0.000773	0.003487	0.000149	0.005258	0.000021	0.000052	
0.000225 34HP45-695-8	0.007474	0.004204	0.000727	0.003332	0.000135	0.004795	0.000026	0.000049	
0.000277 34HP45-695-9	0.005678	0.003212	0.000597	0.002644	0.000130	0.004678	0.000028	0.000046	
0.000243 34HP45-695-10	0.007824	0.004448	0.000725	0.003368	0.000141	0.003738	0.000024	0.000067	
0.000181 34HP45-695-11	0.008904	0.005065	0.000753	0.003634	0.000161	0.002305	0.000024	0.000093	
0.000203 34HP45-695-12	0.009993	0.005666	0.000851	0.004061	0.000196	0.002447	0.000031	0.000081	
0.000339 34HP45-695-13	0.008812	0.005030	0.000778	0.003689	0.000170	0.003177	0.000029	0.000044	
0.000162 34HP45-695-14	0.008759	0.005019	0.000767	0.003633	0.000146	0.002311	0.000024	0.000031	
0.000255 34HP45-695-15	0.007431	0.004215	0.000674	0.003154	0.000142	0.002979	0.000027	0.000038	
0.000221 34HP45-695-16	0.009416	0.005340	0.001044	0.004851	0.000164	0.012421	0.000024	0.000044	
0.000145 34HP45-695-17	0.009737	0.005517	0.000913	0.004394	0.000158	0.005902	0.000019	0.000041	
0.000119 34HP45-695-18	0.009924	0.005624	0.000930	0.004439	0.000163	0.006150	0.000021	0.000043	
0.000234 SRM614-2	0.000389	0.000164	0.000075	0.000876	0.000130	0.000596	0.0000274	0.000112	
0.004347 SRM612-2	0.005239	0.003100	0.000503	0.002926	0.004419	0.012195	0.005891	0.004204	
0.064462 SRM610-2	0.086861	0.048076	0.007146	0.035490	0.058872	0.193961	0.079986	0.046620	
0.000008 AP1-2	0.000056	0.000028	0.000005	0.000010	0.000003	0.000137	0.000020	0.000013	
0.000092 AP2-2	0.002325	0.001354	0.000203	0.000952	0.000046	0.000250	0.000024	0.000020	
0.000631 AP3-2	0.028615	0.015394	0.001774	0.010109	0.000353	0.000643	0.000025	0.000076	
0.000903 AP4-2	0.043258	0.023108	0.002539	0.015195	0.000492	0.000892	0.000029	0.000099	

standardize signal averages AP									
0.000007 AP1	0.000105	0.000050	0.000013	0.000007	0.000003	0.000137	0.000015	0.000012	
0.000098 AP2	0.002488	0.001448	0.000218	0.000993	0.000048	0.000269	0.000020	0.000020	
0.000661 AP3	0.027879	0.014955	0.001753	0.009800	0.000334	0.000710	0.000021	0.000073	
0.000910 AP4	0.040389	0.021523	0.002410	0.014145	0.000462	0.000972	0.000026	0.000091	

linest from std sig ave									
0.032373	0.016432	0.031702	0.278303	0.048296	1.455512	0.004572	0.000000	0.045280	

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
0.000179 srm614-2	0.000356	0.000158	0.000101	0.000957	0.000129	0.000448	0.000161	0.000087
0.004231 srm612-2	0.004794	0.002768	0.000511	0.002744	0.003552	0.011366	0.004962	0.003311
0.060766 srm610-2	0.074065	0.040881	0.006220	0.030429	0.047173	0.176864	0.066967	0.037572

linest from std sig ave								
0.000000	0.071920	0.000000	0.000000	0.000000	0.000000	0.028917	0.074264	0.098754

concentration data								
0.35 SRM614-1	0.46	0.41	3.01	4.29	16.06	0.12	0.00	0.25
11.43 SRM612-1	6.13	6.62	12.39	10.61	335.19	4.13	0.00	9.40
158.45 SRM610-1	86.35	91.59	126.36	105.08	4428.34	62.64	0.00	110.77
0.08 AP1-1	1.02	0.90	2.19	0.06	2.18	0.25	0.00	0.20
1.34 AP2-1	17.38	19.52	25.74	19.91	29.16	0.52	0.00	0.35
8.92 AP3-1	177.94	183.59	192.29	182.89	182.29	1.42	0.00	1.25
11.85 AP4-1	245.96	252.16	253.27	252.30	251.48	1.92	0.00	1.50
2.40 34HP45-695-1	103.79	111.74	138.72	117.20	123.05	3.39	0.00	0.86
2.76 34HP45-695-2	121.45	132.27	164.21	138.75	154.91	4.09	0.00	0.82
1.96 34HP45-695-3	117.13	128.04	158.95	134.42	177.94	4.19	0.00	0.80
4.35 34HP45-695-4	30.04	32.08	60.73	44.63	73.54	11.30	0.00	1.00
4.37 34HP45-695-5	25.02	26.72	55.53	39.49	68.05	11.57	0.00	1.00
6.43 34HP45-695-6	23.99	25.64	57.56	39.38	79.13	13.17	0.00	1.71
3.38 34HP45-695-7	51.69	55.77	85.81	67.18	86.36	9.59	0.00	0.94
2.90 34HP45-695-8	49.00	53.17	80.70	64.19	78.25	8.75	0.00	0.88
3.58 34HP45-695-9	37.22	40.62	66.29	50.94	75.77	8.53	0.00	0.83
3.13 34HP45-695-10	51.29	56.25	80.46	64.89	81.63	6.82	0.00	1.22
2.34 34HP45-695-11	58.37	64.06	83.64	70.02	93.77	4.20	0.00	1.68
2.63 34HP45-695-12	65.51	71.65	94.53	78.24	114.04	4.46	0.00	1.47
4.38 34HP45-695-13	57.77	63.61	86.37	71.08	98.85	5.79	0.00	0.79
2.09 34HP45-695-14	57.42	63.48	85.12	69.99	84.88	4.22	0.00	0.57
3.30 34HP45-695-15	48.71	53.31	74.85	60.76	82.39	5.43	0.00	0.69
2.85 34HP45-695-16	61.72	67.54	115.90	93.47	94.95	22.65	0.00	0.79
1.88 34HP45-695-17	63.83	69.77	101.31	84.65	91.58	10.76	0.00	0.75
1.54 34HP45-695-18	65.06	71.13	103.30	85.53	94.65	11.22	0.00	0.77
0.65 SRM614-2	0.55	0.45	1.80	3.63	16.20	0.23	0.00	0.43
12.07 SRM612-2	7.38	8.43	12.00	12.12	551.65	4.78	0.00	16.32
178.98 SRM610-2	122.41	130.71	170.56	147.00	7348.88	76.05	0.00	181.04
0.10 AP1-2	0.37	0.36	0.60	0.19	1.65	0.25	0.00	0.23
1.19 AP2-2	15.24	17.12	22.59	18.34	26.95	0.46	0.00	0.36
8.16 AP3-2	187.58	194.69	196.95	194.76	205.03	1.17	0.00	1.38
11.66 AP4-2	283.57	292.24	281.91	292.76	285.59	1.63	0.00	1.79

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
738.28 blank-1	483.36	493.00	766.76	4406.42	1265.09	1716.33	751.68	435.64
3425.78 SRM614-1	7084.60	4333.26	1398.01	10313.86	1512.81	4249.42	1313.57	744.88
8433.13 SRM612-1	14503.76	8497.41	1856.05	10602.58	5658.99	16122.13	5954.79	3362.54
38838.54 SRM610-1	44782.25	25525.82	4430.34	23675.37	37327.05	91744.00	47761.11	37073.17
4410.66 AP1-1	29188.73	17073.74	2575.57	16652.77	1483.65	4889.27	1025.41	770.16
3241.70 AP2-1	61776.47	33958.80	5320.99	29764.69	1957.57	6636.40	798.52	657.04
17157.50 AP3-1	533414.44	298021.50	37240.97	205597.08	8139.61	15291.45	970.93	1893.25
25231.82 AP4-1	1058158.40	583747.56	70009.88	395412.31	13884.60	22647.01	965.25	2956.58
1514.01 MZ1-1	72951.01	42507.20	6364.64	34766.07	1890.05	8818.81	637.12	428.36
1144.49 MZ1-2	58476.21	34257.75	5324.11	28951.20	1598.09	7422.64	596.04	355.80
724.76 MZ1-3	56315.72	33385.35	5133.87	28303.24	1732.65	6294.56	571.44	379.28
1978.13 MZ1-4	97690.88	56771.24	8398.01	44597.37	2063.61	7838.92	594.64	445.92
1228.53 MZ1-5	104723.19	61239.66	8971.85	47818.15	2259.21	7270.28	642.72	460.56
1341.69 MZ1-6	85882.84	49888.52	7344.12	40672.27	1974.05	5798.95	611.56	463.88
1988.93 MZ1-7	84846.44	49746.40	7512.84	40399.15	1976.61	5771.43	604.64	410.68
1300.33 MZ1-8	104015.23	59805.78	8810.53	48239.07	2184.21	6466.44	636.84	434.88
1216.49 MZ1-9	86325.73	49715.32	7617.28	41422.27	1973.77	5675.15	636.88	361.84
973.49 MZ1-10	56311.76	32847.70	5096.63	29243.92	1611.61	5377.51	650.64	442.44
918.65 MZ1-11	69336.31	40394.87	6008.91	34776.00	1776.93	4621.63	598.80	394.00
1031.01 MZ1-12	71175.84	41126.71	6126.79	34868.84	1743.93	4653.99	625.32	412.84
1686.61 MZ1-13	76698.52	45023.49	6742.12	37749.01	2538.05	6231.48	685.08	454.96
1836.09 MZ1-14	100923.93	58460.25	8764.33	46638.78	3027.22	7071.08	660.64	488.56
1668.65 MZ1-15	107581.80	62471.63	9242.69	49698.44	2991.46	6601.36	660.08	502.36
1726.33 MZ1-16	65291.73	38847.42	5944.23	33055.51	1684.05	5026.39	627.48	403.00

Appendix A. Raw trace element datasheets from laser ablation.

1102.93 MZ1-17	86283.25	50409.84	7543.88	41646.63	1954.01	5081.19	621.48	366.52
1524.97 MZ1-18	146930.86	83633.79	12167.11	65463.73	2834.26	15764.41	662.72	445.88
1632.57 MZ1-19	288516.88	162121.00	22847.45	119574.95	4229.18	33762.83	767.88	414.64
1207.05 MZ1-20	304561.84	170671.39	23984.18	124924.66	4537.59	31632.54	652.36	374.92
1246.49 MZ1-21	315587.66	176108.44	24454.46	128538.16	4587.07	31760.06	719.92	421.76
1156.61 srm614-2	2669.38	1765.21	675.80	9153.13	1152.21	3401.82	1163.49	630.00
5101.59 srm612-2	7770.84	4669.59	1001.81	9963.66	5082.59	13757.16	6053.63	3772.02
36173.20 srm610-2	33281.15	19136.67	3273.74	20823.40	36044.48	91110.43	43049.48	26346.31
584.44 AP1-2	3219.02	2145.25	487.08	7359.04	766.64	2799.26	688.36	382.32
1343.05 AP2-2	23314.93	14082.28	2413.53	15520.09	1113.13	3954.50	667.16	428.68
9016.69 AP3-2	335534.25	185828.92	23980.86	131855.22	5414.59	9474.41	792.48	1388.81
16207.33 AP4-2	700708.00	385394.28	46601.06	263634.66	9512.29	14859.32	825.48	2216.37
457.56 blank-2	497.36	424.64	264.52	6489.16	719.48	1785.05	516.00	304.20
597.92 blank ave	490.36	458.82	515.64	5447.79	992.29	1750.69	633.84	369.92

blank subtraction								
2827.86 SRM614-1	6594.24	3874.44	882.36	4866.07	520.52	2498.73	679.72	374.96
7835.20 SRM612-1	14013.40	8038.59	1340.41	5154.79	4666.71	14371.44	5320.95	2992.62
38240.62 SRM610-1	44291.89	25067.00	3914.70	18227.58	36334.77	89993.31	47127.27	36703.25
3812.74 AP1-1	28698.36	16614.91	2059.93	11204.98	491.36	3138.58	391.56	400.24
2643.77 AP2-1	61286.11	35499.98	4805.35	24316.90	965.29	4885.71	164.68	287.12
16559.57 AP3-1	532924.08	297562.68	36725.33	200149.29	7147.32	13540.76	337.08	1523.33
24633.90 AP4-1	1057668.04	583288.74	69494.23	389964.52	12892.31	20896.32	331.40	2586.65
916.09 MZ1-1	72460.65	42048.38	5848.99	29318.28	897.77	7068.12	3.28	58.44
546.56 MZ1-2	57985.85	33798.93	4808.47	23503.41	605.80	5671.95	-37.80	-14.12
126.84 MZ1-3	55825.36	32926.53	4618.23	22855.45	740.36	4543.87	-62.40	9.36
1380.21 MZ1-4	97200.51	56312.42	7882.36	39149.58	1071.33	6088.23	-39.20	76.00
630.60 MZ1-5	104232.83	60780.84	8456.21	42370.36	1266.93	5519.59	8.88	90.64
743.76 MZ1-6	85392.48	49429.70	6828.48	35224.48	981.77	4048.26	-22.28	93.96
1391.01 MZ1-7	84356.08	49287.58	6997.20	34951.36	984.33	4020.74	-29.20	40.76
702.40 MZ1-8	103524.87	59346.95	8294.89	42791.28	1191.93	4715.75	3.00	64.96
618.56 MZ1-9	85835.36	49256.50	7101.64	35974.48	981.49	3924.46	3.04	-8.08
375.56 MZ1-10	55821.40	32388.88	4580.99	23796.13	619.32	3626.82	16.80	72.52
320.72 MZ1-11	68845.95	39936.04	5493.27	29328.21	784.64	2870.94	-35.04	24.08
433.08 MZ1-12	70685.48	40667.89	5611.15	29421.05	751.64	2903.30	-8.52	42.92
1088.69 MZ1-13	76208.15	44564.67	6226.47	32301.22	1545.77	4480.79	51.24	85.04
1238.17 MZ1-14	100433.57	58001.43	8248.69	41190.99	2034.93	5320.39	26.80	118.64
1070.73 MZ1-15	107091.44	62012.81	8727.05	44250.65	1999.17	4850.67	26.24	132.44
1128.41 MZ1-16	64801.36	38388.60	5428.59	27607.72	691.76	3275.70	-6.36	33.08
505.00 MZ1-17	85792.89	49951.02	7028.24	36198.84	961.73	3330.50	-12.36	-3.40
927.05 MZ1-18	146440.50	83174.97	11651.47	60015.94	1841.97	14013.72	28.88	75.96
1034.65 MZ1-19	288026.52	161662.18	22331.81	114127.16	3236.90	32012.14	134.04	44.72
609.12 MZ1-20	304071.48	170212.57	23468.53	119476.87	3545.30	29881.85	18.52	5.00
648.56 MZ1-21	315097.30	175649.62	23938.81	123090.37	3594.78	30009.37	86.08	51.84
558.68 srm614-2	2179.01	1306.39	160.16	3705.34	159.92	1651.13	529.64	260.08
4503.67 srm612-2	7280.48	4210.76	486.16	4515.87	4090.30	12006.47	5419.79	3402.10
35575.28 srm610-2	32790.79	18677.85	2758.10	15375.61	35052.20	89359.74	42415.64	25976.39
-13.48 AP1-2	2728.66	1686.43	-28.56	1911.25	-225.64	1048.57	54.52	12.40
745.12 AP2-2	22824.57	13623.46	1897.89	10072.30	120.84	2203.81	33.32	58.76
8418.77 AP3-2	335043.89	185370.10	23465.21	126407.43	4422.30	7723.72	158.64	1018.89
15609.41 AP4-2	700217.64	384935.46	46085.42	258186.87	8520.01	13108.63	191.64	1846.45

zero correction								
2827.86 SRM614-1	6594.24	3874.44	882.36	4866.07	520.52	2498.73	679.72	374.96
7835.20 SRM612-1	14013.40	8038.59	1340.41	5154.79	4666.71	14371.44	5320.95	2992.62
38240.62 SRM610-1	44291.89	25067.00	3914.70	18227.58	36334.77	89993.31	47127.27	36703.25
3812.74 AP1-1	28698.36	16614.91	2059.93	11204.98	491.36	3138.58	391.56	400.24
2643.77 AP2-1	61286.11	35499.98	4805.35	24316.90	965.29	4885.71	164.68	287.12
16559.57 AP3-1	532924.08	297562.68	36725.33	200149.29	7147.32	13540.76	337.08	1523.33
24633.90 AP4-1	1057668.04	583288.74	69494.23	389964.52	12892.31	20896.32	331.40	2586.65
916.09 MZ1-1	72460.65	42048.38	5848.99	29318.28	897.77	7068.12	3.28	58.44
546.56 MZ1-2	57985.85	33798.93	4808.47	23503.41	605.80	5671.95	0.00	0.00
126.84 MZ1-3	55825.36	32926.53	4618.23	22855.45	740.36	4543.87	0.00	9.36
1380.21 MZ1-4	97200.51	56312.42	7882.36	39149.58	1071.33	6088.23	0.00	76.00
630.60 MZ1-5	104232.83	60780.84	8456.21	42370.36	1266.93	5519.59	8.88	90.64
743.76 MZ1-6	85392.48	49429.70	6828.48	35224.48	981.77	4048.26	0.00	93.96
1391.01 MZ1-7	84356.08	49287.58	6997.20	34951.36	984.33	4020.74	0.00	40.76
702.40 MZ1-8	103524.87	59346.95	8294.89	42791.28	1191.93	4715.75	3.00	64.96
618.56 MZ1-9	85835.36	49256.50	7101.64	35974.48	981.49	3924.46	3.04	0.00
375.56 MZ1-10	55821.40	32388.88	4580.99	23796.13	619.32	3626.82	16.80	72.52
320.72 MZ1-11	68845.95	39936.04	5493.27	29328.21	784.64	2870.94	0.00	24.08
433.08 MZ1-12	70685.48	40667.89	5611.15	29421.05	751.64	2903.30	0.00	42.92
1088.69 MZ1-13	76208.15	44564.67	6226.47	32301.22	1545.77	4480.79	51.24	85.04
1238.17 MZ1-14	100433.57	58001.43	8248.69	41190.99	2034.93	5320.39	26.80	118.64
1070.73 MZ1-15	107091.44	62012.81	8727.05	44250.65	1999.17	4850.67	26.24	132.44
1128.41 MZ1-16	64801.36	38388.60	5428.59	27607.72	691.76	3275.70	0.00	33.08
505.00 MZ1-17	85792.89	49951.02	7028.24	36198.84	961.73	3330.50	0.00	0.00
927.05 MZ1-18	146440.50	83174.97	11651.47	60015.94	1841.97	14013.72	28.88	75.96

Appendix A. Raw trace element datasheets from laser ablation.

1034.65 MZ1-19	288026.52	161662.18	22331.81	114127.16	3236.90	32012.14	134.04	44.72
609.12 MZ1-20	304071.48	170212.57	23468.53	119476.87	3545.30	29881.85	18.52	5.00
648.56 MZ1-21	315097.30	175649.62	23938.81	123090.37	3594.78	30009.37	86.08	51.84
558.68 srm614-2	2179.01	1306.39	160.16	3705.34	159.92	1651.13	529.64	260.08
4503.67 srm612-2	7280.48	4210.76	486.16	4515.87	4090.30	12006.47	5419.79	3402.10
35575.28 srm610-2	32790.79	18677.85	2758.10	15375.61	35052.20	89359.74	42415.64	25976.39
0.00 AP1-2	2728.66	1686.43	0.00	1911.25	0.00	1048.57	54.52	12.40
745.12 AP2-2	22824.57	13623.46	1897.89	10072.30	120.84	2203.81	33.32	58.76
8418.77 AP3-2	335043.89	185370.10	23465.21	126407.43	4422.30	7723.72	158.64	1018.89
15609.41 AP4-2	700217.64	384935.46	46085.42	258186.87	8520.01	13108.63	191.64	1846.45
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000631 SRM614-1	0.001471	0.000864	0.000197	0.001086	0.000116	0.000557	0.000152	0.000084
0.006134 SRM612-1	0.010970	0.006293	0.001049	0.004035	0.003653	0.011250	0.004165	0.002343
0.055680 SRM610-1	0.064491	0.036498	0.005700	0.026540	0.052905	0.131033	0.068619	0.053441
0.000222 AP1-1	0.001669	0.000966	0.000120	0.000652	0.000029	0.000183	0.000023	0.000023
0.000183 AP2-1	0.004233	0.002452	0.000332	0.001680	0.000067	0.000337	0.000011	0.000020
0.000879 AP3-1	0.028297	0.015800	0.001950	0.010628	0.000380	0.000719	0.000018	0.000081
0.001434 AP4-1	0.061565	0.033952	0.004045	0.022699	0.000750	0.001216	0.000019	0.000151
0.000079 MZ1-1	0.006229	0.003615	0.000503	0.002520	0.000077	0.000608	0.000000	0.000005
0.000053 MZ1-2	0.005659	0.003299	0.000469	0.002294	0.000059	0.000554	0.000000	0.000000
0.000014 MZ1-3	0.006254	0.003689	0.000517	0.002560	0.000083	0.000509	0.000000	0.000001
0.000131 MZ1-4	0.009253	0.005361	0.000750	0.003727	0.000102	0.000580	0.000000	0.000007
0.000063 MZ1-5	0.010399	0.006064	0.000844	0.004227	0.000126	0.000551	0.000001	0.000009
0.000086 MZ1-6	0.009843	0.005698	0.000787	0.004060	0.000113	0.000467	0.000000	0.000011
0.000117 MZ1-7	0.007117	0.004158	0.000590	0.002949	0.000083	0.000339	0.000000	0.000003
0.000056 MZ1-8	0.008206	0.004704	0.000658	0.003392	0.000094	0.000374	0.000000	0.000005
0.000056 MZ1-9	0.007709	0.004424	0.000638	0.003231	0.000088	0.000352	0.000000	0.000000
0.000047 MZ1-10	0.007015	0.004070	0.000576	0.002991	0.000078	0.000456	0.000002	0.000009
0.000039 MZ1-11	0.008286	0.004807	0.000661	0.003530	0.000094	0.000346	0.000000	0.000003
0.000052 MZ1-12	0.008421	0.004845	0.000669	0.003505	0.000090	0.000346	0.000000	0.000005
0.000111 MZ1-13	0.007791	0.004556	0.000637	0.003302	0.000158	0.000458	0.000005	0.000009
0.000103 MZ1-14	0.008384	0.004842	0.000689	0.003438	0.000170	0.000444	0.000002	0.000010
0.000089 MZ1-15	0.008904	0.005156	0.000726	0.003679	0.000166	0.000403	0.000002	0.000011
0.000143 MZ1-16	0.008233	0.004877	0.000690	0.003508	0.000088	0.000416	0.000000	0.000004
0.000055 MZ1-17	0.009310	0.005420	0.000763	0.003928	0.000104	0.000361	0.000000	0.000000
0.000069 MZ1-18	0.010936	0.006211	0.000870	0.004482	0.000138	0.001047	0.000002	0.000006
0.000057 MZ1-19	0.015898	0.008923	0.001233	0.006300	0.000179	0.001767	0.000007	0.000002
0.000034 MZ1-20	0.016915	0.009468	0.001305	0.006646	0.000197	0.001662	0.000001	0.000000
0.000034 MZ1-21	0.016634	0.009273	0.001264	0.006498	0.000190	0.001584	0.000005	0.000003
0.000198 srm614-2	0.000773	0.000463	0.000057	0.001315	0.000057	0.000586	0.000188	0.000092
0.005878 srm612-2	0.009502	0.005496	0.000635	0.005894	0.005338	0.015670	0.007074	0.004440
0.064569 srm610-2	0.059515	0.033900	0.005006	0.027907	0.063620	0.162188	0.076985	0.047147
0.000000 AP1-2	0.000287	0.000177	0.000000	0.000201	0.000000	0.000110	0.000006	0.000001
0.000092 AP2-2	0.002810	0.001677	0.000234	0.001240	0.000015	0.000271	0.000004	0.000007
0.000676 AP3-2	0.026912	0.014889	0.001885	0.010153	0.000355	0.000620	0.000013	0.000082
0.001254 AP4-2	0.056274	0.030936	0.003704	0.020749	0.000685	0.001053	0.000015	0.000148
standardize signal averages AP								
0.000111 AP1	0.000978	0.000572	0.000060	0.000426	0.000014	0.000146	0.000014	0.000012
0.000137 AP2	0.003522	0.002065	0.000283	0.001460	0.000041	0.000304	0.000008	0.000014
0.000778 AP3	0.027604	0.015345	0.001917	0.010390	0.000367	0.000670	0.000015	0.000081
0.001344 AP4	0.058919	0.032444	0.003874	0.021724	0.000718	0.001135	0.000017	0.000149
lineest from std sig ave								
0.023537	0.012440	0.023229	0.193110	0.034632	1.035140	0.004163	0.000000	0.031629
standardize signal averages SRM								
0.000415 srm614-2	0.001122	0.000664	0.000127	0.001200	0.000086	0.000572	0.000170	0.000088
0.006006 srm612-2	0.010236	0.005894	0.000842	0.004965	0.004496	0.013460	0.005620	0.003391

Appendix A. Raw trace element datasheets from laser ablation.

0.060125 srm610-2	0.062003	0.035199	0.005353	0.027223	0.058262	0.146611	0.072802	0.050294
linest from std sig ave								
0.000000	0.084659	0.000000	0.000000	0.000000	0.000000	0.034813	0.068298	0.073833
concentration data								
1.27 SRM614-1	1.57	1.72	3.26	3.22	10.31	0.20	0.00	0.23
12.38 SRM612-1	11.70	12.54	17.38	11.99	324.32	4.02	0.00	6.35
112.40 SRM610-1	68.81	72.71	94.40	78.83	4696.71	46.78	0.00	144.96
2.08 AP1-1	8.28	8.95	9.23	9.00	11.80	0.30	0.00	0.29
1.71 AP2-1	21.01	22.72	25.57	23.21	27.53	0.56	0.00	0.25
8.26 AP3-1	140.43	146.42	150.23	146.83	156.72	1.19	0.00	1.02
13.46 AP4-1	305.54	314.63	311.63	313.61	309.90	2.02	0.00	1.90
0.74 MZ1-1	30.91	33.50	38.74	34.82	31.87	1.01	0.00	0.06
0.50 MZ1-2	28.09	30.57	36.15	31.69	24.42	0.92	0.00	0.00
0.13 MZ1-3	31.04	34.18	39.86	35.37	34.25	0.85	0.00	0.01
1.23 MZ1-4	45.92	49.68	57.81	51.49	42.12	0.96	0.00	0.09
0.59 MZ1-5	51.61	56.20	65.00	58.40	52.20	0.91	0.00	0.11
0.81 MZ1-6	48.85	52.80	60.64	56.10	46.73	0.77	0.00	0.14
1.10 MZ1-7	35.32	38.53	45.48	40.74	34.29	0.56	0.00	0.04
0.52 MZ1-8	40.73	43.60	50.66	46.86	39.02	0.62	0.00	0.06
0.52 MZ1-9	38.26	41.00	49.14	44.64	36.40	0.59	0.00	0.00
0.44 MZ1-10	34.82	37.72	44.35	41.32	32.14	0.76	0.00	0.11
0.36 MZ1-11	41.12	44.54	50.94	48.77	39.00	0.57	0.00	0.04
0.48 MZ1-12	41.79	44.90	51.50	48.43	36.98	0.57	0.00	0.06
1.05 MZ1-13	38.66	42.22	49.04	45.62	65.26	0.76	0.00	0.11
0.97 MZ1-14	41.61	44.87	53.05	47.51	70.15	0.74	0.00	0.12
0.84 MZ1-15	44.19	47.78	55.90	50.83	68.64	0.67	0.00	0.14
1.35 MZ1-16	40.86	45.20	53.13	48.46	36.29	0.69	0.00	0.05
0.51 MZ1-17	46.20	50.23	58.75	54.27	43.10	0.60	0.00	0.00
0.65 MZ1-18	54.27	57.56	67.03	61.92	56.80	1.74	0.00	0.07
0.54 MZ1-19	78.90	82.69	94.96	87.03	73.78	2.93	0.00	0.03
0.32 MZ1-20	83.94	87.74	100.57	91.82	81.44	2.76	0.00	0.00
0.32 MZ1-21	82.55	85.93	97.36	89.78	78.37	2.63	0.00	0.03
0.40 srm614-2	0.82	0.92	0.94	3.90	5.04	0.21	0.00	0.25
11.87 srm612-2	10.14	10.95	10.51	17.51	473.93	5.59	0.00	12.04
130.34 srm610-2	63.50	67.54	82.91	82.89	5647.96	57.90	0.00	127.89
0.00 AP1-2	1.42	1.64	0.00	2.77	0.00	0.18	0.00	0.02
0.86 AP2-2	13.95	15.54	18.00	17.13	6.14	0.45	0.00	0.09
6.35 AP3-2	133.56	137.98	145.20	140.28	146.69	1.03	0.00	1.03
11.78 AP4-2	279.28	286.68	285.33	286.67	282.76	1.75	0.00	1.87
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
381.36 blank-5	295.72	530.44	824.48	3316.38	1299.33	3580.58	904.21	435.56
1625.85 SRM614-5	2959.50	1905.37	1282.21	8916.17	1817.21	3002.10	1150.53	582.56
10212.06 SRM612-5	12333.87	7275.68	1961.53	14393.36	10273.34	26016.19	12549.83	8377.77
46242.26 SRM610-5	49634.12	28496.92	5087.51	30065.05	45621.50	122876.17	55138.55	30567.21
1713.37 AP1-5	4795.55	3239.18	1011.37	11241.26	1247.49	3287.06	873.92	525.16
1474.29 AP2-5	24308.46	14857.20	2789.10	19490.19	1520.41	4535.75	755.92	520.28
5465.19 AP3-5	187344.33	105696.12	14488.04	82105.38	3817.34	6983.20	735.76	949.17
8005.49 AP4-5	285577.38	159613.89	21622.76	119241.75	5421.75	11061.62	833.24	1072.93
411.00 MZ2-1b	15146.29	9555.21	1857.89	16567.17	1180.93	4687.39	596.04	286.08
477.20 MZ2-2b	20714.48	12584.95	2334.25	19456.43	1315.77	5365.47	542.76	312.08
489.60 MZ2-3b	17489.94	10782.38	1966.89	18240.26	1231.69	4496.03	573.88	353.64
470.48 MZ2-4b	36151.52	21888.88	3657.10	25979.31	1580.45	3665.90	636.84	334.08
556.88 MZ2-5b	39699.26	23566.45	3842.14	27251.43	1508.61	5267.31	623.56	339.28
521.44 MZ2-6b	27716.56	16877.49	2842.78	22403.89	1401.85	4833.63	663.16	321.96
661.16 MZ2-7b	42046.60	25297.14	4023.50	27796.80	1721.89	3943.02	625.80	357.56
595.04 MZ2-8b	39730.74	23838.70	3919.98	27017.35	1608.53	3930.38	642.20	362.24
576.80 MZ2-9b	30854.17	18688.23	3163.66	23877.77	1480.49	3650.86	649.16	311.44
658.36 MZ2-10b	28927.52	17390.86	2969.86	22753.25	1376.13	3605.34	654.88	292.64
637.04 MZ2-11b	29282.61	18013.06	2947.58	23033.85	1376.21	3522.66	705.08	306.56
536.80 MZ2-12b	24292.42	14885.56	2556.37	21122.08	1324.05	3401.82	618.92	332.32
633.72 MZ2-13b	32435.74	19585.99	3258.86	24434.62	1557.69	4086.70	612.40	319.04
724.92 MZ2-14b	41666.15	25000.42	4095.90	28118.68	1560.09	4449.34	676.92	375.40
856.08 MZ2-15b	47719.91	28834.96	4594.43	30303.61	1849.85	5068.51	644.60	371.56
652.16 srm614-6	1185.33	1178.61	581.76	11935.19	1139.85	3189.98	920.37	433.28
7227.08 srm612-6	8257.81	5025.51	1214.33	14247.84	7827.00	20023.71	10002.90	6451.84

Appendix A. Raw trace element datasheets from laser ablation.

35153.80 srm610-6	41909.88	24123.46	4186.98	28340.60	37883.65	102031.13	45706.98	25413.90
485.04 AP1-6	1624.17	1294.93	537.72	9756.78	1023.73	2948.14	751.12	399.68
987.89 AP2-6	16603.65	10114.42	1869.89	15654.73	1231.57	3801.34	741.92	436.60
4643.55 AP3-6	155951.20	88480.22	12158.79	69417.71	3458.26	6298.92	762.48	833.52
7634.44 AP4-6	264292.53	148132.59	20013.43	110118.18	4920.19	10043.38	751.32	1072.49
431.80 blank-6	543.96	770.24	456.00	12070.83	1050.01	2658.81	630.44	274.72
406.58 blank ave	419.84	650.34	640.24	7693.60	1174.67	3119.70	767.32	355.14
blank subtraction								
1219.27 SRM614-5	2539.65	1255.03	641.96	1222.57	642.54	-117.60	383.20	227.42
9805.48 SRM612-5	11914.03	6625.34	1321.29	6699.76	9098.67	22896.49	11782.51	8022.62
45835.68 SRM610-5	49214.28	27846.58	4447.27	22371.45	44446.83	119756.47	54371.23	30212.07
1306.79 AP1-5	4375.70	2588.83	371.12	3547.66	72.82	167.36	106.60	170.02
1067.71 AP2-5	23888.61	14206.86	2148.85	11796.59	345.74	1416.05	-11.40	165.14
5058.61 AP3-5	186924.49	105045.78	13847.80	74411.78	2642.68	3863.50	-31.56	594.02
7598.90 AP4-5	285157.54	158963.55	20982.52	111548.15	4247.08	7941.92	65.92	717.78
4.42 MZ2-1b	14726.44	8904.87	1217.65	8873.57	6.26	1567.69	-171.28	-69.06
70.62 MZ2-2b	20294.63	11934.61	1694.01	11762.83	141.10	2245.77	-224.56	-43.06
83.02 MZ2-3b	17070.10	10132.04	1326.65	10546.66	57.02	1376.33	193.44	-1.50
63.90 MZ2-4b	35731.68	21238.54	3016.86	18285.70	405.78	546.20	-130.48	-21.06
150.30 MZ2-5b	39279.42	22916.11	3201.90	19557.83	333.94	2147.61	-143.76	-15.86
114.86 MZ2-6b	27296.71	16227.15	2202.53	14710.28	227.18	1713.93	-104.16	-33.18
254.58 MZ2-7b	41626.76	24646.80	3383.26	20103.19	547.22	823.32	-141.52	2.42
188.46 MZ2-8b	39310.90	23188.35	3279.74	19323.75	433.86	810.68	-125.12	7.10
170.22 MZ2-9b	30434.33	18037.88	2523.41	16184.17	305.82	531.16	-118.16	-43.70
251.78 MZ2-10b	28507.68	16740.51	2329.61	15059.64	201.46	485.64	-112.44	-62.50
230.46 MZ2-11b	28862.76	17362.72	2307.33	15340.25	201.54	402.96	-62.24	-48.58
130.22 MZ2-12b	23872.57	14235.22	1916.13	13428.47	149.38	282.12	-148.40	-22.82
227.14 MZ2-13b	32015.90	18935.65	2618.61	16741.01	383.02	967.01	-154.92	-36.10
318.34 MZ2-14b	41246.31	24350.08	3455.66	20425.07	385.42	1329.65	-90.40	20.26
449.50 MZ2-15b	47300.06	28184.62	3954.18	22610.01	675.18	1948.81	-122.72	16.42
245.58 srm614-6	765.48	528.26	-58.48	4241.58	-34.82	70.28	153.04	78.14
6820.50 srm612-6	7837.96	4375.16	574.08	6554.24	6652.34	16904.02	9235.57	6096.69
34747.21 srm610-6	41490.03	23473.11	3546.74	20647.00	36708.99	98911.43	44939.65	25058.76
78.46 AP1-6	1204.33	644.58	-102.52	2063.17	-150.94	-171.56	-16.20	44.54
581.30 AP2-6	16183.81	9464.07	1229.65	7961.12	56.90	681.64	-25.40	81.46
4236.96 AP3-6	155531.36	87829.88	11518.54	61724.11	2283.59	3179.22	-4.84	478.38
7227.86 AP4-6	263872.69	147482.25	19373.19	102424.58	3745.52	6923.68	-16.00	717.34
zero correction								
1219.27 SRM614-5	2539.65	1255.03	641.96	1222.57	642.54	0.00	383.20	227.42
9805.48 SRM612-5	11914.03	6625.34	1321.29	6699.76	9098.67	22896.49	11782.51	8022.62
45835.68 SRM610-5	49214.28	27846.58	4447.27	22371.45	44446.83	119756.47	54371.23	30212.07
1306.79 AP1-5	4375.70	2588.83	371.12	3547.66	72.82	167.36	106.60	170.02
1067.71 AP2-5	23888.61	14206.86	2148.85	11796.59	345.74	1416.05	0.00	165.14
5058.61 AP3-5	186924.49	105045.78	13847.80	74411.78	2642.68	3863.50	0.00	594.02
7598.90 AP4-5	285157.54	158963.55	20982.52	111548.15	4247.08	7941.92	65.92	717.78
4.42 MZ2-1b	14726.44	8904.87	1217.65	8873.57	6.26	1567.69	0.00	0.00
70.62 MZ2-2b	20294.63	11934.61	1694.01	11762.83	141.10	2245.77	0.00	0.00
83.02 MZ2-3b	17070.10	10132.04	1326.65	10546.66	57.02	1376.33	0.00	0.00
63.90 MZ2-4b	35731.68	21238.54	3016.86	18285.70	405.78	546.20	0.00	0.00
150.30 MZ2-5b	39279.42	22916.11	3201.90	19557.83	333.94	2147.61	0.00	0.00
114.86 MZ2-6b	27296.71	16227.15	2202.53	14710.28	227.18	1713.93	0.00	0.00
254.58 MZ2-7b	41626.76	24646.80	3383.26	20103.19	547.22	823.32	0.00	2.42
188.46 MZ2-8b	39310.90	23188.35	3279.74	19323.75	433.86	810.68	0.00	7.10
170.22 MZ2-9b	30434.33	18037.88	2523.41	16184.17	305.82	531.16	0.00	0.00
251.78 MZ2-10b	28507.68	16740.51	2329.61	15059.64	201.46	485.64	0.00	0.00
230.46 MZ2-11b	28862.76	17362.72	2307.33	15340.25	201.54	402.96	0.00	0.00
130.22 MZ2-12b	23872.57	14235.22	1916.13	13428.47	149.38	282.12	0.00	0.00
227.14 MZ2-13b	32015.90	18935.65	2618.61	16741.01	383.02	967.01	0.00	0.00
318.34 MZ2-14b	41246.31	24350.08	3455.66	20425.07	385.42	1329.65	0.00	20.26
449.50 MZ2-15b	47300.06	28184.62	3954.18	22610.01	675.18	1948.81	0.00	16.42
245.58 srm614-6	765.48	528.26	0.00	4241.58	0.00	70.28	153.04	78.14
6820.50 srm612-6	7837.96	4375.16	574.08	6554.24	6652.34	16904.02	9235.57	6096.69
34747.21 srm610-6	41490.03	23473.11	3546.74	20647.00	36708.99	98911.43	44939.65	25058.76
78.46 AP1-6	1204.33	644.58	0.00	2063.17	0.00	0.00	0.00	44.54
581.30 AP2-6	16183.81	9464.07	1229.65	7961.12	56.90	681.64	0.00	81.46
4236.96 AP3-6	155531.36	87829.88	11518.54	61724.11	2283.59	3179.22	0.00	478.38
7227.86 AP4-6	263872.69	147482.25	19373.19	102424.58	3745.52	6923.68	0.00	717.34
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.001020 SRM614-5	0.002124	0.001050	0.000537	0.001022	0.000537	0.000000	0.000320	0.000190
0.006596 SRM612-5	0.008015	0.004457	0.000889	0.004507	0.006121	0.015403	0.007926	0.005397
0.068320 SRM610-5	0.073356	0.041507	0.006629	0.033346	0.066250	0.178503	0.081043	0.045033
0.000179 AP1-5	0.000600	0.000355	0.000051	0.000486	0.000010	0.000023	0.000015	0.000023
0.000136 AP2-5	0.003051	0.001814	0.000274	0.001506	0.000044	0.000181	0.000000	0.000021
0.000745 AP3-5	0.027540	0.015477	0.002040	0.010963	0.000389	0.000569	0.000000	0.000088
0.000750 AP4-5	0.028129	0.015681	0.002070	0.011004	0.000419	0.000783	0.000007	0.000071
0.000001 MZ2-1b	0.004372	0.002643	0.000361	0.002634	0.000002	0.000465	0.000000	0.000000
0.000019 MZ2-2b	0.005438	0.003198	0.000454	0.003152	0.000038	0.000602	0.000000	0.000000
0.000025 MZ2-3b	0.005128	0.003044	0.000399	0.003168	0.000017	0.000413	0.000000	0.000000
0.000014 MZ2-4b	0.007816	0.004646	0.000660	0.004000	0.000089	0.000119	0.000000	0.000000
0.000032 MZ2-5b	0.008370	0.004883	0.000682	0.004168	0.000071	0.000458	0.000000	0.000000
0.000028 MZ2-6b	0.006719	0.003995	0.000542	0.003621	0.000056	0.000422	0.000000	0.000000
0.000049 MZ2-7b	0.008039	0.004760	0.000653	0.003882	0.000106	0.000159	0.000000	0.000000
0.000036 MZ2-8b	0.007528	0.004440	0.000628	0.003700	0.000083	0.000155	0.000000	0.000001
0.000037 MZ2-9b	0.006639	0.003935	0.000550	0.003530	0.000067	0.000116	0.000000	0.000000
0.000062 MZ2-10b	0.007011	0.004117	0.000573	0.003704	0.000050	0.000119	0.000000	0.000000
0.000062 MZ2-11b	0.007724	0.004647	0.000617	0.004105	0.000054	0.000108	0.000000	0.000000
0.000041 MZ2-12b	0.007432	0.004432	0.000597	0.004180	0.000047	0.000088	0.000000	0.000000
0.000048 MZ2-13b	0.006808	0.004027	0.000557	0.003560	0.000081	0.000206	0.000000	0.000000
0.000058 MZ2-14b	0.007472	0.004411	0.000626	0.003700	0.000070	0.000241	0.000000	0.000004
0.000075 MZ2-15b	0.007935	0.004728	0.000663	0.003793	0.000113	0.000327	0.000000	0.000003
0.000271 srm614-6	0.000845	0.000583	0.000000	0.004681	0.000000	0.000078	0.000169	0.000086
0.006318 srm612-6	0.007260	0.004053	0.000532	0.006071	0.006162	0.015658	0.008555	0.005647
0.062832 srm610-6	0.075025	0.042445	0.006413	0.037335	0.066379	0.178857	0.081262	0.045313
0.000014 AP1-6	0.000214	0.000115	0.000000	0.000367	0.000000	0.000000	0.000000	0.000000
0.000094 AP2-6	0.002614	0.001529	0.000199	0.001286	0.000009	0.000110	0.000000	0.000013
0.000706 AP3-6	0.025917	0.014636	0.001919	0.010285	0.000381	0.000530	0.000000	0.000080
0.000801 AP4-6	0.029229	0.016336	0.002146	0.011345	0.000415	0.000767	0.000000	0.000079
standardize signal averages AP								
0.000097 AP1	0.000407	0.000235	0.000025	0.000427	0.000005	0.000011	0.000007	0.000016
0.000115 AP2	0.002832	0.001671	0.000237	0.001396	0.000027	0.000145	0.000000	0.000017
0.000726 AP3	0.026729	0.015056	0.001980	0.010624	0.000385	0.000549	0.000000	0.000084
0.000775 AP4	0.028679	0.016009	0.002108	0.011175	0.000417	0.000775	0.000003	0.000075
linest from std sig ave								
0.033211	0.020060	0.036854	0.280148	0.052425	1.428554	0.005819	0.000000	0.045065
standardize signal averages SRM								
0.000645 srm614-2	0.001484	0.000816	0.000268	0.002852	0.000269	0.000039	0.000245	0.000138
0.006457 srm612-2	0.007638	0.004255	0.000710	0.005289	0.006142	0.015531	0.008241	0.005522
0.065576 srm610-2	0.074190	0.041976	0.006521	0.035340	0.066315	0.178680	0.081153	0.045173
linest from std sig ave								
1.041704	0.989567	0.989526	1.020912	0.937866	0.999022	0.998954	0.998275	0.996614
concentration data								
2.90 SRM614-5	3.65	3.32	12.90	4.60	65.84	0.00	0.00	0.74
18.79 SRM612-5	13.79	14.09	21.36	20.26	749.92	7.69	0.00	20.86
194.59 SRM610-5	126.21	131.19	159.27	149.93	8116.76	89.08	0.00	174.04
2.37 AP1-5	4.80	5.22	5.68	10.17	5.69	0.05	0.00	0.42
1.81 AP2-5	24.41	26.67	30.67	31.51	25.16	0.42	0.00	0.38
9.87 AP3-5	220.40	227.54	228.02	229.29	221.89	1.32	0.00	1.57
9.93 AP4-5	225.11	230.54	231.32	230.13	238.76	1.82	0.00	1.27
0.02 MZ2-1b	34.98	38.86	40.40	55.09	1.06	1.08	0.00	0.00
0.25 MZ2-2b	43.52	47.02	50.73	65.93	21.55	1.40	0.00	0.00
0.33 MZ2-3b	41.04	44.75	44.54	66.27	9.76	0.96	0.00	0.00
0.19 MZ2-4b	62.55	68.30	73.75	83.65	50.58	0.28	0.00	0.00
0.42 MZ2-5b	66.99	71.80	76.26	87.16	40.55	1.06	0.00	0.00
0.37 MZ2-6b	53.77	58.73	60.59	75.73	31.87	0.98	0.00	0.00
0.65 MZ2-7b	64.33	69.98	73.02	81.19	60.22	0.37	0.00	0.01
0.48 MZ2-8b	60.24	65.28	70.19	77.39	47.35	0.36	0.00	0.02
0.49 MZ2-9b	53.13	57.85	61.52	73.84	38.02	0.27	0.00	0.00
0.82 MZ2-10b	56.11	60.53	64.03	77.46	28.24	0.28	0.00	0.00
0.82 MZ2-11b	61.81	68.31	69.01	85.86	30.74	0.25	0.00	0.00
0.54 MZ2-12b	59.48	65.15	66.67	87.43	26.50	0.20	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

0.64 MZ2-13b	54.49	59.20	62.23	74.46	46.42	0.48	0.00	0.00
0.76 MZ2-14b	59.79	64.85	69.96	77.38	39.79	0.56	0.00	0.07
1.00 MZ2-15b	63.51	69.52	74.14	79.33	64.55	0.76	0.00	0.05
0.77 srm614-6	1.45	1.84	0.00	21.05	0.00	0.04	0.00	0.33
17.99 srm612-6	12.49	12.81	12.78	27.30	754.96	7.81	0.00	21.83
178.96 srm610-6	129.08	134.16	154.09	167.86	8132.59	89.26	0.00	175.13
0.18 AP1-6	1.71	1.69	0.00	7.67	0.00	0.00	0.00	0.14
1.24 AP2-6	20.92	22.48	22.20	26.89	5.24	0.26	0.00	0.24
9.35 AP3-6	207.41	215.18	215.51	215.11	216.86	1.23	0.00	1.43
10.61 AP4-6	233.91	240.18	239.83	237.28	236.44	1.78	0.00	1.43

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
433.04 blank-7	342.32	326.00	531.44	3048.10	1010.77	1644.05	670.12	418.00
912.81 SRM614-7	1311.93	829.00	654.24	5528.23	1296.09	2893.42	1099.93	659.88
11626.39 SRM612-7	12756.03	7367.92	1734.09	9974.98	10187.34	32488.10	14101.92	8257.09
101544.85 SRM610-7	115341.77	64375.81	9925.90	49891.24	77334.91	297103.47	114287.32	57165.36
464.40 AP1-7	3944.62	2162.81	727.96	3757.38	896.85	3702.02	846.16	535.32
2028.01 AP2-7	36741.25	21616.68	3470.58	17326.94	1420.49	5954.23	955.41	686.16
10257.22 AP3-7	318338.44	175468.11	22396.25	120140.08	5156.47	12571.03	954.09	1357.57
13093.15 AP4-7	404974.47	220281.56	27340.80	149806.16	6114.19	13968.96	928.73	1480.89
1222.57 T1-1	253782.70	140571.59	19784.31	102317.81	3855.78	46890.98	754.44	468.12
846.96 T1-2	164563.53	92602.60	13464.96	68286.78	2758.06	29396.25	736.64	425.68
776.68 T1-3	97375.31	55585.83	8176.33	42352.44	1914.65	15281.69	688.92	395.68
1325.21 T1-4	131351.63	75032.82	10573.86	54913.03	2378.05	6965.72	763.80	441.52
1208.97 T1-5	140374.70	79625.17	11328.42	57608.45	2464.73	7398.84	777.00	422.12
1257.13 T1-6	146251.58	82811.47	11577.15	60236.90	2438.05	7404.92	784.84	433.92
1141.97 T1-7	104299.75	60006.02	8703.69	44752.77	2011.61	6575.88	752.68	411.76
873.20 T1-8	69866.79	40586.43	6155.51	31245.46	1634.65	6886.88	772.04	443.36
1092.97 T1-9	113024.67	64844.24	9124.77	48005.79	2168.69	6690.12	719.92	449.76
1252.85 T1-10	125521.18	71071.48	9999.22	52764.94	2278.73	7126.24	759.28	396.64
1201.57 T1-11	131895.98	75265.66	10412.78	55151.43	2383.77	7122.76	750.44	373.68
1132.09 T1-12	124319.50	70056.27	10136.26	52400.06	2260.85	7221.56	814.16	442.08
1348.29 T1-13	96485.63	55422.91	8210.69	42050.40	1999.85	9865.62	826.00	401.88
1086.05 T1-14	85579.36	49178.16	7428.64	38185.98	1882.21	10421.70	817.84	419.96
1074.69 T1-15	89723.15	51532.01	7701.24	40004.34	1891.69	9952.86	820.48	419.56
1257.25 T1-16	102322.89	58277.45	8609.09	44396.97	2042.85	10434.10	759.48	386.32
1291.09 T1-17	124389.34	70340.44	10169.34	53183.90	2317.65	10970.14	769.20	398.52
1278.25 T1-18	118468.51	68072.27	9841.74	51118.89	2294.33	11113.22	757.60	378.76
789.88 SRM614-8	1010.09	694.28	395.56	5814.47	1020.37	2632.77	977.09	518.36
8466.17 SRM612-8	9670.17	5823.27	1280.01	9953.98	9476.53	24090.30	11990.71	8361.33
69844.52 SRM610-8	92896.45	51643.89	7993.56	42739.56	69798.56	209198.97	92828.13	54296.11
486.20 AP1-8	619.40	462.92	340.04	4603.55	834.52	3050.98	846.56	468.88
1621.29 AP2-8	23306.37	13759.32	2357.21	13628.48	1254.41	4510.95	886.25	575.12
9357.29 AP3-8	337629.38	183375.00	22681.33	127353.32	5292.27	10389.02	983.89	1373.17
10025.42 AP4-8	372062.75	201262.84	24620.66	139291.78	5803.15	11192.70	961.49	1273.69
632.00 blank-8	346.20	306.12	259.28	4234.86	681.80	1822.97	707.56	343.76
532.52 blank average	344.26	316.06	395.36	3641.48	846.28	1733.51	688.84	380.88

blank subtraction								
380.28 SRM614-7	967.67	512.94	258.88	1886.75	449.80	1159.91	411.08	279.00
11093.86 SRM612-7	12411.77	7051.86	1338.73	6333.50	9341.05	30754.59	13413.08	7876.20
101012.33 SRM610-7	114997.51	64059.74	9530.53	46249.76	76488.63	295369.96	113598.48	56784.48
-68.12 AP1-7	3600.36	1846.75	332.60	115.90	50.56	1968.51	157.32	154.44
1495.49 AP2-7	36396.98	21300.62	3075.22	13685.46	574.20	4220.72	266.56	305.28
9724.70 AP3-7	317994.18	175152.05	22000.88	116498.60	4310.18	10837.52	265.24	976.69
12560.63 AP4-7	404630.21	219965.50	26945.43	146164.68	5267.91	12235.45	239.88	1100.01
690.04 T1-1	253438.44	140255.53	19388.95	98676.33	3009.50	45157.47	65.60	87.24
314.44 T1-2	164219.27	92286.54	13069.59	64645.30	1911.77	27662.74	47.80	44.80
244.16 T1-3	97031.05	55269.77	7780.96	38710.96	1068.37	13548.18	0.08	14.80
792.68 T1-4	131007.37	74716.76	10178.50	51271.55	1531.77	5232.21	74.96	60.64
676.44 T1-5	140030.44	79309.11	10933.06	53966.96	1618.45	5665.33	88.16	41.24
724.60 T1-6	145907.32	82495.41	11181.78	56595.42	1591.77	5671.41	96.00	53.04
609.44 T1-7	103955.49	59689.95	8308.33	41111.29	1165.33	4842.37	63.84	30.88
340.68 T1-8	69522.53	40270.37	5760.15	27603.98	788.36	5153.37	83.20	62.48
560.44 T1-9	112680.41	64528.18	8729.41	44364.31	1322.41	4956.61	31.08	68.88
720.32 T1-10	125176.92	70755.42	9603.85	49123.46	1432.45	5392.73	70.44	15.76
669.04 T1-11	131551.72	74949.60	10017.42	51509.95	1537.49	5389.25	61.60	-7.20
599.56 T1-12	123975.24	69740.21	9740.89	48758.57	1414.57	5488.05	125.32	61.20

Appendix A. Raw trace element datasheets from laser ablation.

815.76 T1-13	96141.36	55106.85	7815.32	38408.91	1153.57	8132.11	137.16	21.00
553.52 T1-14	85235.10	48862.09	7033.28	34544.50	1035.93	8688.19	129.00	39.08
542.16 T1-15	89378.89	51215.95	7305.88	36362.86	1045.41	8219.35	131.64	38.68
724.72 T1-16	101978.63	57961.39	8213.73	40755.49	1196.57	8700.59	70.64	5.44
758.56 T1-17	124045.08	70024.38	9773.97	49542.42	1471.37	9236.63	80.36	17.64
745.72 T1-18	118124.25	67756.20	9446.37	47477.41	1448.05	9379.71	68.76	-2.12
257.36 SRM614-8	665.82	378.22	0.20	2172.99	174.08	899.27	288.24	137.48
7933.65 SRM612-8	9325.91	5507.21	884.64	6312.50	8630.25	22356.79	11301.86	7980.44
69311.99 SRM610-8	92552.18	51327.83	7598.20	39098.08	68952.27	207465.46	92139.28	53915.22
-46.32 AP1-8	275.14	146.86	-55.32	962.07	-11.76	1317.47	157.72	88.00
1088.77 AP2-8	22962.11	13443.26	1961.85	9987.00	408.12	2777.44	197.40	194.24
8824.77 AP3-8	337285.12	183058.94	22285.97	123711.84	4445.99	8655.51	295.04	992.29
9492.89 AP4-8	371718.49	200946.78	24225.30	135650.30	4956.87	9459.19	272.64	892.80
zero correction								
380.28 SRM614-7	967.67	512.94	258.88	1886.75	449.80	1159.91	411.08	279.00
11093.86 SRM612-7	12411.77	7051.86	1338.73	6333.50	9341.05	30754.59	13413.08	7876.20
101012.33 SRM610-7	114997.51	64059.74	9530.53	46249.76	76488.63	295369.96	113598.48	56784.48
0.00 AP1-7	3600.36	1846.75	332.60	115.90	50.56	1968.51	157.32	154.44
1495.49 AP2-7	36396.98	21300.62	3075.22	13685.46	574.20	4220.72	266.56	305.28
9724.70 AP3-7	317994.18	175152.05	22000.88	116498.60	4310.18	10837.52	265.24	976.69
12560.63 AP4-7	404630.21	219965.50	26945.43	146164.68	5267.91	12235.45	239.88	1100.01
690.04 T1-1	253438.44	140255.53	19388.95	98676.33	3009.50	45157.47	65.60	87.24
314.44 T1-2	164219.27	92286.54	13069.59	64645.30	1911.77	27662.74	47.80	44.80
244.16 T1-3	97031.05	55269.77	7780.96	38710.96	1068.37	13548.18	0.08	14.80
792.68 T1-4	131007.37	74716.76	10178.50	51271.55	1531.77	5232.21	74.96	60.64
676.44 T1-5	140030.44	79309.11	10933.06	53966.96	1618.45	5665.33	88.16	41.24
724.60 T1-6	145907.32	82495.41	11181.78	56595.42	1591.77	5671.41	96.00	53.04
609.44 T1-7	103955.49	59689.95	8308.33	41111.29	1165.33	4842.37	63.84	30.88
340.68 T1-8	69522.53	40270.37	5760.15	27603.98	788.36	5153.37	83.20	62.48
560.44 T1-9	112680.41	64528.18	8729.41	44364.31	1322.41	4956.61	31.08	68.88
720.32 T1-10	125176.92	70755.42	9603.85	49123.46	1432.45	5392.73	70.44	15.76
669.04 T1-11	131551.72	74949.60	10017.42	51509.95	1537.49	5389.25	61.60	0.00
599.56 T1-12	123975.24	69740.21	9740.89	48758.57	1414.57	5488.05	125.32	61.20
815.76 T1-13	96141.36	55106.85	7815.32	38408.91	1153.57	8132.11	137.16	21.00
553.52 T1-14	85235.10	48862.09	7033.28	34544.50	1035.93	8688.19	129.00	39.08
542.16 T1-15	89378.89	51215.95	7305.88	36362.86	1045.41	8219.35	131.64	38.68
724.72 T1-16	101978.63	57961.39	8213.73	40755.49	1196.57	8700.59	70.64	5.44
758.56 T1-17	124045.08	70024.38	9773.97	49542.42	1471.37	9236.63	80.36	17.64
745.72 T1-18	118124.25	67756.20	9446.37	47477.41	1448.05	9379.71	68.76	0.00
257.36 SRM614-8	665.82	378.22	0.20	2172.99	174.08	899.27	288.24	137.48
7933.65 SRM612-8	9325.91	5507.21	884.64	6312.50	8630.25	22356.79	11301.86	7980.44
69311.99 SRM610-8	92552.18	51327.83	7598.20	39098.08	68952.27	207465.46	92139.28	53915.22
0.00 AP1-8	275.14	146.86	0.00	962.07	0.00	1317.47	157.72	88.00
1088.77 AP2-8	22962.11	13443.26	1961.85	9987.00	408.12	2777.44	197.40	194.24
8824.77 AP3-8	337285.12	183058.94	22285.97	123711.84	4445.99	8655.51	295.04	992.29
9492.89 AP4-8	371718.49	200946.78	24225.30	135650.30	4956.87	9459.19	272.64	892.80
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000134 SRM614-7	0.000341	0.000181	0.000091	0.000665	0.000158	0.000409	0.000145	0.000098
0.004034 SRM612-7	0.004513	0.002564	0.000487	0.002303	0.003397	0.011184	0.004878	0.002864
0.061128 SRM610-7	0.069591	0.038766	0.005767	0.027988	0.046287	0.178745	0.068745	0.034363
0.000000 AP1-7	0.000222	0.000114	0.000021	0.000007	0.000003	0.000122	0.000010	0.000010
0.000088 AP2-7	0.002150	0.001258	0.000182	0.000808	0.000034	0.000249	0.000016	0.000018
0.000475 AP3-7	0.015525	0.008551	0.001074	0.005688	0.000210	0.000529	0.000013	0.000048
0.000722 AP4-7	0.023272	0.012651	0.001550	0.008407	0.000303	0.000704	0.000014	0.000063
0.000046 T1-1	0.016895	0.009350	0.001293	0.006578	0.000201	0.003010	0.000004	0.000006
0.000028 T1-2	0.014592	0.008200	0.001161	0.005744	0.000170	0.002458	0.000004	0.000004
0.000029 T1-3	0.011365	0.006473	0.000911	0.004534	0.000125	0.001587	0.000000	0.000002
0.000056 T1-4	0.009255	0.005279	0.000719	0.003622	0.000108	0.000370	0.000005	0.000004

Appendix A. Raw trace element datasheets from laser ablation.

0.000046 T1-5	0.009553	0.005410	0.000746	0.003682	0.000110	0.000386	0.000006	0.000003
0.000048 T1-6	0.009585	0.005419	0.000735	0.003718	0.000105	0.000373	0.000006	0.000003
0.000055 T1-7	0.009353	0.005370	0.000747	0.003699	0.000105	0.000436	0.000006	0.000003
0.000032 T1-8	0.006591	0.003818	0.000546	0.002617	0.000075	0.000489	0.000008	0.000006
0.000046 T1-9	0.009331	0.005343	0.000723	0.003674	0.000110	0.000410	0.000003	0.000006
0.000062 T1-10	0.010773	0.006089	0.000827	0.004228	0.000123	0.000464	0.000006	0.000001
0.000054 T1-11	0.010647	0.006066	0.000811	0.004169	0.000124	0.000436	0.000005	0.000000
0.000048 T1-12	0.010012	0.005632	0.000787	0.003938	0.000114	0.000443	0.000010	0.000005
0.000061 T1-13	0.007180	0.004115	0.000584	0.002868	0.000086	0.000607	0.000010	0.000002
0.000039 T1-14	0.005974	0.003425	0.000493	0.002421	0.000073	0.000609	0.000009	0.000003
0.000040 T1-15	0.006663	0.003818	0.000545	0.002711	0.000078	0.000613	0.000010	0.000003
0.000062 T1-16	0.008744	0.004970	0.000704	0.003494	0.000103	0.000746	0.000006	0.000000
0.000055 T1-17	0.009026	0.005095	0.000711	0.003605	0.000107	0.000672	0.000006	0.000001
0.000055 T1-18	0.008778	0.005035	0.000702	0.003528	0.000108	0.000697	0.000005	0.000000
0.000146 SRM614-8	0.000376	0.000214	0.000000	0.001229	0.000098	0.000508	0.000163	0.000078
0.004122 SRM612-8	0.004845	0.002861	0.000460	0.003280	0.004484	0.011615	0.005872	0.004146
0.059034 SRM610-8	0.078828	0.043716	0.006471	0.033300	0.058727	0.176701	0.078476	0.045920
0.000000 AP1-8	0.000024	0.000013	0.000000	0.000082	0.000000	0.000113	0.000013	0.000008
0.000082 AP2-8	0.001723	0.001009	0.000147	0.000750	0.000031	0.000208	0.000015	0.000015
0.000545 AP3-8	0.020843	0.011312	0.001377	0.007645	0.000275	0.000535	0.000018	0.000061
0.000711 AP4-8	0.027831	0.015045	0.001814	0.010156	0.000371	0.000708	0.000020	0.000067
standardize signal averages AP								
0.000000 AP1	0.000123	0.000063	0.000010	0.000045	0.000002	0.000117	0.000012	0.000009
0.000085 AP2	0.001936	0.001133	0.000164	0.000779	0.000032	0.000229	0.000015	0.000016
0.000510 AP3	0.018184	0.009932	0.001226	0.006666	0.000243	0.000532	0.000016	0.000055
0.000717 AP4	0.025552	0.013848	0.001682	0.009282	0.000337	0.000706	0.000017	0.000065
linest from std sig ave								
0.041438	0.025689	0.048700	0.398546	0.072623	1.998609	0.006174	0.000000	0.061769
standardize signal averages SRM								
0.000140 srm614-2	0.000359	0.000197	0.000046	0.000947	0.000128	0.000459	0.000154	0.000088
0.004078 srm612-2	0.004679	0.002713	0.000473	0.002791	0.003940	0.011400	0.005375	0.003505
0.060081 srm610-2	0.074209	0.041241	0.006119	0.030644	0.052507	0.177723	0.073610	0.040142
linest from std sig ave								
0.000000	0.071785	0.000000	0.000000	0.000000	0.000000	0.028777	0.067567	0.092437
concentration data								
0.48 SRM614-7	0.75	0.75	3.12	4.14	27.16	0.22	0.00	0.52
14.34 SRM612-7	9.94	10.71	16.64	14.34	582.24	5.92	0.00	15.17
217.24 SRM610-7	153.32	161.91	197.13	174.32	7933.98	94.65	0.00	182.04
0.00 AP1-7	2.28	2.22	3.27	0.21	2.49	0.30	0.00	0.23
1.46 AP2-7	22.03	24.44	28.88	23.42	27.04	0.61	0.00	0.44
7.85 AP3-7	159.11	166.14	170.78	164.79	167.78	1.30	0.00	1.18
11.94 AP4-7	238.50	245.79	246.41	243.56	241.58	1.73	0.00	1.56
0.76 T1-1	173.14	181.65	205.51	190.58	159.96	7.41	0.00	0.14
0.46 T1-2	149.54	159.31	184.64	166.42	135.44	6.05	0.00	0.10
0.47 T1-3	116.47	125.76	144.90	131.36	99.77	3.91	0.00	0.04
0.93 T1-4	94.85	102.55	114.33	104.94	86.28	0.91	0.00	0.11
0.76 T1-5	97.90	105.11	118.58	106.66	88.03	0.95	0.00	0.07
0.79 T1-6	98.23	105.29	116.79	107.72	83.37	0.92	0.00	0.09
0.91 T1-7	95.85	104.33	118.85	107.16	83.59	1.07	0.00	0.07
0.53 T1-8	67.54	74.17	86.82	75.81	59.59	1.20	0.00	0.15
0.77 T1-9	95.62	103.81	114.93	106.43	87.31	1.01	0.00	0.14
1.02 T1-10	110.41	118.31	131.42	122.49	98.29	1.14	0.00	0.03
0.90 T1-11	109.11	117.85	128.90	120.78	99.21	1.07	0.00	0.00
0.80 T1-12	102.60	109.42	125.07	114.08	91.08	1.09	0.00	0.12
1.01 T1-13	73.58	79.96	92.80	83.10	68.69	1.50	0.00	0.04
0.64 T1-14	61.23	66.54	78.38	70.15	57.89	1.50	0.00	0.07
0.67 T1-15	68.28	74.17	86.59	78.53	62.13	1.51	0.00	0.07
1.03 T1-16	89.61	96.55	111.97	101.24	81.80	1.84	0.00	0.01
0.91 T1-17	92.50	98.99	113.08	104.44	85.36	1.66	0.00	0.03
0.92 T1-18	89.96	97.82	111.61	102.22	85.80	1.72	0.00	0.00
0.52 SRM614-8	0.83	0.89	0.00	7.65	16.87	0.27	0.00	0.41
14.65 SRM612-8	10.67	11.95	15.71	20.43	768.55	6.15	0.00	21.96
209.79 SRM610-8	173.67	182.59	221.20	207.41	10066.27	93.56	0.00	243.26
0.00 AP1-8	0.24	0.24	0.00	2.38	0.00	0.28	0.00	0.19
1.35 AP2-8	17.66	19.60	23.41	21.71	24.42	0.51	0.00	0.36
9.01 AP3-8	213.60	219.78	218.96	221.49	219.06	1.32	0.00	1.51
11.75 AP4-8	285.22	292.30	288.38	294.25	295.91	1.74	0.00	1.65
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07

Appendix A. Raw trace element datasheets from laser ablation.

2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63	0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23	1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77	1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
322.36 blank-5	370.68	302.00	455.72	2249.33	908.37	1506.57	624.72	408.40
1013.01 SRM614-5	1933.85	1258.45	765.76	6306.76	1262.77	3279.22	1148.01	632.32
14364.80 SRM612-5	19853.47	11504.19	2296.49	12741.59	11448.94	36638.77	15720.57	9317.77
83316.43 SRM610-5	94625.61	52134.37	8242.97	40583.27	59529.90	231809.14	86243.05	41557.72
722.68 AP1-5	9505.73	5507.39	1207.05	5946.87	1026.77	4199.66	845.04	573.96
2684.82 AP2-5	58946.09	34055.07	5284.79	26148.99	1876.69	6995.24	894.97	750.12
28542.92 AP3-5	1138792.60	615317.50	69270.27	406522.41	13411.56	23862.22	1142.81	3024.10
14994.81 AP4-5	543737.75	294667.09	36310.32	198367.28	7464.20	16058.21	916.65	1643.05
572.80 TGP12-1	32892.02	18914.15	2986.10	16006.25	1107.05	3398.74	558.64	353.12
579.72 TGP12-2	39214.70	22436.53	3284.30	18624.71	1191.77	3061.22	591.68	381.04
550.28 TGP12-3	37229.65	21277.64	3169.98	18442.46	1149.49	3154.42	586.72	370.48
1301.05 TGP12-4	70124.79	39936.75	6027.87	31989.26	1611.05	6252.72	630.52	379.20
1221.49 TGP12-5	74211.94	42873.48	6375.52	34136.15	1713.61	9515.21	572.76	390.32
1807.05 TGP12-6	114805.16	65233.61	9954.26	50961.53	2205.65	22613.13	741.04	492.48
2116.29 TGP12-7	175888.14	98786.12	14895.32	75419.46	3091.22	41528.47	834.92	582.40
1525.97 TGP12-8	157738.61	88623.38	13451.12	67955.06	2750.14	38796.34	710.84	523.20
1386.01 TGP12-9	144165.73	82019.58	12548.03	63215.56	2658.66	40076.55	770.64	484.96
1416.49 TGP12-10	232734.72	128219.36	17997.42	94177.85	3510.66	32889.27	741.28	502.60
1243.53 TGP12-11	226598.88	125856.51	17831.82	92162.96	3374.98	32919.18	692.92	398.56
1044.57 TGP12-12	251315.53	139721.94	19352.27	101888.09	3666.30	34122.19	756.32	359.12
817.72 TGP12-13	41606.75	24077.73	3603.10	20816.56	1197.45	4264.26	653.72	357.64
787.96 TGP12-14	48010.39	28019.52	4123.58	23737.85	1263.21	4545.23	645.92	302.40
845.16 TGP12-15	50943.32	29565.85	4523.99	24870.82	1335.33	4397.70	595.28	303.16
1652.53 TGP12-16	95626.62	55198.47	8168.37	42910.92	2045.01	8373.01	751.24	355.12
1827.73 TGP12-17	101977.45	58177.21	8411.65	45080.06	2067.65	8436.57	720.96	384.76
953.29 TGP12-18	76743.35	44265.49	6580.08	35976.04	1773.49	7306.00	706.64	364.52
756.20 SRM614-6	1235.57	910.41	442.76	7112.92	1011.53	2851.14	969.01	516.76
9489.37 SRM612-6	11008.34	6529.92	1395.41	10870.78	9533.65	25360.98	12362.15	8192.61
59389.06 SRM610-6	70347.31	39266.74	6163.83	34000.43	53513.66	164557.89	69640.83	37324.65
465.40 AP1-6	1268.49	816.56	394.72	5269.39	779.64	3028.46	749.28	371.08
1940.61 AP2-6	38545.50	22444.53	3502.74	20140.71	1539.77	4535.11	814.36	550.40
18559.55 AP3-6	785866.13	421436.09	48635.84	282677.50	9952.02	15787.85	1019.05	2414.65
11903.91 AP4-6	462643.56	250219.81	30230.45	171442.56	6615.28	12596.03	821.08	1359.17
642.12 blank-6	395.44	317.56	231.20	5359.75	597.48	1735.81	607.24	278.20
482.24 blank average	383.06	309.78	343.46	3804.54	752.92	1621.19	615.98	343.30

blank subtraction								
530.76 SRM614-5	1550.79	948.67	422.30	2502.21	509.84	1658.03	532.02	289.02
13882.56 SRM612-5	19470.41	11194.40	1953.03	8937.05	10696.02	35017.58	15104.58	8974.47
82834.19 SRM610-5	94242.55	51824.59	7899.50	36778.73	58776.97	230187.95	85627.06	41214.41
240.44 AP1-5	9122.67	5197.61	863.58	2142.33	273.84	2578.47	229.06	230.66
2202.57 AP2-5	58563.03	33745.29	4941.33	22344.45	1123.77	5374.05	278.98	406.82
28060.68 AP3-5	1138409.54	615007.72	68926.80	402717.87	12658.63	22241.03	526.82	2680.79
14512.56 AP4-5	543354.69	294357.31	35966.86	194562.74	6711.28	144307.02	300.66	1299.75
90.56 TGP12-1	32508.96	18604.36	2642.63	12201.71	354.12	1777.55	-57.34	9.82
97.48 TGP12-2	38831.64	22126.74	2940.84	14820.16	438.84	1440.03	-24.30	37.74
68.04 TGP12-3	36846.59	20967.86	2826.52	14637.92	396.56	1533.23	-29.26	27.18
818.80 TGP12-4	69741.73	39626.96	5684.12	28184.72	858.12	4631.53	14.54	35.90
739.24 TGP12-5	73828.88	42563.70	6032.05	30331.61	960.69	7894.02	-43.22	47.02
1324.81 TGP12-6	114422.10	64923.82	9610.79	47156.99	1452.73	20991.94	125.06	149.18
1634.05 TGP12-7	175505.08	98476.34	14551.86	71614.92	2338.29	39907.28	218.94	239.10
1043.73 TGP12-8	157355.55	88313.59	13107.65	64150.52	1997.21	37175.15	94.86	179.90
903.77 TGP12-9	143782.67	81709.80	12204.57	59411.02	1905.73	38455.36	154.66	141.66
934.25 TGP12-10	232351.66	127909.58	17653.96	90373.31	2757.74	31268.08	125.30	159.30
761.28 TGP12-11	226215.82	125546.73	17488.36	88358.42	2622.05	31297.99	76.94	55.26
562.32 TGP12-12	250932.47	139412.16	19008.81	98083.55	2913.38	32501.00	140.34	15.82
335.48 TGP12-13	41223.69	23767.95	3259.64	17012.02	444.52	2643.07	37.74	14.34
305.72 TGP12-14	47627.33	27709.74	3780.12	19933.31	510.28	2924.04	29.94	-40.90
362.92 TGP12-15	50560.26	29256.06	4180.52	21066.28	582.40	2776.52	-20.70	-40.14
1170.29 TGP12-16	95243.55	54888.69	7824.90	39106.38	1292.09	6751.82	135.26	11.82
1345.49 TGP12-17	101594.39	57867.43	8068.19	41275.51	1314.73	6815.38	104.98	41.46
471.04 TGP12-18	76360.29	43955.71	6236.62	32171.50	1020.57	5684.81	90.66	21.22
273.96 SRM614-6	852.50	600.62	99.30	3308.38	258.60	1229.95	353.02	173.46
9007.13 SRM612-6	10625.28	6220.13	1051.95	7066.24	8780.73	23739.79	11746.17	7849.30
58906.81 SRM610-6	69964.25	38956.96	5820.37	30195.89	52760.74	162936.70	69024.84	36981.35
-16.84 AP1-6	885.42	506.78	51.26	1464.85	26.72	1407.27	133.30	27.78
1458.37 AP2-6	38162.43	22134.75	3159.28	16336.17	786.84	2913.92	198.38	207.10
18077.30 AP3-6	785483.07	421126.31	48292.37	278872.96	9199.09	14166.66	403.06	2071.35
11421.66 AP4-6	462260.50	249910.03	29886.99	167638.02	5862.35	10974.84	205.10	1015.87

zero correction								
530.76 SRM614-5	1550.79	948.67	422.30	2502.21	509.84	1658.03	532.02	289.02

Appendix A. Raw trace element datasheets from laser ablation.

13882.56 SRM612-5	19470.41	11194.40	1953.03	8937.05	10696.02	35017.58	15104.58	8974.47
82834.19 SRM610-5	94242.55	51824.59	7899.50	36778.73	58776.97	230187.95	85627.06	41214.41
240.44 AP1-5	9122.67	5197.61	863.58	2142.33	273.84	2578.47	229.06	230.66
2202.57 AP2-5	58563.03	33745.29	4941.33	22344.45	1123.77	5374.05	278.98	406.82
28060.68 AP3-5	1138409.54	615007.72	68926.80	402717.87	12658.63	22241.03	526.82	2680.79
14512.56 AP4-5	543354.69	294357.31	35966.86	194562.74	6711.28	14437.02	300.66	1299.75
90.56 TGP12-1	32508.96	18604.36	2642.63	12201.71	354.12	1777.55	0.00	9.82
97.48 TGP12-2	38831.64	22126.74	2940.84	14820.16	438.84	1440.03	0.00	37.74
68.04 TGP12-3	36846.59	20967.86	2826.52	14637.92	396.56	1533.23	0.00	27.18
818.80 TGP12-4	69741.73	39626.96	5684.41	28184.72	858.12	4631.53	14.54	35.90
739.24 TGP12-5	73828.88	42563.70	6032.05	30331.61	960.69	7894.02	0.00	47.02
1324.81 TGP12-6	114422.10	64923.82	9610.79	47156.99	1452.73	20991.94	125.06	149.18
1634.05 TGP12-7	175505.08	98476.34	14551.86	71614.92	2338.29	39907.28	218.94	239.10
1043.73 TGP12-8	157355.55	88313.59	13107.65	64150.52	1997.21	37175.15	94.86	179.90
903.77 TGP12-9	143782.67	81709.80	12204.57	59411.02	1905.73	38455.36	154.66	141.66
934.25 TGP12-10	232351.66	127909.58	17653.96	90373.31	2757.74	31268.08	125.30	159.30
761.28 TGP12-11	226215.82	125546.73	17488.36	88358.42	2622.05	31297.99	76.94	55.26
562.32 TGP12-12	250932.47	139412.16	19008.81	98083.55	2913.38	32501.00	140.34	15.82
335.48 TGP12-13	41223.69	23767.95	3259.64	17012.02	444.52	2643.07	37.74	14.34
305.72 TGP12-14	47627.33	27709.74	3780.12	19933.31	510.28	2924.04	29.94	0.00
362.92 TGP12-15	50560.26	29256.06	4180.52	21066.28	582.40	2776.52	0.00	0.00
1170.29 TGP12-16	95243.55	54888.69	7824.90	39106.38	1292.09	6751.82	135.26	11.82
1345.49 TGP12-17	101594.39	57867.43	8068.19	41275.51	1314.73	6815.38	104.98	41.46
471.04 TGP12-18	76360.29	43955.71	6236.62	32171.50	1020.57	5684.81	90.66	21.22
273.96 SRM614-6	852.50	600.62	99.30	3308.38	258.60	1229.95	353.02	173.46
9007.13 SRM612-6	10625.28	6220.13	1051.95	7066.24	8780.73	23739.79	11746.17	7849.30
58906.81 SRM610-6	69964.25	38956.96	5820.37	30195.89	52760.74	162936.70	69024.84	36981.35
0.00 AP1-6	885.42	506.78	51.26	1464.85	26.72	1407.27	133.30	27.78
1458.37 AP2-6	38162.43	22134.75	3159.28	16336.17	786.84	2913.92	198.38	207.10
18077.30 AP3-6	785483.07	421126.31	48292.37	278872.96	9199.09	14166.66	403.06	2071.35
11421.66 AP4-6	462260.50	249910.03	29886.99	167638.02	5862.35	10974.84	205.10	1015.87

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000141 SRM614-5	0.000412	0.000252	0.000112	0.000665	0.000135	0.000441	0.000141	0.000077
0.004321 SRM612-5	0.006060	0.003484	0.000608	0.002782	0.003329	0.010900	0.004701	0.002793
0.058201 SRM610-5	0.066217	0.036413	0.005550	0.025842	0.041298	0.161735	0.060164	0.028958
0.000014 AP1-5	0.000547	0.000312	0.000052	0.000129	0.000016	0.000155	0.000014	0.000014
0.000118 AP2-5	0.003139	0.001809	0.000265	0.001198	0.000060	0.000288	0.000015	0.000022
0.001083 AP3-5	0.043926	0.023730	0.002660	0.015539	0.000488	0.000858	0.000020	0.000103
0.000900 AP4-5	0.033678	0.018245	0.002229	0.012059	0.000416	0.000895	0.000019	0.000081
0.000021 TGP12-1	0.007620	0.004361	0.000619	0.002860	0.000083	0.000417	0.000000	0.000002
0.000024 TGP12-2	0.009616	0.005479	0.000728	0.003670	0.000109	0.000357	0.000000	0.000009
0.000019 TGP12-3	0.010259	0.005838	0.000787	0.004075	0.000110	0.000427	0.000000	0.000008
0.000131 TGP12-4	0.011198	0.006363	0.000913	0.004525	0.000138	0.000744	0.000002	0.000006
0.000092 TGP12-5	0.009140	0.005270	0.000747	0.003755	0.000119	0.000977	0.000000	0.000006
0.000084 TGP12-6	0.007283	0.004132	0.000612	0.003001	0.000092	0.001336	0.000008	0.000009
0.000085 TGP12-7	0.009127	0.005121	0.000757	0.003724	0.000122	0.002075	0.000011	0.000012
0.000055 TGP12-8	0.008303	0.004660	0.000692	0.003385	0.000105	0.001962	0.000005	0.000009
0.000049 TGP12-9	0.007752	0.004405	0.000658	0.003203	0.000103	0.002073	0.000008	0.000008
0.000067 TGP12-10	0.016654	0.009168	0.001265	0.006478	0.000198	0.002241	0.000009	0.000011
0.000054 TGP12-11	0.016059	0.008912	0.001241	0.006272	0.000186	0.002222	0.000005	0.000004
0.000041 TGP12-12	0.018109	0.010061	0.001372	0.007078	0.000210	0.002346	0.000010	0.000001
0.000050 TGP12-13	0.006137	0.003538	0.000485	0.002533	0.000066	0.000393	0.000006	0.000002
0.000044 TGP12-14	0.006912	0.004021	0.000549	0.002893	0.000074	0.000424	0.000004	0.000000
0.000051 TGP12-15	0.007131	0.004126	0.000590	0.002971	0.000082	0.000392	0.000000	0.000000
0.000093 TGP12-16	0.007578	0.004367	0.000623	0.003111	0.000103	0.000537	0.000011	0.000001
0.000111 TGP12-17	0.008349	0.004756	0.000663	0.003392	0.000108	0.000560	0.000009	0.000003
0.000043 TGP12-18	0.007047	0.004057	0.000576	0.002969	0.000094	0.000525	0.000008	0.000002
0.000115 SRM614-6	0.000359	0.000253	0.000042	0.001391	0.000109	0.000517	0.000148	0.000073
0.004323 SRM612-6	0.005100	0.002986	0.000505	0.003392	0.004215	0.011395	0.005638	0.003768

Appendix A. Raw trace element datasheets from laser ablation.

0.063503 SRM610-6	0.075424	0.041997	0.006275	0.032552	0.056878	0.175651	0.074411	0.039867
0.000000 AP1-6	0.000067	0.000039	0.000004	0.000111	0.000002	0.000107	0.000010	0.000002
0.000099 AP2-6	0.002590	0.001502	0.000214	0.001109	0.000053	0.000198	0.000013	0.000014
0.000851 AP3-6	0.036988	0.019831	0.002274	0.013132	0.000433	0.000667	0.000019	0.000098
0.000844 AP4-6	0.034150	0.018463	0.002208	0.012385	0.000433	0.000811	0.000015	0.000075
standardize signal averages AP								
0.000007 AP1	0.000307	0.000175	0.000028	0.000120	0.000009	0.000131	0.000012	0.000008
0.000109 AP2	0.002864	0.001655	0.000240	0.001153	0.000057	0.000243	0.000014	0.000018
0.000967 AP3	0.040457	0.021780	0.002467	0.014335	0.000461	0.000763	0.000020	0.000100
0.000872 AP4	0.033914	0.018354	0.002219	0.012222	0.000425	0.000853	0.000017	0.000078
linest from std sig ave								
0.026613	0.014310	0.027394	0.238092	0.041516	1.265979	0.004788	0.000000	0.039393
standardize signal averages SRM								
0.000128 srm614-2	0.000385	0.000252	0.000077	0.001028	0.000122	0.000479	0.000145	0.000075
0.004322 srm612-2	0.005580	0.003235	0.000556	0.003087	0.003772	0.011147	0.005170	0.003281
0.060852 srm610-2	0.070820	0.039205	0.005912	0.029197	0.049088	0.168693	0.067287	0.034413
linest from std sig ave								
0.000000	0.075151	0.000000	0.000000	0.000000	0.000000	0.030315	0.073897	0.107771
concentration data								
0.32 SRM614-5	0.51	0.59	2.29	2.37	14.71	0.18	0.00	0.26
9.86 SRM612-5	7.44	8.19	12.41	9.90	361.47	4.48	0.00	9.44
132.84 SRM610-5	81.27	85.55	113.34	92.01	4483.90	66.41	0.00	97.83
0.15 AP1-5	3.13	3.41	4.92	2.13	8.30	0.30	0.00	0.22
1.25 AP2-5	17.92	19.77	25.16	19.84	30.42	0.55	0.00	0.34
11.49 AP3-5	250.76	259.33	252.61	257.36	246.68	1.64	0.00	1.63
9.55 AP4-5	192.26	199.39	211.75	199.73	210.09	1.71	0.00	1.27
0.23 TGP12-1	43.50	47.66	58.83	47.37	41.92	0.80	0.00	0.04
0.26 TGP12-2	54.89	59.88	69.17	60.78	54.88	0.68	0.00	0.15
0.20 TGP12-3	58.57	63.80	74.75	67.50	55.76	0.82	0.00	0.12
1.40 TGP12-4	63.93	69.53	86.69	74.95	69.59	1.42	0.00	0.09
0.97 TGP12-5	52.18	57.59	70.93	62.19	60.07	1.87	0.00	0.09
0.90 TGP12-6	41.57	45.16	58.10	49.71	46.70	2.55	0.00	0.15
0.90 TGP12-7	52.10	55.96	71.88	61.68	61.41	3.96	0.00	0.20
0.58 TGP12-8	47.40	50.93	65.69	56.06	53.22	3.75	0.00	0.15
0.52 TGP12-9	44.26	48.15	62.50	53.05	51.89	3.96	0.00	0.12
0.71 TGP12-10	95.07	100.19	120.19	107.28	99.83	4.28	0.00	0.18
0.57 TGP12-11	91.67	97.40	117.92	103.88	94.01	4.24	0.00	0.06
0.43 TGP12-12	103.38	109.95	130.30	117.24	106.19	4.48	0.00	0.02
0.53 TGP12-13	35.04	38.67	46.09	41.95	33.42	0.75	0.00	0.03
0.47 TGP12-14	39.46	43.95	52.11	47.91	37.40	0.81	0.00	0.00
0.54 TGP12-15	40.71	45.09	56.00	49.21	41.48	0.75	0.00	0.00
0.99 TGP12-16	43.26	47.73	59.13	51.53	51.92	1.03	0.00	0.01
1.17 TGP12-17	47.66	51.97	62.98	56.18	54.57	1.07	0.00	0.05
0.46 TGP12-18	40.23	44.33	54.67	49.18	47.57	1.00	0.00	0.03
0.26 SRM614-6	0.44	0.59	0.85	4.95	11.81	0.21	0.00	0.25
9.87 SRM612-6	6.26	7.01	10.31	12.08	457.61	4.68	0.00	12.73
144.94 SRM610-6	92.56	98.67	128.12	115.90	6175.46	72.12	0.00	134.69
0.00 AP1-6	0.38	0.42	0.37	1.84	1.03	0.20	0.00	0.03
1.05 AP2-6	14.78	16.42	20.36	18.36	26.97	0.38	0.00	0.22
9.04 AP3-6	211.15	216.72	216.00	217.49	218.77	1.27	0.00	1.53
8.96 AP4-6	194.95	201.77	209.72	205.12	218.73	1.55	0.00	1.18
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
520.88 blank-1	781.00	606.64	570.08	5295.63	1036.73	1921.17	712.80	495.76
1177.77 SRM614-1	2687.34	1681.53	922.49	7929.96	1508.93	3757.06	1310.85	716.92
14543.16 SRM612-1	15847.41	9192.01	2035.17	12831.91	14331.40	41630.56	18659.59	10352.90
84101.59 SRM610-1	84966.36	47446.19	7928.92	39317.10	71588.13	257482.36	92262.96	40518.19
852.64 AP1-1	6021.55	3681.42	979.57	5865.03	1050.05	4803.31	994.53	714.60
3704.90 AP2-1	92341.20	53204.82	7926.56	40411.63	2600.33	8887.81	1133.89	888.21
24505.50 AP3-1	1055853.10	572125.50	64353.12	381977.94	13045.19	25336.30	1181.93	2739.26
31138.70 AP4-1	1405008.30	766433.75	84072.44	508509.88	16643.57	32380.26	1206.61	3109.18
1941.81 TGP18-1	262379.69	146188.47	19925.19	103930.70	3874.66	13331.92	899.13	585.92
1587.49 TGP18-2	227844.64	127380.88	17253.70	90234.31	3459.66	11458.06	812.28	537.28

Appendix A. Raw trace element datasheets from laser ablation.

1975.09 TGP18-3	207179.56	116241.13	15926.29	82940.15	3317.86	10518.34	785.40	519.36
5385.87 TGP18-4	200946.13	113335.60	16104.81	82353.82	3470.10	24328.74	1049.21	735.80
5062.79 TGP18-5	195275.14	109920.42	15424.33	79808.13	3437.14	22850.89	1077.29	774.28
1494.37 TGP18-6	205048.03	115500.65	16000.57	81853.58	3232.02	16731.69	957.01	608.76
2643.05 TGP18-7	358630.75	197685.55	25657.63	136653.45	4780.39	19251.79	1040.13	694.24
2723.90 TGP18-8	374640.09	205038.47	26677.03	142817.64	5001.03	19626.11	1015.89	689.64
3597.34 TGP18-9	383056.91	209762.34	27016.07	145311.63	5179.19	20350.15	1039.89	719.72
5625.19 TGP18-10	274395.56	152879.73	20864.84	108367.37	4209.74	24421.22	1073.85	723.96
5576.47 TGP18-11	292732.22	162725.92	21916.00	114558.32	4433.75	27120.11	1159.05	731.32
6486.48 TGP18-12	234676.28	130077.73	18293.50	94022.73	3843.78	26951.23	1164.05	692.96
919.77 SRM614-2	1799.49	1197.21	469.36	5274.87	1019.85	2661.05	1089.61	570.84
11023.62 SRM612-2	12942.99	7700.60	1595.21	10518.38	12032.67	30455.57	15001.48	9898.26
65636.65 SRM610-2	79558.73	44403.57	6972.44	36435.85	64759.84	195848.14	82336.34	44792.57
645.04 AP1-2	1852.05	1180.69	420.92	3929.74	857.04	3437.82	915.89	586.36
2475.73 AP2-2	59402.61	34698.40	5312.75	27588.72	1918.81	5807.03	967.57	737.80
20235.99 AP3-2	960477.00	517223.91	57238.04	343805.81	11539.19	18858.59	1182.57	2693.94
27513.96 AP4-2	1390661.90	753187.31	80000.29	499123.41	15918.65	25931.55	1161.73	3077.66
690.52 blank-2	745.12	484.92	236.68	3080.34	724.64	1627.41	681.76	418.00
605.70 blank ave	763.06	545.78	403.38	4187.94	880.68	1774.29	697.28	456.88
blank subtraction								
572.06 SRM614-1	1924.27	1135.75	519.10	3741.98	628.24	1982.77	613.56	260.04
13937.46 SRM612-1	15084.34	8646.23	1631.79	8643.93	13450.72	39856.27	17962.30	9896.02
83495.89 SRM610-1	84203.29	46900.40	7525.54	35129.12	70707.44	255708.07	91565.68	40061.31
246.94 AP1-1	5258.49	3135.64	576.18	1677.05	169.36	3029.02	297.24	257.72
3099.20 AP2-1	91578.14	52659.04	7523.18	36223.64	1719.65	7113.52	436.60	431.32
23899.79 AP3-1	1055090.04	571579.72	63949.74	377789.96	12164.51	23562.01	484.64	2282.37
30532.99 AP4-1	1404245.24	765887.97	83669.06	504321.90	15762.89	30605.97	509.32	2652.29
1336.11 TGP18-1	261616.63	145642.69	19521.81	99742.72	2993.98	11557.63	201.84	129.04
981.79 TGP18-2	227081.58	126835.10	16850.31	86046.32	2578.97	9683.77	115.00	80.40
1369.39 TGP18-3	206416.50	115695.35	15522.91	78752.16	2437.17	8744.05	88.12	62.48
4780.17 TGP18-4	200183.07	112789.82	15701.43	78165.84	2589.41	22554.45	351.92	278.92
4457.09 TGP18-5	194512.08	109374.64	15020.94	75620.14	2556.45	21076.60	380.00	317.40
888.67 TGP18-6	204284.97	114954.87	15597.19	77665.59	2351.33	14957.40	259.72	151.88
2037.35 TGP18-7	357867.69	197139.77	25254.24	132465.47	3899.70	17477.50	342.84	237.36
2118.19 TGP18-8	373877.03	204492.69	26273.65	138629.66	4120.34	17851.82	318.60	232.76
2991.64 TGP18-9	382293.85	209216.56	26612.69	141123.65	4298.50	18575.86	342.60	262.84
5019.49 TGP18-10	273632.50	152333.95	20461.46	104179.39	3329.06	22646.93	376.56	267.08
4970.77 TGP18-11	291969.16	162180.14	21512.62	110370.34	3553.06	25345.82	461.76	274.44
5880.77 TGP18-12	233913.22	129531.95	17890.12	89834.75	2963.10	25176.94	466.76	236.08
314.06 SRM614-2	1036.43	651.42	65.98	1086.89	139.16	886.76	392.32	113.96
10417.92 SRM612-2	12179.93	7154.82	1191.83	6330.40	11151.98	28681.28	14304.20	9441.37
65030.94 SRM610-2	78795.66	43857.79	6569.06	32247.86	63879.16	194073.85	81639.06	44335.69
39.34 AP1-2	1088.99	634.90	17.54	-258.24	-23.64	1663.53	218.60	129.48
1870.03 AP2-2	58639.55	34152.61	4909.37	23400.73	1038.13	4032.74	270.28	280.92
19630.29 AP3-2	959713.94	516678.13	56834.66	339617.83	10658.50	17084.30	485.28	2237.05
26908.25 AP4-2	1389898.84	752641.53	79596.91	494935.43	15037.96	24157.26	464.44	2620.77
zero correction								
572.06 SRM614-1	1924.27	1135.75	519.10	3741.98	628.24	1982.77	613.56	260.04
13937.46 SRM612-1	15084.34	8646.23	1631.79	8643.93	13450.72	39856.27	17962.30	9896.02
83495.89 SRM610-1	84203.29	46900.40	7525.54	35129.12	70707.44	255708.07	91565.68	40061.31
246.94 AP1-1	5258.49	3135.64	576.18	1677.05	169.36	3029.02	297.24	257.72
3099.20 AP2-1	91578.14	52659.04	7523.18	36223.64	1719.65	7113.52	436.60	431.32
23899.79 AP3-1	1055090.04	571579.72	63949.74	377789.96	12164.51	23562.01	484.64	2282.37
30532.99 AP4-1	1404245.24	765887.97	83669.06	504321.90	15762.89	30605.97	509.32	2652.29
1336.11 TGP18-1	261616.63	145642.69	19521.81	99742.72	2993.98	11557.63	201.84	129.04
981.79 TGP18-2	227081.58	126835.10	16850.31	86046.32	2578.97	9683.77	115.00	80.40
1369.39 TGP18-3	206416.50	115695.35	15522.91	78752.16	2437.17	8744.05	88.12	62.48
4780.17 TGP18-4	200183.07	112789.82	15701.43	78165.84	2589.41	22554.45	351.92	278.92
4457.09 TGP18-5	194512.08	109374.64	15020.94	75620.14	2556.45	21076.60	380.00	317.40
888.67 TGP18-6	204284.97	114954.87	15597.19	77665.59	2351.33	14957.40	259.72	151.88
2037.35 TGP18-7	357867.69	197139.77	25254.24	132465.47	3899.70	17477.50	342.84	237.36
2118.19 TGP18-8	373877.03	204492.69	26273.65	138629.66	4120.34	17851.82	318.60	232.76
2991.64 TGP18-9	382293.85	209216.56	26612.69	141123.65	4298.50	18575.86	342.60	262.84
5019.49 TGP18-10	273632.50	152333.95	20461.46	104179.39	3329.06	22646.93	376.56	267.08
4970.77 TGP18-11	291969.16	162180.14	21512.62	110370.34	3553.06	25345.82	461.76	274.44
5880.77 TGP18-12	233913.22	129531.95	17890.12	89834.75	2963.10	25176.94	466.76	236.08
314.06 SRM614-2	1036.43	651.42	65.98	1086.89	139.16	886.76	392.32	113.96
10417.92 SRM612-2	12179.93	7154.82	1191.83	6330.40	11151.98	28681.28	14304.20	9441.37
65030.94 SRM610-2	78795.66	43857.79	6569.06	32247.86	63879.16	194073.85	81639.06	44335.69
39.34 AP1-2	1088.99	634.90	17.54	0.00	0.00	1663.53	218.60	129.48
1870.03 AP2-2	58639.55	34152.61	4909.37	23400.73	1038.13	4032.74	270.28	280.92
19630.29 AP3-2	959713.94	516678.13	56834.66	339617.83	10658.50	17084.30	485.28	2237.05
26908.25 AP4-2	1389898.84	752641.53	79596.91	494935.43	15037.96	24157.26	464.44	2620.77
certified concentration								
SRM614	1.90					1.12		

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000145 SRM614-1	0.000486	0.000287	0.000131	0.000946	0.000159	0.000501	0.000155	0.000066
0.003807 SRM612-1	0.004120	0.002362	0.000446	0.002361	0.003674	0.010887	0.004906	0.002703
0.058093 SRM610-1	0.058586	0.032632	0.005236	0.024442	0.049196	0.177913	0.063708	0.027873
0.000011 AP1-1	0.000239	0.000143	0.000026	0.000076	0.000008	0.000138	0.000014	0.000012
0.000130 AP2-1	0.003853	0.002215	0.000317	0.001524	0.000072	0.000299	0.000018	0.000018
0.000999 AP3-1	0.044121	0.023902	0.002674	0.015798	0.000509	0.000985	0.000020	0.000095
0.001370 AP4-1	0.063014	0.034368	0.003755	0.022631	0.000707	0.001373	0.000023	0.000119
0.000057 TGP18-1	0.011226	0.006250	0.000838	0.004280	0.000128	0.000496	0.000009	0.000006
0.000050 TGP18-2	0.011649	0.006506	0.000864	0.004414	0.000132	0.000497	0.000006	0.000004
0.000077 TGP18-3	0.011594	0.006498	0.000872	0.004423	0.000137	0.000491	0.000005	0.000004
0.000152 TGP18-4	0.006349	0.003577	0.000498	0.002479	0.000082	0.000715	0.000011	0.000009
0.000146 TGP18-5	0.006361	0.003577	0.000491	0.002473	0.000084	0.000689	0.000012	0.000010
0.000038 TGP18-6	0.008724	0.004909	0.000666	0.003317	0.000100	0.000639	0.000011	0.000006
0.000073 TGP18-7	0.012845	0.007076	0.000906	0.004755	0.000140	0.000627	0.000012	0.000009
0.000076 TGP18-8	0.013350	0.007302	0.000938	0.004950	0.000147	0.000637	0.000011	0.000008
0.000104 TGP18-9	0.013281	0.007268	0.000925	0.004903	0.000149	0.000645	0.000012	0.000009
0.000169 TGP18-10	0.009214	0.005130	0.000689	0.003508	0.000112	0.000763	0.000013	0.000009
0.000155 TGP18-11	0.009104	0.005057	0.000671	0.003442	0.000111	0.000790	0.000014	0.000009
0.000180 TGP18-12	0.007148	0.003958	0.000547	0.002745	0.000091	0.000769	0.000014	0.000007
0.000169 SRM614-2	0.000557	0.000350	0.000035	0.000584	0.000075	0.000477	0.000021	0.000061
0.004155 SRM612-2	0.004858	0.002854	0.000475	0.002525	0.004448	0.011439	0.005705	0.003766
0.060780 SRM610-2	0.073645	0.040991	0.006140	0.030140	0.059704	0.181388	0.076303	0.041438
0.000002 AP1-2	0.000069	0.000040	0.000001	0.000000	0.000000	0.000105	0.000014	0.000008
0.000104 AP2-2	0.003257	0.001897	0.000273	0.001300	0.000058	0.000224	0.000015	0.000016
0.001044 AP3-2	0.051043	0.027480	0.003023	0.018063	0.000567	0.000909	0.000026	0.000119
0.001480 AP4-2	0.076458	0.041403	0.004379	0.027226	0.000827	0.001329	0.000026	0.000144
standardize signal averages AP								
0.000007 AP1	0.000154	0.000092	0.000014	0.000038	0.000004	0.000122	0.000014	0.000010
0.000117 AP2	0.003555	0.002056	0.000295	0.001412	0.000065	0.000262	0.000017	0.000017
0.001022 AP3	0.047582	0.025691	0.002848	0.016930	0.000538	0.000947	0.000023	0.000107
0.001425 AP4	0.069736	0.037886	0.004067	0.024929	0.000767	0.001351	0.000024	0.000132
linest from std sig ave								
0.020782	0.009551	0.018159	0.167315	0.027586	0.886899	0.003362	0.000000	0.031421
standardize signal averages SRM								
0.000157 srm614-2	0.000522	0.000319	0.000083	0.000765	0.000117	0.000489	0.000183	0.000063
0.003981 srm612-2	0.004489	0.002608	0.000461	0.002443	0.004061	0.011163	0.005306	0.003234
0.059437 srm610-2	0.066115	0.036811	0.005688	0.027291	0.054450	0.179650	0.070005	0.034655
linest from std sig ave								
0.977303	0.886260	0.886553	0.921008	0.896426	0.903516	0.990269	0.910129	0.804568
concentration data								
0.26 SRM614-1	0.40	0.45	1.88	2.24	12.08	0.14	0.00	0.18
6.79 SRM612-1	3.38	3.68	6.40	5.59	279.46	3.14	0.00	7.28
103.54 SRM610-1	47.99	50.82	75.13	57.82	3741.98	51.31	0.00	75.11
0.09 AP1-1	0.91	1.03	1.75	0.84	2.73	0.18	0.00	0.15
1.08 AP2-1	14.68	16.05	21.13	16.77	25.60	0.40	0.00	0.23
8.29 AP3-1	168.11	173.15	178.50	173.86	179.98	1.32	0.00	1.20
11.36 AP4-1	240.10	248.97	250.61	249.05	250.27	1.84	0.00	1.49
0.48 TGP18-1	42.78	45.27	55.92	47.10	45.46	0.67	0.00	0.07
0.42 TGP18-2	44.39	47.13	57.70	48.57	46.81	0.67	0.00	0.05
0.64 TGP18-3	44.18	47.08	58.20	48.68	48.44	0.66	0.00	0.04
1.26 TGP18-4	24.19	25.91	33.24	27.28	29.06	0.96	0.00	0.11
1.21 TGP18-5	24.24	25.91	32.79	27.21	29.58	0.92	0.00	0.13
0.31 TGP18-6	33.24	35.56	44.46	36.50	35.53	0.86	0.00	0.08
0.61 TGP18-7	48.94	51.26	60.50	52.32	49.52	0.84	0.00	0.11
0.63 TGP18-8	50.87	52.90	62.62	54.48	52.06	0.86	0.00	0.10
0.86 TGP18-9	50.61	52.65	61.71	53.95	52.84	0.87	0.00	0.11

Appendix A. Raw trace element datasheets from laser ablation.

1.40 TGP18-10	35.11	37.16	45.99	38.61	39.66	1.02	0.00	0.11
1.29 TGP18-11	34.69	36.64	44.78	37.88	39.20	1.06	0.00	0.11
1.49 TGP18-12	27.23	28.67	36.49	30.21	32.04	1.03	0.00	0.09
1.40 SRM614-2	2.12	2.54	2.37	6.43	26.47	0.64	0.00	0.77
7.41 SRM612-2	3.98	4.44	6.82	5.97	338.31	3.30	0.00	10.15
108.33 SRM610-2	60.33	63.84	88.10	71.31	4541.25	52.31	0.00	111.66
0.00 AP1-2	0.06	0.06	0.02	0.00	0.00	0.03	0.00	0.02
0.86 AP2-2	12.41	13.74	18.20	14.30	20.40	0.30	0.00	0.20
8.66 AP3-2	194.49	199.07	201.76	198.78	200.57	1.22	0.00	1.49
12.27 AP4-2	291.33	299.93	292.26	299.62	292.69	1.78	0.00	1.81

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
389 blank-7b	355	721	987	3947	1360	4329	856	467
1394 SRM614-7b	1865	1549	1134	13219	1956	3620	1309	621
10461 SRM612-7	12158	7415	1881	15077	10262	26428	12758	8240
47788 SRM610-7	48217	28029	5081	30214	47971	125277	60050	34766
1170 AP1-7	6190	3964	1089	11735	1202	3393	893	560
1420 AP2-7	24460	15090	2726	19524	1483	4615	753	497
3354 AP3-7	94319	54344	8135	47019	2517	5741	697	655
6832 AP4-7	240677	135199	18012	101812	4373	9092	783	1034
517 MZ3-1	27960	16794	2849	21549	1448	4511	620	345
580 MZ3-2	29810	18058	3015	22540	1448	5000	670	361
517 MZ3-3	27373	16584	2839	21944	1379	4224	587	364
1559 MZ3-4	70828	41843	6881	39739	2048	21569	686	536
1248 MZ3-5	76080	44314	7116	39861	1974	15386	652	419
1192 MZ3-6	108353	62591	9620	52930	2500	20669	703	513
2442 MZ3-7	195702	111127	16119	86663	3537	25068	693	436
4910 MZ3-8	194599	110219	16260	85655	3457	23877	712	458
4815 MZ3-9	201569	114723	16672	88269	3510	23763	691	445
743 srm614-8	1650	1304	508	9971	1063	2855	862	454
7193 srm612-8	8360	5129	1172	12370	7698	19622	9847	6640
37378 srm610-8	42914	24626	4192	26864	41261	108177	49784	29338
478 AP1-8	3083	2202	640	9086	925	2961	740	421
1042 AP2-8	17217	10634	1976	14944	1188	3936	708	446
3243 AP3-8	95593	54398	8147	45540	2501	5449	702	632
5670 AP4-8	191123	107620	14771	84656	3949	8175	716	942
405 blank-8	462	628	363	8899	865	2168	636	286
397 blank ave	409	675	675	6423	1113	3249	746	377

blank subtraction								
997.11 SRM614-7b	1456.03	874.52	458.98	6795.74	843.90	371.42	562.96	244.20
10063.56 SRM612-7	11748.97	6740.24	1206.07	8653.87	9149.63	23179.03	12011.87	7863.12
47390.69 SRM610-7	47808.25	27354.63	4405.92	23790.87	46858.40	122028.51	59304.17	34389.71
773.38 AP1-7	5781.81	3289.38	414.70	5312.05	89.74	144.26	147.48	183.28
1022.95 AP2-7	24051.35	14415.80	2051.27	13101.57	370.30	1366.39	7.24	120.52
2957.24 AP3-7	93910.43	53669.34	7460.34	40596.45	1404.67	2492.27	-48.52	278.28
6434.54 AP4-7	240268.54	134524.08	17336.92	95389.31	3260.12	5842.81	37.28	657.12
120.22 MZ3-1	27551.38	16119.49	2174.63	15126.47	335.18	1262.43	-126.00	-31.44
183.10 MZ3-2	29401.11	17383.50	2340.43	16117.31	335.38	1751.51	-75.60	-16.00
120.30 MZ3-3	26964.13	15909.17	2164.15	15521.39	266.70	975.03	-158.48	-13.16
1161.75 MZ3-4	70419.17	41168.15	6206.41	33316.37	935.71	18320.28	-59.32	159.28
850.98 MZ3-5	75671.17	43639.33	6441.26	33438.13	861.46	12137.37	-93.16	42.28
794.70 MZ3-6	107944.27	61916.87	8945.75	46507.69	1387.79	17420.12	-42.36	136.28
2044.63 MZ3-7	195293.01	110452.55	15444.07	80240.07	2424.55	21819.30	-52.96	59.28
4512.61 MZ3-8	194190.04	109544.70	15585.15	79232.35	2344.79	20627.97	-33.40	81.16
4417.56 MZ3-9	201160.76	114048.28	15996.91	81845.72	2397.51	20513.97	-54.28	68.44
345.58 srm614-8	1241.19	629.76	-166.38	3548.32	-49.94	-394.14	116.72	77.48
6796.14 srm612-8	7951.31	4453.99	497.10	5947.69	6585.46	16373.35	9101.53	6263.39
36981.31 srm610-8	42505.42	23951.66	3516.88	20441.54	40148.09	104927.85	49038.28	28961.56
81.42 AP1-8	2674.44	1527.45	-34.54	2663.52	-187.14	-287.74	-6.08	44.20
644.90 AP2-8	16808.15	9959.78	1301.51	8521.31	75.82	687.02	-37.52	69.52
2845.56 AP3-8	95184.43	53723.90	7472.30	39117.08	1388.27	2200.75	-43.16	255.72
5272.89 AP4-8	190714.13	106945.81	14096.54	78233.10	2836.16	4925.97	-29.60	565.04

zero correction								
997.11 SRM614-7b	1456.03	874.52	458.98	6795.74	843.90	371.42	562.96	244.20
10063.56 SRM612-7	11748.97	6740.24	1206.07	8653.87	9149.63	23179.03	12011.87	7863.12
47390.69 SRM610-7	47808.25	27354.63	4405.92	23790.87	46858.40	122028.51	59304.17	34389.71

Appendix A. Raw trace element datasheets from laser ablation.

773.38 AP1-7	5781.81	3289.38	414.70	5312.05	89.74	144.26	147.48	183.28
1022.95 AP2-7	24051.35	14415.80	2051.27	13101.57	370.30	1366.39	7.24	120.52
2957.24 AP3-7	93910.43	53669.34	7460.34	40596.45	1404.67	2492.27	0.00	278.28
6434.54 AP4-7	240268.54	134524.08	17336.92	95389.31	3260.12	5842.81	37.28	657.12
120.22 MZ3-1	27551.38	16119.49	2174.63	15126.47	335.18	1262.43	0.00	0.00
183.10 MZ3-2	29401.11	17383.50	2340.43	16117.31	335.38	1751.51	0.00	0.00
120.30 MZ3-3	26964.13	15909.17	2164.15	15521.39	266.70	975.03	0.00	0.00
1161.75 MZ3-4	70419.17	41168.15	6206.41	33316.37	935.71	18320.28	0.00	159.28
850.98 MZ3-5	75671.17	43639.33	6441.26	33438.13	861.46	12137.37	0.00	42.28
794.70 MZ3-6	107944.27	61916.87	8945.75	46507.69	1387.79	17420.12	0.00	136.28
2044.63 MZ3-7	195293.01	110452.55	15444.07	80240.07	2424.55	21819.30	0.00	59.28
4512.61 MZ3-8	194190.04	109544.70	15585.15	79232.35	2344.79	20627.97	0.00	81.16
4417.56 MZ3-9	201160.76	114048.28	15996.91	81845.72	2397.51	20513.97	0.00	68.44
345.58 srm614-8	1241.19	629.76	0.00	3548.32	0.00	0.00	116.72	77.48
6796.14 srm612-8	7951.31	4453.99	497.10	5947.69	6585.46	16373.35	9101.53	6263.39
36981.31 srm610-8	42505.42	23951.66	3516.88	20441.54	40148.09	104927.85	49038.28	28961.56
81.42 AP1-8	2674.44	1527.45	0.00	2663.52	0.00	0.00	0.00	44.20
644.90 AP2-8	16808.15	9959.78	1301.51	8521.31	75.82	687.02	0.00	69.52
2845.56 AP3-8	95184.43	53723.90	7472.30	39117.08	1388.27	2200.75	0.00	255.72
5272.89 AP4-8	190714.13	106945.81	14096.54	78233.10	2836.16	4925.97	0.00	565.04
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000704 SRM614-7b	0.001028	0.000617	0.000324	0.004798	0.000596	0.000262	0.000397	0.000172
0.006521 SRM612-7	0.007613	0.004368	0.000782	0.005608	0.005929	0.015020	0.007784	0.005095
0.066798 SRM610-7	0.067387	0.038557	0.006210	0.033534	0.066048	0.172001	0.083590	0.048473
0.000085 AP1-7	0.000638	0.000363	0.000046	0.000587	0.000010	0.000016	0.000016	0.000020
0.000122 AP2-7	0.002868	0.001719	0.000245	0.001562	0.000044	0.000163	0.000001	0.000014
0.000354 AP3-7	0.011235	0.006421	0.000893	0.004857	0.000168	0.000298	0.000000	0.000033
0.000824 AP4-7	0.030758	0.017221	0.002219	0.012211	0.000417	0.000748	0.000005	0.000084
0.000027 MZ3-1	0.006090	0.003563	0.000481	0.003344	0.000074	0.000279	0.000000	0.000000
0.000040 MZ3-2	0.006425	0.003799	0.000511	0.003522	0.000073	0.000383	0.000000	0.000000
0.000029 MZ3-3	0.006548	0.003863	0.000526	0.003769	0.000065	0.000237	0.000000	0.000000
0.000087 MZ3-4	0.005266	0.003078	0.000464	0.002491	0.000070	0.001370	0.000000	0.000012
0.000082 MZ3-5	0.007300	0.004210	0.000621	0.003226	0.000083	0.001171	0.000000	0.000004
0.000062 MZ3-6	0.008467	0.004857	0.000702	0.003648	0.000109	0.001366	0.000000	0.000011
0.000162 MZ3-7	0.015433	0.008728	0.001220	0.006341	0.000192	0.001724	0.000000	0.000005
0.000362 MZ3-8	0.015596	0.008798	0.001252	0.006363	0.000188	0.001657	0.000000	0.000007
0.000353 MZ3-9	0.016091	0.009123	0.001280	0.006547	0.000192	0.001641	0.000000	0.000005
0.000340 srm614-8	0.001223	0.000620	0.000000	0.003495	0.000000	0.000000	0.000115	0.000076
0.006211 srm612-8	0.007267	0.004070	0.000454	0.005435	0.006018	0.014963	0.008318	0.005724
0.059332 srm610-8	0.068195	0.038428	0.005642	0.032796	0.064413	0.168345	0.078676	0.046466
0.000012 AP1-8	0.000380	0.000217	0.000000	0.000378	0.000000	0.000000	0.000000	0.000006
0.000091 AP2-8	0.002382	0.001411	0.000184	0.001207	0.000011	0.000097	0.000000	0.000010
0.000368 AP3-8	0.012319	0.006953	0.000967	0.005062	0.000180	0.000285	0.000000	0.000033
0.000748 AP4-8	0.027056	0.015172	0.002000	0.011099	0.000402	0.000699	0.000000	0.000080
standardize signal averages AP								
0.000048 AP1	0.000509	0.000290	0.000023	0.000482	0.000005	0.000008	0.000008	0.000013
0.000107 AP2	0.002625	0.001565	0.000215	0.001385	0.000027	0.000130	0.000000	0.000012
0.000361 AP3	0.011777	0.006687	0.000930	0.004960	0.000174	0.000291	0.000000	0.000033
0.000786 AP4	0.028907	0.016196	0.002110	0.011655	0.000410	0.000723	0.000002	0.000082
linest from std sig ave								
0.042183	0.025841	0.047404	0.361185	0.065539	1.867061	0.006913	0.000000	0.059159
standardize signal averages SRM								
0.000522 srm614-2	0.001125	0.000619	0.000162	0.004146	0.000298	0.000131	0.000256	0.000124
0.006366 srm612-2	0.007440	0.004219	0.000618	0.005522	0.005974	0.014992	0.008051	0.005410
0.063065 srm610-2	0.067791	0.038492	0.005926	0.033165	0.065230	0.170173	0.081133	0.047469

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave								
1.058858	0.994362	1.002074	1.050938	1.013424	1.012384	1.010675	1.029669	1.020130
concentration data								
2.55 SRM614-7b	2.28	2.51	10.04	26.97	95.40	0.16	0.00	0.87
23.59 SRM612-7	16.87	17.76	24.21	31.52	949.37	8.90	0.00	25.85
241.66 SRM610-7	149.34	156.75	192.37	188.49	10575.88	101.97	0.00	245.94
1.44 AP1-7	6.58	6.87	6.60	15.34	7.38	0.04	0.00	0.48
2.05 AP2-7	29.57	32.51	35.25	40.85	32.89	0.45	0.00	0.34
5.95 AP3-7	115.82	121.42	128.60	126.98	125.17	0.82	0.00	0.79
13.86 AP4-7	317.08	325.67	319.79	319.27	310.85	2.06	0.00	1.99
0.45 MZ3-1	62.79	67.39	69.27	87.43	55.19	0.77	0.00	0.00
0.67 MZ3-2	66.24	71.84	73.70	92.09	54.59	1.06	0.00	0.00
0.49 MZ3-3	67.50	73.06	75.73	98.55	48.24	0.65	0.00	0.00
1.46 MZ3-4	54.28	58.22	66.87	65.14	52.11	3.78	0.00	0.28
1.38 MZ3-5	75.26	79.62	89.54	84.34	61.90	3.23	0.00	0.10
1.05 MZ3-6	87.29	91.85	101.11	95.38	81.08	3.77	0.00	0.25
2.72 MZ3-7	159.10	165.06	175.85	165.79	142.71	4.75	0.00	0.11
6.10 MZ3-8	160.78	166.38	180.36	166.38	140.27	4.57	0.00	0.15
5.95 MZ3-9	165.88	172.52	184.38	171.17	142.84	4.53	0.00	0.13
1.23 srm614-8	2.71	2.52	0.00	19.64	0.00	0.00	0.00	0.39
22.47 srm612-8	16.10	16.55	14.07	30.55	963.68	8.87	0.00	29.04
214.65 srm610-8	151.14	156.23	174.78	184.34	10314.14	99.80	0.00	235.75
0.19 AP1-8	3.92	4.10	0.00	9.89	0.00	0.00	0.00	0.15
1.54 AP2-8	24.55	26.69	26.57	31.57	8.00	0.27	0.00	0.23
6.20 AP3-8	126.99	131.49	139.34	132.36	133.82	0.79	0.00	0.78
12.59 AP4-8	278.92	286.92	288.15	290.18	299.69	1.93	0.00	1.89
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
Cu65	Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data								
808.84 blank-5	1620.05	1128.13	1408.61	5065.67	1694.57	1949.77	880.00	476.20
1443.09 SRM614-5	2374.05	1580.57	1198.13	8705.49	1795.41	3818.54	1565.97	777.12
16149.97 SRM612-5	19783.87	11537.23	2550.01	16018.21	15575.97	43152.68	19922.75	12709.59
76949.31 SRM610-5	86609.17	48561.11	7979.52	41536.40	64045.52	206264.39	84281.07	43725.97
1840.33 AP1-5	12823.07	7876.12	1627.61	11103.02	1166.73	3891.30	857.72	494.72
4884.71 AP2-5	95370.30	54948.87	8295.49	44716.89	2563.21	7569.16	991.05	849.76
20111.79 AP3-5	798920.44	433676.69	51921.65	295842.69	10469.86	14759.60	1002.89	2460.93
44927.13 AP4-5	2106746.80	1166371.00	127746.96	781405.88	23822.90	32288.10	1163.25	4866.35
5274.55 V1-1	155359.67	88070.45	12385.55	67971.46	3100.78	14481.12	656.32	521.40
4771.91 V1-2	161290.78	90885.75	12826.03	70705.04	3177.06	19046.39	652.88	451.96
2533.13 V1-3	130573.81	74096.94	10831.62	58986.57	2845.26	13277.52	645.40	397.68
2552.73 V1-4	158318.50	90118.75	13196.27	70958.00	3265.02	14869.16	659.56	523.28
2616.53 V1-5	147533.23	84409.76	12031.95	66565.06	2913.10	12479.11	641.84	416.48
1727.53 V1-6	137690.61	78458.16	11453.86	62641.47	2955.58	12197.39	666.20	365.88
2157.01 V1-7	141614.59	81103.85	11845.75	65146.57	3107.46	14429.56	674.96	407.48
1861.29 V1-8	150143.28	85490.20	12481.11	68297.23	3046.22	13645.96	653.72	413.76
2081.97 V1-9	215797.78	121049.96	17180.70	93032.28	4088.54	18966.39	673.08	399.52
1425.61 V1-10	60764.58	35536.48	5466.47	33747.91	1774.17	9161.61	658.44	335.36
1310.21 V1-11	72020.41	42144.32	6433.00	38037.93	1931.61	9422.85	621.96	314.32
1619.61 V1-12	74752.22	42830.88	6353.16	39072.14	1980.93	9005.33	665.08	341.12
2083.73 V1-13	67062.98	40006.50	6282.28	37742.41	2020.33	11422.22	705.92	398.32
1943.01 V1-14	56475.44	32899.15	5130.51	33132.71	1760.05	8934.33	651.40	353.88
1233.53 V1-15	57424.45	33408.03	5223.83	33403.83	1772.33	10086.86	620.84	374.28
708.44 SRM614-6	1616.33	1262.73	570.28	11850.35	1145.81	3148.10	882.69	433.68
11446.02 SRM612-6	12945.51	7659.44	1704.65	16308.57	11767.19	31163.78	14725.24	9606.49
79393.33 SRM610-6	94030.57	52526.38	8365.53	47455.87	72901.61	216777.30	96926.15	51070.09
576.36 AP1-6	2424.81	1728.37	599.96	8895.37	929.09	3205.98	663.20	391.60
2255.69 AP2-6	48970.59	29046.64	4628.71	27617.68	1804.37	5572.63	803.96	538.68
13359.56 AP3-6	492948.13	269813.63	33742.03	188862.09	7408.44	11278.94	953.77	1766.53
26189.19 AP4-6	1246838.50	680254.25	76665.47	460137.22	15022.97	20338.19	912.05	3138.50
586.76 blank-6	677.44	762.76	347.92	10955.46	892.57	2515.65	634.68	273.32
697.80 blank average	1148.75	945.45	878.26	8010.57	1293.57	2232.71	757.34	374.76
blank subtraction								
745.28 SRM614-5	1225.31	635.12	319.86	694.92	501.84	1585.83	808.62	402.36
15452.17 SRM612-5	18635.12	10591.78	1671.75	8007.64	14282.40	40919.97	19165.41	12334.83
76251.51 SRM610-5	85460.43	47615.67	7101.26	33525.83	62751.95	204031.68	83523.73	43351.20
1142.53 AP1-5	11674.32	6930.68	749.34	3092.46	-126.84	1658.59	100.38	119.96
4186.90 AP2-5	94221.55	54003.42	7417.22	36706.33	1269.65	5336.45	233.70	475.00

Appendix A. Raw trace element datasheets from laser ablation.

19413.99 AP3-5	797771.69	432731.24	51043.39	287832.12	9176.29	12526.89	245.54	2086.17
44229.33 AP4-5	2105598.05	1165425.55	126868.70	773395.31	22529.33	30055.39	405.90	4491.59
4576.75 V1-1	154210.92	87125.01	11507.29	59960.90	1807.21	12248.41	-101.02	146.64
4074.10 V1-2	160142.03	89940.30	11947.77	62694.47	1883.49	16813.67	-104.46	77.20
1835.33 V1-3	129425.06	73151.49	9953.36	50976.01	1551.69	11044.80	-111.94	22.92
1854.93 V1-4	157169.75	89173.30	12318.01	62947.43	1971.45	12636.45	-97.78	148.52
1918.73 V1-5	146384.48	83464.31	11153.68	58554.49	1619.53	10246.40	-115.50	41.72
1029.73 V1-6	136541.86	77512.72	10575.60	54630.91	1662.01	9964.68	-91.14	-8.82
1459.21 V1-7	140465.84	80158.41	10967.48	57136.00	1813.89	12196.85	-82.38	32.72
1163.49 V1-8	148994.53	84544.76	11602.85	60286.66	1752.65	11413.24	-103.62	39.00
1384.17 V1-9	214649.03	120104.51	16302.43	85021.72	2794.98	16733.67	-84.26	24.76
727.80 V1-10	59615.84	34591.03	4588.21	25737.34	480.60	6928.90	-98.90	-39.40
612.40 V1-11	70871.66	41198.87	5554.73	30027.37	638.04	7190.14	-135.38	-60.44
921.81 V1-12	73603.47	41885.44	5474.89	31061.58	687.36	6772.62	-92.26	-33.64
1385.93 V1-13	65914.23	39061.06	5404.01	29731.85	726.76	9189.51	-51.42	23.56
1245.21 V1-14	55326.69	31953.70	4252.24	25122.14	466.48	6701.62	-105.94	-20.88
535.72 V1-15	56275.70	32462.58	4345.56	25393.26	478.76	7854.14	-136.50	-0.48
10.64 SRM614-6	467.58	317.28	-307.98	3839.78	-147.76	915.39	125.34	58.92
10748.22 SRM612-6	11796.77	6714.00	826.38	8298.01	10473.62	28931.06	13967.90	9231.73
78695.52 SRM610-6	92881.82	51580.93	7487.26	39445.30	71608.04	214544.59	96168.80	50695.32
-121.44 AP1-6	1276.07	782.92	-278.30	884.80	-364.48	973.27	-94.14	16.84
1557.89 AP2-6	47821.85	28101.20	3750.44	19607.11	510.80	3339.92	46.62	163.92
12661.75 AP3-6	491799.38	268868.18	32863.77	180851.52	6114.87	9046.23	196.42	1391.77
25491.38 AP4-6	1245689.75	679308.80	75787.20	452126.65	13729.40	18105.48	154.70	2763.74

zero correction								
745.28 SRM614-5	1225.31	635.12	319.86	694.92	501.84	1585.83	808.62	402.36
15452.17 SRM612-5	18635.12	10591.78	1671.75	8007.64	14282.40	40919.97	19165.41	12334.83
76251.51 SRM610-5	85460.43	47615.67	7101.26	33525.83	62751.95	204031.68	83523.73	43351.20
1142.53 AP1-5	11674.32	6930.68	749.34	3092.46	0.00	1658.59	100.38	119.96
4186.90 AP2-5	94221.55	54003.42	7417.22	36706.33	1269.65	5336.45	233.70	475.00
19413.99 AP3-5	797771.69	432731.24	51043.39	287832.12	9176.29	12526.89	245.54	2086.17
44229.33 AP4-5	2105598.05	1165425.55	126868.70	773395.31	22529.33	30055.39	405.90	4491.59
4576.75 V1-1	154210.92	87125.01	11507.29	59960.90	1807.21	12248.41	0.00	146.64
4074.10 V1-2	160142.03	89940.30	11947.77	62694.47	1883.49	16813.67	0.00	77.20
1835.33 V1-3	129425.06	73151.49	9953.36	50976.01	1551.69	11044.80	0.00	22.92
1854.93 V1-4	157169.75	89173.30	12318.01	62947.43	1971.45	12636.45	0.00	148.52
1918.73 V1-5	146384.48	83464.31	11153.68	58554.49	1619.53	10246.40	0.00	41.72
1029.73 V1-6	136541.86	77512.72	10575.60	54630.91	1662.01	9964.68	0.00	0.00
1459.21 V1-7	140465.84	80158.41	10967.48	57136.00	1813.89	12196.85	0.00	32.72
1163.49 V1-8	148994.53	84544.76	11602.85	60286.66	1752.65	11413.24	0.00	39.00
1384.17 V1-9	214649.03	120104.51	16302.43	85021.72	2794.98	16733.67	0.00	24.76
727.80 V1-10	59615.84	34591.03	4588.21	25737.34	480.60	6928.90	0.00	0.00
612.40 V1-11	70871.66	41198.87	5554.73	30027.37	638.04	7190.14	0.00	0.00
921.81 V1-12	73603.47	41885.44	5474.89	31061.58	687.36	6772.62	0.00	0.00
1385.93 V1-13	65914.23	39061.06	5404.01	29731.85	726.76	9189.51	0.00	23.56
1245.21 V1-14	55326.69	31953.70	4252.24	25122.14	466.48	6701.62	0.00	0.00
535.72 V1-15	56275.70	32462.58	4345.56	25393.26	478.76	7854.14	0.00	0.00
10.64 SRM614-6	467.58	317.28	0.00	3839.78	0.00	915.39	125.34	58.92
10748.22 SRM612-6	11796.77	6714.00	826.38	8298.01	10473.62	28931.06	13967.90	9231.73
78695.52 SRM610-6	92881.82	51580.93	7487.26	39445.30	71608.04	214544.59	96168.80	50695.32
0.00 AP1-6	1276.07	782.92	0.00	884.80	0.00	973.27	0.00	16.84
1557.89 AP2-6	47821.85	28101.20	3750.44	19607.11	510.80	3339.92	46.62	163.92
12661.75 AP3-6	491799.38	268868.18	32863.77	180851.52	6114.87	9046.23	196.42	1391.77
25491.38 AP4-6	1245689.75	679308.80	75787.20	452126.65	13729.40	18105.48	154.70	2763.74

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005

standardized signal								
0.000188 SRM614-5	0.000308	0.000160	0.000081	0.000175	0.000126	0.000399	0.000204	0.000101
0.004418 SRM612-5	0.005328	0.003029	0.000478	0.002290	0.004084	0.011700	0.005480	0.003527
0.070106 SRM610-5	0.078573	0.043778	0.006529	0.030824	0.057695	0.187588	0.076792	0.039857

Appendix A. Raw trace element datasheets from laser ablation.

0.000073 AP1-5	0.000750	0.000446	0.000048	0.000199	0.000000	0.000107	0.000006	0.000008
0.000190 AP2-5	0.004286	0.002456	0.000337	0.001670	0.000058	0.000243	0.000011	0.000022
0.001002 AP3-5	0.041176	0.022335	0.002635	0.014856	0.000474	0.000647	0.000013	0.000108
0.002258 AP4-5	0.107472	0.059485	0.006476	0.039475	0.001150	0.001534	0.000021	0.000229
0.000492 V1-1	0.016586	0.009371	0.001238	0.006449	0.000194	0.001317	0.000000	0.000016
0.000361 V1-2	0.014199	0.007975	0.001059	0.005559	0.000167	0.001491	0.000000	0.000007
0.000216 V1-3	0.015250	0.008619	0.001173	0.006006	0.000183	0.001301	0.000000	0.000003
0.000207 V1-4	0.017527	0.009945	0.001374	0.007020	0.000220	0.001409	0.000000	0.000017
0.000199 V1-5	0.015179	0.008654	0.001157	0.006071	0.000168	0.001062	0.000000	0.000004
0.000117 V1-6	0.015527	0.008814	0.001203	0.006212	0.000189	0.001133	0.000000	0.000000
0.000172 V1-7	0.016555	0.009447	0.001293	0.006734	0.000214	0.001437	0.000000	0.000004
0.000133 V1-8	0.017049	0.009674	0.001328	0.006899	0.000201	0.001306	0.000000	0.000004
0.000122 V1-9	0.018962	0.010610	0.001440	0.007511	0.000247	0.001478	0.000000	0.000002
0.000107 V1-10	0.008733	0.005067	0.000672	0.003770	0.000070	0.001015	0.000000	0.000000
0.000085 V1-11	0.009872	0.005739	0.000774	0.004183	0.000089	0.001002	0.000000	0.000000
0.000139 V1-12	0.011072	0.006301	0.000824	0.004673	0.000103	0.001019	0.000000	0.000000
0.000221 V1-13	0.010516	0.006232	0.000862	0.004744	0.000116	0.001466	0.000000	0.000004
0.000211 V1-14	0.009355	0.005403	0.000719	0.004248	0.000079	0.001133	0.000000	0.000000
0.000083 V1-15	0.008683	0.005009	0.000671	0.003918	0.000074	0.001212	0.000000	0.000000
0.000009 SRM614-6	0.000405	0.000275	0.000000	0.003326	0.000000	0.000793	0.000109	0.000051
0.004721 SRM612-6	0.005182	0.002949	0.000363	0.003645	0.004601	0.012709	0.006136	0.004055
0.071438 SRM610-6	0.084316	0.046824	0.006797	0.035807	0.065004	0.194758	0.087300	0.046020
0.000000 AP1-6	0.000124	0.000076	0.000000	0.000086	0.000000	0.000094	0.000000	0.000002
0.000093 AP2-6	0.002853	0.001677	0.000224	0.001170	0.000030	0.000199	0.000003	0.000010
0.000711 AP3-6	0.027631	0.015106	0.001846	0.010161	0.000344	0.000508	0.000011	0.000078
0.001873 AP4-6	0.091523	0.049910	0.005568	0.033219	0.001009	0.001330	0.000011	0.000203
standardize signal averages AP								
0.000037 AP1	0.000437	0.000261	0.000024	0.000142	0.000000	0.000100	0.000003	0.000005
0.000142 AP2	0.003569	0.002066	0.000281	0.001420	0.000044	0.000221	0.000007	0.000016
0.000857 AP3	0.034404	0.018720	0.002240	0.012509	0.000409	0.000577	0.000012	0.000093
0.002065 AP4	0.099498	0.054697	0.006022	0.036347	0.001079	0.001432	0.000016	0.000216
linest from std sig ave								
0.016337	0.007586	0.014212	0.128514	0.021384	0.715743	0.003507	0.000000	0.022770
standardize signal averages SRM								
0.000098 srm614-2	0.000357	0.000217	0.000040	0.001751	0.000063	0.000596	0.000156	0.000076
0.004570 srm612-2	0.005255	0.002989	0.000421	0.002967	0.004342	0.012205	0.005808	0.003791
0.070772 srm610-2	0.081444	0.045301	0.006663	0.033316	0.061349	0.191173	0.082046	0.042939
linest from std sig ave								
0.000000	0.065404	0.000000	0.000000	0.000000	0.000000	0.026753	0.060628	0.086411
concentration data								
0.26 SRM614-5	0.20	0.19	0.89	0.32	7.75	0.12	0.00	0.20
6.19 SRM612-5	3.47	3.69	5.27	4.20	250.68	3.52	0.00	6.89
98.23 SRM610-5	51.12	53.36	71.96	56.53	3541.54	56.41	0.00	77.84
0.48 AP1-5	2.27	2.53	2.47	1.70	0.00	0.15	0.00	0.07
1.24 AP2-5	12.97	13.93	17.30	14.24	16.49	0.34	0.00	0.20
6.53 AP3-5	124.61	126.63	135.07	126.74	135.24	0.90	0.00	0.98
14.71 AP4-5	325.25	337.26	331.99	336.75	328.34	2.15	0.00	2.08
3.21 V1-1	50.20	53.13	63.45	55.02	55.50	1.84	0.00	0.14
2.35 V1-2	42.97	45.21	54.31	47.42	47.68	2.09	0.00	0.06
1.41 V1-3	46.15	48.87	60.13	51.24	52.20	1.82	0.00	0.02
1.35 V1-4	53.04	56.38	70.43	59.88	62.78	1.97	0.00	0.15
1.30 V1-5	45.94	49.07	59.29	51.79	47.95	1.49	0.00	0.04
0.76 V1-6	46.99	49.97	61.66	53.00	53.96	1.59	0.00	0.00
1.12 V1-7	50.10	53.56	66.27	57.44	61.04	2.01	0.00	0.04
0.87 V1-8	51.60	54.85	68.07	58.85	57.27	1.83	0.00	0.04
0.80 V1-9	57.39	60.16	73.83	64.07	70.50	2.07	0.00	0.02
0.69 V1-10	26.43	28.73	34.46	32.16	20.10	1.42	0.00	0.00
0.56 V1-11	29.88	32.54	39.67	35.68	25.38	1.40	0.00	0.00
0.90 V1-12	33.51	35.72	42.22	39.86	29.52	1.43	0.00	0.00
1.44 V1-13	31.83	35.33	44.20	40.47	33.11	2.05	0.00	0.03
1.37 V1-14	28.31	30.63	36.86	36.24	22.52	1.59	0.00	0.00
0.54 V1-15	26.28	28.40	34.38	33.43	21.09	1.70	0.00	0.00
0.01 SRM614-6	0.26	0.34	0.00	6.10	0.00	0.24	0.00	0.10
6.62 SRM612-6	3.37	3.59	4.00	6.68	282.42	3.82	0.00	7.92
100.09 SRM610-6	54.86	57.07	74.91	65.67	3990.22	58.57	0.00	89.87
0.00 AP1-6	0.37	0.43	0.00	0.73	0.00	0.13	0.00	0.01
0.61 AP2-6	8.63	9.51	11.47	9.98	8.70	0.28	0.00	0.09
4.64 AP3-6	83.62	85.65	94.66	86.68	98.10	0.71	0.00	0.71
12.21 AP4-6	276.98	282.98	285.48	283.38	288.03	1.86	0.00	1.84
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	456.30					438.10	426.30	317.40	
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07	
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38	
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09	
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84	
Cu65		Zn64	Zn66	Zn67	Zn68	Zn70	Ga	Ge	As
raw data									
1117.93 blank-3	981.97	910.65	1257.01	10056.50	2176.97	2572.21	1226.85	376.64	
1973.09 SRM614-3	6003.47	3851.82	1347.65	11938.43	1970.37	3841.54	1372.37	678.84	
13435.96 SRM612-3	16713.61	9765.09	2358.97	14861.00	12994.19	34764.56	15943.53	10372.14	
73235.66 SRM610-3	79981.97	44839.25	7325.84	39760.59	60316.98	203698.31	77770.40	38038.66	
1225.89 AP1-3	10891.58	6576.40	1429.89	10131.78	1174.77	4596.15	979.01	646.76	
2978.02 AP2-3	79799.97	46848.26	7106.24	37764.21	2273.01	7022.44	967.05	738.56	
16307.93 AP3-3	642785.88	350996.47	42711.84	240491.28	9085.13	15307.61	972.33	2074.01	
25898.35 AP4-3	1155258.10	630846.75	72315.97	424619.22	14460.28	21992.40	1114.53	2981.02	
974.81 V3-1	37313.29	22114.76	3793.18	22876.33	1499.57	7518.28	713.20	374.28	
702.52 V3-2	40528.79	24225.42	3917.94	24372.38	1349.85	8331.21	651.52	367.04	
706.48 V3-3	47143.02	27672.04	4469.91	27168.83	1634.37	7881.28	627.56	326.72	
1018.21 V3-4	69055.55	40630.87	6779.92	38224.66	1914.13	22586.85	771.68	395.28	
732.68 V3-5	63790.40	36910.33	6067.31	35163.64	1785.09	20684.60	771.96	346.40	
834.80 V3-6	90366.91	52335.09	8524.49	46191.90	2101.65	28319.08	761.28	382.32	
1543.29 V3-7	509501.09	281985.03	38907.70	207853.41	6859.36	89292.91	896.29	475.16	
1292.89 V3-8	559097.31	306135.88	40696.07	221218.72	6887.52	91498.03	917.57	417.76	
1318.81 V3-9	606372.69	330939.31	43375.92	237769.25	7209.60	94773.06	945.69	421.96	
868.88 SRM614-4	1849.77	1268.69	533.96	7753.08	1036.29	2985.14	988.61	519.68	
9862.14 SRM612-4	12184.15	7188.00	1526.73	12124.07	10217.06	27000.27	13088.51	8784.77	
65119.16 SRM610-4	76798.43	42959.20	6775.40	37692.77	57977.84	181355.38	76646.79	39319.78	
611.04 AP1-4	1804.33	1230.33	503.24	5658.99	819.20	3616.02	843.00	491.84	
1909.77 AP2-4	43316.32	25525.06	3986.54	23055.77	1556.61	4896.83	857.16	588.72	
13397.64 AP3-4	519076.34	281593.69	34353.27	193743.48	7579.52	12588.19	931.89	1781.09	
16559.17 AP4-4	739219.38	401074.28	46774.54	272928.13	9878.10	15625.01	955.81	2087.01	
671.00 blank-4	702.32	565.72	250.48	5933.43	647.88	1953.21	589.32	276.16	
894.47 blank average	842.14	738.18	753.74	7994.97	1412.43	2262.71	908.09	326.40	
blank subtraction									
1078.63 SRM614-3	5161.33	3113.64	593.90	3943.46	557.94	1578.83	464.28	352.44	
12541.49 SRM612-3	15871.47	9026.91	1605.23	6866.04	11581.77	32501.84	15035.44	10045.74	
72341.19 SRM610-3	79139.82	44101.07	6572.10	31765.62	58904.55	201435.60	76862.31	37712.25	
331.42 AP1-3	10049.44	5838.21	676.14	2136.81	-237.66	2333.43	70.92	320.36	
2083.55 AP2-3	78957.82	46110.08	6352.50	29769.25	860.58	4759.73	58.96	412.16	
15413.47 AP3-3	641943.74	350258.29	41958.10	232496.31	7672.70	13044.89	64.24	1747.61	
25003.88 AP4-3	1154415.96	630108.57	71562.22	416624.25	13047.85	19729.69	206.44	2654.61	
80.34 V3-1	36471.14	21376.58	3039.44	14881.36	87.14	5255.57	-194.88	47.88	
-191.94 V3-2	39686.64	23487.23	3164.20	16377.41	-62.58	6068.49	-256.56	40.64	
-187.98 V3-3	46300.88	26933.85	3716.16	19173.87	221.94	5618.57	-280.52	0.32	
123.74 V3-4	68213.40	39892.68	6026.17	30229.69	501.70	20324.14	-136.40	68.88	
-161.78 V3-5	62948.25	36172.14	5313.57	27168.67	372.66	18421.89	-136.12	20.00	
-59.66 V3-6	89524.76	51596.91	7770.74	38196.94	689.22	26056.37	-146.80	55.92	
648.82 V3-7	508658.95	281246.85	38153.95	199858.44	5446.93	87030.19	-11.80	148.76	
398.42 V3-8	558255.17	305397.70	39942.33	213223.75	5475.09	89235.32	9.48	91.36	
424.34 V3-9	605530.55	330201.13	42622.18	229774.28	5797.17	92510.34	37.60	95.56	
-25.58 SRM614-4	1007.63	530.50	-219.78	-241.88	-376.14	722.42	80.52	193.28	
8967.67 SRM612-4	11342.00	6449.82	772.98	4129.10	8804.63	24737.56	12180.43	8458.37	
64224.70 SRM610-4	75956.29	42221.02	6021.65	29697.81	56565.42	179092.67	75738.70	38993.38	
-283.42 AP1-4	962.19	492.14	-250.50	-2335.97	-593.22	1353.31	-65.08	165.44	
1015.31 AP2-4	42474.18	24786.88	3232.80	15060.80	144.18	2634.11	-50.92	262.32	
12503.17 AP3-4	518234.20	280855.51	33599.53	185748.51	6167.09	10325.48	23.80	1454.69	
15664.71 AP4-4	738377.24	400336.10	46020.80	264933.16	8465.67	13362.30	47.72	1760.61	
zero correction									
1078.63 SRM614-3	5161.33	3113.64	593.90	3943.46	557.94	1578.83	464.28	352.44	
12541.49 SRM612-3	15871.47	9026.91	1605.23	6866.04	11581.77	32501.84	15035.44	10045.74	
72341.19 SRM610-3	79139.82	44101.07	6572.10	31765.62	58904.55	201435.60	76862.31	37712.25	
331.42 AP1-3	10049.44	5838.21	676.14	2136.81	0.00	2333.43	70.92	320.36	
2083.55 AP2-3	78957.82	46110.08	6352.50	29769.25	860.58	4759.73	58.96	412.16	
15413.47 AP3-3	641943.74	350258.29	41958.10	232496.31	7672.70	13044.89	64.24	1747.61	
25003.88 AP4-3	1154415.96	630108.57	71562.22	416624.25	13047.85	19729.69	206.44	2654.61	
80.34 V3-1	36471.14	21376.58	3039.44	14881.36	87.14	5255.57	0.00	47.88	
0.00 V3-2	39686.64	23487.23	3164.20	16377.41	0.00	6068.49	0.00	40.64	
0.00 V3-3	46300.88	26933.85	3716.16	19173.87	221.94	5618.57	0.00	0.32	
123.74 V3-4	68213.40	39892.68	6026.17	30229.69	501.70	20324.14	0.00	68.88	
0.00 V3-5	62948.25	36172.14	5313.57	27168.67	372.66	18421.89	0.00	20.00	
0.00 V3-6	89524.76	51596.91	7770.74	38196.94	689.22	26056.37	0.00	55.92	
648.82 V3-7	508658.95	281246.85	38153.95	199858.44	5446.93	87030.19	0.00	148.76	
398.42 V3-8	558255.17	305397.70	39942.33	213223.75	5475.09	89235.32	9.48	91.36	
424.34 V3-9	605530.55	330201.13	42622.18	229774.28	5797.17	92510.34	37.60	95.56	
0.00 SRM614-4	1007.63	530.50	0.00	0.00	0.00	722.42	80.52	193.28	

Appendix A. Raw trace element datasheets from laser ablation.

8967.67 SRM612-4	11342.00	6449.82	772.98	4129.10	8804.63	24737.56	12180.43	8458.37
64224.70 SRM610-4	75956.29	42221.02	6021.65	29697.81	56565.42	179092.67	75738.70	38993.38
0.00 AP1-4	962.19	492.14	0.00	0.00	0.00	1353.31	0.00	165.44
1015.31 AP2-4	42474.18	24786.88	3232.80	15060.80	144.18	2634.11	0.00	262.32
12503.17 AP3-4	518234.20	280855.51	33599.53	185748.51	6167.09	10325.48	23.80	1454.69
15664.71 AP4-4	738377.24	400336.10	46020.80	264933.16	8465.67	13362.30	47.72	1760.61
certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84
standardized concentration								
0.000000 SRM614	0.000022	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000	0.000000
0.000000 SRM612	0.000442	0.000000	0.000000	0.000000	0.000000	0.000423	0.000404	0.000435
0.000000 SRM610	0.005320	0.000000	0.000000	0.000000	0.000000	0.005108	0.004971	0.003701
0.000000 STD AP1	0.000003	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
0.000006 STD AP2	0.000137	0.000140	0.000140	0.000140	0.000140	0.000002	0.000000	0.000001
0.000017 STD AP3	0.000386	0.000400	0.000400	0.000400	0.000400	0.000003	0.000000	0.000003
0.000032 STD AP4	0.000708	0.000727	0.000727	0.000727	0.000727	0.000004	0.000000	0.000005
standardized signal								
0.000394 SRM614-3	0.001884	0.001137	0.000217	0.001440	0.000204	0.000576	0.000169	0.000129
0.004765 SRM612-3	0.006031	0.003430	0.000610	0.002609	0.004401	0.012350	0.005713	0.003817
0.073682 SRM610-3	0.080606	0.044918	0.006694	0.032354	0.059996	0.205169	0.078287	0.038411
0.000014 AP1-3	0.000428	0.000249	0.000029	0.000091	0.000000	0.000099	0.000003	0.000014
0.000114 AP2-3	0.004322	0.002524	0.000348	0.001630	0.000047	0.000261	0.000003	0.000023
0.000712 AP3-3	0.029642	0.016173	0.001937	0.010735	0.000354	0.000602	0.000003	0.000081
0.001342 AP4-3	0.061971	0.033825	0.003842	0.022365	0.000700	0.001059	0.000011	0.000143
0.000013 V3-1	0.005962	0.003495	0.000497	0.002433	0.000014	0.000859	0.000000	0.000008
0.000000 V3-2	0.005589	0.003308	0.000446	0.002307	0.000000	0.000855	0.000000	0.000006
0.000000 V3-3	0.005797	0.003372	0.000465	0.002401	0.000028	0.000704	0.000000	0.000000
0.000013 V3-4	0.007238	0.004233	0.000639	0.003208	0.000053	0.002157	0.000000	0.000007
0.000000 V3-5	0.006942	0.003989	0.000586	0.002996	0.000041	0.002031	0.000000	0.000002
0.000000 V3-6	0.007501	0.004323	0.000651	0.003200	0.000058	0.002183	0.000000	0.000005
0.000029 V3-7	0.023096	0.012770	0.001732	0.009075	0.000247	0.003952	0.000000	0.000007
0.000017 V3-8	0.023492	0.012851	0.001681	0.008973	0.000230	0.003755	0.000000	0.000004
0.000017 V3-9	0.024200	0.013196	0.001703	0.009183	0.000232	0.003697	0.000002	0.000004
0.000000 SRM614-4	0.000534	0.000281	0.000000	0.000000	0.000000	0.000383	0.000043	0.000102
0.004604 SRM612-4	0.005823	0.003311	0.000397	0.002120	0.004520	0.012700	0.006253	0.004342
0.076742 SRM610-4	0.090760	0.050450	0.007195	0.035486	0.067590	0.213998	0.090500	0.046593
0.000000 AP1-4	0.000053	0.000027	0.000000	0.000000	0.000000	0.000074	0.000000	0.000009
0.000076 AP2-4	0.003164	0.001846	0.000241	0.001122	0.000011	0.000196	0.000000	0.000020
0.000671 AP3-4	0.027802	0.015067	0.001803	0.009965	0.000331	0.000554	0.000001	0.000078
0.000984 AP4-4	0.046387	0.025150	0.002891	0.016644	0.000532	0.000839	0.000003	0.000111
standardize signal averages AP								
0.000007 AP1	0.000240	0.000138	0.000014	0.000046	0.000000	0.000087	0.000002	0.000011
0.000095 AP2	0.003743	0.002185	0.000294	0.001376	0.000029	0.000228	0.000002	0.000021
0.000691 AP3	0.028722	0.015620	0.001870	0.010350	0.000343	0.000578	0.000002	0.000079
0.001163 AP4	0.054179	0.029488	0.003366	0.019504	0.000616	0.000949	0.000007	0.000127
linest from std sig ave								
0.027125	0.013230	0.025042	0.217084	0.037841	1.183739	0.004965	0.000000	0.035934
standardize signal averages SRM								
0.000197 srm614-2	0.001209	0.000709	0.000108	0.000720	0.000102	0.000480	0.000106	0.000116
0.004685 srm612-2	0.005927	0.003371	0.000503	0.002364	0.004461	0.012525	0.005983	0.004080
0.075212 srm610-2	0.085683	0.047684	0.006945	0.033920	0.063793	0.209583	0.084393	0.042502
linest from std sig ave								
0.000000	0.062146	0.000000	0.000000	0.000000	0.000000	0.024407	0.058942	0.087254
concentration data								
0.92 SRM614-3	2.14	2.44	4.04	4.67	20.68	0.25	0.00	0.40
11.09 SRM612-3	6.84	7.37	11.36	8.47	446.77	5.26	0.00	11.76
171.41 SRM610-3	91.46	96.47	124.63	105.00	6090.87	87.36	0.00	118.38
0.15 AP1-3	2.26	2.49	2.50	1.38	0.00	0.20	0.00	0.20
1.23 AP2-3	22.81	25.22	30.12	24.60	22.25	0.52	0.00	0.32
7.70 AP3-3	156.45	161.57	167.78	162.06	167.31	1.19	0.00	1.16
14.52 AP4-3	327.08	337.91	332.69	337.62	330.77	2.10	0.00	2.04
0.14 V3-1	31.47	34.91	43.03	36.73	6.73	1.70	0.00	0.11
0.00 V3-2	29.50	33.05	38.59	34.82	0.00	1.69	0.00	0.08
0.00 V3-3	30.60	33.69	40.30	36.24	13.12	1.39	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

0.14 V3-4	38.20	42.29	55.38	48.42	25.14	4.27	0.00	0.10
0.00 V3-5	36.64	39.85	50.74	45.23	19.41	4.02	0.00	0.03
0.00 V3-6	39.59	43.19	56.38	48.31	27.27	4.32	0.00	0.07
0.32 V3-7	121.90	127.57	150.03	136.99	116.79	7.83	0.00	0.10
0.18 V3-8	123.99	128.39	145.56	135.45	108.80	7.44	0.00	0.06
0.18 V3-9	127.73	131.83	147.52	138.62	109.41	7.32	0.00	0.05
0.00 SRM614-4	0.61	0.60	0.00	0.00	0.00	0.16	0.00	0.32
10.71 SRM612-4	6.61	7.11	7.39	6.88	458.90	5.41	0.00	13.38
178.53 SRM610-4	102.98	108.35	133.96	115.16	6861.80	91.11	0.00	143.59
0.00 AP1-4	0.28	0.27	0.00	0.00	0.00	0.15	0.00	0.13
0.82 AP2-4	16.70	18.44	20.85	16.93	5.07	0.39	0.00	0.28
7.26 AP3-4	146.74	150.52	156.10	150.43	156.24	1.10	0.00	1.12
10.65 AP4-4	244.83	251.25	250.38	251.25	251.15	1.66	0.00	1.59

certified concentration								
SRM614	1.90					1.12		
SRM612	37.92					36.24	34.64	37.33
SRM610	456.30					438.10	426.30	317.40
0.14 STD AP1	1.29	0.19	0.19	0.19	0.19	0.32		0.07
2.25 STD AP2	54.67	55.86	55.86	55.86	55.86	0.63		0.38
6.94 STD AP3	153.86	159.71	159.71	159.71	159.71	1.23		1.09
12.81 STD AP4	282.34	290.12	290.12	290.12	290.12	1.77		1.84

Appendix A. Raw trace element datasheets from laser ablation.

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
992.25 blank-3	156.16	258.08	855.56	304.32	117.80	147.76	39.68
1482.13 SRM614-3	199.36	1818.57	1294.25	9041.49	6957.36	81133.18	1092.49
1531.85 SRM612-3	1017.89	45287.61	1640.01	13533.52	27980.44	128217.48	47654.39
1821.21 SRM610-3	2987.02	275152.63	3640.90	36770.65	131001.82	394003.63	281039.03
1209.37 AP1-3	154.04	1269.33	2366.53	32511.10	23477.09	345641.31	423.48
1261.05 AP2-3	282.20	1311.61	3528.54	54324.43	39321.02	630056.94	3080.02
1282.25 AP3-3	874.96	2784.54	6072.83	112257.43	80722.09	1429449.10	12805.19
1309.29 AP4-3	965.61	3075.38	6399.68	120908.05	86542.13	1543064.50	18601.66
3004.94 EVA2.5-1	154.88	3616.34	1833.89	23659.77	18525.39	252708.58	369.04
2854.66 EVA2.5-2	166.84	3991.06	1422.81	15782.29	13030.63	163963.72	262.28
3111.30 EVA2.5-3	158.92	3254.78	1626.81	20463.28	15940.89	211856.23	435.96
2379.33 EVA2.5-4	151.76	1618.09	2873.50	43282.61	31640.02	490786.72	613.28
2525.53 EVA2.5-5	152.80	1709.73	3248.78	52915.90	38807.74	622351.94	648.96
2686.38 EVA2.5-6	134.24	1678.61	3458.94	56618.04	40996.23	667539.63	709.96
1161.29 EVA2.5-7	102.88	704.68	1275.93	14847.04	10913.86	143628.33	241.96
1162.53 EVA2.5-8	139.56	643.64	1318.25	16014.01	11795.07	158832.22	247.92
1126.29 EVA2.5-9	124.20	619.88	1400.77	16950.62	12448.59	170838.28	265.20
1102.25 EVA2.5-10	118.04	546.72	1071.89	10851.42	7971.96	102227.26	144.88
1048.25 EVA2.5-11	100.56	469.12	1152.73	12376.59	9186.25	121223.96	213.72
1089.53 EVA2.5-12	120.84	507.00	1250.69	13536.20	10185.74	134186.75	208.16
1028.09 EVA2.5-13	122.64	571.76	1185.33	13238.40	9700.09	128612.16	193.92
1058.53 EVA2.5-14	121.44	492.64	1192.01	14659.96	10915.50	143653.48	178.40
1085.73 EVA2.5-15	107.20	557.76	1260.17	14527.40	10665.74	141902.88	210.84
1493.45 SRM614-4	115.96	1115.65	747.72	5286.59	4356.54	47916.79	747.64
1527.37 SRM612-4	854.32	28832.56	1000.57	8754.21	17730.06	80088.66	33963.87
1622.13 SRM610-4	2893.22	213859.33	2615.73	27037.39	99403.96	283007.44	228433.13
1093.33 AP1-4	101.36	1491.01	1604.09	21652.60	16030.57	222752.17	278.08
1142.69 AP2-4	185.16	926.49	2072.13	32513.82	23890.90	359280.47	2032.17
1079.61 AP3-4	724.20	2036.49	3958.82	70619.27	51577.85	879801.38	8987.21
1075.77 AP4-4	597.52	1588.89	3464.06	59159.33	42797.16	714433.44	10478.66
779.88 blank-4	97.92	260.24	416.16	203.84	158.20	370.04	27.48
886.07 blank average	127.04	259.16	635.86	254.08	138.00	258.90	33.58
blank subtraction							
596.06 SRM614-3	72.32	1559.41	658.38	8787.41	6819.36	80874.28	1058.91
645.78 SRM612-3	890.84	45028.45	1004.15	13279.44	27842.44	127958.58	47620.81
935.15 SRM610-3	2859.98	274893.47	3005.04	36516.57	130863.82	393744.73	281005.45
323.30 AP1-3	27.00	1010.17	1730.67	32257.02	23339.09	345382.41	389.90
374.98 AP2-3	155.16	1052.45	2892.68	54070.34	39183.02	629798.04	3046.44
396.18 AP3-3	747.92	2525.37	5436.97	112003.35	80584.09	1429190.20	12771.61
423.22 AP4-3	838.56	2816.22	5763.81	120653.97	86404.12	1542805.60	18568.08
2118.87 EVA2.5-1	27.84	3357.18	1198.03	23405.69	18387.38	252449.68	335.46
1968.59 EVA2.5-2	39.80	3731.90	786.94	15528.21	12892.63	163704.82	228.70
2225.23 EVA2.5-3	31.88	2995.62	990.95	20209.19	15802.89	211597.33	402.38
1493.27 EVA2.5-4	24.72	1358.93	2237.63	43028.52	31502.02	490527.82	579.70
1639.47 EVA2.5-5	25.76	1450.57	2612.91	52661.82	38669.74	622093.04	615.38
1800.31 EVA2.5-6	7.20	1419.45	2823.08	56363.96	40858.23	667280.73	676.38
275.22 EVA2.5-7	-24.16	445.52	640.06	14592.96	10775.86	143369.43	208.38
276.46 EVA2.5-8	12.52	384.48	682.38	15759.93	11657.07	158573.32	214.34
240.22 EVA2.5-9	-2.84	360.72	764.90	16696.53	12310.59	170579.38	231.62
216.18 EVA2.5-10	-9.00	287.56	436.02	10597.34	7833.96	101968.36	111.30
162.18 EVA2.5-11	-26.48	209.96	516.86	12122.51	9048.25	120965.06	180.14
203.46 EVA2.5-12	-6.20	247.84	614.82	13282.11	10047.74	133927.85	174.58
142.02 EVA2.5-13	-4.40	312.60	549.46	12984.31	9562.09	128353.26	160.34
172.46 EVA2.5-14	-5.60	233.48	556.14	14405.88	10777.50	143394.58	144.82
199.66 EVA2.5-15	-19.84	298.60	624.30	14273.32	10527.74	141643.98	177.26
607.38 SRM614-4	-11.08	856.48	111.86	5032.51	4218.54	47657.89	714.06
641.30 SRM612-4	727.28	28573.40	364.70	8500.13	17592.06	79829.75	33930.29
736.06 SRM610-4	2766.18	213600.17	1979.87	26783.31	99265.96	282748.54	228399.55
207.26 AP1-4	-25.68	1231.85	968.23	21398.52	15892.57	222493.27	244.50
256.62 AP2-4	58.12	667.32	1436.27	32259.74	23752.89	359021.57	1998.59
193.54 AP3-4	597.16	1777.33	3322.96	70365.19	51439.85	879542.48	8953.63
189.70 AP4-4	470.48	1329.73	2828.20	58905.25	42659.16	714174.54	10445.08
zero correction							
596.06 SRM614-3	72.32	1559.41	658.38	8787.41	6819.36	80874.28	1058.91
645.78 SRM612-3	890.84	45028.45	1004.15	13279.44	27842.44	127958.58	47620.81

Appendix A. Raw trace element datasheets from laser ablation.

935.15	SRM610-3	2859.98	274893.47	3005.04	36516.57	130863.82	393744.73	281005.45
323.30	AP1-3	27.00	1010.17	1730.67	32257.02	23339.09	345382.41	389.90
374.98	AP2-3	155.16	1052.45	2892.68	54070.34	39183.02	629798.04	3046.44
396.18	AP3-3	747.92	2525.37	5436.97	112003.35	80584.09	1429190.20	12771.61
423.22	AP4-3	838.56	2816.22	5763.81	120653.97	86404.12	1542805.60	18568.08
2118.87	EVA2.5-1	27.84	3357.18	1198.03	23405.69	18387.38	252449.68	335.46
1968.59	EVA2.5-2	39.80	3731.90	786.94	15528.21	12892.63	163704.82	228.70
2225.23	EVA2.5-3	31.88	2995.62	990.95	20209.19	15802.89	211597.33	402.38
1493.27	EVA2.5-4	24.72	1358.93	2237.63	43028.52	31502.02	490527.82	579.70
1639.47	EVA2.5-5	25.76	1450.57	2612.91	52661.82	38669.74	622093.04	615.38
1800.31	EVA2.5-6	7.20	1419.45	2823.08	56363.96	40858.23	667280.73	676.38
275.22	EVA2.5-7	0.00	445.52	640.06	14592.96	10775.86	143369.43	208.38
276.46	EVA2.5-8	12.52	384.48	682.38	15759.93	11657.07	158573.32	214.34
240.22	EVA2.5-9	0.00	360.72	764.90	16696.53	12310.59	170579.38	231.62
216.18	EVA2.5-10	0.00	287.56	436.02	10597.34	7833.96	101968.36	111.30
162.18	EVA2.5-11	0.00	209.96	516.86	12122.51	9048.25	120965.06	180.14
203.46	EVA2.5-12	0.00	247.84	614.82	13282.11	10047.74	133927.85	174.58
142.02	EVA2.5-13	0.00	312.60	549.46	12984.31	9562.09	128353.26	160.34
172.46	EVA2.5-14	0.00	233.48	556.14	14405.88	10777.50	143394.58	144.82
199.66	EVA2.5-15	0.00	298.60	624.30	14273.32	10527.74	141643.98	177.26
607.38	SRM614-4	0.00	856.48	111.86	5032.51	4218.54	47657.89	714.06
641.30	SRM612-4	727.28	28573.40	364.70	8500.13	17592.06	79829.75	33930.29
736.06	SRM610-4	2766.18	213600.17	1979.87	26783.31	99265.96	282748.54	228399.55
207.26	AP1-4	0.00	1231.85	968.23	21398.52	15892.57	222493.27	244.50
256.62	AP2-4	58.12	667.32	1436.27	32259.74	23752.89	359021.57	1998.59
193.54	AP3-4	597.16	1777.33	3322.96	70365.19	51439.85	879542.48	8953.63
189.70	AP4-4	470.48	1329.73	2828.20	58905.25	42659.16	714174.54	10445.08

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	4.94

standardized concentration							
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000146	SRM614-3	0.000018	0.000383	0.000162	0.002157	0.001674	0.019853	0.000260
0.000181	SRM612-3	0.000250	0.012636	0.000282	0.003726	0.007813	0.035908	0.013363
0.000726	SRM610-3	0.002220	0.213351	0.002332	0.028341	0.101566	0.305594	0.218095
0.000016	AP1-3	0.000001	0.000050	0.000086	0.001610	0.001165	0.017237	0.000019
0.000018	AP2-3	0.000007	0.000050	0.000138	0.002578	0.001868	0.030026	0.000145
0.000017	AP3-3	0.000032	0.000108	0.000232	0.004787	0.003444	0.061089	0.000546
0.000021	AP4-3	0.000042	0.000140	0.000286	0.005981	0.004283	0.076477	0.000920
0.000184	EVA2.5-1	0.000002	0.000291	0.000104	0.002028	0.001593	0.021869	0.000029
0.000249	EVA2.5-2	0.000005	0.000471	0.000099	0.001961	0.001628	0.020671	0.000029
0.000255	EVA2.5-3	0.000004	0.000343	0.000114	0.002317	0.001811	0.024256	0.000046
0.000102	EVA2.5-4	0.000002	0.000093	0.000154	0.002952	0.002161	0.033650	0.000040
0.000093	EVA2.5-5	0.000001	0.000082	0.000147	0.002972	0.002183	0.035113	0.000035
0.000096	EVA2.5-6	0.000000	0.000076	0.000151	0.003017	0.002187	0.035719	0.000036
0.000023	EVA2.5-7	0.000000	0.000038	0.000054	0.001235	0.000912	0.012138	0.000018
0.000022	EVA2.5-8	0.000001	0.000030	0.000053	0.001228	0.000908	0.012357	0.000017
0.000018	EVA2.5-9	0.000000	0.000027	0.000056	0.001231	0.000908	0.012580	0.000017
0.000023	EVA2.5-10	0.000000	0.000030	0.000046	0.001120	0.000828	0.010777	0.000012
0.000015	EVA2.5-11	0.000000	0.000019	0.000046	0.001090	0.000814	0.010878	0.000016
0.000017	EVA2.5-12	0.000000	0.000021	0.000052	0.001117	0.000845	0.011262	0.000015
0.000012	EVA2.5-13	0.000000	0.000027	0.000047	0.001116	0.000822	0.011034	0.000014
0.000013	EVA2.5-14	0.000000	0.000018	0.000043	0.001113	0.000832	0.011076	0.000011

Appendix A. Raw trace element datasheets from laser ablation.

0.000016	EVA2.5-15	0.000000	0.000024	0.000049	0.001124	0.000829	0.011151	0.000014
0.000251	SRM614-4	0.000000	0.000354	0.000046	0.002083	0.001746	0.019724	0.000296
0.000283	SRM612-4	0.000321	0.012620	0.000161	0.003754	0.007770	0.035257	0.014986
0.000781	SRM610-4	0.002936	0.226677	0.002101	0.028423	0.105343	0.300058	0.242382
0.000014	AP1-4	0.000000	0.000086	0.000067	0.001488	0.001105	0.015474	0.000017
0.000018	AP2-4	0.000004	0.000046	0.000098	0.002201	0.001620	0.024490	0.000136
0.000012	AP3-4	0.000036	0.000107	0.000200	0.004231	0.003093	0.052892	0.000538
0.000014	AP4-4	0.000035	0.000100	0.000213	0.004428	0.003207	0.053692	0.000785
standardize signal averages AP								
0.000015	AP1	0.000001	0.000068	0.000077	0.001549	0.001135	0.016355	0.000018
0.000018	AP2	0.000006	0.000048	0.000118	0.002389	0.001744	0.027258	0.000141
0.000014	AP3	0.000034	0.000107	0.000216	0.004509	0.003269	0.056991	0.000542
0.000018	AP4	0.000038	0.000120	0.000249	0.005205	0.003745	0.065084	0.000853
linest from std sig ave								
4.581869		0.231763	0.005255	2.392623	0.114989	0.159083	0.009238	0.014119
standardize signal averages SRM								
0.000199	srM614-2	0.000009	0.000369	0.000104	0.002120	0.001710	0.019789	0.000278
0.000232	srM612-2	0.000286	0.012628	0.000221	0.003740	0.007791	0.035583	0.014174
0.000753	srM610-2	0.002578	0.220014	0.002217	0.028382	0.103455	0.302826	0.230238
linest from std sig ave								
0.000000		0.487086	0.022868	2.635244	0.205119	0.056454	0.019260	0.022817
concentration data								
57.50	SRM614-3	0.35	0.17	33.16	21.27	22.84	15.73	0.31
71.21	SRM612-3	4.97	5.69	57.82	36.75	106.60	28.45	16.18
285.20	SRM610-3	44.12	96.15	478.58	279.50	1385.71	242.11	264.09
29.49	AP1-3	0.12	0.11	82.44	73.85	73.92	63.52	0.11
32.68	AP2-3	0.68	0.11	131.64	118.25	118.56	110.66	0.82
30.95	AP3-3	2.96	0.23	221.82	219.62	218.60	225.13	3.07
38.35	AP4-3	3.84	0.29	272.72	274.36	271.82	281.85	5.18
335.51	EVA2.5-1	0.22	0.61	99.06	93.01	101.09	80.59	0.16
454.37	EVA2.5-2	0.46	0.99	94.85	89.95	103.32	76.18	0.16
466.25	EVA2.5-3	0.34	0.72	108.42	106.27	114.96	89.39	0.26
187.24	EVA2.5-4	0.16	0.20	146.52	135.41	137.15	124.01	0.22
169.15	EVA2.5-5	0.13	0.17	140.77	136.36	138.52	129.41	0.20
176.15	EVA2.5-6	0.04	0.16	144.24	138.41	138.80	131.64	0.20
42.59	EVA2.5-7	0.00	0.08	51.72	56.67	57.90	44.73	0.10
39.38	EVA2.5-8	0.09	0.06	50.76	56.34	57.65	45.54	0.09
32.38	EVA2.5-9	0.00	0.06	53.84	56.49	57.62	46.36	0.10
41.76	EVA2.5-10	0.00	0.06	43.99	51.38	52.55	39.72	0.07
26.66	EVA2.5-11	0.00	0.04	44.37	50.01	51.64	40.09	0.09
31.27	EVA2.5-12	0.00	0.04	49.35	51.24	53.62	41.50	0.08
22.32	EVA2.5-13	0.00	0.06	45.09	51.20	52.17	40.66	0.08
24.35	EVA2.5-14	0.00	0.04	41.00	51.04	52.83	40.82	0.06
28.73	EVA2.5-15	0.00	0.05	46.91	51.55	52.60	41.09	0.08
98.78	SRM614-4	0.00	0.16	9.50	20.54	23.82	15.63	0.36
111.30	SRM612-4	6.38	5.69	33.05	37.02	106.00	27.93	18.15
306.95	SRM610-4	58.35	102.16	431.14	280.30	1437.24	237.73	293.50
26.35	AP1-4	0.00	0.18	64.27	68.27	70.15	57.03	0.10
32.00	AP2-4	0.37	0.10	93.52	100.95	102.83	90.25	0.77
21.27	AP3-4	3.32	0.22	190.74	194.11	196.32	194.93	3.03
26.07	AP4-4	3.27	0.21	202.95	203.15	203.54	197.87	4.42
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								

Appendix A. Raw trace element datasheets from laser ablation.

799.92	blank-5	122.92	257.04	797.24	321.88	126.00	142.76	39.56
1255.69	SRM614-5	167.76	1193.53	1080.41	6342.00	4979.27	55774.75	856.32
1497.65	SRM612-5	827.80	36485.00	1416.21	11176.58	22790.33	105023.75	40015.02
1671.65	SRM610-5	2921.74	261428.23	3475.74	34720.52	123006.41	368206.03	263698.56
1069.57	AP1-5	127.20	1247.53	1993.05	26471.75	19612.75	275696.91	332.84
1154.09	AP2-5	230.12	1136.25	2639.29	40163.71	29258.69	447365.88	2366.57
1152.85	AP3-5	548.92	1941.13	4526.87	79061.32	57055.60	971022.94	9717.17
1165.81	AP4-5	673.40	2105.57	4684.19	81779.66	59673.82	1025572.00	13632.84
1601.81	EVA3-1	150.32	1858.97	2943.06	45725.66	33751.15	520533.53	941.97
1516.73	EVA3-2	147.80	1403.41	2796.86	44320.17	32368.06	502466.91	753.08
1491.45	EVA3-3	138.00	1661.69	2358.85	35359.12	25891.95	387782.19	593.76
1386.01	SRM614-6	138.36	890.13	680.52	3705.90	2969.90	32150.86	526.56
1558.85	SRM612-6	804.12	26368.87	1056.73	8278.09	16792.65	76434.79	32049.86
1709.05	SRM610-6	3150.54	220729.81	2889.26	29335.89	104323.47	309610.53	242175.09
1069.13	AP1-6	93.24	1401.81	1606.49	20737.60	15580.17	214984.28	270.12
1111.57	AP2-6	188.80	1056.73	2225.49	33961.27	24758.70	374012.13	1953.61
1077.61	AP3-6	697.32	2127.49	4218.90	73952.02	53960.70	922291.63	8993.05
972.41	AP4-6	774.56	2312.57	4269.70	76916.95	55982.48	966103.69	12555.55
863.24	blank-6	103.36	369.00	493.28	204.00	166.72	344.20	41.72
831.58	blank average	113.14	313.02	645.26	262.94	146.36	243.48	40.64

blank subtraction								
424.10	SRM614-5	54.62	880.50	435.14	6079.05	4832.91	55531.27	815.68
666.06	SRM612-5	714.66	36171.98	770.94	10913.64	22643.97	104780.27	39974.38
840.06	SRM610-5	2808.60	261115.21	2830.48	34457.57	122860.05	367962.55	263657.92
237.98	AP1-5	14.06	934.51	1347.79	26208.81	19466.39	275453.43	292.20
322.50	AP2-5	116.98	823.22	1994.03	39900.77	29112.33	447122.40	2325.93
321.26	AP3-5	435.78	1628.11	3881.60	78798.38	56909.24	970779.46	9676.53
334.22	AP4-5	560.26	1792.55	4038.92	81516.72	59527.46	1025328.52	13592.20
770.22	EVA3-1	37.18	1545.95	2297.79	45462.71	33604.79	520290.05	901.33
685.14	EVA3-2	34.66	1090.39	2151.59	44057.23	32221.70	502223.43	712.44
659.86	EVA3-3	24.86	1348.67	1713.59	35096.18	25745.58	387538.71	553.12
554.42	SRM614-6	25.22	577.10	35.26	3442.96	2823.54	31907.38	485.92
727.26	SRM612-6	690.98	26055.85	411.46	8015.15	16646.29	76191.31	32009.22
877.47	SRM610-6	3037.40	220416.79	2243.99	29072.94	104177.11	309367.05	242134.45
237.54	AP1-6	-19.90	1088.79	961.23	20474.66	15433.81	214740.80	229.48
279.98	AP2-6	75.66	743.70	1580.23	33698.33	24612.34	373768.65	1912.97
246.02	AP3-6	584.18	1814.47	3573.64	73689.07	53814.34	922048.15	8952.41
140.82	AP4-6	661.42	1999.55	3624.44	76654.01	55836.12	965860.21	12514.91

zero correction								
424.10	SRM614-5	54.62	880.50	435.14	6079.05	4832.91	55531.27	815.68
666.06	SRM612-5	714.66	36171.98	770.94	10913.64	22643.97	104780.27	39974.38
840.06	SRM610-5	2808.60	261115.21	2830.48	34457.57	122860.05	367962.55	263657.92
237.98	AP1-5	14.06	934.51	1347.79	26208.81	19466.39	275453.43	292.20
322.50	AP2-5	116.98	823.22	1994.03	39900.77	29112.33	447122.40	2325.93
321.26	AP3-5	435.78	1628.11	3881.60	78798.38	56909.24	970779.46	9676.53
334.22	AP4-5	560.26	1792.55	4038.92	81516.72	59527.46	1025328.52	13592.20
770.22	EVA3-1	37.18	1545.95	2297.79	45462.71	33604.79	520290.05	901.33
685.14	EVA3-2	34.66	1090.39	2151.59	44057.23	32221.70	502223.43	712.44
659.86	EVA3-3	24.86	1348.67	1713.59	35096.18	25745.58	387538.71	553.12
554.42	SRM614-6	25.22	577.10	35.26	3442.96	2823.54	31907.38	485.92
727.26	SRM612-6	690.98	26055.85	411.46	8015.15	16646.29	76191.31	32009.22
877.47	SRM610-6	3037.40	220416.79	2243.99	29072.94	104177.11	309367.05	242134.45
237.54	AP1-6	0.00	1088.79	961.23	20474.66	15433.81	214740.80	229.48
279.98	AP2-6	75.66	743.70	1580.23	33698.33	24612.34	373768.65	1912.97
246.02	AP3-6	584.18	1814.47	3573.64	73689.07	53814.34	922048.15	8952.41
140.82	AP4-6	661.42	1999.55	3624.44	76654.01	55836.12	965860.21	12514.91

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
	32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
	33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
	25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
	27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
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Appendix A. Raw trace element datasheets from laser ablation.

0.000153	SRM614-5	0.000020	0.000318	0.000157	0.002195	0.001745	0.020049	0.000295
0.000227	SRM612-5	0.000244	0.012344	0.000263	0.003724	0.007728	0.035758	0.013642
0.000700	SRM610-5	0.002341	0.217638	0.002359	0.028720	0.102403	0.306695	0.219758
0.000014	AP1-5	0.000001	0.000055	0.000080	0.001548	0.001149	0.016265	0.000017
0.000019	AP2-5	0.000007	0.000049	0.000119	0.002384	0.001739	0.026712	0.000139
0.000016	AP3-5	0.000021	0.000080	0.000190	0.003866	0.002792	0.047634	0.000475
0.000019	AP4-5	0.000031	0.000100	0.000225	0.004545	0.003319	0.057172	0.000758
0.000042	EVA3-1	0.000002	0.000084	0.000124	0.002462	0.001820	0.028176	0.000049
0.000040	EVA3-2	0.000002	0.000064	0.000127	0.002603	0.001904	0.029672	0.000042
0.000044	EVA3-3	0.000002	0.000089	0.000114	0.002325	0.001706	0.025679	0.000037
0.000343	SRM614-6	0.000016	0.000357	0.000022	0.002131	0.001748	0.019748	0.000301
0.000324	SRM612-6	0.000308	0.011616	0.000183	0.003573	0.007421	0.033966	0.014270
0.000824	SRM610-6	0.002853	0.207023	0.002108	0.027306	0.097847	0.290568	0.227421
0.000017	AP1-6	0.000000	0.000077	0.000068	0.001439	0.001085	0.015090	0.000016
0.000019	AP2-6	0.000005	0.000050	0.000106	0.002266	0.001655	0.025135	0.000129
0.000014	AP3-6	0.000032	0.000101	0.000198	0.004085	0.002983	0.051110	0.000496
0.000009	AP4-6	0.000043	0.000130	0.000235	0.004969	0.003619	0.062609	0.000811
standardize signal averages AP								
0.000015	AP1	0.000000	0.000066	0.000074	0.001493	0.001117	0.015678	0.000017
0.000019	AP2	0.000006	0.000050	0.000113	0.002325	0.001697	0.025923	0.000134
0.000015	AP3	0.000027	0.000090	0.000194	0.003976	0.002888	0.049372	0.000486
0.000014	AP4	0.000037	0.000115	0.000230	0.004757	0.003469	0.059890	0.000785
linest from std sig ave								
4.711882		0.262185	0.005681	2.606294	0.126624	0.173722	0.010253	0.015462
standardize signal averages SRM								
0.000248	srM614-2	0.000018	0.000338	0.000089	0.002163	0.001746	0.019899	0.000298
0.000276	srM612-2	0.000276	0.011980	0.000223	0.003649	0.007574	0.034862	0.013956
0.000762	srM610-2	0.002597	0.212330	0.002233	0.028013	0.100125	0.298631	0.223589
linest from std sig ave								
0.000000		0.483924	0.023696	2.615466	0.207822	0.058334	0.019530	0.023495
concentration data								
61.88	SRM614-5	0.44	0.15	35.12	23.83	26.00	17.63	0.39
91.85	SRM612-5	5.48	6.01	58.81	40.45	115.13	31.44	18.09
282.95	SRM610-5	52.64	106.04	527.33	311.89	1525.70	269.68	291.40
26.42	AP1-5	0.09	0.13	82.75	78.18	79.66	66.53	0.11
36.22	AP2-5	0.73	0.11	123.86	120.41	120.53	109.26	0.86
29.63	AP3-5	2.24	0.18	198.03	195.31	193.52	194.83	2.93
35.03	AP4-5	3.27	0.23	234.16	229.61	230.03	233.84	4.67
78.41	EVA3-1	0.21	0.19	129.38	124.37	126.12	115.25	0.30
76.09	EVA3-2	0.21	0.15	132.17	131.49	131.94	121.37	0.26
82.19	EVA3-3	0.17	0.20	118.06	117.47	118.23	105.03	0.23
138.67	SRM614-6	0.35	0.17	4.88	23.14	26.04	17.36	0.40
131.02	SRM612-6	6.93	5.66	41.00	38.80	110.56	29.87	18.92
333.04	SRM610-6	64.15	100.87	471.11	296.54	1457.81	255.50	301.57
31.38	AP1-6	0.00	0.17	70.23	72.68	75.16	61.72	0.10
35.39	AP2-6	0.53	0.11	110.49	114.47	114.71	102.81	0.79
25.63	AP3-6	3.39	0.23	205.96	206.34	206.73	209.05	3.06
17.16	AP4-6	4.48	0.29	244.28	251.00	250.84	256.08	5.00
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br								
	raw data	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
361.88	blank-3	79.96	198.72	199.36	127.88	100.84	89.16	50.08
1143.81	SRM614-3	108.00	695.16	570.72	3118.10	2407.01	26563.63	426.56
1122.41	SRM612-3	119.28	559.88	458.56	2449.37	1915.53	19945.07	349.88
1231.73	SRM610-3	1488.77	111747.87	2019.29	17105.74	55730.36	160407.91	126608.27
1002.21	AP1-3	97.24	1499.77	1696.77	21688.36	16034.21	211045.42	335.08
968.85	AP2-3	242.48	1189.45	2625.85	42354.24	30713.93	446443.88	2527.69
998.25	AP3-3	1192.69	1767.77	4791.59	83440.63	60491.82	959862.44	11086.86
999.41	AP4-3	1885.05	4109.62	6808.12	126574.52	92037.76	1501519.10	19848.67
1662.85	MZ5-1	137.68	3353.06	4095.74	71896.60	53059.38	808145.75	915.65
1415.93	MZ5-2	138.00	2540.85	3922.42	68265.95	49913.56	762220.25	773.76
1761.21	MZ5-3	125.44	3425.46	3802.22	65037.29	48206.11	724499.13	742.28
1250.77	MZ5-4	109.04	1656.37	1969.37	30152.01	22212.40	302333.25	403.44
1072.25	MZ5-5	112.00	1415.17	2168.37	32941.34	24039.34	338933.81	448.76

Appendix A. Raw trace element datasheets from laser ablation.

1432.93	MZ5-6	98.00	1954.01	2380.97	34796.32	26018.55	361883.38	386.64
1655.77	MZ5-7	102.28	2647.73	3050.06	50265.76	37245.69	542357.38	605.32
1432.61	MZ5-8	123.72	2176.65	3314.78	55576.63	41004.55	610916.31	689.36
1436.01	MZ5-9	102.20	2230.81	3173.54	52732.66	38581.50	574495.69	591.72
1298.21	MZ5-10	112.68	2994.22	3578.02	60351.70	44988.49	668629.25	841.64
1291.73	MZ5-11	135.76	2437.89	3916.98	67794.95	50037.00	764837.38	802.96
1324.17	MZ5-12	124.32	2051.33	3711.42	62432.83	46076.18	694668.25	651.64
1326.45	MZ5-13	117.88	3210.54	3115.18	54090.39	40148.47	588910.25	651.76
1392.65	MZ5-14	139.32	3230.74	3369.42	56945.36	41805.91	626237.88	808.84
1387.33	MZ5-15	165.36	4133.14	3619.38	60901.46	45368.50	676370.50	846.68
1067.65	MZ5-16	108.60	1395.05	3696.34	64345.08	46505.98	725488.19	742.24
1035.73	MZ5-17	151.44	1535.05	3938.78	67400.54	48955.59	762161.88	788.12
1013.25	MZ5-18	151.00	1232.53	3993.66	70090.16	50671.32	792257.56	820.28
862.16	SRM614-4	95.76	512.84	514.52	1749.09	1438.57	15148.13	278.04
1028.85	SRM612-4	451.16	13449.68	629.84	3334.30	7729.28	27696.32	10919.22
1154.17	SRM610-4	1507.85	115700.41	1473.61	13653.76	53911.66	128437.64	100231.96
868.04	AP1-4	89.28	1080.81	1268.73	15038.17	10939.30	140429.88	202.52
868.40	AP2-4	169.44	760.64	1777.73	25359.82	18627.74	254728.80	1594.25
839.32	AP3-4	705.92	1066.65	2999.06	48600.59	35173.44	534817.44	6544.00
745.60	AP4-4	960.61	1921.01	3973.50	69611.31	50935.13	802593.63	11343.14
691.24	blank-4	71.92	210.08	426.80	214.84	158.16	779.72	28.68
526.56	blank average	75.94	204.40	313.08	171.36	129.50	434.44	39.38

blank subtraction								
617.24	SRM614-3	32.06	490.76	257.64	2946.74	2277.51	26129.19	387.18
595.84	SRM612-3	43.34	355.48	145.48	2278.01	1786.03	19510.63	310.50
705.16	SRM610-3	1412.83	111543.47	1706.21	16934.38	55600.85	159973.47	126568.89
475.64	AP1-3	21.30	1295.37	1383.69	21517.00	15904.71	210610.98	295.70
442.28	AP2-3	166.54	985.05	2312.77	42182.88	30584.43	446009.44	2488.31
471.68	AP3-3	1116.75	1563.37	4478.51	83269.27	60362.32	959428.00	11047.48
472.84	AP4-3	1809.11	3905.22	6495.04	126403.16	91908.26	1501084.66	19809.29
1136.29	MZ5-1	61.74	3148.66	3782.66	71725.24	52929.87	807711.31	876.26
889.37	MZ5-2	62.06	2336.45	3609.34	68094.58	49784.06	761785.81	734.38
1234.65	MZ5-3	49.50	3221.06	3489.14	64865.93	48076.61	724064.69	702.90
724.20	MZ5-4	33.10	1451.97	1656.29	29980.65	22082.90	301898.81	364.06
545.68	MZ5-5	36.06	1210.77	1855.29	32769.98	23909.84	338499.37	409.38
906.37	MZ5-6	22.06	1749.61	2067.89	34624.96	25889.05	361448.94	347.26
1129.21	MZ5-7	26.34	2443.33	2736.98	50094.40	37116.19	541922.94	565.94
906.05	MZ5-8	47.78	1972.25	3001.70	55405.27	40875.05	610481.87	649.98
909.45	MZ5-9	26.26	2026.41	2860.46	52561.30	38452.00	574061.25	552.34
771.64	MZ5-10	36.74	2789.82	3264.94	60180.34	44858.99	668194.81	802.26
765.16	MZ5-11	59.82	2233.49	3603.90	67623.58	49907.50	764402.94	763.58
797.60	MZ5-12	48.38	1846.93	3398.34	62261.47	45946.68	694233.81	612.26
799.88	MZ5-13	41.94	3006.14	2802.10	53919.03	40018.96	588475.81	612.38
866.08	MZ5-14	63.38	3026.34	3056.34	56774.00	41676.41	625803.44	769.46
860.76	MZ5-15	89.42	3928.74	3306.30	60730.10	45239.00	675936.06	807.30
541.08	MZ5-16	32.66	1190.65	3383.26	64173.72	46376.48	725053.75	702.86
509.16	MZ5-17	75.50	1330.65	3625.70	67229.18	48826.09	761727.44	748.74
486.68	MZ5-18	75.06	1028.13	3680.58	69918.80	50541.82	791823.12	780.90
335.60	SRM614-4	19.82	308.44	201.44	1577.73	1309.07	14713.68	238.66
502.28	SRM612-4	375.22	13245.27	316.76	3162.94	7599.78	27261.87	10879.84
627.60	SRM610-4	1431.91	115496.01	1160.53	13482.40	53782.16	128003.20	100192.58
341.48	AP1-4	13.34	876.41	955.65	14866.80	10809.80	139995.44	163.14
341.84	AP2-4	93.50	556.24	1464.65	25188.46	18498.24	254294.36	1554.87
312.76	AP3-4	629.98	862.24	2685.98	48429.23	35043.94	534383.00	6504.62
219.04	AP4-4	884.66	1716.61	3660.42	69439.95	50805.62	802159.19	11303.76

zero correction								
617.24	SRM614-3	32.06	490.76	257.64	2946.74	2277.51	26129.19	387.18
595.84	SRM612-3	43.34	355.48	145.48	2278.01	1786.03	19510.63	310.50
705.16	SRM610-3	1412.83	111543.47	1706.21	16934.38	55600.85	159973.47	126568.89
475.64	AP1-3	21.30	1295.37	1383.69	21517.00	15904.71	210610.98	295.70
442.28	AP2-3	166.54	985.05	2312.77	42182.88	30584.43	446009.44	2488.31
471.68	AP3-3	1116.75	1563.37	4478.51	83269.27	60362.32	959428.00	11047.48
472.84	AP4-3	1809.11	3905.22	6495.04	126403.16	91908.26	1501084.66	19809.29
1136.29	MZ5-1	61.74	3148.66	3782.66	71725.24	52929.87	807711.31	876.26
889.37	MZ5-2	62.06	2336.45	3609.34	68094.58	49784.06	761785.81	734.38
1234.65	MZ5-3	49.50	3221.06	3489.14	64865.93	48076.61	724064.69	702.90
724.20	MZ5-4	33.10	1451.97	1656.29	29980.65	22082.90	301898.81	364.06
545.68	MZ5-5	36.06	1210.77	1855.29	32769.98	23909.84	338499.37	409.38
906.37	MZ5-6	22.06	1749.61	2067.89	34624.96	25889.05	361448.94	347.26
1129.21	MZ5-7	26.34	2443.33	2736.98	50094.40	37116.19	541922.94	565.94
906.05	MZ5-8	47.78	1972.25	3001.70	55405.27	40875.05	610481.87	649.98
909.45	MZ5-9	26.26	2026.41	2860.46	52561.30	38452.00	574061.25	552.34
771.64	MZ5-10	36.74	2789.82	3264.94	60180.34	44858.99	668194.81	802.26
765.16	MZ5-11	59.82	2233.49	3603.90	67623.58	49907.50	764402.94	763.58
797.60	MZ5-12	48.38	1846.93	3398.34	62261.47	45946.68	694233.81	612.26
799.88	MZ5-13	41.94	3006.14	2802.10	53919.03	40018.96	588475.81	612.38

Appendix A. Raw trace element datasheets from laser ablation.

866.08	MZ5-14	63.38	3026.34	3056.34	56774.00	41676.41	625803.44	769.46
860.76	MZ5-15	89.42	3928.74	3306.30	60730.10	45239.00	675936.06	807.30
541.08	MZ5-16	32.66	1190.65	3383.26	64173.72	46376.48	725053.75	702.86
509.16	MZ5-17	75.50	1330.65	3625.70	67229.18	48826.09	761727.44	748.74
486.68	MZ5-18	75.06	1028.13	3680.58	69918.80	50541.82	791823.12	780.90
335.60	SRM614-4	19.82	308.44	201.44	1577.73	1309.07	14713.68	238.66
502.28	SRM612-4	375.22	13245.27	316.76	3162.94	7599.78	27261.87	10879.84
627.60	SRM610-4	1431.91	115496.01	1160.53	13482.40	53782.16	128003.20	100192.58
341.48	AP1-4	13.34	876.41	955.65	14866.80	10809.80	139995.44	163.14
341.84	AP2-4	93.50	556.24	1464.65	25188.46	18498.24	254294.36	1554.87
312.76	AP3-4	629.98	862.24	2685.98	48429.23	35043.94	534383.00	6504.62
219.04	AP4-4	884.66	1716.61	3660.42	69439.95	50805.62	802159.19	11303.76
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
	32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
	33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
	25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
	27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000526	SRM614-3	0.000027	0.000418	0.000219	0.002510	0.001940	0.022252	0.000330
0.000693	SRM612-3	0.000050	0.000414	0.000169	0.002651	0.002079	0.022706	0.000361
0.001415	SRM610-3	0.002835	0.223831	0.003424	0.033982	0.111573	0.321014	0.253982
0.000036	AP1-3	0.000002	0.000099	0.000105	0.001640	0.001213	0.016056	0.000023
0.000030	AP2-3	0.000011	0.000068	0.000159	0.002905	0.002106	0.030714	0.000171
0.000032	AP3-3	0.000075	0.000105	0.000302	0.005608	0.004066	0.064620	0.000744
0.000029	AP4-3	0.000111	0.000239	0.000398	0.007747	0.005633	0.091999	0.001214
0.000090	MZ5-1	0.000005	0.000248	0.000298	0.005650	0.004170	0.063630	0.000069
0.000065	MZ5-2	0.000005	0.000170	0.000263	0.004969	0.003633	0.055588	0.000054
0.000105	MZ5-3	0.000004	0.000275	0.000298	0.005538	0.004105	0.061822	0.000060
0.000086	MZ5-4	0.000004	0.000172	0.000196	0.003547	0.002613	0.035718	0.000043
0.000059	MZ5-5	0.000004	0.000130	0.000199	0.003518	0.002567	0.036336	0.000044
0.000091	MZ5-6	0.000002	0.000176	0.000207	0.003473	0.002597	0.036259	0.000035
0.000077	MZ5-7	0.000002	0.000167	0.000187	0.003424	0.002537	0.037040	0.000039
0.000057	MZ5-8	0.000003	0.000124	0.000189	0.003485	0.002571	0.038396	0.000041
0.000061	MZ5-9	0.000002	0.000135	0.000190	0.003499	0.002560	0.038219	0.000037
0.000047	MZ5-10	0.000002	0.000169	0.000198	0.003643	0.002715	0.040443	0.000049
0.000041	MZ5-11	0.000003	0.000121	0.000195	0.003661	0.002702	0.041378	0.000041
0.000047	MZ5-12	0.000003	0.000110	0.000202	0.003700	0.002731	0.041259	0.000036
0.000063	MZ5-13	0.000003	0.000235	0.000219	0.004222	0.003133	0.046077	0.000048
0.000064	MZ5-14	0.000005	0.000224	0.000226	0.004196	0.003080	0.046256	0.000057
0.000060	MZ5-15	0.000006	0.000276	0.000232	0.004261	0.003174	0.047430	0.000057
0.000037	MZ5-16	0.000002	0.000082	0.000233	0.004411	0.003188	0.049838	0.000048
0.000033	MZ5-17	0.000005	0.000087	0.000238	0.004407	0.003201	0.049936	0.000049
0.000031	MZ5-18	0.000005	0.000065	0.000234	0.004440	0.003210	0.050283	0.000050
0.000506	SRM614-4	0.000030	0.000465	0.000304	0.002378	0.001973	0.022179	0.000360
0.000708	SRM612-4	0.000529	0.018663	0.000446	0.004457	0.010708	0.038413	0.015330
0.001394	SRM610-4	0.003180	0.256457	0.002577	0.029937	0.119422	0.284229	0.222476
0.000036	AP1-4	0.000001	0.000093	0.000102	0.001586	0.001153	0.014933	0.000017
0.000034	AP2-4	0.000009	0.000055	0.000145	0.002499	0.001835	0.025231	0.000154
0.000029	AP3-4	0.000058	0.000079	0.000247	0.004461	0.003228	0.049220	0.000599
0.000020	AP4-4	0.000079	0.000153	0.000327	0.006202	0.004538	0.071644	0.001010
standardize signal averages AP								
0.000036	AP1	0.000002	0.000096	0.000104	0.001613	0.001183	0.015495	0.000020
0.000032	AP2	0.000010	0.000062	0.000152	0.002702	0.001971	0.027972	0.000163
0.000030	AP3	0.000067	0.000092	0.000275	0.005035	0.003647	0.056920	0.000672
0.000024	AP4	0.000095	0.000196	0.000362	0.006974	0.005085	0.081821	0.001112
linest from std sig ave								
2.399480		0.103926	0.004100	1.744462	0.092777	0.127481	0.008043	0.011012
standardize signal averages SRM								
0.000516	srm614-2	0.000029	0.000441	0.000262	0.002444	0.001956	0.022215	0.000345
0.000701	srm612-2	0.000290	0.009538	0.000308	0.003554	0.006393	0.030559	0.007846
0.001404	srm610-2	0.003007	0.240144	0.003000	0.031960	0.115498	0.302622	0.238229

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
0.000000	0.418699	0.020960	1.943151	0.182472	0.050547	0.019286	0.022058
concentration data							
108.17 SRM614-3	0.24	0.15	32.83	19.97	21.21	15.35	0.31
142.70 SRM612-3	0.45	0.15	25.33	21.09	22.73	15.66	0.34
291.19 SRM610-3	25.27	78.71	512.24	270.39	1219.84	221.44	239.86
34.71 AP1-3	0.07	0.16	73.41	60.71	61.67	51.52	0.10
29.15 AP2-3	0.48	0.11	110.84	107.51	107.11	98.55	0.75
30.41 AP3-3	3.12	0.17	209.92	207.58	206.76	207.35	3.27
27.74 AP4-3	4.60	0.39	277.03	286.73	286.47	295.21	5.33
85.69 MZ5-1	0.20	0.41	207.38	209.13	212.06	204.18	0.30
62.12 MZ5-2	0.19	0.28	183.29	183.91	184.75	178.37	0.24
100.91 MZ5-3	0.18	0.45	207.32	204.99	208.76	198.37	0.26
82.02 MZ5-4	0.16	0.28	136.37	131.28	132.87	114.61	0.19
56.07 MZ5-5	0.16	0.21	138.60	130.19	130.53	116.59	0.19
87.03 MZ5-6	0.09	0.29	144.36	128.56	132.08	116.35	0.15
73.88 MZ5-7	0.07	0.27	130.19	126.73	129.02	118.85	0.17
54.55 MZ5-8	0.12	0.20	131.39	128.98	130.74	123.21	0.18
57.96 MZ5-9	0.07	0.22	132.53	129.52	130.19	122.64	0.16
44.71 MZ5-10	0.09	0.28	137.53	134.82	138.08	129.78	0.21
39.65 MZ5-11	0.13	0.20	135.76	135.48	137.39	132.77	0.18
45.38 MZ5-12	0.12	0.18	140.55	136.95	138.87	132.39	0.16
59.95 MZ5-13	0.14	0.39	152.69	156.26	159.36	147.85	0.21
61.28 MZ5-14	0.19	0.37	157.22	155.32	156.66	148.43	0.25
57.82 MZ5-15	0.26	0.45	161.46	157.72	161.44	152.19	0.25
35.60 MZ5-16	0.09	0.13	161.84	163.26	162.12	159.92	0.21
31.95 MZ5-17	0.21	0.14	165.41	163.12	162.79	160.24	0.22
29.58 MZ5-18	0.20	0.11	162.66	164.33	163.23	161.35	0.22
104.10 SRM614-4	0.27	0.16	45.43	18.92	21.57	15.30	0.34
145.64 SRM612-4	4.71	6.56	66.77	35.46	117.07	26.50	14.48
286.78 SRM610-4	28.34	90.19	385.54	238.21	1305.66	196.07	210.11
34.87 AP1-4	0.06	0.15	70.94	58.69	58.64	47.92	0.08
32.47 AP2-4	0.38	0.09	101.13	92.50	93.34	80.96	0.68
27.58 AP3-4	2.41	0.13	172.17	165.10	164.15	157.94	2.63
18.73 AP4-4	3.28	0.25	227.52	229.55	230.77	229.89	4.44

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
947.41 blank-1	95.40	379.32	581.44	166.44	135.52	160.84	32.64
977.81 SRM614-1	132.64	628.24	548.24	2289.53	1826.45	18918.31	290.28
1205.97 SRM612-1	709.24	26955.31	887.08	6088.47	15060.77	53805.26	18669.51
1250.37 SRM610-1	1673.57	112561.52	1677.77	14876.04	54686.27	137970.42	99001.20
1028.61 AP1-1	86.00	1214.93	1159.81	13392.04	10095.34	125391.06	238.24
968.85 AP2-1	171.52	1158.69	1548.05	20345.04	15023.16	197726.44	1033.13
950.33 AP3-1	227.48	1038.41	1608.97	21627.60	15793.81	212824.20	2689.58
961.93 AP4-1	385.76	1261.65	2544.41	38351.54	28143.16	404522.19	6081.43
924.05 MZ4-1	93.96	737.04	2195.13	32303.50	23490.93	329393.47	379.96
998.77 MZ4-2	104.00	969.33	3135.90	51759.61	37604.97	574006.69	597.60
1034.85 MZ4-3	101.76	1372.65	4304.02	77027.44	54709.31	882696.13	1014.77
892.77 MZ4-4	72.36	1033.37	1505.85	19874.07	14620.16	192604.80	381.04
856.36 MZ4-5	80.68	915.85	1390.77	18129.82	13425.08	174739.66	330.72
818.52 MZ4-6	84.04	902.69	1372.05	17249.78	12561.55	166247.77	384.84
913.17 MZ4-7	85.20	1141.01	1135.49	14236.00	10730.22	135249.95	282.84
858.04 MZ4-8	70.16	885.45	1220.53	13668.16	10142.02	128548.45	259.44
829.48 MZ4-9	94.52	847.12	1137.13	14356.32	10728.38	137006.09	283.00
882.40 MZ4-10	88.60	945.85	1349.49	15579.09	11529.79	148295.88	256.48
869.84 MZ4-11	99.60	925.65	1550.25	19061.03	14037.44	184681.39	353.48
816.28 MZ4-12	89.92	1018.77	1626.49	22321.48	16505.73	220822.41	415.12
949.81 SRM614-2	117.08	882.32	674.48	2749.18	2228.53	23269.01	377.16
999.05 SRM612-2	575.84	20662.24	815.20	4714.39	11482.94	40930.39	15071.69
1179.65 SRM610-2	1713.81	117379.34	1628.37	14693.80	56132.76	139420.31	103849.98
928.21 AP1-2	73.92	1036.17	962.17	8862.49	6983.80	83181.51	128.32
900.73 AP2-2	132.64	807.84	1336.85	16686.57	12565.35	161866.31	896.77
823.60 AP3-2	276.68	935.89	1577.77	22246.37	16708.73	226532.16	2897.38
847.08 AP4-2	356.68	1107.85	2260.93	35043.60	25392.62	364365.44	5757.63
673.04 blank-2	77.24	308.52	454.40	169.44	174.52	369.12	25.00
810.22 blank average	86.32	343.92	517.92	167.94	155.02	264.98	28.82

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction							
167.58 SRM614-1	46.32	284.32	30.32	2121.59	1671.43	18653.33	261.46
395.74 SRM612-1	622.92	26611.39	369.16	5920.53	14905.74	53540.28	18640.69
440.14 SRM610-1	1587.25	112217.60	1159.85	14708.10	54531.25	137705.44	98972.37
218.38 AP1-1	-0.32	871.00	641.88	13224.09	9940.32	125126.08	209.42
158.62 AP2-1	85.20	814.76	1030.13	20177.09	14868.14	197461.46	1004.31
140.10 AP3-1	141.16	694.48	1091.05	21459.66	15638.79	212559.22	2660.76
151.70 AP4-1	299.44	917.73	2026.49	38183.59	27988.14	404257.21	6052.61
113.82 MZ4-1	7.64	393.12	1677.21	32135.56	23335.91	329128.49	351.14
188.54 MZ4-2	17.68	625.40	2617.97	51591.67	37449.95	573741.71	568.78
224.62 MZ4-3	15.44	1028.73	3786.10	76859.50	54554.29	882431.15	985.95
82.54 MZ4-4	-13.96	689.44	987.93	19706.13	14465.14	192339.82	352.22
46.14 MZ4-5	-5.64	571.92	872.84	17961.88	13270.05	174474.68	301.90
8.30 MZ4-6	-2.28	558.76	854.12	17081.84	12406.53	165982.79	356.02
102.94 MZ4-7	-1.12	797.08	617.56	14068.06	10575.20	134984.97	254.02
47.82 MZ4-8	-16.16	541.52	702.60	13500.22	9987.00	128283.47	230.62
19.26 MZ4-9	8.20	503.20	619.20	14188.38	10573.36	136741.11	254.18
72.18 MZ4-10	2.28	601.92	831.56	15411.15	11374.76	148030.90	227.66
59.62 MZ4-11	13.28	581.72	1032.33	18893.09	13882.42	184416.41	324.66
6.06 MZ4-12	3.60	674.84	1108.57	22153.54	16350.71	220557.43	386.30
139.58 SRM614-2	30.76	538.40	156.56	2581.23	2073.51	23004.03	348.34
188.82 SRM612-2	489.52	20318.31	297.28	4546.45	11327.92	40665.41	15042.86
369.42 SRM610-2	1627.49	117035.42	1110.45	14525.86	55977.74	139155.33	103821.16
117.98 AP1-2	-12.40	692.24	444.24	8694.55	6828.78	82916.53	99.50
90.50 AP2-2	46.32	463.92	818.92	16518.63	12410.33	161601.33	867.94
13.38 AP3-2	190.36	591.96	1059.85	22078.42	16553.71	226267.18	2868.56
36.86 AP4-2	270.36	763.92	1743.01	34875.66	25237.60	364100.46	5728.81

zero correction							
167.58 SRM614-1	46.32	284.32	30.32	2121.59	1671.43	18653.33	261.46
395.74 SRM612-1	622.92	26611.39	369.16	5920.53	14905.74	53540.28	18640.69
440.14 SRM610-1	1587.25	112217.60	1159.85	14708.10	54531.25	137705.44	98972.37
218.38 AP1-1	0.00	871.00	641.88	13224.09	9940.32	125126.08	209.42
158.62 AP2-1	85.20	814.76	1030.13	20177.09	14868.14	197461.46	1004.31
140.10 AP3-1	141.16	694.48	1091.05	21459.66	15638.79	212559.22	2660.76
151.70 AP4-1	299.44	917.73	2026.49	38183.59	27988.14	404257.21	6052.61
113.82 MZ4-1	7.64	393.12	1677.21	32135.56	23335.91	329128.49	351.14
188.54 MZ4-2	17.68	625.40	2617.97	51591.67	37449.95	573741.71	568.78
224.62 MZ4-3	15.44	1028.73	3786.10	76859.50	54554.29	882431.15	985.95
82.54 MZ4-4	0.00	689.44	987.93	19706.13	14465.14	192339.82	352.22
46.14 MZ4-5	0.00	571.92	872.84	17961.88	13270.05	174474.68	301.90
8.30 MZ4-6	0.00	558.76	854.12	17081.84	12406.53	165982.79	356.02
102.94 MZ4-7	0.00	797.08	617.56	14068.06	10575.20	134984.97	254.02
47.82 MZ4-8	0.00	541.52	702.60	13500.22	9987.00	128283.47	230.62
19.26 MZ4-9	8.20	503.20	619.20	14188.38	10573.36	136741.11	254.18
72.18 MZ4-10	2.28	601.92	831.56	15411.15	11374.76	148030.90	227.66
59.62 MZ4-11	13.28	581.72	1032.33	18893.09	13882.42	184416.41	324.66
6.06 MZ4-12	3.60	674.84	1108.57	22153.54	16350.71	220557.43	386.30
139.58 SRM614-2	30.76	538.40	156.56	2581.23	2073.51	23004.03	348.34
188.82 SRM612-2	489.52	20318.31	297.28	4546.45	11327.92	40665.41	15042.86
369.42 SRM610-2	1627.49	117035.42	1110.45	14525.86	55977.74	139155.33	103821.16
117.98 AP1-2	0.00	692.24	444.24	8694.55	6828.78	82916.53	99.50
90.50 AP2-2	46.32	463.92	818.92	16518.63	12410.33	161601.33	867.94
13.38 AP3-2	190.36	591.96	1059.85	22078.42	16553.71	226267.18	2868.56
36.86 AP4-2	270.36	763.92	1743.01	34875.66	25237.60	364100.46	5728.81

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal							
0.000210 SRM614-1	0.000058	0.000356	0.000038	0.002659	0.002095	0.023380	0.000328
0.000285 SRM612-1	0.000448	0.019151	0.000266	0.004261	0.010727	0.038530	0.013415

Appendix A. Raw trace element datasheets from laser ablation.

0.001007 SRM610-1	0.003632	0.256797	0.002654	0.033658	0.124788	0.315123	0.226487
0.000027 AP1-1	0.000000	0.000106	0.000078	0.001614	0.001213	0.015272	0.000026
0.000023 AP2-1	0.000013	0.000120	0.000152	0.002983	0.002198	0.029192	0.000148
0.000022 AP3-1	0.000022	0.000107	0.000169	0.003321	0.002420	0.032893	0.000412
0.000018 AP4-1	0.000035	0.000108	0.000239	0.004496	0.003296	0.047605	0.000713
0.000018 MZ4-1	0.000001	0.000062	0.000266	0.005090	0.003696	0.052128	0.000056
0.000029 MZ4-2	0.000003	0.000095	0.000399	0.007861	0.005706	0.087420	0.000087
0.000035 MZ4-3	0.000002	0.000158	0.000582	0.011821	0.008390	0.135713	0.000152
0.000013 MZ4-4	0.000000	0.000109	0.000157	0.003126	0.002295	0.030513	0.000056
0.000007 MZ4-5	0.000000	0.000093	0.000142	0.002918	0.002156	0.028344	0.000049
0.000001 MZ4-6	0.000000	0.000091	0.000139	0.002780	0.002019	0.027013	0.000058
0.000021 MZ4-7	0.000000	0.000159	0.000123	0.002803	0.002107	0.026891	0.000051
0.000010 MZ4-8	0.000000	0.000113	0.000146	0.002806	0.002076	0.026664	0.000048
0.000004 MZ4-9	0.000002	0.000101	0.000125	0.002862	0.002133	0.027579	0.000051
0.000015 MZ4-10	0.000000	0.000124	0.000171	0.003174	0.002343	0.030489	0.000047
0.000010 MZ4-11	0.000002	0.000098	0.000173	0.003172	0.002331	0.030960	0.000055
0.000001 MZ4-12	0.000001	0.000100	0.000164	0.003276	0.002418	0.032616	0.000057
0.000133 SRM614-2	0.000029	0.000514	0.000150	0.002467	0.001981	0.021982	0.000333
0.000181 SRM612-2	0.000471	0.019529	0.000286	0.004370	0.010888	0.039085	0.014458
0.000828 SRM610-2	0.003646	0.262208	0.002488	0.032544	0.125413	0.311766	0.232602
0.000021 AP1-2	0.000000	0.000121	0.000078	0.001520	0.001194	0.014498	0.000017
0.000015 AP2-2	0.000008	0.000078	0.000137	0.002771	0.002082	0.027110	0.000146
0.000002 AP3-2	0.000030	0.000092	0.000165	0.003440	0.002579	0.035256	0.000447
0.000005 AP4-2	0.000034	0.000096	0.000220	0.004394	0.003180	0.045873	0.000722
standardize signal averages AP							
0.000024 AP1	0.000000	0.000114	0.000078	0.001567	0.001204	0.014885	0.000021
0.000019 AP2	0.000010	0.000099	0.000145	0.002877	0.002140	0.028151	0.000147
0.000012 AP3	0.000026	0.000100	0.000167	0.003380	0.002500	0.034074	0.000429
0.000011 AP4	0.000035	0.000102	0.000229	0.004445	0.003238	0.046739	0.000717
linest from std sig ave							
4.230003	0.271599	0.003489	2.622068	0.132869	0.180416	0.013015	0.016981
standardize signal averages SRM							
0.000172 srm614-2	0.000044	0.000435	0.000094	0.002563	0.002038	0.022681	0.000330
0.000233 srm612-2	0.000459	0.019340	0.000276	0.004315	0.010807	0.038808	0.013937
0.000917 srm610-2	0.003639	0.259502	0.002571	0.033101	0.125101	0.313444	0.229545
linest from std sig ave							
0.000000	0.343707	0.019369	2.271028	0.175875	0.046680	0.018591	0.022887
concentration data							
76.20 SRM614-1	1.35	0.11	8.55	30.30	32.42	26.10	0.48
103.32 SRM612-1	10.44	5.73	59.74	48.55	165.98	43.01	19.54
365.40 SRM610-1	84.61	76.84	596.86	383.54	1930.86	351.73	329.85
44.98 AP1-1	0.00	0.15	81.95	85.55	87.32	79.29	0.17
39.57 AP2-1	1.36	0.17	159.30	158.11	158.21	151.57	1.01
36.59 AP3-1	2.37	0.15	176.61	176.02	174.18	170.78	2.79
30.15 AP4-1	3.82	0.15	249.63	238.34	237.22	247.17	4.83
30.42 MZ4-1	0.13	0.09	277.87	269.78	266.01	270.65	0.38
48.48 MZ4-2	0.29	0.13	417.26	416.68	410.70	453.89	0.59
58.30 MZ4-3	0.26	0.22	609.09	626.56	603.88	704.62	1.03
22.10 MZ4-4	0.00	0.15	163.94	165.71	165.17	158.43	0.38
12.65 MZ4-5	0.00	0.13	148.33	154.67	155.16	147.16	0.33
2.28 MZ4-6	0.00	0.13	145.41	147.36	145.33	140.25	0.39
34.61 MZ4-7	0.00	0.22	128.69	148.55	151.63	139.62	0.34
16.77 MZ4-8	0.00	0.16	152.76	148.74	149.41	138.44	0.32
6.56 MZ4-9	0.18	0.14	130.63	151.68	153.49	143.19	0.35
25.09 MZ4-10	0.05	0.17	179.16	168.25	168.62	158.30	0.32
16.89 MZ4-11	0.24	0.14	181.29	168.13	167.74	160.75	0.37
1.51 MZ4-12	0.06	0.14	171.48	173.65	174.03	169.34	0.39
48.39 SRM614-2	0.68	0.15	33.64	28.11	30.66	24.54	0.48
65.84 SRM612-2	10.96	5.84	64.25	49.79	168.47	43.63	21.06
300.26 SRM610-2	84.93	78.46	559.46	370.85	1940.53	347.98	338.75
34.81 AP1-2	0.00	0.17	81.25	80.58	85.94	75.28	0.12
25.62 AP2-2	0.84	0.11	143.70	146.89	149.84	140.75	0.99
3.52 AP3-2	3.21	0.13	172.74	182.35	185.65	183.05	3.03
7.84 AP4-2	3.69	0.13	229.71	232.91	228.86	238.17	4.89
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y	
raw data								
457.20	blank-3	142.44	196.76	695.24	269.40	73.44	86.72	43.60
808.88	SRM614-3	152.60	1484.29	1038.49	6603.48	5278.19	58015.25	717.56
914.53	SRM612-3	683.88	38882.26	1482.25	11631.91	23624.61	107267.37	32675.15
1161.93	SRM610-3	2578.73	267959.75	3395.14	35656.16	126860.80	369366.34	221076.36
789.04	AP1-3	137.92	2086.29	2144.13	30294.81	22518.01	314035.69	585.84
824.64	AP2-3	227.24	1911.81	3074.14	45913.14	33481.63	506598.91	2424.29
794.68	AP3-3	718.00	3339.46	5577.75	97723.11	71007.92	1188471.60	10368.14
776.52	AP4-3	911.65	3509.38	6639.12	120476.04	87378.33	1502679.50	17057.94
908.17	TGP3-1	190.24	1844.45	7263.16	135885.64	97104.43	1706467.00	1837.53
869.16	TGP3-2	166.80	1177.81	6257.88	116829.50	83423.91	1456603.00	1420.93
808.84	TGP3-3	178.52	1339.53	5648.47	102026.21	73249.06	1261442.90	1261.33
887.33	TGP3-4	184.72	1772.93	7490.68	142448.61	102138.26	1811380.50	2198.57
831.08	TGP3-5	181.76	1229.25	6786.04	130695.70	93007.64	1647398.10	1606.85
828.56	TGP3-6	198.04	1264.61	6511.68	121700.04	86557.37	1533112.50	1634.93
852.96	TGP3-7	191.16	6028.59	6109.35	115353.45	84463.12	1451976.50	6267.76
791.88	TGP3-8	153.96	2776.06	5713.03	107777.20	76851.27	1343331.80	3725.50
814.92	TGP3-9	121.68	1040.21	6501.24	120691.59	85954.56	1532421.60	2279.89
825.60	TGP3-10	161.96	2455.57	4938.95	86840.21	63275.59	1071989.50	2594.61
805.32	TGP3-11	146.76	1634.89	5116.83	91941.68	66480.34	1140820.50	1911.85
823.20	TGP3-12	150.20	1316.93	5331.43	96791.42	69652.56	1209657.30	1655.17
709.72	TGP3-13	134.00	2099.05	1658.89	24149.46	18315.26	251284.73	17082.38
696.84	TGP3-14	91.28	1137.33	1687.73	23935.62	17585.34	246419.63	8477.09
710.76	TGP3-15	142.32	2182.05	2019.77	31285.86	23321.25	331963.28	32723.86
941.05	SRM614-4	111.60	1062.21	578.72	4263.26	3397.46	37374.45	585.24
1126.01	SRM612-4	763.44	26357.75	893.65	7883.32	16135.01	71638.48	28909.20
1255.33	SRM610-4	2612.29	201700.81	2461.69	25489.66	94417.33	265068.28	201349.05
784.52	AP1-4	109.60	1230.41	1403.45	18194.86	13772.20	182259.63	238.96
786.56	AP2-4	157.28	976.45	1983.85	30629.41	22204.73	324507.88	1824.37
743.40	AP3-4	593.72	1455.21	3361.90	57618.00	41799.72	678768.44	6647.00
712.40	AP4-4	877.44	2271.13	4695.51	86601.65	62792.87	1076410.30	13571.84
504.72	blank-4	82.88	265.52	355.48	236.44	200.92	660.08	31.12
480.96	blank average	112.66	231.14	525.36	252.92	137.18	373.40	37.36
blank subtraction								
327.92	SRM614-3	39.94	1253.15	513.12	6350.56	5141.01	57641.84	680.20
433.56	SRM612-3	571.22	38651.12	956.89	11378.98	23487.43	106893.97	32637.78
680.96	SRM610-3	2466.07	267728.61	2869.78	35403.24	126723.62	368992.94	221039.00
308.08	AP1-3	25.26	1855.15	1618.77	30041.89	22380.83	313662.29	548.48
343.68	AP2-3	114.58	1680.67	2548.77	45660.22	33344.45	506225.51	2386.93
313.72	AP3-3	605.34	3108.32	5052.39	97470.19	70870.74	1188098.20	10330.78
295.56	AP4-3	798.98	3278.24	6113.75	120223.12	87241.15	1502306.10	17020.58
427.20	TGP3-1	77.58	1613.31	6737.80	135632.72	96967.25	1706093.60	1800.17
388.20	TGP3-2	54.14	946.67	5732.51	116576.58	83286.73	1456229.60	1383.57
327.88	TGP3-3	65.86	1108.39	5123.11	101773.29	73111.87	1261069.50	1223.97
406.36	TGP3-4	72.06	1541.79	6965.32	142195.69	102001.08	1811007.10	2161.21
350.12	TGP3-5	69.10	998.11	6260.68	130442.78	92870.46	1647024.70	1569.49
347.60	TGP3-6	85.38	1033.47	5986.31	121447.12	86420.19	1532739.10	1597.57
372.00	TGP3-7	78.50	5797.45	5583.99	115100.53	84325.94	1451603.10	6230.40
310.92	TGP3-8	41.30	2544.91	5187.67	107524.28	76714.09	1342958.40	3688.14
333.96	TGP3-9	9.02	809.06	5975.87	120438.67	85817.38	1532048.20	2242.53
344.64	TGP3-10	49.30	2224.43	4413.58	86587.29	63138.41	1071616.10	2557.25
324.36	TGP3-11	34.10	1403.75	4591.47	91688.76	66343.16	1140447.10	1874.49
342.24	TGP3-12	37.54	1085.79	4806.07	96538.50	69515.37	1209283.90	1617.81
228.76	TGP3-13	21.34	1867.91	1133.53	23896.53	18178.08	250911.33	17045.02
215.88	TGP3-14	-21.38	906.19	1162.37	23682.69	17448.16	246046.23	8439.73
229.80	TGP3-15	29.66	1950.91	1494.41	31032.93	23184.07	331589.88	32686.50
460.08	SRM614-4	-1.06	831.06	53.36	4010.34	3260.28	37001.05	547.88
645.04	SRM612-4	650.78	26126.61	368.28	7630.40	15997.83	71265.08	28871.84
774.36	SRM610-4	2499.63	201469.67	1936.33	25236.74	94280.15	264694.88	201311.69
303.56	AP1-4	-3.06	999.27	878.08	17941.94	13635.02	181886.23	201.60
305.60	AP2-4	44.62	745.30	1458.49	30376.49	22067.54	324134.48	1787.01
262.44	AP3-4	481.06	1224.07	2836.54	57365.08	41662.53	678395.04	6609.64
231.44	AP4-4	764.78	2039.99	4170.14	86348.73	62655.69	1076036.90	13534.48
zero correction								
327.92	SRM614-3	39.94	1253.15	513.12	6350.56	5141.01	57641.84	680.20
433.56	SRM612-3	571.22	38651.12	956.89	11378.98	23487.43	106893.97	32637.78
680.96	SRM610-3	2466.07	267728.61	2869.78	35403.24	126723.62	368992.94	221039.00
308.08	AP1-3	25.26	1855.15	1618.77	30041.89	22380.83	313662.29	548.48
343.68	AP2-3	114.58	1680.67	2548.77	45660.22	33344.45	506225.51	2386.93
313.72	AP3-3	605.34	3108.32	5052.39	97470.19	70870.74	1188098.20	10330.78
295.56	AP4-3	798.98	3278.24	6113.75	120223.12	87241.15	1502306.10	17020.58
427.20	TGP3-1	77.58	1613.31	6737.80	135632.72	96967.25	1706093.60	1800.17
388.20	TGP3-2	54.14	946.67	5732.51	116576.58	83286.73	1456229.60	1383.57
327.88	TGP3-3	65.86	1108.39	5123.11	101773.29	73111.87	1261069.50	1223.97

Appendix A. Raw trace element datasheets from laser ablation.

406.36	TGP3-4	72.06	1541.79	6965.32	142195.69	102001.08	1811007.10	2161.21
350.12	TGP3-5	69.10	998.11	6260.68	130442.78	92870.46	1647024.70	1569.49
347.60	TGP3-6	85.38	1033.47	5986.31	121447.12	86420.19	1532739.10	1597.57
372.00	TGP3-7	78.50	5797.45	5583.99	115100.53	84325.94	1451603.10	6230.40
310.92	TGP3-8	41.30	2544.91	5187.67	107524.28	76714.09	1342958.40	3688.14
333.96	TGP3-9	9.02	809.06	5975.87	120438.67	85817.38	1532048.20	2242.53
344.64	TGP3-10	49.30	2224.43	4413.58	86587.29	63138.41	1071616.10	2557.25
324.36	TGP3-11	34.10	1403.75	4591.47	91688.76	66343.16	1140447.10	1874.49
342.24	TGP3-12	37.54	1085.79	4806.07	96538.50	69515.37	1209283.90	1617.81
228.76	TGP3-13	21.34	1867.91	1133.53	23896.53	18178.08	250911.33	17045.02
215.88	TGP3-14	0.00	906.19	1162.37	23682.69	17448.16	246046.23	8439.73
229.80	TGP3-15	29.66	1950.91	1494.41	31032.93	23184.07	331589.88	32686.50
460.08	SRM614-4	0.00	831.06	53.36	4010.34	3260.28	37001.05	547.88
645.04	SRM612-4	650.78	26126.61	368.28	7630.40	15997.83	71265.08	28871.84
774.36	SRM610-4	2499.63	201469.67	1936.33	25236.74	94280.15	264694.88	201311.69
303.56	AP1-4	0.00	999.27	878.08	17941.94	13635.02	181886.23	201.60
305.60	AP2-4	44.62	745.30	1458.49	30376.49	22067.54	324134.48	1787.01
262.44	AP3-4	481.06	1224.07	2836.54	57365.08	41662.53	678395.04	6609.64
231.44	AP4-4	764.78	2039.99	4170.14	86348.73	62655.69	1076036.90	13534.48

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000101	SRM614-3	0.000012	0.000388	0.000159	0.001964	0.001590	0.017827	0.000210
0.000142	SRM612-3	0.000186	0.012616	0.000312	0.003714	0.007667	0.034891	0.010653
0.000500	SRM610-3	0.001812	0.196768	0.002109	0.026020	0.093136	0.271193	0.162454
0.000017	AP1-3	0.000001	0.000103	0.000090	0.001670	0.001244	0.017431	0.000030
0.000020	AP2-3	0.000007	0.000097	0.000147	0.002641	0.001929	0.029280	0.000138
0.000014	AP3-3	0.000027	0.000140	0.000227	0.004379	0.003184	0.053381	0.000464
0.000015	AP4-3	0.000041	0.000167	0.000312	0.006126	0.004446	0.076556	0.000867
0.000017	TGP3-1	0.000003	0.000063	0.000263	0.005303	0.003791	0.066705	0.000070
0.000017	TGP3-2	0.000002	0.000041	0.000247	0.005019	0.003586	0.062697	0.000060
0.000016	TGP3-3	0.000003	0.000053	0.000245	0.004867	0.003496	0.060304	0.000059
0.000016	TGP3-4	0.000003	0.000060	0.000272	0.005543	0.003976	0.070595	0.000084
0.000014	TGP3-5	0.000003	0.000041	0.000259	0.005387	0.003836	0.068023	0.000065
0.000015	TGP3-6	0.000004	0.000045	0.000261	0.005303	0.003773	0.066925	0.000070
0.000017	TGP3-7	0.000004	0.000271	0.000261	0.005371	0.003935	0.067740	0.000291
0.000015	TGP3-8	0.000002	0.000121	0.000246	0.005099	0.003638	0.063681	0.000175
0.000014	TGP3-9	0.000000	0.000034	0.000249	0.005022	0.003579	0.063889	0.000094
0.000017	TGP3-10	0.000002	0.000111	0.000221	0.004332	0.003159	0.053617	0.000128
0.000016	TGP3-11	0.000002	0.000067	0.000220	0.004384	0.003172	0.054530	0.000090
0.000016	TGP3-12	0.000002	0.000050	0.000223	0.004474	0.003222	0.056048	0.000075
0.000020	TGP3-13	0.000002	0.000166	0.000101	0.002125	0.001616	0.022312	0.001516
0.000019	TGP3-14	0.000000	0.000079	0.000101	0.002064	0.001521	0.021445	0.000736
0.000016	TGP3-15	0.000002	0.000132	0.000101	0.002102	0.001570	0.022456	0.002214
0.000234	SRM614-4	0.000000	0.000422	0.000027	0.002039	0.001657	0.018811	0.000279
0.000298	SRM612-4	0.000301	0.012069	0.000170	0.003525	0.007390	0.032919	0.013337
0.000819	SRM610-4	0.002645	0.213194	0.002049	0.026705	0.099767	0.280099	0.213027
0.000024	AP1-4	0.000000	0.000078	0.000069	0.001408	0.001070	0.014278	0.000016
0.000023	AP2-4	0.000003	0.000056	0.000110	0.002288	0.001662	0.024411	0.000135
0.000016	AP3-4	0.000029	0.000075	0.000173	0.003498	0.002541	0.041368	0.000403
0.000015	AP4-4	0.000050	0.000132	0.000271	0.005606	0.004068	0.069860	0.000879

standardize signal averages AP								
0.000020	AP1	0.000001	0.000091	0.000079	0.001539	0.001157	0.015855	0.000023
0.000021	AP2	0.000005	0.000077	0.000129	0.002464	0.001795	0.026846	0.000136
0.000015	AP3	0.000028	0.000107	0.000200	0.003939	0.002862	0.047374	0.000434
0.000015	AP4	0.000045	0.000150	0.000291	0.005866	0.004257	0.073208	0.000873

linest from std sig ave								
4.103318		0.226504	0.004244	2.225246	0.111641	0.153635	0.009128	0.014627

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
0.000168	srM614-2	0.000006	0.000405	0.000093	0.002001	0.001624	0.018319	0.000244
0.000220	srM612-2	0.000244	0.012342	0.000241	0.003619	0.007528	0.033905	0.011995
0.000660	srM610-2	0.002229	0.204981	0.002079	0.026363	0.096452	0.275646	0.187740

linest from std sig ave								
0.000000		0.563510	0.024542	2.806807	0.220677	0.060553	0.021148	0.027980

concentration data								
35.69	SRM614-3	0.24	0.14	30.29	18.81	20.95	13.96	0.26
49.80	SRM612-3	3.62	4.59	59.61	35.56	101.02	27.31	13.36
176.12	SRM610-3	35.21	71.62	402.52	249.13	1227.18	212.30	203.79
28.03	AP1-3	0.13	0.17	79.86	74.36	76.23	63.47	0.18
32.54	AP2-3	0.60	0.16	130.87	117.62	118.21	106.62	0.81
23.07	AP3-3	2.46	0.24	201.52	195.04	195.16	194.38	2.71
24.65	AP4-3	3.68	0.28	276.57	272.86	272.48	278.77	5.06
27.34	TGP3-1	0.27	0.11	233.86	236.18	232.37	242.90	0.41
27.36	TGP3-2	0.21	0.07	219.10	223.54	219.78	228.30	0.35
25.67	TGP3-3	0.28	0.09	217.48	216.76	214.28	219.59	0.34
25.93	TGP3-4	0.25	0.10	241.03	246.87	243.70	257.06	0.49
23.67	TGP3-5	0.26	0.07	229.54	239.94	235.08	247.70	0.38
24.85	TGP3-6	0.34	0.08	232.04	236.18	231.28	243.70	0.41
28.42	TGP3-7	0.33	0.46	231.33	239.22	241.19	246.67	1.70
24.13	TGP3-8	0.18	0.20	218.37	227.08	222.96	231.89	1.02
22.80	TGP3-9	0.03	0.06	221.22	223.69	219.34	232.64	0.55
28.23	TGP3-10	0.22	0.19	196.04	192.95	193.62	195.24	0.75
25.39	TGP3-11	0.15	0.11	194.89	195.26	194.42	198.57	0.52
25.97	TGP3-12	0.16	0.09	197.74	199.28	197.47	204.09	0.44
33.30	TGP3-13	0.17	0.28	89.48	94.64	99.07	81.24	8.84
30.80	TGP3-14	0.00	0.13	89.94	91.93	93.21	78.09	4.29
25.48	TGP3-15	0.18	0.22	89.84	93.60	96.23	81.77	12.92
82.31	SRM614-4	0.00	0.15	5.18	19.52	21.84	14.73	0.35
104.86	SRM612-4	5.84	4.39	32.47	33.75	97.37	25.77	16.73
288.37	SRM610-4	51.38	77.60	391.04	255.70	1314.55	219.27	267.23
39.01	AP1-4	0.00	0.13	61.19	62.73	65.60	51.99	0.09
37.67	AP2-4	0.30	0.10	97.51	101.89	101.86	88.89	0.79
26.20	AP3-4	2.65	0.13	153.55	155.79	155.71	150.64	2.35
24.60	AP4-4	4.49	0.22	240.34	249.68	249.32	254.39	5.13

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610		109.00	431.10	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y	
raw data								
434.84	blank-1	164.40	172.40	798.32	313.64	77.44	99.60	47.36
643.52	SRM614-1	156.44	1637.33	1150.41	7931.20	6237.40	69328.91	823.36
781.52	SRM612-1	759.00	44347.05	1586.17	12325.95	26694.39	113267.52	36277.40
1040.65	SRM610-1	2307.17	262831.53	3207.18	32176.34	121381.84	327004.09	210092.27
706.12	AP1-1	139.48	1905.61	2492.29	34618.79	25640.02	360110.59	437.56
765.20	AP2-1	241.36	2283.77	3168.90	47878.99	35163.64	526138.19	2579.65
748.92	AP3-1	980.93	3443.10	6554.36	118405.66	85845.09	1464209.50	12454.23
795.28	AP4-1	1071.41	3578.14	7069.00	129500.17	93523.33	1620843.60	17289.74
775.92	TGP2-1	213.88	4108.18	6485.24	118716.43	86613.69	1480117.40	1666.61
749.76	TGP2-2	192.20	2916.38	5821.07	105498.23	76472.11	1303699.10	1490.69
693.28	TGP2-3	154.32	4896.99	5895.99	103952.70	76503.63	1282603.80	1975.97
673.20	TGP2-4	133.64	2008.85	1740.45	22875.61	17288.82	237336.86	497.40
635.40	TGP2-5	144.32	972.41	1651.85	21103.20	15655.25	212508.47	391.28
660.96	TGP2-6	142.72	1039.69	1442.81	17854.58	12993.99	175195.19	324.84
613.60	TGP2-7	131.96	1954.81	1434.57	18424.34	13968.52	184435.52	567.80
643.20	TGP2-8	117.44	804.96	1404.53	17893.46	13232.04	177553.28	387.20
632.52	TGP2-9	117.96	728.80	1348.69	17754.90	13111.35	177725.77	318.72
653.88	TGP2-10	106.92	532.84	1599.01	21127.00	15539.61	214597.97	288.20
685.64	TGP2-11	127.04	634.84	2040.37	29897.97	21856.00	323427.88	499.20
618.48	TGP2-12	109.56	709.56	1543.25	21908.84	15596.85	218975.47	479.08
597.44	TGP2-13	119.00	1153.13	1945.09	28485.72	20897.88	310893.75	523.68
593.00	TGP2-14	114.28	743.20	2264.81	33945.51	24944.06	382786.81	561.48
626.56	TGP2-15	112.44	841.88	2871.38	47498.47	34459.59	552465.75	683.36
620.16	TGP2-16	133.88	1093.17	4865.55	85232.12	61094.91	1040836.50	1110.77
596.68	TGP2-17	159.60	897.09	4662.67	84168.27	60637.06	1036590.40	1038.65
660.04	TGP2-18	145.64	1185.37	4632.23	86372.81	62499.95	1065149.50	1056.01
873.04	SRM614-2	109.12	1031.93	558.00	4612.39	3694.46	41744.95	656.56
1031.85	SRM612-2	749.44	26528.39	910.97	7710.92	16219.69	70172.07	28622.16

Appendix A. Raw trace element datasheets from laser ablation.

1108.21	SRM610-2	2486.81	187311.66	2324.53	23462.93	88141.46	240452.83	185498.17
638.28	AP1-2	90.12	842.80	1487.29	21343.28	15629.01	217139.02	254.08
656.12	AP2-2	195.52	842.96	1858.49	29545.61	21211.72	311468.03	1764.93
652.28	AP3-2	968.09	2135.05	4862.15	89255.63	64327.16	1103998.50	11209.54
666.76	AP4-2	875.96	1855.97	4261.54	76878.63	55813.47	942851.13	12144.79
460.76	blank-2	71.28	238.80	379.04	185.44	151.28	553.48	32.44
447.80	blank average	117.84	205.60	588.68	249.54	114.36	326.54	39.90
blank subtraction								
195.72	SRM614-1	38.60	1431.73	561.72	7681.66	6123.03	69002.36	783.46
333.72	SRM612-1	641.16	44141.45	997.49	12076.41	26580.03	112940.98	36237.50
592.84	SRM610-1	2189.33	262625.93	2618.49	31926.80	121267.48	326677.55	210052.37
258.32	AP1-1	21.64	1700.01	1903.61	34369.25	25525.66	359784.05	397.66
317.40	AP2-1	123.52	2078.17	2580.21	47629.45	35049.28	525811.65	2539.75
301.12	AP3-1	863.08	3237.50	5965.67	118156.12	85730.73	1463882.96	12414.33
347.48	AP4-1	953.57	3372.54	6480.32	129250.63	93408.97	1620517.06	17249.84
328.12	TGP2-1	96.04	3902.58	5896.55	118466.89	86499.33	1479790.86	1626.71
301.96	TGP2-2	74.36	2710.78	5232.39	105248.69	76357.75	1303372.56	1450.79
245.48	TGP2-3	36.48	4691.39	5307.31	103703.16	76389.27	1282277.26	1936.07
225.40	TGP2-4	15.80	1803.25	1151.77	22626.07	17174.46	237010.32	457.50
187.60	TGP2-5	26.48	766.80	1063.17	20853.66	15540.89	212181.93	351.38
213.16	TGP2-6	24.88	834.08	854.12	17605.04	12879.63	174868.65	284.94
165.80	TGP2-7	14.12	1749.21	845.88	18174.80	13854.16	184108.98	527.90
195.40	TGP2-8	-0.40	599.36	815.84	17643.92	13117.67	177226.74	347.30
184.72	TGP2-9	0.12	523.20	760.00	17505.36	12996.99	177399.23	278.82
206.08	TGP2-10	-10.92	327.24	1010.33	20877.46	15425.25	214271.43	248.30
237.84	TGP2-11	9.20	429.24	1451.69	29648.43	21741.64	323101.34	459.30
170.68	TGP2-12	-8.28	503.96	954.57	21659.30	15482.49	218648.93	439.18
149.64	TGP2-13	1.16	947.53	1356.41	28236.18	20783.52	310567.21	483.78
145.20	TGP2-14	-3.56	537.60	1676.13	33695.97	24829.70	382460.27	521.58
178.76	TGP2-15	-5.40	636.28	2282.69	47248.92	34345.23	552139.21	643.46
172.36	TGP2-16	16.04	887.56	4276.86	84982.58	60980.55	1040509.96	1070.87
148.88	TGP2-17	41.76	691.48	4073.98	83918.73	60522.70	1036263.86	998.75
212.24	TGP2-18	27.80	979.77	4043.54	86123.26	62385.59	1064822.96	1016.11
425.24	SRM614-2	-8.72	826.32	-30.68	4362.84	3580.10	41418.41	616.66
584.04	SRM612-2	631.60	26322.79	322.28	7461.38	16105.33	69845.53	28582.26
660.40	SRM610-2	2368.97	187106.06	1735.85	23213.39	88027.10	240126.29	185458.27
190.48	AP1-2	-27.72	637.20	898.61	21093.74	15514.65	216812.48	214.18
208.32	AP2-2	77.68	637.36	1269.81	29296.06	21097.36	311141.49	1725.03
204.48	AP3-2	850.24	1929.45	4273.46	89006.08	64212.80	1103671.96	11169.64
218.96	AP4-2	758.12	1650.37	3672.86	76629.09	55699.11	942524.59	12104.89
zero correction								
195.72	SRM614-1	38.60	1431.73	561.72	7681.66	6123.03	69002.36	783.46
333.72	SRM612-1	641.16	44141.45	997.49	12076.41	26580.03	112940.98	36237.50
592.84	SRM610-1	2189.33	262625.93	2618.49	31926.80	121267.48	326677.55	210052.37
258.32	AP1-1	21.64	1700.01	1903.61	34369.25	25525.66	359784.05	397.66
317.40	AP2-1	123.52	2078.17	2580.21	47629.45	35049.28	525811.65	2539.75
301.12	AP3-1	863.08	3237.50	5965.67	118156.12	85730.73	1463882.96	12414.33
347.48	AP4-1	953.57	3372.54	6480.32	129250.63	93408.97	1620517.06	17249.84
328.12	TGP2-1	96.04	3902.58	5896.55	118466.89	86499.33	1479790.86	1626.71
301.96	TGP2-2	74.36	2710.78	5232.39	105248.69	76357.75	1303372.56	1450.79
245.48	TGP2-3	36.48	4691.39	5307.31	103703.16	76389.27	1282277.26	1936.07
225.40	TGP2-4	15.80	1803.25	1151.77	22626.07	17174.46	237010.32	457.50
187.60	TGP2-5	26.48	766.80	1063.17	20853.66	15540.89	212181.93	351.38
213.16	TGP2-6	24.88	834.08	854.12	17605.04	12879.63	174868.65	284.94
165.80	TGP2-7	14.12	1749.21	845.88	18174.80	13854.16	184108.98	527.90
195.40	TGP2-8	0.00	599.36	815.84	17643.92	13117.67	177226.74	347.30
184.72	TGP2-9	0.12	523.20	760.00	17505.36	12996.99	177399.23	278.82
206.08	TGP2-10	0.00	327.24	1010.33	20877.46	15425.25	214271.43	248.30
237.84	TGP2-11	9.20	429.24	1451.69	29648.43	21741.64	323101.34	459.30
170.68	TGP2-12	0.00	503.96	954.57	21659.30	15482.49	218648.93	439.18
149.64	TGP2-13	1.16	947.53	1356.41	28236.18	20783.52	310567.21	483.78
145.20	TGP2-14	0.00	537.60	1676.13	33695.97	24829.70	382460.27	521.58
178.76	TGP2-15	0.00	636.28	2282.69	47248.92	34345.23	552139.21	643.46
172.36	TGP2-16	16.04	887.56	4276.86	84982.58	60980.55	1040509.96	1070.87
148.88	TGP2-17	41.76	691.48	4073.98	83918.73	60522.70	1036263.86	998.75
212.24	TGP2-18	27.80	979.77	4043.54	86123.26	62385.59	1064822.96	1016.11
425.24	SRM614-2	0.00	826.32	0.00	4362.84	3580.10	41418.41	616.66
584.04	SRM612-2	631.60	26322.79	322.28	7461.38	16105.33	69845.53	28582.26
660.40	SRM610-2	2368.97	187106.06	1735.85	23213.39	88027.10	240126.29	185458.27
190.48	AP1-2	0.00	637.20	898.61	21093.74	15514.65	216812.48	214.18
208.32	AP2-2	77.68	637.36	1269.81	29296.06	21097.36	311141.49	1725.03
204.48	AP3-2	850.24	1929.45	4273.46	89006.08	64212.80	1103671.96	11169.64
218.96	AP4-2	758.12	1650.37	3672.86	76629.09	55699.11	942524.59	12104.89
certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77

Appendix A. Raw trace element datasheets from laser ablation.

SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal							
0.000050 SRM614-1	0.000010	0.000366	0.000144	0.001965	0.001566	0.017653	0.000200
0.000099 SRM612-1	0.000190	0.013055	0.000295	0.003572	0.007861	0.033403	0.010718
0.000534 SRM610-1	0.001974	0.236763	0.002361	0.028783	0.109325	0.294507	0.189367
0.000012 AP1-1	0.000001	0.000079	0.000089	0.001601	0.001189	0.016763	0.000019
0.000019 AP2-1	0.000008	0.000127	0.000157	0.002904	0.002137	0.032055	0.000155
0.000014 AP3-1	0.000041	0.000154	0.000284	0.005620	0.004077	0.069623	0.000590
0.000018 AP4-1	0.000048	0.000170	0.000328	0.006534	0.004722	0.081917	0.000872
0.000013 TGP2-1	0.000004	0.000152	0.000230	0.004624	0.003376	0.057755	0.000063
0.000013 TGP2-2	0.000003	0.000113	0.000218	0.004391	0.003186	0.054378	0.000061
0.000010 TGP2-3	0.000002	0.000196	0.000221	0.004325	0.003186	0.053479	0.000081
0.000021 TGP2-4	0.000001	0.000164	0.000105	0.002059	0.001563	0.021569	0.000042
0.000016 TGP2-5	0.000002	0.000066	0.000091	0.001790	0.001334	0.018213	0.000030
0.000022 TGP2-6	0.000003	0.000085	0.000087	0.001786	0.001306	0.017736	0.000029
0.000018 TGP2-7	0.000002	0.000191	0.000093	0.001989	0.001516	0.020146	0.000058
0.000020 TGP2-8	0.000000	0.000061	0.000083	0.001802	0.001340	0.018105	0.000035
0.000019 TGP2-9	0.000000	0.000053	0.000077	0.001763	0.001309	0.017863	0.000028
0.000016 TGP2-10	0.000000	0.000026	0.000079	0.001632	0.001206	0.016751	0.000019
0.000017 TGP2-11	0.000001	0.000030	0.000103	0.002101	0.001541	0.022899	0.000033
0.000013 TGP2-12	0.000000	0.000040	0.000075	0.001707	0.001220	0.017232	0.000035
0.000013 TGP2-13	0.000000	0.000080	0.000114	0.002383	0.001754	0.026214	0.000041
0.000011 TGP2-14	0.000000	0.000040	0.000125	0.002512	0.001851	0.028511	0.000039
0.000011 TGP2-15	0.000000	0.000041	0.000146	0.003017	0.002193	0.035251	0.000041
0.000008 TGP2-16	0.000001	0.000041	0.000198	0.003924	0.002816	0.048050	0.000049
0.000007 TGP2-17	0.000002	0.000032	0.000188	0.003869	0.002790	0.047775	0.000046
0.000010 TGP2-18	0.000001	0.000045	0.000185	0.003946	0.002858	0.048782	0.000047
0.000192 SRM614-2	0.000000	0.000372	0.000000	0.001967	0.001614	0.018670	0.000278
0.000275 SRM612-2	0.000298	0.012400	0.000152	0.003515	0.007587	0.032902	0.013464
0.000772 SRM610-2	0.002770	0.218801	0.002030	0.027146	0.102938	0.280802	0.216874
0.000013 AP1-2	0.000000	0.000043	0.000060	0.001418	0.001043	0.014571	0.000014
0.000018 AP2-2	0.000007	0.000054	0.000107	0.002462	0.001773	0.026150	0.000145
0.000011 AP3-2	0.000047	0.000106	0.000234	0.004876	0.003518	0.060460	0.000612
0.000015 AP4-2	0.000051	0.000110	0.000246	0.005125	0.003726	0.063042	0.000810

standardize signal averages AP							
0.000012 AP1	0.000001	0.000061	0.000075	0.001509	0.001116	0.015667	0.000016
0.000018 AP2	0.000007	0.000090	0.000132	0.002683	0.001955	0.029103	0.000150
0.000013 AP3	0.000044	0.000130	0.000259	0.005248	0.003798	0.065042	0.000601
0.000016 AP4	0.000049	0.000140	0.000287	0.005830	0.004224	0.072480	0.000841

linest from std sig ave							
4.899617	0.179967	0.004208	2.056297	0.101263	0.139745	0.008231	0.013740

standardize signal averages SRM							
0.000121 srm614-2	0.000005	0.000369	0.000072	0.001966	0.001590	0.018161	0.000239
0.000187 srm612-2	0.000244	0.012728	0.000223	0.003543	0.007724	0.033153	0.012091
0.000653 srm610-2	0.002372	0.227782	0.002195	0.027964	0.106132	0.287655	0.203120

linest from std sig ave							
0.000000	0.530218	0.022089	2.660377	0.208345	0.055024	0.020281	0.025865

concentration data							
21.04 SRM614-1	0.15	0.13	25.34	17.07	18.77	12.46	0.24
41.47 SRM612-1	2.93	4.71	52.03	31.02	94.22	23.58	12.63
224.58 SRM610-1	30.46	85.45	416.31	249.97	1310.26	207.90	223.15
23.53 AP1-1	0.07	0.13	72.76	64.69	66.30	55.05	0.10
37.82 AP2-1	0.54	0.21	129.04	117.30	119.12	105.26	0.85
27.99 AP3-1	2.95	0.26	232.75	227.02	227.31	228.62	3.24
34.33 AP4-1	3.46	0.29	268.72	263.94	263.24	269.00	4.78
25.03 TGP2-1	0.27	0.26	188.79	186.78	188.21	189.65	0.35
24.62 TGP2-2	0.22	0.19	179.08	177.39	177.60	178.57	0.33
20.01 TGP2-3	0.11	0.33	181.58	174.72	177.61	175.61	0.44

Appendix A. Raw trace element datasheets from laser ablation.

40.09	TGP2-4	0.10	0.28	85.98	83.18	87.13	70.83	0.23
31.48	TGP2-5	0.16	0.11	74.86	72.31	74.37	59.81	0.17
42.26	TGP2-6	0.18	0.14	71.07	72.13	72.83	58.24	0.16
35.46	TGP2-7	0.11	0.32	75.93	80.34	84.51	66.15	0.32
39.02	TGP2-8	0.00	0.10	68.37	72.82	74.71	59.45	0.19
36.36	TGP2-9	0.00	0.09	62.78	71.21	72.96	58.66	0.15
31.49	TGP2-10	0.00	0.04	64.79	65.93	67.23	55.01	0.11
32.95	TGP2-11	0.05	0.05	84.40	84.88	85.90	75.19	0.18
26.29	TGP2-12	0.00	0.07	61.71	68.96	68.03	56.59	0.19
24.69	TGP2-13	0.01	0.13	93.92	96.28	97.80	86.08	0.22
21.16	TGP2-14	0.00	0.07	102.50	101.47	103.19	93.62	0.21
22.31	TGP2-15	0.00	0.07	119.55	121.86	122.24	115.75	0.23
15.56	TGP2-16	0.05	0.07	162.02	158.54	156.99	157.78	0.27
13.42	TGP2-17	0.14	0.05	154.08	156.29	155.56	156.88	0.25
19.01	TGP2-18	0.09	0.08	151.96	159.39	159.33	160.19	0.26
80.55	SRM614-2	0.00	0.13	0.00	17.08	19.34	13.18	0.33
115.61	SRM612-2	4.59	4.48	26.77	30.52	90.93	23.23	15.87
324.51	SRM610-2	42.76	78.97	357.98	235.75	1233.72	198.23	255.57
25.02	AP1-2	0.00	0.07	49.54	57.27	58.13	47.85	0.08
34.22	AP2-2	0.47	0.09	87.55	99.47	98.85	85.87	0.79
21.90	AP3-2	3.34	0.18	192.04	196.97	196.11	198.54	3.35
28.63	AP4-2	3.64	0.19	201.53	207.06	207.70	207.02	4.44

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
783.24	blank-11	171.12	202.92	908.13	371.76	101.16	104.36	37.44
1224.25	SRM614-11	203.76	1877.45	1267.53	7773.72	6313.80	70645.28	952.37
1286.65	SRM612-11	810.68	42164.28	1543.09	11976.19	25128.74	110573.14	35802.76
1514.09	SRM610-11	3076.58	348826.13	3858.86	42365.84	161147.23	456341.53	273364.53
983.29	AP1-11	185.24	1942.73	2335.73	31724.02	23721.41	337330.78	540.60
1053.33	AP2-11	265.04	1890.73	3414.46	53304.86	38652.26	609966.63	2796.78
1083.01	AP3-11	943.69	2849.62	5938.31	107277.05	77244.91	1351901.60	12156.83
1017.17	AP4-11	1835.45	5424.71	10232.94	206550.48	147135.19	2672005.50	27256.43
1533.33	GCK4-1	162.44	2726.18	3516.22	57631.16	42348.80	667473.50	745.52
1500.29	GCK4-2	162.00	1618.61	3311.74	54801.23	39841.75	629054.50	646.20
1573.89	GCK4-3	151.44	1742.85	3653.26	60042.26	44044.97	704234.63	655.72
2700.58	GCK4-4	187.84	2745.94	5125.11	90923.63	66314.06	1124696.50	1010.05
2937.46	GCK4-5	180.12	2653.65	5129.83	91640.03	67217.70	1139887.50	1000.53
2786.38	GCK4-6	187.60	2783.14	5092.91	91295.39	66119.73	1125672.00	966.57
1082.13	GCK4-7	126.76	654.96	1755.29	25236.02	18173.58	264439.22	313.32
948.85	GCK4-8	129.92	494.56	1436.45	18633.63	13592.56	187676.38	248.36
1139.81	GCK4-9	123.80	913.33	2038.13	29707.21	21505.80	317635.31	344.36
837.68	GCK4-10	96.00	633.32	1644.21	23274.33	16617.13	240584.97	284.32
762.52	GCK4-11	99.72	373.00	1050.89	11448.62	8122.93	109011.17	137.80
738.84	GCK4-12	91.84	437.40	1074.17	12191.99	8815.77	117385.78	176.44
716.04	GCK4-13	122.08	696.56	1740.21	25172.22	18432.58	265257.78	334.72
817.28	GCK4-14	100.16	615.80	1813.85	26032.27	18743.82	271866.44	348.76
868.48	GCK4-15	110.92	659.52	1824.81	25756.90	18663.87	267963.78	308.88
835.72	GCK4-16	109.56	474.32	2506.53	40195.27	29119.24	445832.03	439.40
757.48	GCK4-17	103.56	464.28	2353.25	37160.61	26997.03	410131.78	425.72
832.40	GCK4-18	121.28	480.36	2348.85	36986.29	26525.87	402889.50	414.76
820.52	SRM614-11	78.84	510.80	445.20	2296.21	1782.33	19935.99	309.76
1027.89	SRM612-11	487.88	15656.81	621.96	4968.95	9877.42	44212.09	19047.47
1153.09	SRM610-11	1976.53	152079.17	1758.73	18327.46	70926.04	180688.42	136089.00
760.40	AP1-11	85.56	1243.73	1342.13	17986.14	13272.35	175748.91	244.16
835.20	AP2-11	158.64	1162.73	1950.77	29586.53	21895.96	312152.00	1804.09
746.48	AP3-11	602.76	1430.53	3088.94	54074.75	39487.06	625989.06	6695.20
768.64	AP4-11	1152.57	2441.37	4607.67	87970.45	63625.84	1081570.60	13711.00
611.48	blank-11	64.76	133.08	330.36	148.68	69.32	123.88	45.16
697.36	blank average	117.94	168.00	619.24	260.22	85.24	114.12	41.30

blank subtraction								
526.88	SRM614-11	85.82	1709.45	648.28	7513.50	6228.55	70531.16	911.07
589.28	SRM612-11	692.74	41996.28	923.85	11715.97	25043.50	110459.02	35761.46
816.72	SRM610-11	2958.64	348658.13	3239.62	42105.62	161061.99	456227.41	273323.23
285.92	AP1-11	67.30	1774.73	1716.49	31463.80	23636.17	337216.66	499.30
355.96	AP2-11	147.10	1722.73	2795.22	53044.64	38567.02	609852.51	2755.48
385.64	AP3-11	825.74	2681.62	5319.07	107016.83	77159.67	1351787.48	12115.53
319.80	AP4-11	1717.51	5256.71	9613.69	206290.26	147049.95	2671891.38	27215.13

Appendix A. Raw trace element datasheets from laser ablation.

835.96	GCK4-1	44.50	2558.17	2896.98	57370.94	42263.56	667359.38	704.22
802.92	GCK4-2	44.06	1450.61	2692.50	54541.01	39756.51	628940.38	604.90
876.53	GCK4-3	33.50	1574.85	3034.02	59782.04	43959.73	704120.51	614.42
2003.21	GCK4-4	69.90	2577.93	4505.87	90663.41	66228.81	1124582.38	968.75
2240.09	GCK4-5	62.18	2485.65	4510.59	91379.81	67132.45	1139773.38	959.23
2089.01	GCK4-6	69.66	2615.13	4473.67	91035.17	66034.49	1125557.88	925.27
384.76	GCK4-7	8.82	486.96	1136.05	24975.80	18088.34	264325.10	272.02
251.48	GCK4-8	11.98	326.56	817.20	18373.40	13507.32	187562.26	207.06
442.44	GCK4-9	5.86	745.32	1418.89	29446.99	21420.56	317521.19	303.06
140.32	GCK4-10	-21.94	465.32	1024.97	23014.11	16531.89	240470.85	243.02
65.16	GCK4-11	-18.22	205.00	431.64	11188.40	8037.69	108897.05	96.50
41.48	GCK4-12	-26.10	269.40	454.92	11931.77	8730.53	117271.66	135.14
18.68	GCK4-13	4.14	528.56	1120.97	24912.00	18347.34	265143.66	293.42
119.92	GCK4-14	-17.78	447.80	1194.61	25772.04	18658.58	271752.32	307.46
171.12	GCK4-15	-7.02	491.52	1205.57	25496.68	18578.62	267849.66	267.58
138.36	GCK4-16	-8.38	306.32	1887.29	39935.04	29034.00	445717.91	398.10
60.12	GCK4-17	-14.38	296.28	1734.01	36900.39	26911.79	410017.66	384.42
135.04	GCK4-18	3.34	312.36	1729.61	36726.07	26440.63	402775.38	373.46
123.16	SRM614-11	-39.10	342.80	-174.04	2035.99	1697.09	19821.87	268.46
330.52	SRM612-11	369.94	15488.81	2.72	4708.73	9792.17	44097.97	19006.17
455.72	SRM610-11	1858.59	151911.17	1139.49	18067.24	70840.80	180574.30	136047.70
63.04	AP1-11	-32.38	1075.73	722.88	17725.92	13187.11	175634.79	202.86
137.84	AP2-11	40.70	994.73	1331.53	29326.30	21810.72	312037.88	1762.79
49.12	AP3-11	484.82	1262.53	2469.69	53814.52	39401.82	625874.94	6653.90
71.28	AP4-11	1034.63	2273.37	3988.42	87710.23	63540.60	1081456.48	13669.70
zero correction								
526.88	SRM614-11	85.82	1709.45	648.28	7513.50	6228.55	70531.16	911.07
589.28	SRM612-11	692.74	41996.28	923.85	11715.97	25043.50	110459.02	35761.46
816.72	SRM610-11	2958.64	348658.13	3239.62	42105.62	161061.99	456227.41	273323.23
285.92	AP1-11	67.30	1774.73	1716.49	31463.80	23636.17	337216.66	499.30
355.96	AP2-11	147.10	1722.73	2795.22	53044.64	38567.02	609852.51	2755.48
385.64	AP3-11	825.74	2681.62	5319.07	107016.83	77159.67	1351787.48	12115.53
319.80	AP4-11	1717.51	5256.71	9613.69	206290.26	147049.95	2671891.38	27215.13
835.96	GCK4-1	44.50	2558.17	2896.98	57370.94	42263.56	667359.38	704.22
802.92	GCK4-2	44.06	1450.61	2692.50	54541.01	39756.51	628940.38	604.90
876.53	GCK4-3	33.50	1574.85	3034.02	59782.04	43959.73	704120.51	614.42
2003.21	GCK4-4	69.90	2577.93	4505.87	90663.41	66228.81	1124582.38	968.75
2240.09	GCK4-5	62.18	2485.65	4510.59	91379.81	67132.45	1139773.38	959.23
2089.01	GCK4-6	69.66	2615.13	4473.67	91035.17	66034.49	1125557.88	925.27
384.76	GCK4-7	8.82	486.96	1136.05	24975.80	18088.34	264325.10	272.02
251.48	GCK4-8	11.98	326.56	817.20	18373.40	13507.32	187562.26	207.06
442.44	GCK4-9	5.86	745.32	1418.89	29446.99	21420.56	317521.19	303.06
140.32	GCK4-10	0.00	465.32	1024.97	23014.11	16531.89	240470.85	243.02
65.16	GCK4-11	0.00	205.00	431.64	11188.40	8037.69	108897.05	96.50
41.48	GCK4-12	0.00	269.40	454.92	11931.77	8730.53	117271.66	135.14
18.68	GCK4-13	4.14	528.56	1120.97	24912.00	18347.34	265143.66	293.42
119.92	GCK4-14	0.00	447.80	1194.61	25772.04	18658.58	271752.32	307.46
171.12	GCK4-15	0.00	491.52	1205.57	25496.68	18578.62	267849.66	267.58
138.36	GCK4-16	0.00	306.32	1887.29	39935.04	29034.00	445717.91	398.10
60.12	GCK4-17	0.00	296.28	1734.01	36900.39	26911.79	410017.66	384.42
135.04	GCK4-18	3.34	312.36	1729.61	36726.07	26440.63	402775.38	373.46
123.16	SRM614-11	0.00	342.80	0.00	2035.99	1697.09	19821.87	268.46
330.52	SRM612-11	369.94	15488.81	2.72	4708.73	9792.17	44097.97	19006.17
455.72	SRM610-11	1858.59	151911.17	1139.49	18067.24	70840.80	180574.30	136047.70
63.04	AP1-11	0.00	1075.73	722.88	17725.92	13187.11	175634.79	202.86
137.84	AP2-11	40.70	994.73	1331.53	29326.30	21810.72	312037.88	1762.79
49.12	AP3-11	484.82	1262.53	2469.69	53814.52	39401.82	625874.94	6653.90
71.28	AP4-11	1034.63	2273.37	3988.42	87710.23	63540.60	1081456.48	13669.70
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal								
0.000145	SRM614-11	0.000024	0.000472	0.000179	0.002073	0.001719	0.019461	0.000251
0.000186	SRM612-11	0.000219	0.013288	0.000292	0.003707	0.007924	0.034950	0.011315
0.000502	SRM610-11	0.001818	0.214267	0.001991	0.025876	0.098980	0.280374	0.167970
0.000014	AP1-11	0.000003	0.000088	0.000085	0.001562	0.001173	0.016737	0.000025
0.000019	AP2-11	0.000008	0.000093	0.000151	0.002869	0.002086	0.032986	0.000149
0.000018	AP3-11	0.000038	0.000125	0.000247	0.004976	0.003587	0.062850	0.000563
0.000014	AP4-11	0.000077	0.000236	0.000432	0.009273	0.006610	0.120107	0.001223
0.000047	GCK4-1	0.000002	0.000142	0.000161	0.003192	0.002351	0.037131	0.000039
0.000044	GCK4-2	0.000002	0.000080	0.000148	0.003007	0.002192	0.034670	0.000033
0.000044	GCK4-3	0.000002	0.000080	0.000154	0.003034	0.002231	0.035739	0.000031
0.000074	GCK4-4	0.000003	0.000095	0.000166	0.003333	0.002435	0.041343	0.000036
0.000083	GCK4-5	0.000002	0.000092	0.000167	0.003375	0.002480	0.042102	0.000035
0.000077	GCK4-6	0.000003	0.000096	0.000165	0.003351	0.002431	0.041432	0.000034
0.000040	GCK4-7	0.000001	0.000051	0.000119	0.002617	0.001895	0.027695	0.000029
0.000032	GCK4-8	0.000002	0.000042	0.000105	0.002362	0.001736	0.024108	0.000027
0.000039	GCK4-9	0.000001	0.000065	0.000125	0.002585	0.001880	0.027871	0.000027
0.000013	GCK4-10	0.000000	0.000043	0.000095	0.002144	0.001540	0.022402	0.000023
0.000012	GCK4-11	0.000000	0.000038	0.000079	0.002054	0.001476	0.019991	0.000018
0.000007	GCK4-12	0.000000	0.000045	0.000075	0.001978	0.001447	0.019438	0.000022
0.000001	GCK4-13	0.000000	0.000041	0.000087	0.001939	0.001428	0.020639	0.000023
0.000009	GCK4-14	0.000000	0.000035	0.000093	0.002013	0.001458	0.021231	0.000024
0.000013	GCK4-15	0.000000	0.000039	0.000095	0.002010	0.001465	0.021115	0.000021
0.000008	GCK4-16	0.000000	0.000019	0.000115	0.002439	0.001774	0.027227	0.000024
0.000004	GCK4-17	0.000000	0.000018	0.000107	0.002276	0.001660	0.025292	0.000024
0.000009	GCK4-18	0.000000	0.000020	0.000110	0.002336	0.001682	0.025617	0.000024
0.000129	SRM614-11	0.000000	0.000358	0.000000	0.002125	0.001771	0.020687	0.000280
0.000263	SRM612-11	0.000295	0.012336	0.000002	0.003750	0.007799	0.035121	0.015137
0.000736	SRM610-11	0.003000	0.245204	0.001839	0.029163	0.114346	0.291469	0.219598
0.000005	AP1-11	0.000000	0.000089	0.000060	0.001459	0.001085	0.014457	0.000017
0.000012	AP2-11	0.000003	0.000085	0.000114	0.002505	0.001863	0.026656	0.000151
0.000004	AP3-11	0.000036	0.000095	0.000186	0.004050	0.002965	0.047104	0.000501
0.000005	AP4-11	0.000079	0.000174	0.000305	0.006717	0.004866	0.082823	0.001047
standardize signal averages AP								
0.000010	AP1	0.000002	0.000088	0.000072	0.001510	0.001129	0.015597	0.000021
0.000016	AP2	0.000006	0.000089	0.000132	0.002687	0.001975	0.029821	0.000150
0.000011	AP3	0.000037	0.000110	0.000217	0.004513	0.003276	0.054977	0.000532
0.000010	AP4	0.000078	0.000205	0.000369	0.007995	0.005738	0.101465	0.001135
linest from std sig ave								
6.307606		0.138456	0.003766	1.851223	0.086266	0.119835	0.006866	0.011383
standardize signal averages SRM								
0.000137	srM614-2	0.000012	0.000415	0.000089	0.002099	0.001745	0.020074	0.000266
0.000225	srM612-2	0.000257	0.012812	0.000147	0.003729	0.007861	0.035035	0.013226
0.000619	srM610-2	0.002409	0.229735	0.001915	0.027519	0.106663	0.285922	0.193784
linest from std sig ave								
0.000000		0.521613	0.021902	3.051974	0.211442	0.054755	0.020385	0.027101
concentration data								
78.64	SRM614-11	0.28	0.15	28.40	15.34	17.66	11.46	0.25
100.86	SRM612-11	2.60	4.29	46.41	27.43	81.44	20.58	11.05
271.52	SRM610-11	21.59	69.21	316.09	191.44	1017.26	165.09	163.98
35.71	AP1-11	0.18	0.13	62.92	53.74	56.08	45.84	0.11
48.45	AP2-11	0.44	0.14	111.66	98.74	99.73	90.35	0.68
45.12	AP3-11	2.12	0.19	182.64	171.23	171.50	172.14	2.56
36.17	AP4-11	4.26	0.36	319.15	319.13	316.01	328.96	5.56
117.04	GCK4-1	0.14	0.21	119.04	109.85	112.42	101.70	0.18
111.38	GCK4-2	0.13	0.12	109.61	103.47	104.77	94.96	0.15
111.95	GCK4-3	0.09	0.12	113.73	104.43	106.67	97.89	0.14
185.31	GCK4-4	0.14	0.14	122.33	114.71	116.40	113.24	0.16
208.22	GCK4-5	0.13	0.14	123.05	116.17	118.55	115.31	0.16
193.50	GCK4-6	0.14	0.14	121.62	115.32	116.21	113.48	0.15
101.44	GCK4-7	0.05	0.08	87.91	90.06	90.61	75.86	0.13
81.34	GCK4-8	0.09	0.06	77.57	81.27	83.00	66.03	0.12
97.72	GCK4-9	0.03	0.10	91.98	88.95	89.89	76.34	0.12
32.89	GCK4-10	0.00	0.07	70.52	73.79	73.63	61.36	0.10
30.10	GCK4-11	0.00	0.06	58.52	70.68	70.54	54.75	0.08
17.30	GCK4-12	0.00	0.07	55.69	68.06	69.18	53.24	0.10
3.66	GCK4-13	0.02	0.06	64.44	66.74	68.28	56.53	0.10
23.58	GCK4-14	0.00	0.05	68.93	69.29	69.69	58.15	0.11
33.94	GCK4-15	0.00	0.06	70.19	69.17	70.02	57.83	0.10
21.27	GCK4-16	0.00	0.03	85.14	83.95	84.79	74.57	0.11
9.33	GCK4-17	0.00	0.03	78.99	78.33	79.36	69.27	0.11
21.61	GCK4-18	0.01	0.03	81.24	80.39	80.39	70.16	0.11
69.53	SRM614-11	0.00	0.12	0.00	15.72	18.20	12.18	0.27

Appendix A. Raw trace element datasheets from laser ablation.

142.40	SRM612-11	3.50	3.98	0.34	27.75	80.15	20.68	14.78
397.93	SRM610-11	35.62	79.21	292.01	215.76	1175.17	171.62	214.38
13.06	AP1-11	0.00	0.13	43.94	50.21	51.89	39.60	0.08
29.63	AP2-11	0.19	0.13	84.00	86.22	89.07	73.01	0.68
9.30	AP3-11	2.02	0.14	137.27	139.38	141.77	129.02	2.27
13.74	AP4-11	4.38	0.26	225.58	231.17	232.64	226.85	4.75

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
589.48	blank-9	229.80	160.76	1070.73	392.92	90.40	190.40	56.92
887.69	SRM614-9	221.12	1323.13	1377.53	6923.40	5227.31	59800.54	741.24
965.41	SRM612-9	831.36	47349.27	1884.13	13497.08	28187.24	121799.77	38936.14
1343.21	SRM610-9	3019.70	442575.38	4628.55	47751.07	200357.84	510662.66	282665.72
735.72	AP1-9	198.68	1220.77	2988.66	38314.02	27873.64	400567.16	445.16
835.04	AP2-9	275.56	1332.93	3630.38	54939.35	40146.47	611776.69	2959.70
789.44	AP3-9	711.52	1983.41	6547.64	116056.13	83337.51	1425831.40	12752.39
898.13	AP4-9	919.29	3215.26	7550.44	135062.41	97431.55	1682808.60	18325.50
813.96	GCK3-1	174.68	650.64	4382.86	72663.85	52185.02	848397.94	813.32
909.65	GCK3-2	230.08	1268.61	7622.88	146129.14	105017.79	1836529.30	1499.05
906.05	GCK3-3	205.16	1242.93	7055.20	129552.85	91858.60	1611093.60	1371.41
772.28	GCK3-4	156.56	551.08	1568.61	18770.67	13726.88	187053.09	344.88
769.04	GCK3-5	153.72	353.96	1636.93	19367.71	14048.56	192256.84	261.04
744.72	GCK3-6	154.00	383.76	1584.09	18721.07	13810.56	188472.22	329.92
739.92	GCK3-7	145.16	664.44	2322.25	33996.95	24877.02	361703.97	481.40
770.08	GCK3-8	142.00	420.08	2297.85	33164.47	23914.70	348531.41	409.48
758.88	GCK3-9	152.56	396.08	2258.17	32824.43	23881.98	347937.41	487.84
712.32	GCK3-10	146.68	538.28	1952.93	27298.91	19805.07	283153.88	1326.01
754.60	GCK3-11	131.68	315.16	2063.17	28034.60	20235.03	291940.69	523.32
735.80	GCK3-12	127.16	271.76	1870.73	26534.87	18869.11	272210.63	399.52
744.36	GCK3-13	143.64	606.12	2025.37	29617.05	21871.60	311688.88	436.84
722.08	GCK3-14	118.72	408.64	2052.93	30070.77	21659.24	314329.28	456.64
726.16	GCK3-15	135.64	322.48	2164.45	30933.30	22615.33	326677.28	365.20
710.16	GCK3-16	172.40	882.36	2574.37	41412.99	29912.25	448747.38	537.76
738.64	GCK3-17	148.04	441.32	2705.02	41426.79	30167.37	454795.16	481.52
678.84	GCK3-18	125.80	380.32	2892.42	45725.38	32732.63	499652.94	527.64
1051.13	SRM614-10	114.52	826.04	670.20	4309.54	3364.78	37468.53	596.64
1204.37	SRM612-10	848.16	26578.63	991.05	8011.52	16425.17	72347.65	29066.32
1453.41	SRM610-10	3214.22	246170.86	2876.54	29721.77	113603.40	310095.72	226273.28
864.68	AP1-10	81.36	926.85	1808.61	25075.38	18374.66	259298.70	276.96
733.12	AP2-10	190.32	738.20	1955.57	29029.72	21123.20	308785.78	1643.25
779.68	AP3-10	649.56	1301.93	4249.70	76111.91	54981.67	924367.38	9269.17
772.04	AP4-10	982.37	2247.49	5009.07	92889.84	67588.50	1156263.30	14002.20
566.28	blank-10	115.08	174.12	438.92	176.00	120.52	557.04	28.56
577.88	blank average	172.44	167.44	754.82	284.46	105.46	373.72	42.74

blank subtraction								
309.80	SRM614-9	48.68	1155.69	622.70	6638.94	5121.85	59426.81	698.50
387.52	SRM612-9	658.92	47181.83	1129.31	13212.61	28081.78	121426.05	38893.40
765.32	SRM610-9	2847.26	442407.94	3873.72	47466.61	200252.38	510288.94	282622.98
157.84	AP1-9	26.24	1053.33	2233.83	38029.55	27768.18	400193.44	402.42
257.16	AP2-9	103.12	1165.49	2875.56	54654.89	40041.00	611402.97	2916.96
211.56	AP3-9	539.08	1815.97	5792.81	115771.67	83232.05	1425457.68	12709.65
320.24	AP4-9	746.84	3047.82	6795.62	134777.95	97326.09	1682434.88	18282.76
236.08	GCK3-1	2.24	483.20	3628.04	72379.39	52079.56	848024.22	770.58
331.76	GCK3-2	57.64	1101.17	6868.06	145844.68	104912.33	1836155.58	1456.31
328.16	GCK3-3	32.72	1075.49	6300.38	129268.39	91753.14	1610719.88	1328.67
194.40	GCK3-4	-15.88	383.64	813.78	18486.20	13621.42	186679.37	302.14
191.16	GCK3-5	-18.72	186.52	882.10	19083.25	13943.10	191883.12	218.30
166.84	GCK3-6	-18.44	216.32	829.26	18436.60	13705.10	188098.50	287.18
162.04	GCK3-7	-27.28	497.00	1567.43	33712.49	24771.56	361330.25	438.66
192.20	GCK3-8	-30.44	252.64	1543.03	32880.01	23809.23	348157.69	366.74
181.00	GCK3-9	-19.88	228.64	1503.35	32539.96	23776.51	347563.69	445.10
134.44	GCK3-10	-25.76	370.84	1198.11	27014.45	19699.61	282780.16	1283.27
176.72	GCK3-11	-40.76	147.72	1308.35	27750.14	20129.57	291566.97	480.58
157.92	GCK3-12	-45.28	104.32	1115.91	26250.41	18763.65	271836.91	356.78
166.48	GCK3-13	-28.80	438.68	1270.55	29332.59	21766.14	311315.16	394.10
144.20	GCK3-14	-53.72	241.20	1298.11	29786.31	21553.78	313955.56	413.90
148.28	GCK3-15	-36.80	155.04	1409.63	30648.83	22509.87	326303.56	322.46
132.28	GCK3-16	-0.04	714.92	1819.55	41128.53	29806.79	448373.66	495.02

Appendix A. Raw trace element datasheets from laser ablation.

160.76	GCK3-17	-24.40	273.88	1950.19	41142.33	30061.91	454421.44	438.78
100.96	GCK3-18	-46.64	212.88	2137.59	45440.92	32627.16	499279.22	484.90
473.24	SRM614-10	-57.92	658.60	-84.62	4025.08	3259.32	37094.81	553.90
626.48	SRM612-10	675.72	26411.19	236.22	7727.06	16319.71	71973.93	29023.58
875.52	SRM610-10	3041.78	246003.42	2121.71	29437.31	113497.94	309722.00	226230.54
286.80	AP1-10	-91.08	759.40	1053.79	24790.92	18269.20	258924.98	234.22
155.24	AP2-10	17.88	570.76	1200.75	28745.26	21017.74	308412.06	1600.51
201.80	AP3-10	477.12	1134.49	3494.88	75827.44	54876.21	923993.66	9226.43
194.16	AP4-10	809.92	2080.05	4254.24	92605.38	67483.04	1155889.58	13959.46
zero correction								
309.80	SRM614-9	48.68	1155.69	622.70	6638.94	5121.85	59426.81	698.50
387.52	SRM612-9	658.92	47181.83	1129.31	13212.61	28081.78	121426.05	38893.40
765.32	SRM610-9	2847.26	442407.94	3873.72	47466.61	200252.38	510288.94	282622.98
157.84	AP1-9	26.24	1053.33	2233.83	38029.55	27768.18	400193.44	402.42
257.16	AP2-9	103.12	1165.49	2875.56	54654.89	40041.00	611402.97	2916.96
211.56	AP3-9	539.08	1815.97	5792.81	115771.67	83232.05	1425457.68	12709.65
320.24	AP4-9	746.84	3047.82	6795.62	134777.95	97326.09	1682434.88	18282.76
236.08	GCK3-1	2.24	483.20	3628.04	72379.39	52079.56	848024.22	770.58
331.76	GCK3-2	57.64	1101.17	6868.06	145844.68	104912.33	1836155.58	1456.31
328.16	GCK3-3	32.72	1075.49	6300.38	129268.39	91753.14	1610719.88	1328.67
194.40	GCK3-4	0.00	383.64	813.78	18486.20	13621.42	186679.37	302.14
191.16	GCK3-5	0.00	186.52	882.10	19083.25	13943.10	191883.12	218.30
166.84	GCK3-6	0.00	216.32	829.26	18436.60	13705.10	188098.50	287.18
162.04	GCK3-7	0.00	497.00	1567.43	33712.49	24771.56	361330.25	438.66
192.20	GCK3-8	0.00	252.64	1543.03	32880.01	23809.23	348157.69	366.74
181.00	GCK3-9	0.00	228.64	1503.35	32539.96	23776.51	347563.69	445.10
134.44	GCK3-10	0.00	370.84	1198.11	27014.45	19699.61	282780.16	1283.27
176.72	GCK3-11	0.00	147.72	1308.35	27750.14	20129.57	291566.97	480.58
157.92	GCK3-12	0.00	104.32	1115.91	26250.41	18763.65	271836.91	356.78
166.48	GCK3-13	0.00	438.68	1270.55	29332.59	21766.14	311315.16	394.10
144.20	GCK3-14	0.00	241.20	1298.11	29786.31	21553.78	313955.56	413.90
148.28	GCK3-15	0.00	155.04	1409.63	30648.83	22509.87	326303.56	322.46
132.28	GCK3-16	0.00	714.92	1819.55	41128.53	29806.79	448373.66	495.02
160.76	GCK3-17	0.00	273.88	1950.19	41142.33	30061.91	454421.44	438.78
100.96	GCK3-18	0.00	212.88	2137.59	45440.92	32627.16	499279.22	484.90
473.24	SRM614-10	0.00	658.60	0.00	4025.08	3259.32	37094.81	553.90
626.48	SRM612-10	675.72	26411.19	236.22	7727.06	16319.71	71973.93	29023.58
875.52	SRM610-10	3041.78	246003.42	2121.71	29437.31	113497.94	309722.00	226230.54
286.80	AP1-10	0.00	759.40	1053.79	24790.92	18269.20	258924.98	234.22
155.24	AP2-10	17.88	570.76	1200.75	28745.26	21017.74	308412.06	1600.51
201.80	AP3-10	477.12	1134.49	3494.88	75827.44	54876.21	923993.66	9226.43
194.16	AP4-10	809.92	2080.05	4254.24	92605.38	67483.04	1155889.58	13959.46
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000090	SRM614-9	0.000014	0.000338	0.000182	0.001939	0.001496	0.017358	0.000204
0.000104	SRM612-9	0.000177	0.012692	0.000304	0.003554	0.007554	0.032665	0.010463
0.000425	SRM610-9	0.001582	0.245799	0.002152	0.026372	0.111259	0.283513	0.157023
0.000007	AP1-9	0.000001	0.000045	0.000095	0.001610	0.001175	0.016939	0.000017
0.000013	AP2-9	0.000005	0.000059	0.000146	0.002767	0.002027	0.030953	0.000148
0.000008	AP3-9	0.000020	0.000068	0.000217	0.004334	0.003116	0.053360	0.000476
0.000014	AP4-9	0.000033	0.000137	0.000305	0.006043	0.004364	0.075436	0.000820
0.000011	GCK3-1	0.000000	0.000022	0.000162	0.003230	0.002324	0.037838	0.000034
0.000013	GCK3-2	0.000002	0.000044	0.000272	0.005781	0.004158	0.072778	0.000058
0.000014	GCK3-3	0.000001	0.000047	0.000274	0.005631	0.003997	0.070162	0.000058
0.000022	GCK3-4	0.000000	0.000043	0.000091	0.002078	0.001531	0.020984	0.000034
0.000020	GCK3-5	0.000000	0.000020	0.000093	0.002022	0.001477	0.020330	0.000023
0.000018	GCK3-6	0.000000	0.000023	0.000090	0.001992	0.001480	0.020318	0.000031
0.000010	GCK3-7	0.000000	0.000031	0.000098	0.002109	0.001550	0.022602	0.000027
0.000012	GCK3-8	0.000000	0.000016	0.000098	0.002085	0.001510	0.022074	0.000023

Appendix A. Raw trace element datasheets from laser ablation.

0.000012	GCK3-9	0.000000	0.000015	0.000096	0.002073	0.001515	0.022140	0.000028
0.000010	GCK3-10	0.000000	0.000028	0.000092	0.002076	0.001514	0.021727	0.000099
0.000013	GCK3-11	0.000000	0.000011	0.000096	0.002030	0.001472	0.021326	0.000035
0.000012	GCK3-12	0.000000	0.000008	0.000086	0.002017	0.001442	0.020891	0.000027
0.000011	GCK3-13	0.000000	0.000030	0.000087	0.002003	0.001487	0.021263	0.000027
0.000010	GCK3-14	0.000000	0.000016	0.000087	0.001994	0.001443	0.021021	0.000028
0.000010	GCK3-15	0.000000	0.000010	0.000092	0.001995	0.001465	0.021237	0.000021
0.000007	GCK3-16	0.000000	0.000039	0.000099	0.002238	0.001622	0.024402	0.000027
0.000009	GCK3-17	0.000000	0.000015	0.000106	0.002242	0.001638	0.024762	0.000024
0.000005	GCK3-18	0.000000	0.000010	0.000105	0.002233	0.001604	0.024538	0.000024
0.000249	SRM614-10	0.000000	0.000347	0.000000	0.002119	0.001716	0.019530	0.000292
0.000295	SRM612-10	0.000318	0.012441	0.000111	0.003640	0.007688	0.033905	0.013672
0.000811	SRM610-10	0.002816	0.227768	0.001964	0.027255	0.105085	0.286763	0.209461
0.000017	AP1-10	0.000000	0.000045	0.000062	0.001454	0.001071	0.015185	0.000014
0.000013	AP2-10	0.000001	0.000047	0.000098	0.002353	0.001721	0.025249	0.000131
0.000010	AP3-10	0.000024	0.000057	0.000175	0.003800	0.002750	0.046299	0.000462
0.000011	AP4-10	0.000048	0.000122	0.000250	0.005435	0.003961	0.067841	0.000819
standardize signal averages AP								
0.000012	AP1	0.000001	0.000045	0.000078	0.001532	0.001123	0.016062	0.000015
0.000013	AP2	0.000003	0.000053	0.000122	0.002560	0.001874	0.028101	0.000139
0.000009	AP3	0.000022	0.000062	0.000196	0.004067	0.002933	0.049830	0.000469
0.000013	AP4	0.000041	0.000129	0.000277	0.005739	0.004162	0.071638	0.000820
linest from std sig ave								
6.360661		0.261496	0.006416	2.319103	0.111932	0.154399	0.009122	0.015113
standardize signal averages SRM								
0.000170	srM614-2	0.000007	0.000342	0.000091	0.002029	0.001606	0.018444	0.000248
0.000200	srM612-2	0.000248	0.012567	0.000208	0.003597	0.007621	0.033285	0.012067
0.000618	srM610-2	0.002199	0.236783	0.002058	0.026814	0.108172	0.285138	0.183242
linest from std sig ave								
0.000000		0.570685	0.021252	2.837873	0.217047	0.053985	0.020456	0.028664
concentration data								
49.36	SRM614-9	0.32	0.19	36.18	18.62	19.81	13.58	0.26
56.87	SRM612-9	3.98	6.98	60.42	34.12	100.03	25.55	13.56
231.96	SRM610-9	35.48	135.26	428.06	253.16	1473.26	221.80	203.52
16.95	AP1-9	0.12	0.11	87.48	71.88	72.40	61.65	0.10
33.04	AP2-9	0.54	0.15	134.69	123.56	124.86	112.64	0.89
20.10	AP3-9	2.11	0.17	200.62	193.52	191.91	194.18	2.87
36.44	AP4-9	3.49	0.35	281.90	269.85	268.79	274.52	4.94
26.73	GCK3-1	0.01	0.06	149.77	144.21	143.13	137.70	0.21
33.37	GCK3-2	0.24	0.11	251.85	258.13	256.13	264.85	0.35
36.27	GCK3-3	0.15	0.12	253.91	251.44	246.18	255.33	0.35
55.45	GCK3-4	0.00	0.11	84.63	92.79	94.31	76.36	0.20
51.39	GCK3-5	0.00	0.05	86.47	90.29	90.99	73.99	0.14
45.73	GCK3-6	0.00	0.06	82.87	88.93	91.19	73.94	0.19
25.72	GCK3-7	0.00	0.08	90.71	94.17	95.44	82.25	0.17
30.92	GCK3-8	0.00	0.04	90.51	93.09	92.98	80.33	0.14
29.26	GCK3-9	0.00	0.04	88.60	92.56	93.29	80.57	0.17
26.21	GCK3-10	0.00	0.07	85.17	92.68	93.23	79.07	0.59
32.80	GCK3-11	0.00	0.03	88.54	90.64	90.69	77.61	0.21
30.80	GCK3-12	0.00	0.02	79.34	90.08	88.82	76.02	0.17
28.85	GCK3-13	0.00	0.08	80.28	89.46	91.57	77.38	0.16
24.50	GCK3-14	0.00	0.04	80.41	89.06	88.89	76.50	0.17
24.49	GCK3-15	0.00	0.03	84.88	89.07	90.24	77.29	0.13
18.27	GCK3-16	0.00	0.10	91.62	99.95	99.92	88.80	0.16
22.23	GCK3-17	0.00	0.04	98.32	100.11	100.90	90.11	0.14
12.59	GCK3-18	0.00	0.03	97.19	99.72	98.77	89.30	0.14
135.92	SRM614-10	0.00	0.19	0.00	20.34	22.72	15.28	0.38
160.99	SRM612-10	7.14	6.85	22.13	34.94	101.80	26.53	17.72
442.20	SRM610-10	63.16	125.34	390.71	261.64	1391.51	224.35	271.49
42.68	AP1-10	0.00	0.11	57.18	64.92	65.99	55.26	0.08
32.25	AP2-10	0.15	0.12	90.95	105.08	105.99	91.89	0.79
25.66	AP3-10	2.49	0.15	162.02	169.66	169.37	168.49	2.79
28.92	AP4-10	4.96	0.31	231.00	242.70	243.96	246.88	4.94
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
1162.57 blank-7	157.28	272.52	856.56	304.20	122.80	119.48	54.32
1817.61 SRM614-7	179.08	1321.17	1029.69	5977.67	4572.31	52457.10	799.76
1811.97 SRM612-7	702.40	31803.10	1259.21	9733.34	19735.63	88143.85	35142.72
1890.33 SRM610-7	2179.97	242738.86	2826.62	28412.40	112034.67	288889.97	214186.48
1303.17 AP1-7	128.92	1646.25	2158.05	29386.13	21735.32	305736.69	404.08
1309.73 AP2-7	239.96	1423.01	2956.66	44246.33	32624.18	493562.59	2626.65
1286.65 AP3-7	667.36	1867.17	4998.23	87112.69	62720.67	1062897.90	11236.74
1261.73 AP4-7	904.33	2602.01	5551.71	100166.56	72291.01	1240259.30	15899.77
1147.93 GCK2-1	103.80	826.32	1886.69	25774.39	18995.55	273113.94	341.48
1169.17 GCK2-2	106.64	609.36	1737.13	23075.61	16473.53	238760.78	257.24
1128.49 GCK2-3	113.20	564.40	1628.81	22198.13	16180.21	231050.70	291.84
1115.53 GCK2-4	103.20	806.08	1493.13	19103.71	14071.96	192251.25	267.04
1163.85 GCK2-5	102.56	547.72	1492.61	20086.27	14829.72	201383.41	284.24
1116.73 GCK2-6	87.16	539.76	1656.97	22826.29	16774.22	233945.08	298.84
1085.13 GCK2-7	102.84	784.12	1450.97	18768.47	13765.24	189725.75	261.28
1134.21 GCK2-8	95.32	550.20	1539.25	21118.08	15540.01	212592.84	248.88
1083.13 GCK2-9	95.80	520.64	1544.45	19813.55	14491.48	200098.69	248.04
1464.29 GCK2-10	121.08	900.21	3343.50	57543.81	41712.79	656800.25	756.16
1452.97 GCK2-11	130.32	843.68	3321.62	57044.20	41078.71	655067.88	741.32
1444.29 GCK2-12	124.20	812.28	3397.82	56093.00	40689.19	651944.31	729.12
1450.97 GCK2-13	139.84	796.68	3132.30	52966.06	38345.62	605965.56	635.76
1374.25 GCK2-14	112.40	594.40	3141.14	52596.66	38098.06	605621.13	661.80
1376.29 GCK2-15	122.60	716.92	3443.98	57641.48	41637.16	665552.13	791.28
1260.77 GCK2-16	123.16	619.96	2571.93	42412.20	30592.33	469131.31	527.48
1189.25 GCK2-17	107.16	492.92	2665.94	41662.43	29933.37	463729.22	515.64
1158.65 GCK2-18	118.12	441.08	1959.21	30511.45	21996.52	326141.41	352.16
1402.01 SRM614-8	108.80	796.64	607.88	3352.66	2708.42	29024.68	468.68
1554.93 SRM612-8	549.00	21143.96	854.08	6281.48	13016.59	55773.72	24490.62
1521.85 SRM610-8	2164.85	190952.92	2019.57	21843.24	87251.49	217647.27	173024.73
1173.89 AP1-8	83.44	1443.77	1462.21	19777.71	14847.12	199431.31	260.60
1036.65 AP2-8	185.16	1116.29	1964.29	29348.17	21634.64	312308.97	1675.25
1059.45 AP3-8	611.64	1492.57	3638.90	66623.81	47855.23	792421.19	8853.49
1055.09 AP4-8	623.00	1714.97	3478.70	60373.70	44012.37	719812.06	10991.46
776.08 blank-8	76.96	238.32	378.08	230.44	166.76	779.04	35.44
969.33 blank average	117.12	255.42	617.32	267.32	144.78	449.26	44.88
blank subtraction							
848.28 SRM614-7	61.96	1065.75	412.36	5710.35	4427.52	52007.84	754.88
842.64 SRM612-7	585.28	31547.68	641.88	9466.01	19590.85	87694.59	35097.84
921.01 SRM610-7	2062.85	242483.44	2209.29	28145.08	111889.89	288440.71	214141.60
333.84 AP1-7	11.80	1390.83	1540.73	29118.80	21590.54	305287.43	359.20
340.40 AP2-7	122.84	1167.59	2339.33	43979.01	32479.40	493113.33	2581.77
317.32 AP3-7	550.24	1611.75	4380.90	86845.37	62575.89	1062448.64	11191.86
292.40 AP4-7	787.20	2346.59	4934.39	99899.24	72146.23	1239810.04	15854.89
178.60 GCK2-1	-13.32	570.90	1269.37	25507.06	18850.77	272664.68	296.60
199.84 GCK2-2	-10.48	353.94	1119.81	22808.29	16328.75	238311.52	212.36
159.16 GCK2-3	-3.92	308.98	1011.49	21930.80	16035.43	230601.44	246.96
146.20 GCK2-4	-13.92	550.66	875.80	18836.39	13927.18	191801.99	222.16
194.52 GCK2-5	-14.56	292.30	875.28	19818.95	14684.94	200934.15	239.36
147.40 GCK2-6	-29.96	284.34	1039.65	22558.97	16629.43	233495.82	253.96
115.80 GCK2-7	-14.28	528.70	833.64	18501.14	13620.46	189276.49	216.40
164.88 GCK2-8	-21.80	294.78	921.93	20850.76	15395.23	212143.58	204.00
113.80 GCK2-9	-21.32	265.22	927.13	19546.23	14346.70	199649.43	203.16
494.96 GCK2-10	3.96	644.78	2726.18	57276.48	41568.01	656350.99	711.28
483.64 GCK2-11	13.20	588.26	2704.30	56776.88	40933.93	654618.62	696.44
474.96 GCK2-12	7.08	556.86	2780.50	55825.67	40544.41	651495.05	684.24
481.64 GCK2-13	22.72	541.26	2514.97	52698.74	38200.84	605516.30	590.88
404.92 GCK2-14	-4.72	338.98	2523.81	52329.33	37953.27	604811.87	616.92
406.96 GCK2-15	5.48	461.50	2826.66	57374.16	41492.38	665102.87	746.40
291.44 GCK2-16	6.04	364.54	1954.61	42144.88	30447.55	468682.05	482.60
219.92 GCK2-17	-9.96	237.50	2048.61	41395.11	29788.59	463279.96	470.76
189.32 GCK2-18	1.00	185.66	1341.89	30244.13	21851.74	325692.15	307.28
432.68 SRM614-8	-8.32	541.22	-9.44	3085.34	2563.63	28575.42	423.80
585.60 SRM612-8	431.88	20888.54	236.76	6014.15	12871.81	55324.45	24445.74
552.52 SRM610-8	2047.73	190697.50	1402.25	21575.92	87106.71	217198.01	172979.85
204.56 AP1-8	-33.68	1188.35	844.88	19510.39	14702.34	198982.05	215.72
67.32 AP2-8	68.04	860.86	1346.97	29080.84	21489.86	311859.71	1630.37
90.12 AP3-8	494.52	1237.15	3021.58	66356.49	47710.45	791971.93	8808.61
85.76 AP4-8	505.88	1459.55	2861.38	60106.38	43867.59	719362.80	10946.58
zero correction							
848.28 SRM614-7	61.96	1065.75	412.36	5710.35	4427.52	52007.84	754.88
842.64 SRM612-7	585.28	31547.68	641.88	9466.01	19590.85	87694.59	35097.84
921.01 SRM610-7	2062.85	242483.44	2209.29	28145.08	111889.89	288440.71	214141.60
333.84 AP1-7	11.80	1390.83	1540.73	29118.80	21590.54	305287.43	359.20
340.40 AP2-7	122.84	1167.59	2339.33	43979.01	32479.40	493113.33	2581.77

Appendix A. Raw trace element datasheets from laser ablation.

317.32	AP3-7	550.24	1611.75	4380.90	86845.37	62575.89	1062448.64	11191.86
292.40	AP4-7	787.20	2346.59	4934.39	99899.24	72146.23	1239810.04	15854.89
178.60	GCK2-1	0.00	570.90	1269.37	25507.06	18850.77	272664.68	296.60
199.84	GCK2-2	0.00	353.94	1119.81	22808.29	16328.75	238311.52	212.36
159.16	GCK2-3	0.00	308.98	1011.49	21930.80	16035.43	230601.44	246.96
146.20	GCK2-4	0.00	550.66	875.80	18836.39	13927.18	191801.99	222.16
194.52	GCK2-5	0.00	292.30	875.28	19818.95	14684.94	200934.15	239.36
147.40	GCK2-6	0.00	284.34	1039.65	22558.97	16629.43	233495.82	253.96
115.80	GCK2-7	0.00	528.70	833.64	18501.14	13620.46	189276.49	216.40
164.88	GCK2-8	0.00	294.78	921.93	20850.76	15395.23	212143.58	204.00
113.80	GCK2-9	0.00	265.22	927.13	19546.23	14346.70	199649.43	203.16
494.96	GCK2-10	3.96	644.78	2726.18	57276.48	41568.01	656350.99	711.28
483.64	GCK2-11	13.20	588.26	2704.30	56776.88	40933.93	654618.62	696.44
474.96	GCK2-12	7.08	556.86	2780.50	55825.67	40544.41	651495.05	684.24
481.64	GCK2-13	22.72	541.26	2514.97	52698.74	38200.84	605516.30	590.88
404.92	GCK2-14	0.00	338.98	2523.81	52329.33	37953.27	604811.87	616.92
406.96	GCK2-15	5.48	461.50	2826.66	57374.16	41492.38	665102.87	746.40
291.44	GCK2-16	6.04	364.54	1954.61	42144.88	30447.55	468682.05	482.60
219.92	GCK2-17	0.00	237.50	2048.61	41395.11	29788.59	463279.96	470.76
189.32	GCK2-18	1.00	185.66	1341.89	30244.13	21851.74	325692.15	307.28
432.68	SRM614-8	0.00	541.22	0.00	3085.34	2563.63	28575.42	423.80
585.60	SRM612-8	431.88	20888.54	236.76	6014.15	12871.81	55324.45	24445.74
552.52	SRM610-8	2047.73	190697.50	1402.25	21575.92	87106.71	217198.01	172979.85
204.56	AP1-8	0.00	1188.35	844.88	19510.39	14702.34	198982.05	215.72
67.32	AP2-8	68.04	860.86	1346.97	29080.84	21489.86	311859.71	1630.37
90.12	AP3-8	494.52	1237.15	3021.58	66356.49	47710.45	791971.93	8808.61
85.76	AP4-8	505.88	1459.55	2861.38	60106.38	43867.59	719362.80	10946.58
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
	32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
	33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
	25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
	27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000340	SRM614-7	0.000025	0.000427	0.000165	0.002290	0.001775	0.020855	0.000303
0.000354	SRM612-7	0.000246	0.013272	0.000270	0.003982	0.008242	0.036892	0.014765
0.000954	SRM610-7	0.002137	0.251247	0.002289	0.029162	0.115934	0.298865	0.221881
0.000018	AP1-7	0.000001	0.000076	0.000084	0.001582	0.001173	0.016589	0.000020
0.000023	AP2-7	0.000008	0.000078	0.000156	0.002937	0.002169	0.032934	0.000172
0.000016	AP3-7	0.000027	0.000079	0.000215	0.004265	0.003073	0.052179	0.000550
0.000017	AP4-7	0.000046	0.000137	0.000288	0.005824	0.004206	0.072277	0.000924
0.000032	GCK2-1	0.000000	0.000101	0.000225	0.004512	0.003335	0.048235	0.000052
0.000039	GCK2-2	0.000000	0.000069	0.000217	0.004429	0.003171	0.046275	0.000041
0.000031	GCK2-3	0.000000	0.000061	0.000199	0.004316	0.003156	0.045384	0.000049
0.000025	GCK2-4	0.000000	0.000095	0.000151	0.003247	0.002400	0.033058	0.000038
0.000032	GCK2-5	0.000000	0.000048	0.000144	0.003259	0.002415	0.033046	0.000039
0.000021	GCK2-6	0.000000	0.000041	0.000151	0.003270	0.002410	0.033843	0.000037
0.000019	GCK2-7	0.000000	0.000086	0.000135	0.003007	0.002214	0.030764	0.000035
0.000024	GCK2-8	0.000000	0.000043	0.000134	0.003025	0.002234	0.030778	0.000030
0.000018	GCK2-9	0.000000	0.000041	0.000143	0.003023	0.002219	0.030874	0.000031
0.000036	GCK2-10	0.000000	0.000047	0.000200	0.004209	0.003055	0.048233	0.000052
0.000037	GCK2-11	0.000001	0.000045	0.000205	0.004305	0.003104	0.049638	0.000053
0.000037	GCK2-12	0.000001	0.000043	0.000214	0.004295	0.003119	0.050126	0.000053
0.000036	GCK2-13	0.000002	0.000040	0.000186	0.003906	0.002831	0.044881	0.000044
0.000032	GCK2-14	0.000000	0.000027	0.000200	0.004148	0.003008	0.047938	0.000049
0.000030	GCK2-15	0.000000	0.000034	0.000207	0.004201	0.003038	0.048695	0.000055
0.000026	GCK2-16	0.000001	0.000032	0.000174	0.003753	0.002711	0.041736	0.000043
0.000020	GCK2-17	0.000000	0.000022	0.000189	0.003816	0.002746	0.042712	0.000043
0.000022	GCK2-18	0.000000	0.000022	0.000157	0.003549	0.002564	0.038214	0.000036
0.000319	SRM614-8	0.000000	0.000399	0.000000	0.002276	0.001892	0.021084	0.000313
0.000390	SRM612-8	0.000288	0.013906	0.000158	0.004004	0.008569	0.036830	0.016274
0.000779	SRM610-8	0.002887	0.268884	0.001977	0.030422	0.122821	0.306250	0.243902
0.000016	AP1-8	0.000000	0.000091	0.000064	0.001487	0.001120	0.015161	0.000016
0.000006	AP2-8	0.000006	0.000078	0.000122	0.002638	0.001950	0.028292	0.000148
0.000005	AP3-8	0.000030	0.000075	0.000183	0.004027	0.002896	0.048067	0.000535

Appendix A. Raw trace element datasheets from laser ablation.

0.000007 AP4-8	0.000041	0.000118	0.000231	0.004859	0.003546	0.058148	0.000885
standardize signal averages AP							
0.000017 AP1	0.000000	0.000083	0.000074	0.001534	0.001147	0.015875	0.000018
0.000014 AP2	0.000007	0.000078	0.000139	0.002788	0.002059	0.030613	0.000160
0.000011 AP3	0.000029	0.000077	0.000199	0.004146	0.002984	0.050123	0.000542
0.000012 AP4	0.000043	0.000127	0.000259	0.005341	0.003876	0.065212	0.000905
linest from std sig ave							
5.464775	0.231519	0.004758	2.364690	0.114933	0.158277	0.009584	0.013520
standardize signal averages SRM							
0.000330 srm614-2	0.000012	0.000413	0.000083	0.002283	0.001833	0.020969	0.000308
0.000372 srm612-2	0.000267	0.013589	0.000214	0.003993	0.008405	0.036861	0.015520
0.000867 srm610-2	0.002512	0.260066	0.002133	0.029792	0.119377	0.302558	0.232892
linest from std sig ave							
0.000000	0.500221	0.019350	2.738318	0.195339	0.048919	0.019266	0.022552
concentration data							
159.42 SRM614-7	0.49	0.17	33.53	22.57	24.10	17.14	0.35
166.14 SRM612-7	4.89	5.42	54.76	39.25	111.87	30.32	17.12
447.25 SRM610-7	42.44	102.53	464.24	287.45	1573.72	245.65	257.28
39.55 AP1-7	0.06	0.14	78.98	72.55	74.08	63.42	0.11
49.56 AP2-7	0.76	0.15	147.39	134.68	136.97	125.92	0.93
33.98 AP3-7	2.50	0.15	202.97	195.56	194.05	199.50	2.96
37.16 AP4-7	4.24	0.26	271.37	267.03	265.57	276.34	4.99
68.88 GCK2-1	0.00	0.19	211.83	206.89	210.56	184.42	0.28
84.60 GCK2-2	0.00	0.13	205.12	203.07	200.20	176.92	0.22
68.29 GCK2-3	0.00	0.12	187.79	197.90	199.27	173.52	0.26
54.93 GCK2-4	0.00	0.18	142.40	148.86	151.57	126.39	0.21
69.74 GCK2-5	0.00	0.09	135.80	149.45	152.49	126.34	0.21
46.58 GCK2-6	0.00	0.08	142.15	149.92	152.19	129.39	0.20
41.03 GCK2-7	0.00	0.16	127.82	137.88	139.79	117.62	0.19
52.15 GCK2-8	0.00	0.08	126.18	138.70	141.03	117.68	0.16
38.37 GCK2-9	0.00	0.08	135.25	138.59	140.09	118.04	0.17
79.30 GCK2-10	0.03	0.09	188.99	192.99	192.88	184.41	0.28
79.95 GCK2-11	0.09	0.08	193.44	197.40	195.99	189.78	0.28
79.67 GCK2-12	0.05	0.08	201.81	196.94	196.97	191.65	0.28
77.83 GCK2-13	0.16	0.08	175.85	179.09	178.78	171.59	0.24
69.97 GCK2-14	0.00	0.05	188.71	190.17	189.94	183.28	0.26
64.96 GCK2-15	0.04	0.06	195.23	192.60	191.82	186.18	0.29
56.58 GCK2-16	0.05	0.06	164.20	172.08	171.20	159.57	0.23
44.20 GCK2-17	0.00	0.04	178.17	174.98	173.41	163.30	0.23
48.43 GCK2-18	0.01	0.04	148.53	162.71	161.89	146.10	0.19
149.62 SRM614-8	0.00	0.16	0.00	22.44	25.68	17.33	0.36
182.71 SRM612-8	5.71	5.67	31.96	39.46	116.32	30.27	18.87
365.13 SRM610-8	57.33	109.72	400.98	299.87	1667.20	251.72	282.81
33.98 AP1-8	0.00	0.17	60.73	68.16	70.73	57.97	0.09
13.31 AP2-8	0.57	0.15	115.28	120.97	123.10	108.17	0.80
11.92 AP3-8	2.77	0.14	173.00	184.66	182.84	183.77	2.88
15.11 AP4-8	3.78	0.22	218.19	222.77	223.90	222.32	4.77
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
988.69 blank-5	98.76	211.84	463.96	218.00	104.24	383.76	37.28
1809.97 SRM614-5	123.32	1873.61	771.24	6285.20	5171.75	55944.40	790.08
1835.05 SRM612-5	802.64	31219.50	1122.29	9413.05	19394.59	85762.88	33980.43
1920.77 SRM610-5	2782.02	257998.97	2820.98	31921.18	121323.88	330121.66	234827.88
1235.33 AP1-5	101.28	1842.21	2045.61	27962.60	21060.00	290964.41	428.08
1305.97 AP2-5	232.92	1612.13	2644.37	42969.16	31853.82	475441.59	2445.21
1297.89 AP3-5	1199.01	2691.78	6607.16	123315.85	88687.41	1542058.60	16482.21
1228.65 AP4-5	1884.01	4580.75	8234.85	163563.25	117881.59	2066175.00	25188.82
1409.41 GCK1-1	124.56	806.52	3582.14	63217.84	45050.65	729718.63	761.60
1468.29 GCK1-2	115.56	814.16	4198.98	74229.86	53294.58	878684.38	882.24
1257.77 GCK1-3	104.80	710.32	2959.70	49137.07	35404.60	556623.00	659.68
1391.97 GCK1-4	118.20	1106.41	4307.22	74531.02	53203.46	876851.38	902.89
1423.33 GCK1-5	130.32	994.65	4300.06	77747.84	56000.23	929949.00	856.40
1296.57 GCK1-6	104.44	741.32	2977.06	51182.01	36786.45	586170.50	649.32

Appendix A. Raw trace element datasheets from laser ablation.

1145.17	GCK1-7	110.04	789.40	1398.49	18135.46	13753.64	184331.88	279.80
1042.29	GCK1-8	79.08	428.88	1294.01	16590.37	12144.87	162114.70	240.00
1042.21	GCK1-9	86.52	478.20	1317.81	17205.26	12604.83	169789.00	233.00
1514.21	GCK1-10	131.08	701.16	4242.66	76832.15	55090.59	910302.50	846.40
1522.45	GCK1-11	98.60	533.84	3604.50	60846.06	44298.01	714166.69	691.40
1474.21	GCK1-12	105.96	502.12	3577.50	63431.48	45643.50	738710.25	720.96
1110.41	GCK1-13	89.36	514.04	1450.69	21695.56	15972.25	221714.61	357.84
1208.61	GCK1-14	98.68	485.60	1557.13	22283.89	16478.33	226402.95	409.40
1170.37	GCK1-15	111.56	430.96	1407.85	20247.56	14887.20	204530.28	378.36
1136.45	GCK1-16	73.04	793.00	1167.69	15065.65	11029.98	147861.88	268.56
1161.93	GCK1-17	111.64	659.72	1293.25	18085.98	13289.76	177431.28	333.60
1151.09	GCK1-18	88.00	626.80	1164.25	14674.48	10975.22	142853.41	321.72
1518.69	SRM614-6	101.28	953.73	617.80	3408.34	2686.74	29104.36	496.56
1595.77	SRM612-6	569.08	19783.15	782.24	5982.75	12304.31	53447.86	23828.85
1576.25	SRM610-6	2064.93	186660.33	2016.01	22705.21	87333.41	227562.72	182442.91
1154.61	AP1-6	69.92	1509.53	1362.41	18456.82	13712.04	181794.19	259.56
1111.81	AP2-6	120.64	1047.41	1736.57	27516.68	20387.28	290341.56	1635.61
1097.41	AP3-6	773.60	1661.29	3908.58	71613.04	51923.09	859651.88	9980.14
1082.25	AP4-6	818.96	1895.53	3864.14	69049.99	50304.92	832870.25	11511.31
738.80	blank-6	74.60	211.48	382.64	181.08	146.40	593.96	29.88
863.74	blank average	86.68	211.66	423.30	199.54	125.32	488.86	33.58
blank subtraction								
946.23	SRM614-5	36.64	1661.95	347.94	6085.65	5046.43	55455.53	756.50
971.31	SRM612-5	715.96	31007.83	698.98	9213.51	19269.27	85274.02	33946.85
1057.03	SRM610-5	2695.34	257787.31	2397.67	31721.64	121198.56	329632.80	234794.30
371.58	AP1-5	14.60	1630.55	1622.31	27763.06	20934.68	290475.55	394.50
442.22	AP2-5	146.24	1400.47	2221.07	42769.62	31728.50	474952.73	2411.63
434.14	AP3-5	1112.33	2480.11	6183.85	123116.31	88562.09	1541569.74	16448.63
364.90	AP4-5	1797.33	4369.08	7811.54	163363.71	117756.27	2065686.14	25155.24
545.66	GCK1-1	37.88	594.86	3158.84	63018.29	44925.33	729229.77	728.02
604.54	GCK1-2	28.88	602.50	3775.68	74030.32	53169.26	878195.52	848.66
394.02	GCK1-3	18.12	498.66	2536.39	48937.53	35279.28	556134.14	626.10
528.22	GCK1-4	31.52	894.75	3883.92	74331.48	53078.14	876362.52	869.30
559.58	GCK1-5	43.64	782.98	3876.76	77548.29	55874.91	929460.14	822.82
432.82	GCK1-6	17.76	529.66	2553.75	50982.47	36661.12	585681.64	615.74
281.42	GCK1-7	23.36	577.74	975.19	17935.92	13628.32	183843.02	246.22
178.54	GCK1-8	-7.60	217.22	870.70	16390.83	12019.55	161625.84	206.42
178.46	GCK1-9	-0.16	266.54	894.51	17005.71	12479.51	169300.14	199.42
650.46	GCK1-10	44.40	489.50	3819.36	76632.61	54965.27	909813.64	812.82
658.70	GCK1-11	11.92	322.18	3181.20	60646.52	44172.69	713677.83	657.82
610.46	GCK1-12	19.28	290.46	3154.20	63231.94	45518.18	738221.39	687.38
246.66	GCK1-13	2.68	302.38	1027.39	21496.02	15846.93	221225.75	324.26
344.86	GCK1-14	12.00	273.94	1133.83	22084.34	16353.01	225914.09	375.82
306.62	GCK1-15	24.88	219.30	984.55	20048.01	14761.88	204041.42	344.78
272.70	GCK1-16	-13.64	581.34	744.38	14866.10	10904.66	147373.02	234.98
298.18	GCK1-17	24.96	448.06	869.94	17886.44	13164.43	176942.42	300.02
287.34	GCK1-18	1.32	415.14	740.94	14474.94	10849.90	142364.55	288.14
654.94	SRM614-6	14.60	742.06	194.50	3208.80	2561.41	28615.50	462.98
732.02	SRM612-6	482.40	19571.49	358.94	5783.21	12178.99	52959.00	23795.27
712.50	SRM610-6	1978.25	186448.67	1592.71	22505.67	87208.09	227073.86	182409.33
290.86	AP1-6	-16.76	1297.87	939.11	18257.28	13586.72	181305.33	225.98
248.06	AP2-6	33.96	835.74	1313.27	27317.13	20261.95	289852.70	1602.03
233.66	AP3-6	686.92	1449.63	3485.28	71413.50	51797.77	859163.02	9946.56
218.50	AP4-6	732.28	1683.87	3440.84	68850.45	50179.60	832381.39	11477.72
zero correction								
946.23	SRM614-5	36.64	1661.95	347.94	6085.65	5046.43	55455.53	756.50
971.31	SRM612-5	715.96	31007.83	698.98	9213.51	19269.27	85274.02	33946.85
1057.03	SRM610-5	2695.34	257787.31	2397.67	31721.64	121198.56	329632.80	234794.30
371.58	AP1-5	14.60	1630.55	1622.31	27763.06	20934.68	290475.55	394.50
442.22	AP2-5	146.24	1400.47	2221.07	42769.62	31728.50	474952.73	2411.63
434.14	AP3-5	1112.33	2480.11	6183.85	123116.31	88562.09	1541569.74	16448.63
364.90	AP4-5	1797.33	4369.08	7811.54	163363.71	117756.27	2065686.14	25155.24
545.66	GCK1-1	37.88	594.86	3158.84	63018.29	44925.33	729229.77	728.02
604.54	GCK1-2	28.88	602.50	3775.68	74030.32	53169.26	878195.52	848.66
394.02	GCK1-3	18.12	498.66	2536.39	48937.53	35279.28	556134.14	626.10
528.22	GCK1-4	31.52	894.75	3883.92	74331.48	53078.14	876362.52	869.30
559.58	GCK1-5	43.64	782.98	3876.76	77548.29	55874.91	929460.14	822.82
432.82	GCK1-6	17.76	529.66	2553.75	50982.47	36661.12	585681.64	615.74
281.42	GCK1-7	23.36	577.74	975.19	17935.92	13628.32	183843.02	246.22
178.54	GCK1-8	0.00	217.22	870.70	16390.83	12019.55	161625.84	206.42
178.46	GCK1-9	0.00	266.54	894.51	17005.71	12479.51	169300.14	199.42
650.46	GCK1-10	44.40	489.50	3819.36	76632.61	54965.27	909813.64	812.82
658.70	GCK1-11	11.92	322.18	3181.20	60646.52	44172.69	713677.83	657.82
610.46	GCK1-12	19.28	290.46	3154.20	63231.94	45518.18	738221.39	687.38
246.66	GCK1-13	2.68	302.38	1027.39	21496.02	15846.93	221225.75	324.26
344.86	GCK1-14	12.00	273.94	1133.83	22084.34	16353.01	225914.09	375.82

Appendix A. Raw trace element datasheets from laser ablation.

306.62	GCK1-15	24.88	219.30	984.55	20048.01	14761.88	204041.42	344.78
272.70	GCK1-16	0.00	581.34	744.38	14866.10	10904.66	147373.02	234.98
298.18	GCK1-17	24.96	448.06	869.94	17886.44	13164.43	176942.42	300.02
287.34	GCK1-18	1.32	415.14	740.94	14474.94	10849.90	142364.55	288.14
654.94	SRM614-6	14.60	742.06	194.50	3208.80	2561.41	28615.50	462.98
732.02	SRM612-6	482.40	19571.49	358.94	5783.21	12178.99	52959.00	23795.27
712.50	SRM610-6	1978.25	186448.67	1592.71	22505.67	87208.09	227073.86	182409.33
290.86	AP1-6	0.00	1297.87	939.11	18257.28	13586.72	181305.33	225.98
248.06	AP2-6	33.96	835.74	1313.27	27317.13	20261.95	289852.70	1602.03
233.66	AP3-6	686.92	1449.63	3485.28	71413.50	51797.77	859163.02	9946.56
218.50	AP4-6	732.28	1683.87	3440.84	68850.45	50179.60	832381.39	11477.72
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000384	SRM614-5	0.000015	0.000674	0.000141	0.002469	0.002047	0.022496	0.000307
0.000436	SRM612-5	0.000321	0.013905	0.000313	0.004132	0.008641	0.038240	0.015223
0.000983	SRM610-5	0.002506	0.239695	0.002229	0.029495	0.112693	0.306499	0.218316
0.000022	AP1-5	0.000001	0.000094	0.000094	0.001609	0.001213	0.016833	0.000023
0.000031	AP2-5	0.000010	0.000099	0.000157	0.003018	0.002239	0.033517	0.000170
0.000021	AP3-5	0.000055	0.000122	0.000305	0.006068	0.004365	0.075977	0.000811
0.000020	AP4-5	0.000098	0.000238	0.000426	0.008913	0.006424	0.112697	0.0001372
0.000030	GCK1-1	0.000002	0.000033	0.000177	0.003522	0.002511	0.040754	0.000041
0.000030	GCK1-2	0.000001	0.000030	0.000190	0.003725	0.002675	0.044184	0.000043
0.000026	GCK1-3	0.000001	0.000033	0.000168	0.003250	0.002343	0.036937	0.000042
0.000028	GCK1-4	0.000002	0.000048	0.000208	0.003983	0.002844	0.046954	0.000047
0.000029	GCK1-5	0.000002	0.000041	0.000204	0.004076	0.002937	0.048852	0.000043
0.000028	GCK1-6	0.000001	0.000034	0.000163	0.003248	0.002336	0.037312	0.000039
0.000034	GCK1-7	0.000003	0.000070	0.000117	0.002160	0.001641	0.022137	0.000030
0.000022	GCK1-8	0.000000	0.000027	0.000109	0.002045	0.001499	0.020163	0.000026
0.000021	GCK1-9	0.000000	0.000032	0.000107	0.002043	0.001499	0.020335	0.000024
0.000033	GCK1-10	0.000002	0.000025	0.000196	0.003932	0.002820	0.046684	0.000042
0.000041	GCK1-11	0.000001	0.000020	0.000197	0.003752	0.002733	0.044157	0.000041
0.000036	GCK1-12	0.000001	0.000017	0.000189	0.003780	0.002721	0.044131	0.000041
0.000022	GCK1-13	0.000000	0.000027	0.000092	0.001927	0.001420	0.019827	0.000029
0.000030	GCK1-14	0.000001	0.000024	0.000100	0.001945	0.001440	0.019894	0.000033
0.000029	GCK1-15	0.000002	0.000021	0.000093	0.001886	0.001388	0.019191	0.000032
0.000033	GCK1-16	0.000000	0.000071	0.000091	0.001826	0.001339	0.018103	0.000029
0.000032	GCK1-17	0.000003	0.000047	0.000092	0.001893	0.001393	0.018726	0.000032
0.000036	GCK1-18	0.000000	0.000053	0.000094	0.001833	0.001374	0.018029	0.000036
0.000486	SRM614-6	0.000011	0.000550	0.000144	0.002379	0.001899	0.021220	0.000343
0.000516	SRM612-6	0.000340	0.013790	0.000253	0.004075	0.008582	0.037316	0.016767
0.000971	SRM610-6	0.002696	0.254051	0.002170	0.030666	0.118828	0.309407	0.248548
0.000024	AP1-6	0.000000	0.000109	0.000079	0.001531	0.001139	0.015200	0.000019
0.000024	AP2-6	0.000003	0.000082	0.000128	0.002668	0.001979	0.028311	0.000156
0.000015	AP3-6	0.000045	0.000095	0.000228	0.004679	0.003394	0.056289	0.000652
0.000020	AP4-6	0.000066	0.000152	0.000311	0.006226	0.004538	0.075273	0.001038
standardize signal averages AP								
0.000023	AP1	0.000000	0.000102	0.000086	0.001570	0.001176	0.016016	0.000021
0.000028	AP2	0.000007	0.000090	0.000143	0.002843	0.002109	0.030914	0.000163
0.000018	AP3	0.000050	0.000109	0.000267	0.005373	0.003879	0.066133	0.000731
0.000020	AP4	0.000082	0.000195	0.000369	0.007569	0.005481	0.093985	0.001205
linest from std sig ave								
3.326146		0.125680	0.003689	1.754386	0.086088	0.118820	0.006985	0.010155
standardize signal averages SRM								
0.000435	srm614-2	0.000013	0.000612	0.000143	0.002424	0.001973	0.021858	0.000325
0.000476	srm612-2	0.000330	0.013848	0.000283	0.004103	0.008611	0.037778	0.015995
0.000977	srm610-2	0.002601	0.246873	0.002200	0.030081	0.115760	0.307953	0.233432

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
0.000000	0.480889	0.020381	2.648626	0.193362	0.050454	0.018926	0.022498
concentration data							
109.50 SRM614-5	0.16	0.21	21.24	18.23	20.86	13.48	0.27
124.25 SRM612-5	3.46	4.40	47.16	30.50	88.05	22.91	13.26
280.37 SRM610-5	27.01	75.83	335.44	217.77	1148.38	183.62	190.14
28.57 AP1-5	0.04	0.14	65.80	55.25	57.50	46.91	0.09
41.41 AP2-5	0.52	0.15	109.70	103.66	106.14	93.40	0.69
28.39 AP3-5	2.75	0.18	213.31	208.39	206.90	211.72	3.28
26.42 AP4-5	4.92	0.35	298.27	306.09	304.53	314.05	5.56
40.46 GCK1-1	0.11	0.05	123.56	120.95	119.01	113.57	0.16
40.36 GCK1-2	0.07	0.04	132.95	127.92	126.80	123.13	0.17
34.73 GCK1-3	0.06	0.05	117.90	111.63	111.07	102.93	0.17
37.55 GCK1-4	0.08	0.07	145.64	136.78	134.80	130.85	0.19
39.03 GCK1-5	0.12	0.06	142.61	139.98	139.21	136.14	0.18
36.59 GCK1-6	0.06	0.05	113.87	111.55	110.71	103.98	0.16
44.97 GCK1-7	0.14	0.10	82.18	74.17	77.79	61.69	0.12
29.55 GCK1-8	0.00	0.04	76.02	70.22	71.07	56.19	0.10
28.44 GCK1-9	0.00	0.05	75.20	70.15	71.05	56.67	0.10
44.29 GCK1-10	0.11	0.04	137.16	135.04	133.69	130.09	0.17
54.08 GCK1-11	0.04	0.03	137.76	128.87	129.55	123.05	0.16
48.42 GCK1-12	0.06	0.03	131.97	129.82	128.98	122.98	0.17
29.33 GCK1-13	0.01	0.04	64.44	66.16	67.32	55.25	0.12
40.30 GCK1-14	0.05	0.04	69.88	66.79	68.26	55.44	0.13
38.27 GCK1-15	0.12	0.03	64.81	64.76	65.81	53.48	0.13
44.45 GCK1-16	0.00	0.11	64.00	62.71	63.49	50.45	0.12
41.87 GCK1-17	0.13	0.07	64.44	65.01	66.04	52.18	0.13
48.28 GCK1-18	0.01	0.08	65.67	62.95	65.13	50.24	0.15
138.54 SRM614-6	0.12	0.17	21.70	17.57	19.36	12.71	0.30
147.14 SRM612-6	3.66	4.36	38.05	30.09	87.45	22.36	14.60
276.94 SRM610-6	29.05	80.37	326.53	226.41	1210.90	185.36	216.47
32.36 AP1-6	0.00	0.16	55.10	52.57	53.99	42.36	0.08
32.15 AP2-6	0.17	0.12	89.77	91.63	93.81	78.89	0.63
20.31 AP3-6	2.26	0.14	159.81	160.68	160.86	156.86	2.64
26.22 AP4-6	3.32	0.22	217.78	213.83	215.10	209.76	4.20
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
384.48 blank-1	68.64	144.32	222.44	116.00	95.40	93.68	38.92
1454.89 SRM614-1	130.88	1909.49	883.48	6853.20	5689.71	61223.11	864.96
1631.69 SRM612-1	835.56	30553.05	1169.37	10049.74	19501.31	92040.04	36022.24
1964.21 SRM610-1	3120.62	237842.63	3011.06	33022.27	114669.16	336233.91	240887.83
1102.53 AP1-1	106.28	1477.53	2113.17	30366.57	22262.29	308008.22	446.40
1125.81 AP2-1	273.20	1216.93	3503.58	57404.20	42130.60	639427.19	3142.30
1150.29 AP3-1	1428.61	2727.34	7373.44	136623.53	98804.12	1662062.30	18953.83
1178.57 AP4-1	1661.69	3634.18	7486.72	142135.64	102845.10	1734665.60	23585.77
991.05 V2-1	115.96	649.88	2142.25	31902.34	23523.53	334563.78	416.12
997.33 V2-2	81.52	487.60	1941.77	27506.83	20097.15	281182.06	347.96
835.76 V2-3	91.12	464.64	1670.73	22338.21	16234.53	223515.30	285.40
954.25 V2-4	136.76	1464.61	2143.89	32417.14	23743.37	338385.47	555.36
943.77 V2-5	102.12	813.24	2695.86	45887.82	33228.71	510775.84	595.96
929.89 V2-6	105.84	1107.81	2785.74	45351.90	32886.95	510856.50	549.96
840.72 V2-7	113.60	2995.86	1787.45	24531.18	18884.07	246442.39	473.08
977.37 V2-8	101.68	1037.01	1666.81	22417.49	16560.73	225021.67	334.88
899.13 V2-9	91.52	1170.69	1482.89	19928.67	15043.69	201149.66	274.44
880.96 V2-10	103.00	1678.37	1473.65	18870.43	14292.28	188453.17	384.44
829.48 V2-11	83.56	951.29	1263.61	16741.90	12368.39	162016.67	237.84
793.92 V2-12	104.56	1128.69	1324.17	16024.81	11998.59	155975.59	237.08
1063.21 V2-13	185.40	2122.01	5768.83	106043.28	77072.84	1263899.50	1777.49
1057.69 V2-14	176.40	931.21	5984.19	110757.46	79503.69	1332199.40	1706.25
1133.17 V2-15	179.60	1107.81	6664.00	124327.94	89387.55	1508824.40	1892.45
1159.77 SRM614-2	127.76	994.45	653.00	3934.70	3020.58	33738.99	502.44
1360.13 SRM612-2	765.16	24653.18	949.65	7414.76	15347.65	66181.66	27937.60
1624.81 SRM610-2	2860.18	229158.69	2578.77	27734.80	106314.44	278608.50	207062.25
995.13 AP1-2	98.36	1322.21	1543.65	19898.15	14862.20	197323.52	264.60
888.45 AP2-2	200.24	975.09	2303.93	35678.36	26207.23	377848.81	2014.41
887.25 AP3-2	728.52	1131.57	3284.82	55967.59	40887.19	632354.50	7744.72
895.17 AP4-2	1072.97	2100.57	4600.03	82376.10	59805.62	983179.56	14435.80

Appendix A. Raw trace element datasheets from laser ablation.

741.24 blank-2	84.52	237.24	397.04	222.80	190.16	954.33	41.00
562.86 blank average	76.58	190.78	309.74	169.40	142.78	524.00	39.96

blank subtraction							
892.03 SRM614-1	54.30	1718.71	573.74	6683.80	5546.93	60699.10	825.00
1068.83 SRM612-1	758.98	30362.27	859.62	9880.34	19358.53	91516.04	35982.28
1401.35 SRM610-1	3044.04	237651.85	2701.32	32852.87	114526.38	335709.91	240847.87
539.66 AP1-1	29.70	1286.75	1803.43	30197.17	22119.50	307484.22	406.44
562.94 AP2-1	196.62	1026.15	3193.84	57234.80	41987.82	638903.19	3102.34
587.42 AP3-1	1352.03	2536.55	7063.70	136454.13	98661.34	1661538.30	18913.87
615.70 AP4-1	1585.11	3443.40	7176.98	141966.24	102702.32	1734141.60	23545.81
428.18 V2-1	39.38	459.10	1832.51	31732.94	23380.75	334039.78	376.16
434.46 V2-2	4.94	296.82	1632.03	27337.43	19954.37	280658.06	308.00
272.90 V2-3	14.54	273.86	1360.99	22168.81	16091.75	222991.30	245.44
391.38 V2-4	60.18	1273.83	1834.15	32247.74	23600.59	337861.47	515.40
380.90 V2-5	25.54	622.46	2386.11	45718.42	33085.93	510251.84	556.00
367.02 V2-6	29.26	917.03	2475.99	45182.49	32744.16	510332.50	510.00
277.86 V2-7	37.02	2805.08	1477.71	24361.78	18741.29	245918.39	433.12
414.50 V2-8	25.10	846.22	1357.07	22248.09	16417.95	224497.67	294.92
336.26 V2-9	14.94	979.91	1173.15	19759.27	14900.90	200625.66	234.48
318.10 V2-10	26.42	1487.59	1163.91	18701.03	14149.50	187929.17	344.48
266.62 V2-11	6.98	760.50	953.87	16572.49	12225.61	161492.67	197.88
231.06 V2-12	27.98	937.91	1014.43	15855.41	11855.81	155451.59	197.12
500.34 V2-13	108.82	1931.23	5459.09	105873.88	76930.06	1263375.50	1737.53
494.82 V2-14	99.82	740.42	5674.45	110588.06	79360.91	1331675.40	1666.29
570.30 V2-15	103.02	917.03	6354.26	124158.54	89244.77	1508300.40	1852.49
596.90 SRM614-2	51.18	803.66	343.26	3765.30	2877.80	33214.99	462.48
797.26 SRM612-2	688.58	24462.40	639.90	7245.36	15204.87	65657.65	27897.64
1061.95 SRM610-2	2783.60	228967.91	2269.03	27565.40	106171.66	278084.50	207022.29
432.26 AP1-2	21.78	1131.43	1233.91	19728.75	14719.42	196799.52	224.64
325.58 AP2-2	123.66	784.30	1994.19	35508.96	26064.45	377324.81	1974.45
324.38 AP3-2	651.94	940.79	2975.08	55798.19	40744.41	631830.50	7704.76
332.30 AP4-2	996.39	1909.79	4290.28	82206.70	59662.84	982655.56	14395.84

zero correction							
892.03 SRM614-1	54.30	1718.71	573.74	6683.80	5546.93	60699.10	825.00
1068.83 SRM612-1	758.98	30362.27	859.62	9880.34	19358.53	91516.04	35982.28
1401.35 SRM610-1	3044.04	237651.85	2701.32	32852.87	114526.38	335709.91	240847.87
539.66 AP1-1	29.70	1286.75	1803.43	30197.17	22119.50	307484.22	406.44
562.94 AP2-1	196.62	1026.15	3193.84	57234.80	41987.82	638903.19	3102.34
587.42 AP3-1	1352.03	2536.55	7063.70	136454.13	98661.34	1661538.30	18913.87
615.70 AP4-1	1585.11	3443.40	7176.98	141966.24	102702.32	1734141.60	23545.81
428.18 V2-1	39.38	459.10	1832.51	31732.94	23380.75	334039.78	376.16
434.46 V2-2	4.94	296.82	1632.03	27337.43	19954.37	280658.06	308.00
272.90 V2-3	14.54	273.86	1360.99	22168.81	16091.75	222991.30	245.44
391.38 V2-4	60.18	1273.83	1834.15	32247.74	23600.59	337861.47	515.40
380.90 V2-5	25.54	622.46	2386.11	45718.42	33085.93	510251.84	556.00
367.02 V2-6	29.26	917.03	2475.99	45182.49	32744.16	510332.50	510.00
277.86 V2-7	37.02	2805.08	1477.71	24361.78	18741.29	245918.39	433.12
414.50 V2-8	25.10	846.22	1357.07	22248.09	16417.95	224497.67	294.92
336.26 V2-9	14.94	979.91	1173.15	19759.27	14900.90	200625.66	234.48
318.10 V2-10	26.42	1487.59	1163.91	18701.03	14149.50	187929.17	344.48
266.62 V2-11	6.98	760.50	953.87	16572.49	12225.61	161492.67	197.88
231.06 V2-12	27.98	937.91	1014.43	15855.41	11855.81	155451.59	197.12
500.34 V2-13	108.82	1931.23	5459.09	105873.88	76930.06	1263375.50	1737.53
494.82 V2-14	99.82	740.42	5674.45	110588.06	79360.91	1331675.40	1666.29
570.30 V2-15	103.02	917.03	6354.26	124158.54	89244.77	1508300.40	1852.49
596.90 SRM614-2	51.18	803.66	343.26	3765.30	2877.80	33214.99	462.48
797.26 SRM612-2	688.58	24462.40	639.90	7245.36	15204.87	65657.65	27897.64
1061.95 SRM610-2	2783.60	228967.91	2269.03	27565.40	106171.66	278084.50	207022.29
432.26 AP1-2	21.78	1131.43	1233.91	19728.75	14719.42	196799.52	224.64
325.58 AP2-2	123.66	784.30	1994.19	35508.96	26064.45	377324.81	1974.45
324.38 AP3-2	651.94	940.79	2975.08	55798.19	40744.41	631830.50	7704.76
332.30 AP4-2	996.39	1909.79	4290.28	82206.70	59662.84	982655.56	14395.84

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246

Appendix A. Raw trace element datasheets from laser ablation.

0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000356	SRM614-1	0.000022	0.000685	0.000229	0.002665	0.002212	0.024207	0.000329
0.000478	SRM612-1	0.000340	0.013585	0.000385	0.004421	0.008662	0.040948	0.016100
0.001341	SRM610-1	0.002914	0.227475	0.002586	0.031446	0.109622	0.321333	0.230534
0.000032	AP1-1	0.000002	0.000076	0.000106	0.001775	0.001300	0.018072	0.000024
0.000033	AP2-1	0.000011	0.000059	0.000185	0.003317	0.002433	0.037024	0.000180
0.000028	AP3-1	0.000064	0.000121	0.000336	0.006495	0.004696	0.079087	0.000900
0.000031	AP4-1	0.000079	0.000172	0.000358	0.007072	0.005116	0.086385	0.001173
0.000047	V2-1	0.000004	0.000051	0.000203	0.003516	0.002590	0.037008	0.000042
0.000055	V2-2	0.000001	0.000037	0.000205	0.003432	0.002505	0.035236	0.000039
0.000041	V2-3	0.000002	0.000041	0.000206	0.003358	0.002438	0.033778	0.000037
0.000047	V2-4	0.000007	0.000152	0.000219	0.003853	0.002820	0.040364	0.000062
0.000042	V2-5	0.000003	0.000069	0.000265	0.005070	0.003669	0.056590	0.000062
0.000041	V2-6	0.000003	0.000102	0.000276	0.005034	0.003648	0.056860	0.000057
0.000045	V2-7	0.000006	0.000455	0.000240	0.003949	0.003038	0.039860	0.000070
0.000069	V2-8	0.000004	0.000142	0.000227	0.003722	0.002746	0.037554	0.000049
0.000064	V2-9	0.000003	0.000185	0.000222	0.003732	0.002814	0.037890	0.000044
0.000062	V2-10	0.000005	0.000291	0.000228	0.003662	0.002771	0.036798	0.000067
0.000057	V2-11	0.000002	0.000164	0.000205	0.003567	0.002631	0.034758	0.000043
0.000052	V2-12	0.000006	0.000210	0.000227	0.003546	0.002652	0.034770	0.000044
0.000028	V2-13	0.000006	0.000108	0.000306	0.005925	0.004305	0.070704	0.000097
0.000027	V2-14	0.000005	0.000040	0.000309	0.006021	0.004321	0.072503	0.000091
0.000029	V2-15	0.000005	0.000046	0.000319	0.006231	0.004479	0.075696	0.000093
0.000395	SRM614-2	0.000034	0.000531	0.000227	0.002490	0.001903	0.021964	0.000306
0.000465	SRM612-2	0.000401	0.014253	0.000373	0.004221	0.008859	0.038255	0.016254
0.001187	SRM610-2	0.003111	0.255899	0.002536	0.030808	0.118660	0.310793	0.231372
0.000035	AP1-2	0.000002	0.000093	0.000101	0.001613	0.001203	0.016091	0.000018
0.000026	AP2-2	0.000010	0.000063	0.000160	0.002847	0.002089	0.030249	0.000158
0.000025	AP3-2	0.000051	0.000073	0.000231	0.004325	0.003158	0.048977	0.000597
0.000022	AP4-2	0.000067	0.000129	0.000289	0.005541	0.004021	0.066235	0.000970

standardize signal averages AP								
0.000034	AP1	0.000002	0.000084	0.000103	0.001694	0.001252	0.017081	0.000021
0.000029	AP2	0.000011	0.000061	0.000172	0.003082	0.002261	0.033636	0.000169
0.000027	AP3	0.000057	0.000097	0.000283	0.005410	0.003927	0.064032	0.000749
0.000027	AP4	0.000073	0.000150	0.000323	0.006306	0.004569	0.076310	0.001072

linest from std sig ave								
2.568875		0.128881	0.004675	1.811499	0.094894	0.130681	0.007991	0.010895

standardize signal averages SRM								
0.000375	srM614-2	0.000028	0.000608	0.000228	0.002578	0.002058	0.023085	0.000317
0.000471	srM612-2	0.000370	0.013919	0.000379	0.004321	0.008760	0.039601	0.016177
0.001264	srM610-2	0.003012	0.241687	0.002561	0.031127	0.114141	0.316063	0.230953

linest from std sig ave								
0.000000		0.415594	0.020817	2.266528	0.186779	0.051172	0.018433	0.022738

concentration data								
78.37	SRM614-1	0.24	0.27	35.55	21.69	24.79	16.59	0.31
105.36	SRM612-1	3.75	5.45	59.76	35.98	97.08	28.06	15.04
295.52	SRM610-1	32.21	91.21	401.70	255.92	1228.59	220.22	215.41
32.51	AP1-1	0.09	0.14	76.60	67.19	67.78	57.61	0.10
33.43	AP2-1	0.59	0.11	133.75	125.56	126.85	118.03	0.78
28.65	AP3-1	3.31	0.23	242.98	245.88	244.83	252.12	3.91
31.43	AP4-1	4.06	0.32	258.37	267.72	266.71	275.38	5.10
48.62	V2-1	0.22	0.09	146.72	133.09	135.04	117.98	0.18
55.90	V2-2	0.03	0.07	148.08	129.93	130.61	112.33	0.17
42.36	V2-3	0.11	0.08	148.99	127.13	127.08	107.68	0.16
47.92	V2-4	0.37	0.28	158.35	145.85	146.99	128.67	0.27
43.29	V2-5	0.15	0.13	191.25	191.95	191.30	180.40	0.27
41.91	V2-6	0.17	0.19	199.36	190.57	190.20	181.26	0.25
46.15	V2-7	0.31	0.85	173.09	149.48	158.36	127.07	0.31
71.06	V2-8	0.22	0.26	164.05	140.89	143.18	119.71	0.21
65.08	V2-9	0.15	0.35	160.12	141.27	146.71	120.79	0.19
63.83	V2-10	0.27	0.54	164.70	138.62	144.44	117.31	0.29
58.81	V2-11	0.08	0.31	148.37	135.03	137.18	110.80	0.19
52.96	V2-12	0.32	0.39	163.97	134.25	138.24	110.84	0.19
28.70	V2-13	0.31	0.20	220.79	224.31	224.45	225.39	0.42
27.61	V2-14	0.28	0.08	223.27	227.93	225.26	231.13	0.39
29.33	V2-15	0.27	0.09	230.46	235.89	233.50	241.31	0.40
86.96	SRM614-2	0.37	0.21	35.26	20.26	21.33	15.05	0.29
102.34	SRM612-2	4.43	5.71	57.92	34.36	99.29	26.22	15.19

Appendix A. Raw trace element datasheets from laser ablation.

261.48	SRM610-2	34.39	102.61	393.98	250.72	1329.88	212.99	216.19
36.22	AP1-2	0.09	0.17	72.91	61.06	62.74	51.29	0.08
26.75	AP2-2	0.51	0.12	115.53	107.76	108.93	96.43	0.69
25.77	AP3-2	2.60	0.14	166.66	163.74	164.66	156.13	2.60
22.95	AP4-2	3.45	0.24	208.98	209.76	209.65	211.15	4.22
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
466.64	blank-23	103.00	293.52	456.44	217.64	123.16	91.36	27.92
671.04	SRM614-23	123.72	1056.65	713.28	4083.58	3284.42	35482.48	486.12
844.60	SRM612-23	514.52	22181.37	953.41	7394.08	14104.20	66939.30	20391.52
788.24	SRM610-23	1469.85	132761.19	2090.13	19196.83	65407.49	189120.42	121122.09
607.08	AP1-23	107.92	1417.33	1195.17	14799.16	11115.98	14179.16	317.68
558.60	AP2-23	201.20	1293.61	2429.61	37532.13	27413.48	407194.09	2010.05
636.44	AP3-23	442.24	1251.37	3370.78	56586.04	41047.91	658214.69	6052.27
611.16	AP4-23	589.04	1824.85	4010.46	70051.71	50662.65	838211.50	9860.74
804.56	34HP45-494-1	194.08	7298.72	4745.07	83710.91	62873.56	1042678.90	87236.81
766.44	34HP45-494-2	180.84	3923.06	3859.26	70455.23	51686.53	859844.31	54367.03
779.76	34HP45-494-3	189.24	7277.08	4242.62	77279.27	58671.97	952906.38	85475.12
1000.97	34HP45-494-4	180.60	12857.55	9453.85	191288.88	140462.39	2548896.30	31123.78
884.92	34HP45-494-5	167.76	5464.19	9524.01	197539.00	140904.91	2637354.80	59766.22
902.73	34HP45-494-6	168.12	7342.88	8046.09	160663.78	116590.02	2142277.30	42170.00
795.44	34HP45-494-7	185.32	7231.88	7179.60	140046.98	101434.70	1850947.80	48587.59
900.45	34HP45-494-8	157.00	11090.82	6465.72	123884.90	91687.27	1610295.00	25294.34
887.33	34HP45-494-9	141.08	9064.81	5833.95	110024.74	81674.46	1422421.80	29950.77
1160.61	34HP45-494-10	239.76	9935.98	9318.57	197273.16	142408.13	2631319.00	159631.34
1113.77	34HP45-494-11	243.00	5743.63	9865.70	204999.67	145243.78	2744233.00	142056.31
1220.53	34HP45-494-12	269.04	6926.96	11622.19	254969.95	180312.30	3431987.00	165857.13
829.56	34HP45-494-13	172.68	8067.89	6289.60	120186.88	89139.74	1588693.80	42523.72
837.48	34HP45-494-14	197.92	8807.45	7813.64	157115.33	114401.77	2103515.00	41606.59
772.84	34HP45-494-15	165.80	6848.72	7162.72	140469.75	102257.22	1877002.90	42379.36
815.08	34HP45-494-16	153.20	3132.74	8111.61	166817.22	118830.31	2259746.50	3342.18
801.76	34HP45-494-17	120.20	4821.15	8697.09	177574.48	126905.55	2403324.50	3724.86
922.41	34HP45-494-18	169.44	3542.02	9302.17	191396.59	135624.36	2608917.50	3278.86
867.16	SRM614-24	101.28	866.04	537.80	3306.58	2662.81	28521.16	451.88
883.92	SRM612-24	557.20	16883.98	710.84	5340.95	10338.14	46953.38	19424.91
952.45	SRM610-24	1927.05	125415.95	1771.65	16666.25	59901.18	165633.25	133536.44
647.24	AP1-24	91.20	1401.49	961.61	11893.31	9051.13	113879.64	185.24
631.92	AP2-24	167.72	1146.65	1782.33	27663.04	20174.40	296566.50	1663.41
607.04	AP3-24	506.84	1381.05	2810.02	48695.20	35225.20	573696.38	5838.03
532.16	AP4-24	581.20	1648.05	3215.94	56637.40	41198.19	683625.25	9043.13
397.64	blank-24	94.60	406.68	340.24	427.28	401.32	2202.89	35.92
432.14	blank average	98.80	350.10	398.34	322.46	262.24	1147.13	31.92

blank subtraction								
238.90	SRM614-23	24.92	706.54	314.94	3761.12	3022.18	34335.35	454.20
412.46	SRM612-23	415.72	21831.26	555.06	7071.62	13841.96	65792.17	20359.60
356.10	SRM610-23	1371.05	132411.09	1691.79	18874.37	65145.25	187973.29	121090.17
174.94	AP1-23	9.12	1067.23	796.82	14476.70	10853.74	140651.03	285.76
126.46	AP2-23	102.40	943.51	2031.27	37209.67	27151.23	406046.96	1978.13
204.30	AP3-23	343.44	901.27	2972.44	56263.58	40785.67	657067.56	6020.35
179.02	AP4-23	490.24	1474.75	3612.12	69729.25	50400.40	837064.37	9828.82
372.42	34HP45-494-1	95.28	6948.62	4346.72	83388.44	62611.31	1041531.77	87204.89
334.30	34HP45-494-2	82.04	3572.96	3460.92	70132.77	51424.29	858697.18	54335.11
347.62	34HP45-494-3	90.44	6926.98	3844.28	76956.81	58409.73	951759.25	85443.20
568.82	34HP45-494-4	81.80	12507.45	9055.51	190966.42	140200.15	2547749.17	31091.85
452.78	34HP45-494-5	68.96	5114.09	9125.67	197216.54	140642.67	2636207.67	59734.29
470.58	34HP45-494-6	69.32	6992.78	7647.74	160341.32	116327.78	2141130.17	42138.08
363.30	34HP45-494-7	86.52	6881.78	6781.26	139724.52	101172.46	1849800.67	48555.67
468.30	34HP45-494-8	58.20	10740.72	6067.37	123562.44	91425.03	1609147.87	25262.42
455.18	34HP45-494-9	42.28	8714.71	5435.61	109702.28	81412.22	1421274.67	29918.85
728.46	34HP45-494-10	140.96	9585.87	8920.23	196950.70	142145.89	2630171.87	159599.42
681.62	34HP45-494-11	144.20	5393.53	9467.35	204677.21	144981.54	2743085.87	142024.39
788.38	34HP45-494-12	170.24	6576.86	11223.84	254647.49	180050.06	3430839.87	165825.21
397.42	34HP45-494-13	73.88	7717.78	5891.25	119864.42	88877.50	1587546.67	42491.80
405.34	34HP45-494-14	99.12	8457.35	7415.30	156792.87	114139.53	2102367.87	41574.67
340.70	34HP45-494-15	67.00	6498.62	6764.38	140147.29	101994.98	1875855.77	42347.44
382.94	34HP45-494-16	54.40	2782.64	7713.26	166494.76	118568.07	2258599.37	3310.26
369.62	34HP45-494-17	21.40	4471.05	8298.75	177252.02	126643.31	2402177.37	3692.94

Appendix A. Raw trace element datasheets from laser ablation.

490.26	34HP45-494-18	70.64	3191.92	8903.83	191074.13	135362.12	2607770.37	3246.94
435.02	SRM614-24	2.48	515.94	139.46	2984.12	2400.57	27374.03	419.96
451.78	SRM612-24	458.40	16533.87	312.50	5018.49	10075.90	45806.26	19392.99
520.30	SRM610-24	1828.25	125065.85	1373.31	16343.79	59638.94	164486.12	133504.52
215.10	AP1-24	-7.60	1051.39	563.26	11570.85	8788.89	112732.51	153.32
199.78	AP2-24	68.92	796.54	1383.99	27340.57	19912.15	295419.37	1631.49
174.90	AP3-24	408.04	1030.95	2411.67	48372.73	34962.96	572549.25	5806.11
100.02	AP4-24	482.40	1297.95	2817.60	56314.94	40935.95	682478.12	9011.21
zero correction								
238.90	SRM614-23	24.92	706.54	314.94	3761.12	3022.18	34335.35	454.20
412.46	SRM612-23	415.72	21831.26	555.06	7071.62	13841.96	65792.17	20359.60
356.10	SRM610-23	1371.05	132411.09	1691.79	18874.37	65145.25	187973.29	121090.17
174.94	AP1-23	9.12	1067.23	796.82	14476.70	10853.74	140651.03	285.76
126.46	AP2-23	102.40	943.51	2031.27	37209.67	27151.23	406046.96	1978.13
204.30	AP3-23	343.44	901.27	2972.44	56263.58	40785.67	657067.56	6020.35
179.02	AP4-23	490.24	1474.75	3612.12	69729.25	50400.40	837064.37	9828.82
372.42	34HP45-494-1	95.28	6948.62	4346.72	83388.44	62611.31	1041531.77	87204.89
334.30	34HP45-494-2	82.04	3572.96	3460.92	70132.77	51424.29	858697.18	54335.11
347.62	34HP45-494-3	90.44	6926.98	3844.28	76956.81	58409.73	951759.25	85443.20
568.82	34HP45-494-4	81.80	12507.45	9055.51	190966.42	140200.15	2547749.17	31091.85
452.78	34HP45-494-5	68.96	5114.09	9125.67	197216.54	140642.67	2636207.67	59734.29
470.58	34HP45-494-6	69.32	6992.78	7647.74	160341.32	116327.78	2141130.17	42138.08
363.30	34HP45-494-7	86.52	6881.78	6781.26	139724.52	101172.46	1849800.67	48555.67
468.30	34HP45-494-8	58.20	10740.72	6067.37	123562.44	91425.03	1609147.87	25262.42
455.18	34HP45-494-9	42.28	8714.71	5435.61	109702.28	81412.22	1421274.67	29918.85
728.46	34HP45-494-10	140.96	9585.87	8920.23	196950.70	142145.89	2630171.87	159599.42
681.62	34HP45-494-11	144.20	5393.53	9467.35	204677.21	144981.54	2743085.87	142024.39
788.38	34HP45-494-12	170.24	6576.86	11223.84	254647.49	180050.06	3430839.87	165825.21
397.42	34HP45-494-13	73.88	7717.78	5891.25	119864.42	88877.50	1587546.67	42491.80
405.34	34HP45-494-14	99.12	8457.35	7415.30	156792.87	114139.53	2102367.87	41574.67
340.70	34HP45-494-15	67.00	6498.62	6764.38	140147.29	101994.98	1875855.77	42347.44
382.94	34HP45-494-16	54.40	2782.64	7713.26	166494.76	118568.07	2258599.37	3310.26
369.62	34HP45-494-17	21.40	4471.05	8298.75	177252.02	126643.31	2402177.37	3692.94
490.26	34HP45-494-18	70.64	3191.92	8903.83	191074.13	135362.12	2607770.37	3246.94
435.02	SRM614-24	2.48	515.94	139.46	2984.12	2400.57	27374.03	419.96
451.78	SRM612-24	458.40	16533.87	312.50	5018.49	10075.90	45806.26	19392.99
520.30	SRM610-24	1828.25	125065.85	1373.31	16343.79	59638.94	164486.12	133504.52
215.10	AP1-24	0.00	1051.39	563.26	11570.85	8788.89	112732.51	153.32
199.78	AP2-24	68.92	796.54	1383.99	27340.57	19912.15	295419.37	1631.49
174.90	AP3-24	408.04	1030.95	2411.67	48372.73	34962.96	572549.25	5806.11
100.02	AP4-24	482.40	1297.95	2817.60	56314.94	40935.95	682478.12	9011.21
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000115	SRM614-23	0.000012	0.000340	0.000152	0.001810	0.001454	0.016520	0.000219
0.000212	SRM612-23	0.000214	0.011214	0.000285	0.003632	0.007110	0.033794	0.010458
0.000491	SRM610-23	0.001892	0.182715	0.002335	0.026045	0.089895	0.259386	0.167094
0.000017	AP1-23	0.000001	0.000106	0.000079	0.001433	0.001075	0.013927	0.000028
0.000009	AP2-23	0.000008	0.000070	0.000150	0.002743	0.002002	0.029932	0.000146
0.000014	AP3-23	0.000023	0.000060	0.000197	0.003733	0.002706	0.043598	0.000399
0.000012	AP4-23	0.000033	0.000099	0.000242	0.004663	0.003371	0.055982	0.000657
0.000025	34HP45-494-1	0.000006	0.000458	0.000286	0.005491	0.004123	0.068586	0.005743
0.000025	34HP45-494-2	0.000006	0.000269	0.000261	0.005281	0.003872	0.064656	0.004091
0.000028	34HP45-494-3	0.000007	0.000552	0.000306	0.006134	0.004656	0.075860	0.006810
0.000040	34HP45-494-4	0.000006	0.000890	0.000644	0.013586	0.009974	0.181254	0.002212
0.000032	34HP45-494-5	0.000005	0.000364	0.000650	0.014040	0.010012	0.187668	0.004252
0.000038	34HP45-494-6	0.000006	0.000559	0.000612	0.012827	0.009306	0.171283	0.003371
0.000032	34HP45-494-7	0.000008	0.000608	0.000599	0.012351	0.008943	0.163513	0.004292
0.000046	34HP45-494-8	0.000006	0.001054	0.000596	0.012128	0.008973	0.157939	0.002480
0.000046	34HP45-494-9	0.000004	0.000889	0.000555	0.011193	0.008306	0.145009	0.003053

Appendix A. Raw trace element datasheets from laser ablation.

0.000058	34HP45-494-10	0.000011	0.000759	0.000706	0.015586	0.011249	0.208148	0.012630
0.000050	34HP45-494-11	0.000011	0.000395	0.000693	0.014980	0.010611	0.200759	0.010394
0.000057	34HP45-494-12	0.000012	0.000474	0.000808	0.018333	0.012963	0.247003	0.011939
0.000032	34HP45-494-13	0.000006	0.000628	0.000479	0.009747	0.007227	0.129099	0.003455
0.000031	34HP45-494-14	0.000008	0.000654	0.000574	0.012130	0.008830	0.162645	0.003216
0.000025	34HP45-494-15	0.000005	0.000486	0.000506	0.010479	0.007626	0.140254	0.003166
0.000035	34HP45-494-16	0.000005	0.000251	0.000697	0.015040	0.010711	0.204033	0.000299
0.000031	34HP45-494-17	0.000002	0.000371	0.000689	0.014710	0.010510	0.199350	0.000306
0.000037	34HP45-494-18	0.000005	0.000239	0.000666	0.014295	0.010127	0.195092	0.000243
0.000326	SRM614-24	0.000002	0.000387	0.000105	0.002238	0.001800	0.020531	0.000315
0.000349	SRM612-24	0.000354	0.012759	0.000241	0.003873	0.007776	0.035349	0.014965
0.000990	SRM610-24	0.003479	0.237964	0.002613	0.031098	0.113476	0.312970	0.254021
0.000025	AP1-24	0.000000	0.000121	0.000065	0.001331	0.001011	0.012969	0.000018
0.000017	AP2-24	0.000006	0.000069	0.000120	0.002368	0.001724	0.025582	0.000141
0.000013	AP3-24	0.000031	0.000079	0.000186	0.003727	0.002694	0.044117	0.000447
0.000008	AP4-24	0.000038	0.000101	0.000219	0.004381	0.003184	0.053089	0.000701
standardize signal averages AP								
0.000021	AP1	0.000000	0.000113	0.000072	0.001382	0.001043	0.013448	0.000023
0.000013	AP2	0.000007	0.000069	0.000135	0.002555	0.001863	0.027757	0.000144
0.000014	AP3	0.000027	0.000070	0.000192	0.003730	0.002700	0.043857	0.000423
0.000010	AP4	0.000035	0.000100	0.000230	0.004522	0.003278	0.054536	0.000679
linest from std sig ave								
4.857620		0.268903	0.004163	2.558084	0.131456	0.181091	0.011189	0.017713
standardize signal averages SRM								
0.000221	sr614-2	0.000007	0.000363	0.000128	0.002024	0.001627	0.018526	0.000267
0.000280	sr612-2	0.000284	0.011986	0.000263	0.003753	0.007443	0.034571	0.012712
0.000741	sr610-2	0.002685	0.210340	0.002474	0.028571	0.101685	0.286178	0.210557
linest from std sig ave								
0.000000		0.468075	0.023920	2.360441	0.203815	0.057434	0.020375	0.024951
concentration data								
47.89	SRM614-23	0.28	0.12	33.24	20.40	22.58	15.85	0.33
88.26	SRM612-23	4.92	4.00	62.55	40.95	110.42	32.43	15.89
204.71	SRM610-23	43.63	65.23	512.17	293.63	1396.15	248.92	253.83
33.57	AP1-23	0.10	0.18	80.52	75.17	77.64	62.17	0.20
18.07	AP2-23	0.81	0.12	152.81	143.85	144.60	133.61	1.03
26.27	AP3-23	2.44	0.10	201.27	195.78	195.51	194.62	2.82
23.20	AP4-23	3.52	0.16	246.53	244.56	243.52	249.90	4.64
47.53	34HP45-494-1	0.67	0.76	292.11	287.97	297.86	306.16	40.58
48.78	34HP45-494-2	0.66	0.45	265.94	276.93	279.73	288.62	28.91
53.69	34HP45-494-3	0.77	0.92	312.70	321.68	336.34	338.63	48.12
78.42	34HP45-494-4	0.62	1.48	657.45	712.48	720.58	809.10	15.63
62.46	34HP45-494-5	0.53	0.60	662.97	736.27	723.32	837.73	30.05
72.95	34HP45-494-6	0.59	0.93	624.34	672.66	672.29	764.58	23.82
62.23	34HP45-494-7	0.82	1.01	611.72	647.71	646.09	729.90	30.33
89.07	34HP45-494-8	0.61	1.75	607.73	636.01	648.28	705.02	17.52
90.00	34HP45-494-9	0.46	1.48	565.96	586.97	600.08	647.30	21.57
111.72	34HP45-494-10	1.20	1.26	720.41	817.39	812.68	929.14	89.25
96.67	34HP45-494-11	1.13	0.66	707.10	785.57	766.56	896.16	73.45
109.99	34HP45-494-12	1.31	0.79	824.64	961.45	936.48	1102.59	84.36
62.63	34HP45-494-13	0.64	1.04	488.90	511.17	522.14	576.28	24.42
60.77	34HP45-494-14	0.82	1.09	585.43	636.12	637.92	726.02	22.73
49.36	34HP45-494-15	0.54	0.81	516.13	549.52	550.93	626.08	22.37
67.04	34HP45-494-16	0.53	0.42	711.08	788.76	773.80	910.78	2.11
59.44	34HP45-494-17	0.19	0.62	702.81	771.41	759.26	889.87	2.17
71.08	34HP45-494-18	0.57	0.40	679.77	749.64	731.59	870.86	1.72
135.93	SRM614-24	0.04	0.14	22.95	25.23	27.96	19.70	0.48
145.24	SRM612-24	8.16	4.55	52.91	43.66	120.76	33.92	22.73
412.43	SRM610-24	80.22	84.95	573.27	350.59	1762.38	300.34	385.88
47.95	AP1-24	0.00	0.20	66.13	69.81	73.05	57.89	0.12
33.53	AP2-24	0.64	0.11	122.31	124.16	124.57	114.20	1.00
26.12	AP3-24	3.37	0.13	189.64	195.47	194.62	196.93	3.16
15.08	AP4-24	4.03	0.17	223.67	229.73	230.05	236.98	4.95
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br Se Rb Sr84 Sr86 Sr87 Sr88 Y

Appendix A. Raw trace element datasheets from laser ablation.

raw data								
476.12	blank-21	124.48	247.04	620.60	239.64	122.72	230.60	34.52
616.56	SRM614-21	121.08	833.92	700.60	2763.70	2121.97	22675.77	354.44
848.88	SRM612-21	440.48	23545.81	1018.65	7301.72	14971.16	66930.38	17510.22
911.33	SRM610-21	1713.49	193069.80	2586.81	25042.34	91503.76	251852.17	143964.94
647.16	AP1-21	129.64	1959.97	1377.85	16164.53	12038.27	156621.72	837.56
642.16	AP2-21	183.00	1335.97	2325.09	33826.35	24738.42	359304.75	1860.57
646.08	AP3-21	174.56	825.36	2059.17	29586.25	21685.76	307596.53	1455.73
630.64	AP4-21	784.68	2808.10	5434.59	96099.42	69496.55	1202147.30	13100.23
989.85	34HP45-671-1	273.16	4660.63	7476.56	143076.00	103170.18	1864332.10	205656.20
943.13	34HP45-671-2	289.00	3380.50	5247.23	95225.26	69180.63	1181211.60	256482.80
934.37	34HP45-671-3	178.08	2665.18	4977.91	89596.54	65227.13	1113088.10	69428.84
1201.05	34HP45-671-4	181.32	6747.48	7279.76	142587.77	103876.70	1855384.00	18795.03
892.89	34HP45-671-5	160.96	1940.25	5528.67	105860.67	75482.23	1356265.50	13486.32
871.04	34HP45-671-6	147.00	4318.54	4392.82	81104.73	59421.38	1001743.80	10973.50
1085.21	34HP45-671-7	195.64	6315.00	5798.95	114108.32	83911.67	1443418.60	49371.32
950.05	34HP45-671-8	177.40	1397.17	5100.99	91366.27	65781.17	1161797.40	42342.08
952.13	34HP45-671-9	159.08	3077.10	4886.27	90939.88	66066.17	1128057.50	40559.35
1005.89	34HP45-671-10	234.04	8502.17	5487.19	106976.36	79813.37	1301643.10	175340.70
922.61	34HP45-671-11	202.20	2391.73	4319.78	79840.17	57655.97	986659.06	134080.47
940.13	34HP45-671-12	215.12	3342.58	4468.02	80025.69	58420.17	986556.38	149962.13
771.00	34HP45-671-13	108.48	3645.94	2254.17	38127.34	28942.00	423158.44	2278.65
646.60	34HP45-671-14	94.92	893.53	1584.37	24442.46	17909.42	259184.09	917.45
613.68	34HP45-671-15	104.08	731.72	1465.33	22030.44	16047.61	231019.53	532.76
589.56	34HP45-671-16	113.56	1083.49	1491.81	21946.44	16216.29	228103.84	732.04
606.08	34HP45-671-17	142.24	563.52	1616.25	23828.61	17350.02	249291.17	636.60
570.88	34HP45-671-18	161.48	712.08	1692.25	26192.07	19194.15	278787.72	835.40
823.76	SRM614-22	109.12	643.72	538.92	2575.85	2138.77	22680.25	425.08
917.49	SRM612-22	493.60	15613.33	698.04	4885.87	9816.70	43983.01	17410.50
1056.41	SRM610-22	2430.17	159147.42	2151.61	21130.28	75412.95	208952.78	158155.84
673.72	AP1-22	92.20	1314.25	1081.81	13493.44	10203.30	131053.14	168.28
622.56	AP2-22	158.44	942.93	1548.41	23402.92	17260.78	243392.45	1289.69
616.56	AP3-22	529.36	1430.65	2975.58	49503.96	36158.92	586230.38	6332.24
656.84	AP4-22	682.28	1797.89	3430.66	59839.74	43400.13	725237.75	9013.41
498.24	blank-22	94.44	285.80	313.76	239.76	197.20	951.09	42.64
487.18	blank average	109.46	266.42	467.18	239.70	159.96	590.84	38.58

blank subtraction								
129.38	SRM614-21	11.62	567.50	233.42	2523.99	1962.01	22084.92	315.86
361.70	SRM612-21	331.02	23279.39	551.46	7062.02	14811.20	66339.53	17471.64
424.14	SRM610-21	1604.03	192803.38	2119.63	24802.64	91343.80	251261.33	143926.36
159.98	AP1-21	20.18	1693.55	910.67	15924.83	11878.31	156030.88	798.98
154.98	AP2-21	73.54	1069.55	1857.91	33586.65	24578.46	358713.91	1821.99
158.90	AP3-21	65.10	558.94	1591.99	29346.54	21525.80	307005.69	1417.15
143.46	AP4-21	675.22	2541.67	4967.41	95859.72	69336.59	1201556.46	13061.65
502.66	34HP45-671-1	163.70	4394.21	7009.38	142836.30	103010.22	1863741.26	205617.62
455.94	34HP45-671-2	179.54	3114.08	4780.05	94985.56	69020.67	1180620.76	256444.22
447.18	34HP45-671-3	68.62	2398.75	4510.73	89356.84	65067.16	1112497.26	69390.26
713.86	34HP45-671-4	71.86	6481.06	6812.58	142348.07	103716.74	1854793.16	18756.44
405.70	34HP45-671-5	51.50	1673.83	5061.49	105620.97	75322.27	1355674.66	13447.74
383.86	34HP45-671-6	37.54	4052.12	3925.64	80865.03	59261.41	1001152.96	10934.92
598.02	34HP45-671-7	86.18	6048.57	5331.77	113868.62	83751.71	1442827.76	49332.74
462.86	34HP45-671-8	67.94	1130.75	4633.81	91126.57	65621.21	1161206.56	42303.50
464.94	34HP45-671-9	49.62	2810.68	4419.09	90700.17	65906.21	1127466.66	40520.77
518.70	34HP45-671-10	124.58	8235.75	5020.01	106736.66	79653.41	1301052.26	175302.12
435.42	34HP45-671-11	92.74	2125.31	3852.60	79600.47	57496.00	986068.22	134041.89
452.94	34HP45-671-12	105.66	3076.16	4000.84	79785.99	58260.21	985965.54	149923.55
283.82	34HP45-671-13	-0.98	3379.52	1786.99	37887.63	28782.04	422567.60	2240.07
159.42	34HP45-671-14	-14.54	627.10	1117.19	24202.76	17749.46	258593.25	878.86
126.50	34HP45-671-15	-5.38	465.30	998.15	21790.74	15887.65	230428.69	494.18
102.38	34HP45-671-16	4.10	817.06	1024.63	21706.74	16056.33	227513.00	693.46
118.90	34HP45-671-17	32.78	297.10	1149.07	23588.91	17190.06	248700.33	598.02
83.70	34HP45-671-18	52.02	445.66	1225.07	25952.36	19034.19	278196.88	796.82
336.58	SRM614-22	-0.34	377.30	71.74	2336.15	1978.81	22089.40	386.50
430.30	SRM612-22	384.14	15346.91	230.86	4646.17	9656.73	43392.16	17371.92
569.22	SRM610-22	2320.71	158881.00	1684.43	20890.58	75252.98	208361.94	158117.26
186.54	AP1-22	-17.26	1047.83	614.62	13253.73	10043.34	130462.30	129.70
135.38	AP2-22	48.98	676.50	1081.23	23163.27	17100.82	242801.61	1251.11
129.38	AP3-22	419.90	1164.23	2508.39	49264.26	35998.96	585639.54	6293.66
169.66	AP4-22	572.82	1531.47	2963.48	59600.04	43240.16	724646.91	8974.83

zero correction								
129.38	SRM614-21	11.62	567.50	233.42	2523.99	1962.01	22084.92	315.86
361.70	SRM612-21	331.02	23279.39	551.46	7062.02	14811.20	66339.53	17471.64
424.14	SRM610-21	1604.03	192803.38	2119.63	24802.64	91343.80	251261.33	143926.36
159.98	AP1-21	20.18	1693.55	910.67	15924.83	11878.31	156030.88	798.98
154.98	AP2-21	73.54	1069.55	1857.91	33586.65	24578.46	358713.91	1821.99
158.90	AP3-21	65.10	558.94	1591.99	29346.54	21525.80	307005.69	1417.15

Appendix A. Raw trace element datasheets from laser ablation.

143.46	AP4-21	675.22	2541.67	4967.41	95859.72	69336.59	1201556.46	13061.65
502.66	34HP45-671-1	163.70	4394.21	7009.38	142836.30	103010.22	1863741.26	205617.62
455.94	34HP45-671-2	179.54	3114.08	4780.05	94985.56	69020.67	1180620.76	256444.22
447.18	34HP45-671-3	68.62	2398.75	4510.73	89356.84	65067.16	1112497.26	69390.26
713.86	34HP45-671-4	71.86	6481.06	6812.58	142348.07	103716.74	1854793.16	18756.44
405.70	34HP45-671-5	51.50	1673.83	5061.49	105620.97	75322.27	1355674.66	13447.74
383.86	34HP45-671-6	37.54	4052.12	3925.64	80865.03	59261.41	1001152.96	10934.92
598.02	34HP45-671-7	86.18	6048.57	5331.77	113868.62	83751.71	1442827.76	49332.74
462.86	34HP45-671-8	67.94	1130.75	4633.81	91126.57	65621.21	1161206.56	42303.50
464.94	34HP45-671-9	49.62	2810.68	4419.09	90700.17	65906.21	1127466.66	40520.77
518.70	34HP45-671-10	124.58	8235.75	5020.01	106736.66	79653.41	1301052.26	175302.12
435.42	34HP45-671-11	92.74	2125.31	3852.60	79600.47	57496.00	986068.22	134041.89
452.94	34HP45-671-12	105.66	3076.16	4000.84	79785.99	58260.21	985965.54	149923.55
283.82	34HP45-671-13	0.00	3379.52	1786.99	37887.63	28782.04	422567.60	2240.07
159.42	34HP45-671-14	0.00	627.10	1117.19	24202.76	17749.46	258593.25	878.86
126.50	34HP45-671-15	0.00	465.30	998.15	21790.74	15887.65	230428.69	494.18
102.38	34HP45-671-16	4.10	817.06	1024.63	21706.74	16056.33	227513.00	693.46
118.90	34HP45-671-17	32.78	297.10	1149.07	23588.91	17190.06	248700.33	598.02
83.70	34HP45-671-18	52.02	445.66	1225.07	25952.36	19034.19	278196.88	796.82
336.58	SRM614-22	0.00	377.30	71.74	2336.15	1978.81	22089.40	386.50
430.30	SRM612-22	384.14	15346.91	230.86	4646.17	9656.73	43392.16	17371.92
569.22	SRM610-22	2320.71	158881.00	1684.43	20890.58	75252.98	208361.94	158117.26
186.54	AP1-22	0.00	1047.83	614.62	13253.73	10043.34	130462.30	129.70
135.38	AP2-22	48.98	676.50	1081.23	23163.27	17100.82	242801.61	1251.11
129.38	AP3-22	419.90	1164.23	2508.39	49264.26	35998.96	585639.54	6293.66
169.66	AP4-22	572.82	1531.47	2963.48	59600.04	43240.16	724646.91	8974.83

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000096 SRM614-21	0.000009	0.000423	0.000174	0.001882	0.001463	0.016465	0.000235	
0.000183 SRM612-21	0.000168	0.011798	0.000279	0.003579	0.007506	0.033619	0.008854	
0.000413 SRM610-21	0.001562	0.187759	0.002064	0.024154	0.088954	0.244688	0.140161	
0.000015 AP1-21	0.000002	0.000163	0.000088	0.001532	0.001143	0.015013	0.000077	
0.000012 AP2-21	0.000006	0.000081	0.000141	0.002546	0.001863	0.027187	0.000138	
0.000013 AP3-21	0.000005	0.000046	0.000130	0.002402	0.001762	0.025127	0.000116	
0.000008 AP4-21	0.000040	0.000149	0.000292	0.005636	0.004077	0.070650	0.000768	
0.000026 34HP45-671-1	0.000009	0.000228	0.000364	0.007426	0.005355	0.096893	0.010690	
0.000026 34HP45-671-2	0.000010	0.000178	0.000273	0.005429	0.003945	0.067479	0.014657	
0.000027 34HP45-671-3	0.000004	0.000144	0.000271	0.005369	0.003909	0.066842	0.004169	
0.000039 34HP45-671-4	0.000004	0.000350	0.000368	0.007691	0.005604	0.100217	0.001013	
0.000024 34HP45-671-5	0.000003	0.000100	0.000304	0.006340	0.004521	0.081373	0.000807	
0.000027 34HP45-671-6	0.000003	0.000287	0.000278	0.005732	0.004201	0.070970	0.000775	
0.000033 34HP45-671-7	0.000005	0.000330	0.000291	0.006213	0.004570	0.078728	0.002692	
0.000026 34HP45-671-8	0.000004	0.000064	0.000263	0.005167	0.003721	0.065844	0.002399	
0.000026 34HP45-671-9	0.000003	0.000155	0.000244	0.005006	0.003637	0.062222	0.002236	
0.000034 34HP45-671-10	0.000008	0.000538	0.000328	0.006979	0.005208	0.085068	0.011462	
0.000030 34HP45-671-11	0.000006	0.000147	0.000267	0.005518	0.003986	0.068356	0.009292	
0.000032 34HP45-671-12	0.000008	0.000220	0.000286	0.005710	0.004169	0.070561	0.010729	
0.000044 34HP45-671-13	0.000000	0.000527	0.000279	0.005911	0.004490	0.065921	0.000349	
0.000030 34HP45-671-14	0.000000	0.000119	0.000212	0.004603	0.003376	0.049182	0.000167	
0.000025 34HP45-671-15	0.000000	0.000092	0.000197	0.004298	0.003133	0.045445	0.000097	
0.000021 34HP45-671-16	0.000001	0.000171	0.000214	0.004541	0.003359	0.047590	0.000145	
0.000020 34HP45-671-17	0.000005	0.000050	0.000193	0.003954	0.002881	0.041683	0.000100	
0.000013 34HP45-671-18	0.000008	0.000070	0.000194	0.004104	0.003010	0.043993	0.000126	
0.000326 SRM614-22	0.000000	0.000365	0.000069	0.002263	0.001917	0.021397	0.000374	
0.000357 SRM612-22	0.000318	0.012722	0.000191	0.003851	0.008005	0.035970	0.014401	
0.000847 SRM610-22	0.003454	0.236491	0.002507	0.031095	0.112012	0.310142	0.235354	
0.000019 AP1-22	0.000000	0.000106	0.000062	0.001341	0.001016	0.013201	0.000013	
0.000013 AP2-22	0.000005	0.000066	0.000105	0.002246	0.001658	0.023539	0.000121	
0.000010 AP3-22	0.000032	0.000089	0.000191	0.003753	0.002742	0.044612	0.000479	
0.000013 AP4-22	0.000044	0.000117	0.000226	0.004544	0.003297	0.055251	0.000684	

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP							
0.000017 AP1	0.000001	0.000134	0.000075	0.001437	0.001080	0.014107	0.000045
0.000012 AP2	0.000005	0.000073	0.000123	0.002396	0.001760	0.025363	0.000130
0.000011 AP3	0.000019	0.000067	0.000161	0.003077	0.002252	0.034869	0.000298
0.000011 AP4	0.000042	0.000133	0.000259	0.005090	0.003687	0.062951	0.000726
linest from std sig ave							
5.633953	0.261628	0.003699	2.533803	0.129743	0.178287	0.010857	0.017934
standardize signal averages SRM							
0.000211 srm614-2	0.000004	0.000394	0.000122	0.002072	0.001690	0.018931	0.000305
0.000270 srm612-2	0.000243	0.012260	0.000235	0.003715	0.007756	0.034795	0.011627
0.000630 srm610-2	0.002508	0.212125	0.002286	0.027624	0.100483	0.277415	0.187758
linest from std sig ave							
0.000000	0.501999	0.023718	2.555071	0.210677	0.058124	0.021006	0.027979
concentration data							
46.61 SRM614-21	0.19	0.13	37.82	20.94	22.37	15.33	0.36
88.57 SRM612-21	3.76	3.74	60.73	39.82	114.77	31.30	13.62
199.58 SRM610-21	35.05	59.57	448.56	268.76	1360.15	227.84	215.58
34.60 AP1-21	0.20	0.24	88.57	79.31	81.29	65.03	0.55
26.40 AP2-21	0.58	0.12	142.33	131.75	132.49	117.75	0.99
29.23 AP3-21	0.56	0.07	131.71	124.32	125.31	108.83	0.83
18.96 AP4-21	4.14	0.22	295.24	291.74	289.97	306.01	5.49
58.74 34HP45-671-1	0.89	0.34	368.35	384.36	380.90	419.68	76.48
58.57 34HP45-671-2	1.07	0.26	276.16	281.00	280.58	292.27	104.86
60.39 34HP45-671-3	0.43	0.21	273.95	277.89	278.06	289.52	29.83
86.69 34HP45-671-4	0.41	0.52	372.08	398.09	398.58	434.07	7.25
54.73 34HP45-671-5	0.32	0.15	307.10	328.14	321.57	352.45	5.78
61.16 34HP45-671-6	0.28	0.42	281.29	296.70	298.79	307.39	5.55
73.34 34HP45-671-7	0.49	0.49	294.08	321.59	325.03	340.99	19.26
58.99 34HP45-671-8	0.40	0.09	265.60	267.45	264.65	285.19	17.16
57.67 34HP45-671-9	0.29	0.23	246.52	259.08	258.70	269.50	16.00
76.23 34HP45-671-10	0.85	0.79	331.78	361.22	370.42	368.45	82.00
67.84 34HP45-671-11	0.67	0.22	269.96	285.61	283.49	296.07	66.48
72.86 34HP45-671-12	0.79	0.32	289.42	295.54	296.55	305.62	76.76
99.52 34HP45-671-13	0.00	0.78	281.79	305.92	319.35	285.53	2.50
68.15 34HP45-671-14	0.00	0.18	214.78	238.26	240.10	213.02	1.20
56.07 34HP45-671-15	0.00	0.14	198.99	222.44	222.86	196.84	0.70
48.13 34HP45-671-16	0.09	0.25	216.65	235.01	238.88	206.13	1.04
44.79 34HP45-671-17	0.57	0.07	194.67	204.64	204.92	180.54	0.72
29.75 34HP45-671-18	0.86	0.10	195.82	212.42	214.08	190.55	0.90
157.54 SRM614-22	0.00	0.12	15.10	25.18	29.31	19.92	0.58
172.35 SRM612-22	7.15	4.04	41.59	42.86	122.40	33.49	22.15
409.39 SRM610-22	77.51	75.03	544.84	346.00	1712.72	288.79	361.99
42.42 AP1-22	0.00	0.16	62.86	69.41	72.28	57.18	0.09
29.50 AP2-22	0.50	0.10	105.96	116.23	117.92	101.96	0.87
22.15 AP3-22	3.34	0.13	193.15	194.24	195.04	193.23	3.43
29.07 AP4-22	4.56	0.17	228.40	235.21	234.49	239.31	4.90
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
492.36 blank-19	104.24	323.08	477.00	162.00	140.52	98.00	23.68
639.80 SRM614-19	109.92	1263.65	709.60	4742.95	3773.18	41180.91	518.16
745.20 SRM612-19	514.00	22248.65	907.89	7141.08	14053.76	65061.29	20100.67
911.21 SRM610-19	2175.61	182974.16	2515.45	25213.66	87273.77	255138.55	151501.14
639.84 AP1-19	107.24	1134.93	1314.13	16599.29	12234.75	160164.73	287.92
661.76 AP2-19	200.64	2466.29	2826.30	45640.62	33761.43	510126.66	2283.41
698.68 AP3-19	979.65	2863.82	6002.71	110151.86	79233.45	1401274.30	12750.23
672.24 AP4-19	1308.29	3925.66	7136.76	138555.58	100036.16	1801602.60	18254.42
669.92 34HP60-102-1	153.32	1849.53	3233.78	57703.29	41777.84	672374.88	36024.32
602.40 34HP60-102-2	136.88	539.08	2010.97	31318.78	22812.21	340751.41	15263.65
621.80 34HP60-102-3	107.52	548.08	1438.89	20366.40	14973.01	211664.78	4782.99
619.08 34HP60-102-4	102.00	566.28	856.00	9737.29	7256.80	92927.60	1347.25
687.36 34HP60-102-5	101.36	698.64	1492.21	21928.08	16265.41	235824.88	10947.50
675.32 34HP60-102-6	148.28	1721.13	3507.50	62916.91	45928.18	759399.94	37846.37
658.12 34HP60-102-7	90.12	496.08	1131.73	15122.65	11080.26	152442.38	6475.16

Appendix A. Raw trace element datasheets from laser ablation.

646.28	34HP60-102-8	129.92	876.60	2118.33	33880.55	24265.46	388679.44	24389.18
697.32	34HP60-102-9	149.32	1208.33	2464.61	41089.15	30103.17	487322.25	35939.64
917.61	34HP60-102-10	155.60	1147.89	4692.11	86849.65	62528.27	109444.40	23303.09
903.81	34HP60-102-11	139.92	1097.37	3993.74	72248.53	51513.05	887172.00	17738.74
1090.61	34HP60-102-12	150.56	1436.65	4931.95	93036.48	66502.94	1182310.10	23950.90
1261.25	34HP60-102-13	176.76	1021.21	5855.99	110886.02	79045.13	1446462.60	30224.13
1244.33	34HP60-102-14	164.64	931.41	5558.95	107771.69	76718.47	1404686.10	25541.06
1199.49	34HP60-102-15	151.84	907.65	5053.47	94117.05	67449.50	1204970.60	19703.83
876.48	34HP60-102-16	118.40	1368.37	3022.02	50255.68	36181.28	612761.06	5116.71
928.77	34HP60-102-17	107.20	741.80	3049.02	52281.33	37418.93	632327.75	4769.19
713.24	34HP60-102-18	92.64	546.68	1602.61	25022.38	18355.46	267408.00	1232.53
872.80	SRM614-20	90.08	777.84	518.48	3173.22	2537.57	27842.24	443.52
1057.29	SRM612-20	594.28	18166.54	712.88	5561.11	11216.22	49714.08	19689.91
1223.85	SRM610-20	2388.93	172116.84	2169.21	22158.81	80340.02	221804.89	160155.63
842.36	AP1-20	122.64	1123.53	1079.45	13849.20	10381.18	135251.84	188.80
680.92	AP2-20	158.80	930.45	1649.89	25895.07	18875.63	274108.22	1352.69
648.44	AP3-20	567.12	1202.45	3056.46	52991.14	38353.66	631410.13	6380.24
710.24	AP4-20	965.33	2290.01	4494.03	81380.66	59068.29	1032239.90	12166.95
492.24	blank-20	79.28	235.36	351.76	230.00	197.64	1015.97	34.68
492.30	blank average	91.76	279.22	414.38	196.00	169.08	556.98	29.18

blank subtraction

147.50	SRM614-19	18.16	984.43	295.22	4546.95	3604.10	40623.93	488.98
252.90	SRM612-19	422.24	21969.42	493.50	6945.08	13884.68	64504.30	20071.49
418.90	SRM610-19	2083.85	182694.94	2101.07	25017.66	87104.69	254581.57	151471.96
147.54	AP1-19	15.48	855.70	899.75	16403.29	12065.67	159607.75	258.74
169.46	AP2-19	108.88	2187.07	2411.91	45444.62	33592.35	509569.68	2254.23
206.38	AP3-19	887.88	2584.59	5588.33	109955.86	79064.36	1400717.32	12721.05
179.94	AP4-19	1216.53	3646.44	6722.38	138359.58	99867.08	1801045.62	18225.24
177.62	34HP60-102-1	61.56	1570.31	2819.40	57507.28	41608.76	671817.90	35995.14
110.10	34HP60-102-2	45.12	259.86	1596.59	31122.77	22643.13	340194.43	15234.47
129.50	34HP60-102-3	15.76	268.86	1024.51	20170.39	14803.92	211107.80	4753.81
126.78	34HP60-102-4	10.24	287.06	441.62	9541.29	7087.72	92370.62	1318.07
195.06	34HP60-102-5	9.60	419.42	1077.83	21732.08	16096.33	235267.90	10918.32
183.02	34HP60-102-6	56.52	1441.91	3093.12	62720.91	45759.10	758842.96	37817.19
165.82	34HP60-102-7	-1.64	216.86	717.34	14926.64	10911.18	151885.40	6445.98
153.98	34HP60-102-8	38.16	597.38	1703.95	33684.55	24096.38	388122.46	24360.00
205.02	34HP60-102-9	57.56	929.11	2050.23	40893.15	29934.09	486765.27	35910.46
425.30	34HP60-102-10	63.84	868.66	4277.72	86653.65	62359.19	1093887.42	23273.91
411.50	34HP60-102-11	48.16	818.14	3579.36	72052.53	51343.97	886615.02	17709.56
598.30	34HP60-102-12	58.80	1157.43	4517.57	92840.48	66333.86	1181753.12	23921.71
768.94	34HP60-102-13	85.00	741.98	5441.61	110690.02	78876.04	1445905.62	30194.95
752.02	34HP60-102-14	72.88	652.18	5144.57	107575.69	76549.39	1404129.12	25511.88
707.18	34HP60-102-15	60.08	628.42	4639.09	93921.05	67280.42	1204413.62	19674.65
384.18	34HP60-102-16	26.64	1089.15	2607.63	50059.68	36012.20	612204.08	5087.53
436.46	34HP60-102-17	15.44	462.58	2634.63	52085.33	37249.85	631770.77	4740.01
220.94	34HP60-102-18	0.88	267.46	1188.23	24826.38	18186.38	266851.02	1203.35
380.50	SRM614-20	-1.68	498.62	104.10	2977.22	2368.49	27285.25	414.34
564.98	SRM612-20	502.52	17887.32	298.50	5365.11	11047.14	49157.09	19660.73
731.54	SRM610-20	2297.17	171837.62	1754.83	21962.80	80170.94	221247.91	160126.45
350.06	AP1-20	30.88	844.30	665.06	13653.20	10212.10	134694.86	159.62
188.62	AP2-20	67.04	651.22	1235.51	25699.06	18706.55	273551.24	1323.51
156.14	AP3-20	475.36	923.23	2642.07	52795.14	38184.58	630853.15	6351.06
217.94	AP4-20	873.56	2010.79	4079.64	81184.65	58899.21	1031682.92	12137.77

zero correction

147.50	SRM614-19	18.16	984.43	295.22	4546.95	3604.10	40623.93	488.98
252.90	SRM612-19	422.24	21969.42	493.50	6945.08	13884.68	64504.30	20071.49
418.90	SRM610-19	2083.85	182694.94	2101.07	25017.66	87104.69	254581.57	151471.96
147.54	AP1-19	15.48	855.70	899.75	16403.29	12065.67	159607.75	258.74
169.46	AP2-19	108.88	2187.07	2411.91	45444.62	33592.35	509569.68	2254.23
206.38	AP3-19	887.88	2584.59	5588.33	109955.86	79064.36	1400717.32	12721.05
179.94	AP4-19	1216.53	3646.44	6722.38	138359.58	99867.08	1801045.62	18225.24
177.62	34HP60-102-1	61.56	1570.31	2819.40	57507.28	41608.76	671817.90	35995.14
110.10	34HP60-102-2	45.12	259.86	1596.59	31122.77	22643.13	340194.43	15234.47
129.50	34HP60-102-3	15.76	268.86	1024.51	20170.39	14803.92	211107.80	4753.81
126.78	34HP60-102-4	10.24	287.06	441.62	9541.29	7087.72	92370.62	1318.07
195.06	34HP60-102-5	9.60	419.42	1077.83	21732.08	16096.33	235267.90	10918.32
183.02	34HP60-102-6	56.52	1441.91	3093.12	62720.91	45759.10	758842.96	37817.19
165.82	34HP60-102-7	0.00	216.86	717.34	14926.64	10911.18	151885.40	6445.98
153.98	34HP60-102-8	38.16	597.38	1703.95	33684.55	24096.38	388122.46	24360.00
205.02	34HP60-102-9	57.56	929.11	2050.23	40893.15	29934.09	486765.27	35910.46
425.30	34HP60-102-10	63.84	868.66	4277.72	86653.65	62359.19	1093887.42	23273.91
411.50	34HP60-102-11	48.16	818.14	3579.36	72052.53	51343.97	886615.02	17709.56
598.30	34HP60-102-12	58.80	1157.43	4517.57	92840.48	66333.86	1181753.12	23921.71
768.94	34HP60-102-13	85.00	741.98	5441.61	110690.02	78876.04	1445905.62	30194.95
752.02	34HP60-102-14	72.88	652.18	5144.57	107575.69	76549.39	1404129.12	25511.88
707.18	34HP60-102-15	60.08	628.42	4639.09	93921.05	67280.42	1204413.62	19674.65

Appendix A. Raw trace element datasheets from laser ablation.

384.18	34HP60-102-16	26.64	1089.15	2607.63	50059.68	36012.20	612204.08	5087.53
436.46	34HP60-102-17	15.44	462.58	2634.63	52085.33	37249.85	631770.77	4740.01
220.94	34HP60-102-18	0.88	267.46	1188.23	24826.38	18186.38	266851.02	1203.35
380.50	SRM614-20	0.00	498.62	104.10	2977.22	2368.49	27285.25	414.34
564.98	SRM612-20	502.52	17887.32	298.50	5365.11	11047.14	49157.09	19660.73
731.54	SRM610-20	2297.17	171837.62	1754.83	21962.80	80170.94	221247.91	160126.45
350.06	AP1-20	30.88	844.30	665.06	13653.20	10212.10	134694.86	159.62
188.62	AP2-20	67.04	651.22	1235.51	25699.06	18706.55	273551.24	1323.51
156.14	AP3-20	475.36	923.23	2642.07	52795.14	38184.58	630853.15	6351.06
217.94	AP4-20	873.56	2010.79	4079.64	81184.65	58899.21	1031682.92	12137.77
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000062	SRM614-19	0.000008	0.000415	0.000125	0.001919	0.001521	0.017143	0.000206
0.000134	SRM612-19	0.000224	0.011670	0.000262	0.003689	0.007376	0.034265	0.010662
0.000436	SRM610-19	0.002168	0.190061	0.002186	0.026026	0.090617	0.264846	0.157579
0.000013	AP1-19	0.000001	0.000074	0.000078	0.001416	0.001042	0.013779	0.000022
0.000010	AP2-19	0.000007	0.000135	0.000149	0.002799	0.002069	0.031388	0.000139
0.000010	AP3-19	0.000043	0.000125	0.000270	0.005311	0.003819	0.067662	0.000614
0.000009	AP4-19	0.000059	0.000178	0.000328	0.006754	0.004875	0.087914	0.000890
0.000015	34HP60-102-1	0.000005	0.000131	0.000235	0.004794	0.003469	0.056006	0.003001
0.000014	34HP60-102-2	0.000006	0.000032	0.000199	0.003877	0.002821	0.042383	0.001898
0.000022	34HP60-102-3	0.000003	0.000047	0.000178	0.003497	0.002567	0.036604	0.000824
0.000033	34HP60-102-4	0.000003	0.000075	0.000116	0.002506	0.001862	0.024261	0.000346
0.000035	34HP60-102-5	0.000002	0.000075	0.000192	0.003864	0.002862	0.041836	0.001942
0.000016	34HP60-102-6	0.000005	0.000122	0.000262	0.005319	0.003880	0.064350	0.003207
0.000040	34HP60-102-7	0.000000	0.000052	0.000172	0.003569	0.002609	0.036317	0.001541
0.000027	34HP60-102-8	0.000007	0.000103	0.000295	0.005824	0.004166	0.067102	0.004212
0.000031	34HP60-102-9	0.000009	0.000140	0.000308	0.006149	0.004501	0.073193	0.005400
0.000037	34HP60-102-10	0.000006	0.000075	0.000369	0.007485	0.005386	0.094487	0.002010
0.000039	34HP60-102-11	0.000005	0.000077	0.000338	0.006800	0.004846	0.083673	0.001671
0.000052	34HP60-102-12	0.000005	0.000101	0.000394	0.008101	0.005788	0.103114	0.002087
0.000061	34HP60-102-13	0.000007	0.000059	0.000432	0.008788	0.006262	0.114798	0.002397
0.000059	34HP60-102-14	0.000006	0.000051	0.000401	0.008393	0.005972	0.109546	0.001990
0.000059	34HP60-102-15	0.000005	0.000053	0.000389	0.007885	0.005648	0.101111	0.001652
0.000046	34HP60-102-16	0.000003	0.000130	0.000312	0.005997	0.004314	0.073342	0.000609
0.000050	34HP60-102-17	0.000002	0.000053	0.000300	0.005924	0.004237	0.071860	0.000539
0.000033	34HP60-102-18	0.000000	0.000040	0.000179	0.003741	0.002741	0.040216	0.000181
0.000264	SRM614-20	0.000000	0.000346	0.000072	0.002064	0.001642	0.018916	0.000287
0.000379	SRM612-20	0.000337	0.011994	0.000200	0.003597	0.007407	0.032960	0.013183
0.000927	SRM610-20	0.002911	0.217736	0.002224	0.027829	0.101585	0.280345	0.202897
0.000034	AP1-20	0.000003	0.000083	0.000065	0.001337	0.001000	0.013190	0.000016
0.000017	AP2-20	0.000006	0.000060	0.000114	0.002363	0.001720	0.025152	0.000122
0.000011	AP3-20	0.000034	0.000066	0.000189	0.003767	0.002724	0.045010	0.000453
0.000014	AP4-20	0.000056	0.000129	0.000261	0.005194	0.003768	0.066005	0.000777
standardize signal averages AP								
0.000024	AP1	0.000002	0.000078	0.000071	0.001377	0.001021	0.013485	0.000019
0.000014	AP2	0.000006	0.000097	0.000131	0.002581	0.001895	0.028270	0.000130
0.000011	AP3	0.000038	0.000095	0.000229	0.004539	0.003272	0.056336	0.000534
0.000011	AP4	0.000058	0.000153	0.000295	0.005974	0.004322	0.076960	0.000833
linest from std sig ave								
4.595811		0.174071	0.004201	2.123908	0.105835	0.146270	0.008395	0.014431
standardize signal averages SRM								
0.000163	srm614-2	0.000004	0.000381	0.000098	0.001991	0.001581	0.018029	0.000247
0.000257	srm612-2	0.000281	0.011832	0.000231	0.003643	0.007391	0.033613	0.011922
0.000681	srm610-2	0.002539	0.203899	0.002205	0.026928	0.096101	0.272595	0.180238
linest from std sig ave								

Appendix A. Raw trace element datasheets from laser ablation.

0.000000	0.494466	0.024675	2.648930	0.216122	0.060773	0.021384	0.029141
concentration data							
24.53 SRM614-19	0.11	0.15	22.69	17.42	19.08	12.34	0.26
52.95 SRM612-19	3.35	4.20	47.75	33.49	92.52	24.67	13.20
171.77 SRM610-19	32.36	68.48	398.15	236.23	1136.74	190.70	195.02
23.35 AP1-19	0.09	0.12	65.82	59.79	60.78	46.15	0.13
19.14 AP2-19	0.47	0.23	125.88	118.19	120.74	105.13	0.80
18.28 AP3-19	2.98	0.21	228.73	224.26	222.86	226.62	3.54
16.10 AP4-19	4.12	0.30	278.03	285.15	284.45	294.45	5.12
27.15 34HP60-102-1	0.36	0.22	199.15	202.41	202.41	187.58	17.27
25.15 34HP60-102-2	0.39	0.05	168.54	163.71	164.61	141.95	10.93
41.17 34HP60-102-3	0.19	0.08	150.52	147.66	149.78	122.60	4.75
61.05 34HP60-102-4	0.19	0.13	98.28	105.81	108.63	81.26	1.99
63.59 34HP60-102-5	0.12	0.12	162.39	163.16	167.02	140.12	11.18
28.46 34HP60-102-6	0.33	0.20	222.24	224.56	226.43	215.52	18.46
72.69 34HP60-102-7	0.00	0.09	145.33	150.69	152.24	121.64	8.87
48.81 34HP60-102-8	0.46	0.17	249.61	245.88	243.09	224.74	24.25
56.52 34HP60-102-9	0.60	0.23	261.21	259.62	262.65	245.14	31.09
67.35 34HP60-102-10	0.38	0.13	313.08	316.02	314.31	316.46	11.57
71.20 34HP60-102-11	0.32	0.13	286.22	287.10	282.75	280.24	9.62
95.71 34HP60-102-12	0.36	0.17	333.99	342.03	337.74	345.36	12.02
111.93 34HP60-102-13	0.47	0.10	366.07	371.05	365.42	384.49	13.80
107.57 34HP60-102-14	0.39	0.09	340.08	354.35	348.49	366.90	11.46
108.85 34HP60-102-15	0.35	0.09	329.98	332.90	329.59	338.65	9.51
84.38 34HP60-102-16	0.22	0.22	264.69	253.21	251.75	245.64	3.51
91.02 34HP60-102-17	0.12	0.09	253.91	250.14	247.23	240.68	3.10
61.05 34HP60-102-18	0.01	0.07	151.73	157.97	159.93	134.69	1.04
103.97 SRM614-20	0.00	0.12	13.15	18.73	20.60	13.62	0.36
149.32 SRM612-20	5.03	4.32	36.46	32.65	92.92	23.73	16.32
365.36 SRM610-20	43.45	78.45	405.03	252.60	1274.34	201.85	251.11
62.85 AP1-20	0.21	0.14	55.18	56.45	58.35	44.18	0.09
31.80 AP2-20	0.43	0.10	96.25	99.77	100.36	84.24	0.70
20.42 AP3-20	2.36	0.11	159.72	159.04	158.97	150.75	2.61
25.56 AP4-20	3.88	0.22	221.15	219.30	219.89	221.07	4.47
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
471.36 blank-17	158.16	215.28	610.16	247.28	111.52	95.36	38.52
633.20 SRM614-17	145.80	1066.01	805.24	3940.14	3151.46	33257.75	386.24
639.56 SRM612-17	406.28	23983.14	1039.85	6780.44	14368.88	61007.58	13701.04
1067.05 SRM610-17	2122.53	235616.80	2761.06	27801.92	107972.05	292656.00	138532.19
769.84 AP1-17	182.32	1769.57	1682.97	21910.64	16178.09	220493.13	372.84
767.96 AP2-17	217.28	2004.33	2658.77	40110.50	29226.32	437184.50	2091.25
720.96 AP3-17	536.20	3024.54	3914.02	70137.20	51109.33	830903.69	7662.76
667.04 AP4-17	990.45	4849.51	6769.12	128377.28	92620.36	1648268.80	16962.98
698.56 34HP60-24-1	127.28	785.64	1375.09	17059.98	12624.31	170160.56	5146.51
686.88 34HP60-24-2	133.44	644.00	1489.61	19321.59	14209.88	197671.48	3283.26
700.88 34HP60-24-3	139.28	731.32	1559.17	20889.72	15291.41	214924.00	4910.07
921.21 34HP60-24-4	175.84	692.40	3063.74	50180.24	36038.00	602026.81	18632.70
1194.53 34HP60-24-5	244.12	623.24	5636.07	104390.19	74033.58	1353643.80	50886.17
1169.37 34HP60-24-6	254.44	692.76	5864.99	109754.22	78448.04	1434197.50	59135.37
1038.01 34HP60-24-7	191.04	631.72	3746.30	68219.55	49052.44	848111.56	14493.20
1029.41 34HP60-24-8	136.40	533.76	3782.66	65941.13	46947.38	815564.19	8338.33
1237.65 34HP60-24-9	190.20	566.24	4864.63	88713.02	63085.99	1128898.60	12759.95
1338.25 34HP60-24-10	207.56	495.12	5688.03	106184.48	75407.10	1392968.90	28297.48
1317.85 34HP60-24-11	210.20	422.04	6051.07	117194.62	82618.91	1533283.60	31687.58
1340.77 34HP60-24-12	250.44	469.12	7036.92	138225.30	98053.27	1844414.60	37425.37
992.77 SRM614-18	115.04	754.76	574.80	2919.86	2345.29	25026.14	370.80
1108.37 SRM612-18	636.44	19337.63	802.60	5672.55	11806.51	51356.05	19372.83
1406.45 SRM610-18	2275.77	169259.80	2352.85	23442.69	80415.02	234133.23	169757.23
902.05 AP1-18	84.76	1290.37	1308.01	15423.49	11726.95	154705.95	213.00
702.40 AP2-18	165.96	1074.81	2020.29	30906.81	22665.53	332118.63	1699.57
702.68 AP3-18	545.20	1330.29	3016.38	50633.77	36988.25	596824.13	6374.88
699.96 AP4-18	1033.49	2415.05	4735.79	88385.13	63558.68	1129129.30	13243.76
595.80 blank-18	88.60	250.40	375.64	255.68	223.60	1089.37	25.04
533.58 blank average	123.38	232.84	492.90	251.48	167.56	592.36	31.78
blank subtraction							

Appendix A. Raw trace element datasheets from laser ablation.

99.62 SRM614-17	22.42	833.16	312.34	3688.66	2983.90	32665.38	354.46
105.98 SRM612-17	282.90	23750.29	546.94	6528.96	14201.32	60415.22	13669.26
533.46 SRM610-17	1999.15	235383.96	2268.15	27550.43	107804.49	292063.64	138500.41
236.26 AP1-17	58.94	1536.73	1190.07	21659.16	16010.53	219900.77	341.06
234.38 AP2-17	93.90	1771.49	2165.87	39859.02	29058.76	436592.14	2059.47
187.38 AP3-17	412.82	2791.70	3421.12	69885.71	50941.77	830311.33	7630.98
133.46 AP4-17	867.06	4616.67	6276.22	128125.80	92452.80	1647676.44	16931.19
164.98 34HP60-24-1	3.90	552.80	882.19	16808.50	12456.75	169568.20	5114.73
153.30 34HP60-24-2	10.06	411.16	996.71	19070.11	14042.32	197079.12	3251.48
167.30 34HP60-24-3	15.90	498.48	1066.27	20638.24	15123.85	214331.64	4878.29
387.62 34HP60-24-4	52.46	459.56	2570.83	49928.76	35870.44	601434.45	18600.92
660.94 34HP60-24-5	120.74	390.40	5143.17	104138.71	73866.02	1353051.44	50854.39
635.78 34HP60-24-6	131.06	459.92	5372.09	109502.74	78280.48	1433605.14	59103.59
504.42 34HP60-24-7	67.66	398.88	3253.40	67968.07	48884.88	847519.20	14461.42
495.82 34HP60-24-8	13.02	300.92	3289.76	65689.65	46779.82	814971.83	8306.55
704.06 34HP60-24-9	66.82	333.40	4371.72	88461.53	62918.43	1128306.24	12728.17
804.66 34HP60-24-10	84.18	262.28	5195.13	105933.00	75239.54	1392376.54	28265.70
784.26 34HP60-24-11	86.82	189.20	5558.17	116943.14	82451.35	1532691.24	31655.80
807.18 34HP60-24-12	127.06	236.28	6544.02	137973.82	97885.71	1843822.24	37393.59
459.18 SRM614-18	-8.34	521.92	81.90	2668.37	2177.73	24433.78	339.02
574.78 SRM612-18	513.06	19104.79	309.70	5421.07	11638.95	50763.69	19341.05
872.86 SRM610-18	2152.39	169026.96	1859.95	23191.21	80247.46	233540.87	169725.45
368.46 AP1-18	-38.62	1057.53	815.10	15172.01	11559.39	154113.59	181.22
168.82 AP2-18	42.58	841.96	1527.39	30655.33	22497.97	331526.27	1667.79
169.10 AP3-18	421.82	1097.45	2523.47	50382.28	36820.69	596231.77	6343.10
166.38 AP4-18	910.11	2182.21	4242.88	88133.65	63391.12	1128536.94	13211.97
zero correction							
99.62 SRM614-17	22.42	833.16	312.34	3688.66	2983.90	32665.38	354.46
105.98 SRM612-17	282.90	23750.29	546.94	6528.96	14201.32	60415.22	13669.26
533.46 SRM610-17	1999.15	235383.96	2268.15	27550.43	107804.49	292063.64	138500.41
236.26 AP1-17	58.94	1536.73	1190.07	21659.16	16010.53	219900.77	341.06
234.38 AP2-17	93.90	1771.49	2165.87	39859.02	29058.76	436592.14	2059.47
187.38 AP3-17	412.82	2791.70	3421.12	69885.71	50941.77	830311.33	7630.98
133.46 AP4-17	867.06	4616.67	6276.22	128125.80	92452.80	1647676.44	16931.19
164.98 34HP60-24-1	3.90	552.80	882.19	16808.50	12456.75	169568.20	5114.73
153.30 34HP60-24-2	10.06	411.16	996.71	19070.11	14042.32	197079.12	3251.48
167.30 34HP60-24-3	15.90	498.48	1066.27	20638.24	15123.85	214331.64	4878.29
387.62 34HP60-24-4	52.46	459.56	2570.83	49928.76	35870.44	601434.45	18600.92
660.94 34HP60-24-5	120.74	390.40	5143.17	104138.71	73866.02	1353051.44	50854.39
635.78 34HP60-24-6	131.06	459.92	5372.09	109502.74	78280.48	1433605.14	59103.59
504.42 34HP60-24-7	67.66	398.88	3253.40	67968.07	48884.88	847519.20	14461.42
495.82 34HP60-24-8	13.02	300.92	3289.76	65689.65	46779.82	814971.83	8306.55
704.06 34HP60-24-9	66.82	333.40	4371.72	88461.53	62918.43	1128306.24	12728.17
804.66 34HP60-24-10	84.18	262.28	5195.13	105933.00	75239.54	1392376.54	28265.70
784.26 34HP60-24-11	86.82	189.20	5558.17	116943.14	82451.35	1532691.24	31655.80
807.18 34HP60-24-12	127.06	236.28	6544.02	137973.82	97885.71	1843822.24	37393.59
459.18 SRM614-18	0.00	521.92	81.90	2668.37	2177.73	24433.78	339.02
574.78 SRM612-18	513.06	19104.79	309.70	5421.07	11638.95	50763.69	19341.05
872.86 SRM610-18	2152.39	169026.96	1859.95	23191.21	80247.46	233540.87	169725.45
368.46 AP1-18	0.00	1057.53	815.10	15172.01	11559.39	154113.59	181.22
168.82 AP2-18	42.58	841.96	1527.39	30655.33	22497.97	331526.27	1667.79
169.10 AP3-18	421.82	1097.45	2523.47	50382.28	36820.69	596231.77	6343.10
166.38 AP4-18	910.11	2182.21	4242.88	88133.65	63391.12	1128536.94	13211.97
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000046 SRM614-17	0.000010	0.000387	0.000145	0.001715	0.001387	0.015188	0.000165
0.000054 SRM612-17	0.000144	0.012125	0.000279	0.003333	0.007250	0.030843	0.006978
0.000413 SRM610-17	0.001549	0.182342	0.001757	0.021342	0.083512	0.226250	0.107291
0.000015 AP1-17	0.000004	0.000096	0.000075	0.001358	0.001004	0.013787	0.000021

Appendix A. Raw trace element datasheets from laser ablation.

0.000015	AP2-17	0.000006	0.000115	0.000141	0.002597	0.001893	0.028447	0.000134
0.000011	AP3-17	0.000025	0.000168	0.000206	0.004210	0.003069	0.050023	0.000460
0.000007	AP4-17	0.000042	0.000226	0.000307	0.006276	0.004529	0.080711	0.000829
0.000034	34HP60-24-1	0.000001	0.000115	0.000184	0.003503	0.002596	0.035337	0.001066
0.000030	34HP60-24-2	0.000002	0.000079	0.000192	0.003674	0.002705	0.037965	0.000626
0.000030	34HP60-24-3	0.000003	0.000089	0.000189	0.003664	0.002685	0.038052	0.000866
0.000048	34HP60-24-4	0.000006	0.000056	0.000315	0.006123	0.004399	0.073759	0.002281
0.000059	34HP60-24-5	0.000011	0.000035	0.000456	0.009237	0.006552	0.120014	0.004511
0.000055	34HP60-24-6	0.000011	0.000040	0.000463	0.009430	0.006741	0.123451	0.005090
0.000052	34HP60-24-7	0.000007	0.000041	0.000334	0.006981	0.005021	0.087043	0.001485
0.000049	34HP60-24-8	0.000001	0.000030	0.000323	0.006447	0.004591	0.079989	0.000815
0.000062	34HP60-24-9	0.000006	0.000029	0.000386	0.007805	0.005551	0.099546	0.001123
0.000076	34HP60-24-10	0.000008	0.000025	0.000489	0.009968	0.007080	0.131015	0.002660
0.000067	34HP60-24-11	0.000007	0.000016	0.000473	0.009950	0.007015	0.130408	0.002693
0.000063	34HP60-24-12	0.000010	0.000018	0.000507	0.010686	0.007581	0.142807	0.002896
0.000374	SRM614-18	0.000000	0.000425	0.000067	0.002173	0.001774	0.019901	0.000276
0.000379	SRM612-18	0.000339	0.012607	0.000204	0.003577	0.007680	0.033499	0.012763
0.001074	SRM610-18	0.002649	0.208008	0.002289	0.028540	0.098754	0.287400	0.208867
0.000033	AP1-18	0.000000	0.000093	0.000072	0.001341	0.001021	0.013618	0.000016
0.000013	AP2-18	0.000003	0.000067	0.000121	0.002422	0.001778	0.026197	0.000132
0.000012	AP3-18	0.000030	0.000079	0.000181	0.003614	0.002641	0.042765	0.000455
0.000010	AP4-18	0.000056	0.000135	0.000262	0.005433	0.003908	0.069566	0.000814

standardize signal averages AP

0.000024	AP1	0.000002	0.000095	0.000073	0.001349	0.001013	0.013702	0.000019
0.000014	AP2	0.000005	0.000091	0.000131	0.002510	0.001836	0.027322	0.000133
0.000012	AP3	0.000028	0.000123	0.000194	0.003912	0.002855	0.046394	0.000457
0.000008	AP4	0.000049	0.000180	0.000284	0.005855	0.004218	0.075139	0.000822

linest from std sig ave

4.571654		0.213457	0.003736	2.275743	0.111987	0.154679	0.008991	0.015182
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standardize signal averages SRM

0.000210	srm614-2	0.000005	0.000406	0.000106	0.001944	0.001581	0.017544	0.000220
0.000217	srm612-2	0.000241	0.012366	0.000242	0.003455	0.007465	0.032171	0.009871
0.000744	srm610-2	0.002099	0.195175	0.002023	0.024941	0.091133	0.256825	0.158079

linest from std sig ave

0.000000		0.597664	0.025771	2.883657	0.233192	0.064087	0.022691	0.033232
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concentration data

18.16	SRM614-17	0.19	0.12	28.34	16.47	18.40	11.71	0.21
21.21	SRM612-17	2.64	3.89	54.50	32.01	96.18	23.78	9.09
162.03	SRM610-17	28.35	58.43	342.93	204.98	1107.85	174.46	139.70
27.01	AP1-17	0.31	0.14	67.74	60.67	61.94	49.45	0.13
27.85	AP2-17	0.52	0.17	128.12	116.03	116.83	102.03	0.81
20.59	AP3-17	2.12	0.25	187.12	188.10	189.38	179.42	2.78
11.92	AP4-17	3.62	0.34	279.12	280.39	279.46	289.49	5.02
62.70	34HP60-24-1	0.07	0.17	166.91	156.49	160.19	126.75	6.46
53.86	34HP60-24-2	0.17	0.12	174.31	164.12	166.92	136.17	3.79
54.17	34HP60-24-3	0.24	0.13	171.86	163.70	165.69	136.48	5.25
86.70	34HP60-24-4	0.55	0.08	286.24	273.56	271.46	264.56	13.82
106.92	34HP60-24-5	0.91	0.05	414.17	412.67	404.30	430.47	27.32
99.85	34HP60-24-6	0.96	0.06	419.99	421.27	415.96	442.79	30.83
94.48	34HP60-24-7	0.59	0.06	303.35	311.86	309.81	312.20	9.00
88.75	34HP60-24-8	0.11	0.04	293.14	288.04	283.32	286.90	4.94
113.29	34HP60-24-9	0.50	0.04	350.17	348.68	342.54	357.05	6.80
138.09	34HP60-24-10	0.67	0.04	443.80	445.31	436.86	469.92	16.11
121.70	34HP60-24-11	0.63	0.02	429.35	444.52	432.89	467.74	16.31
114.02	34HP60-24-12	0.84	0.03	460.15	477.42	467.83	512.22	17.54
146.63	SRM614-18	0.00	0.14	13.02	20.87	23.53	15.35	0.36
148.71	SRM612-18	6.20	4.04	39.89	34.36	101.89	25.83	16.62
421.16	SRM610-18	48.49	66.65	446.73	274.10	1310.05	221.61	271.95
59.38	AP1-18	0.00	0.14	65.39	59.89	63.03	48.84	0.10
24.33	AP2-18	0.29	0.10	109.58	108.22	109.70	93.96	0.80
22.12	AP3-18	2.58	0.12	164.32	161.44	162.97	153.39	2.76
18.71	AP4-18	4.78	0.20	237.45	242.72	241.13	249.52	4.93

certified concentration

	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br Se Rb Sr84 Sr86 Sr87 Sr88 Y

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
463.76	blank-15	100.08	253.00	459.48	176.20	131.84	28.52
796.84	SRM614-15	136.76	1294.25	713.80	5155.15	4206.62	45545.78
835.60	SRM612-15	710.36	40119.63	1047.13	9802.46	22876.13	89066.26
1074.09	SRM610-15	3549.66	419371.47	3934.38	44461.05	187138.69	487686.91
621.24	AP1-15	107.08	1544.97	1410.41	18680.98	14034.16	183395.75
643.60	AP2-15	161.84	1325.89	2053.29	30005.45	22322.97	316227.50
702.68	AP3-15	560.16	2476.81	4212.34	75288.98	54732.51	924349.56
705.32	AP4-15	646.80	2618.85	4727.59	85227.80	61660.67	1064653.50
692.52	34BV166-1	121.84	661.24	966.21	10341.66	7623.76	98583.04
681.60	34BV166-2	92.68	599.36	875.00	8126.05	6050.27	77461.91
692.60	34BV166-3	104.32	518.80	740.96	6901.20	5091.39	63288.16
709.76	34BV166-4	88.92	584.48	764.96	7545.84	5737.27	71099.56
720.04	34BV166-5	89.76	649.08	867.12	8285.77	6191.00	77962.44
713.96	34BV166-6	103.28	635.48	1102.17	13569.80	9967.34	134758.03
1053.05	SRM614-16	130.64	1157.37	602.84	3678.98	3026.54	32465.10
1210.69	SRM612-16	740.68	28430.00	1009.49	8080.77	17230.06	75051.06
1338.21	SRM610-16	3120.98	226899.52	2893.66	29831.89	106505.68	315660.50
848.04	AP1-16	96.44	1602.61	1296.97	16538.05	12595.23	166800.66
824.96	AP2-16	176.20	1168.81	1699.85	24881.30	18059.74	263540.28
797.24	AP3-16	488.12	2059.65	3360.70	58271.93	42731.56	707899.81
769.72	AP4-16	530.20	1967.01	3596.14	63167.91	46088.54	785102.63
670.04	blank-16	72.08	532.96	399.48	183.96	234.68	300.64
566.90	blank average	86.08	392.98	429.48	180.08	183.26	195.78
29.96							
blank subtraction							
229.94	SRM614-15	50.68	901.27	284.32	4975.07	4023.36	45350.00
268.70	SRM612-15	624.28	39726.64	617.64	9622.37	22692.87	88870.48
507.18	SRM610-15	3463.58	418978.49	3504.90	44280.97	186955.43	487491.13
54.34	AP1-15	21.00	1151.99	980.93	18500.90	13850.90	183199.97
76.70	AP2-15	75.76	932.91	1623.81	29825.37	22139.70	316031.72
135.78	AP3-15	474.08	2083.83	3782.86	75108.90	54549.25	924153.78
138.42	AP4-15	560.72	2225.87	4298.10	85047.72	61477.41	1064457.72
125.62	34BV166-1	35.76	268.26	536.72	10161.58	7440.50	98387.26
114.70	34BV166-2	6.60	206.38	445.52	7945.96	5867.01	77266.13
125.70	34BV166-3	18.24	125.82	311.48	6721.12	4908.13	63092.37
142.86	34BV166-4	2.84	191.50	335.48	7365.76	5554.01	70903.78
153.14	34BV166-5	3.68	256.10	437.64	8105.69	6007.73	77766.66
147.06	34BV166-6	17.20	242.50	672.68	13389.72	9784.07	134562.25
486.14	SRM614-16	44.56	764.38	173.36	3498.90	2843.28	32269.32
643.78	SRM612-16	654.60	28037.02	580.00	7900.68	17046.80	74855.28
771.30	SRM610-16	3034.90	226506.54	2464.17	29651.81	106322.42	315464.72
281.14	AP1-16	10.36	1209.63	867.48	16357.97	12411.97	166604.88
258.06	AP2-16	90.12	775.82	1270.37	24701.22	17876.48	263344.50
230.34	AP3-16	402.04	1666.67	2931.22	58091.85	42548.30	707704.03
202.82	AP4-16	444.12	1574.03	3166.66	62987.83	45905.28	784906.85
zero correction							
229.94	SRM614-15	50.68	901.27	284.32	4975.07	4023.36	45350.00
268.70	SRM612-15	624.28	39726.64	617.64	9622.37	22692.87	88870.48
507.18	SRM610-15	3463.58	418978.49	3504.90	44280.97	186955.43	487491.13
54.34	AP1-15	21.00	1151.99	980.93	18500.90	13850.90	183199.97
76.70	AP2-15	75.76	932.91	1623.81	29825.37	22139.70	316031.72
135.78	AP3-15	474.08	2083.83	3782.86	75108.90	54549.25	924153.78
138.42	AP4-15	560.72	2225.87	4298.10	85047.72	61477.41	1064457.72
125.62	34BV166-1	35.76	268.26	536.72	10161.58	7440.50	98387.26
114.70	34BV166-2	6.60	206.38	445.52	7945.96	5867.01	77266.13
125.70	34BV166-3	18.24	125.82	311.48	6721.12	4908.13	63092.37
142.86	34BV166-4	2.84	191.50	335.48	7365.76	5554.01	70903.78
153.14	34BV166-5	3.68	256.10	437.64	8105.69	6007.73	77766.66
147.06	34BV166-6	17.20	242.50	672.68	13389.72	9784.07	134562.25
486.14	SRM614-16	44.56	764.38	173.36	3498.90	2843.28	32269.32
643.78	SRM612-16	654.60	28037.02	580.00	7900.68	17046.80	74855.28
771.30	SRM610-16	3034.90	226506.54	2464.17	29651.81	106322.42	315464.72
281.14	AP1-16	10.36	1209.63	867.48	16357.97	12411.97	166604.88
258.06	AP2-16	90.12	775.82	1270.37	24701.22	17876.48	263344.50
230.34	AP3-16	402.04	1666.67	2931.22	58091.85	42548.30	707704.03
202.82	AP4-16	444.12	1574.03	3166.66	62987.83	45905.28	784906.85
certified concentration							
	SRM614		0.87	44.30	44.30	44.30	44.30
	SRM612		31.63	76.15	76.15	76.15	76.15
	SRM610	109.00	431.10	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000081	SRM614-15	0.000018	0.000316	0.000100	0.001747	0.001413	0.015924
0.000088	SRM612-15	0.000205	0.013020	0.000202	0.003154	0.007437	0.029126
0.000272	SRM610-15	0.001860	0.225045	0.001883	0.023785	0.100419	0.261845
0.000004	AP1-15	0.000002	0.000086	0.000073	0.001378	0.001032	0.013649
0.000005	AP2-15	0.000005	0.000066	0.000115	0.002104	0.001562	0.022298
0.000007	AP3-15	0.000025	0.000112	0.000203	0.004022	0.002921	0.049483
0.000008	AP4-15	0.000033	0.000131	0.000253	0.005011	0.003622	0.062719
0.000030	34BV166-1	0.000009	0.000065	0.000129	0.002443	0.001789	0.023658
0.000032	34BV166-2	0.000002	0.000058	0.000126	0.002240	0.001654	0.021786
0.000039	34BV166-3	0.000006	0.000039	0.000096	0.002069	0.001511	0.019425
0.000049	34BV166-4	0.000001	0.000066	0.000115	0.002530	0.001907	0.024351
0.000050	34BV166-5	0.000001	0.000083	0.000142	0.002636	0.001954	0.025292
0.000035	34BV166-6	0.000004	0.000057	0.000159	0.003156	0.002306	0.031720
0.000282	SRM614-16	0.000026	0.000444	0.000101	0.002032	0.001651	0.018742
0.000278	SRM612-16	0.000283	0.012105	0.000250	0.003411	0.007360	0.032318
0.000692	SRM610-16	0.002723	0.203202	0.002211	0.026601	0.095383	0.283007
0.000023	AP1-16	0.000001	0.000101	0.000072	0.001365	0.001036	0.013906
0.000022	AP2-16	0.000008	0.000065	0.000106	0.002062	0.001492	0.021980
0.000014	AP3-16	0.000025	0.000102	0.000180	0.003565	0.002611	0.043427
0.000014	AP4-16	0.000031	0.000108	0.000218	0.004336	0.003160	0.054028
standardize signal averages AP							
0.000014	AP1	0.000001	0.000093	0.000073	0.001372	0.001034	0.013777
0.000013	AP2	0.000006	0.000065	0.000110	0.002083	0.001527	0.022139
0.000011	AP3	0.000025	0.000107	0.000191	0.003793	0.002766	0.046455
0.000011	AP4	0.000032	0.000120	0.000236	0.004673	0.003391	0.058373
linest from std sig ave							
6.085659		0.294134	0.004442	2.595182	0.131563	0.180675	0.010749
standardize signal averages SRM							
0.000182	srM614-2	0.000022	0.000380	0.000100	0.001890	0.001532	0.017333
0.000183	srM612-2	0.000244	0.012562	0.000226	0.003282	0.007398	0.030722
0.000482	srM610-2	0.002292	0.214123	0.002047	0.025193	0.097901	0.272426
linest from std sig ave							
0.000000		0.548384	0.023496	2.852418	0.231120	0.059653	0.021418
concentration data							
42.14	SRM614-15	0.45	0.12	22.22	19.71	21.89	14.68
45.96	SRM612-15	5.16	4.96	45.05	35.58	115.24	26.85
142.18	SRM610-15	46.93	85.72	419.01	268.37	1556.01	241.39
9.83	AP1-15	0.18	0.15	75.66	72.34	74.38	58.53
13.14	AP2-15	0.63	0.12	118.61	110.45	112.59	95.62
17.65	AP3-15	2.98	0.20	209.70	211.08	210.53	212.20
19.80	AP4-15	3.88	0.23	262.19	263.01	261.09	268.96
73.34	34BV166-1	1.01	0.11	133.62	128.25	128.96	101.45
78.52	34BV166-2	0.22	0.10	130.06	117.59	119.24	93.43
93.96	34BV166-3	0.66	0.07	99.28	108.61	108.92	83.30
119.11	34BV166-4	0.11	0.12	119.28	132.77	137.48	104.42
120.92	34BV166-5	0.14	0.15	147.36	138.36	140.83	108.46
84.16	34BV166-6	0.48	0.10	164.17	165.66	166.24	136.03
147.36	SRM614-16	0.65	0.17	22.41	22.93	25.59	17.28
145.07	SRM612-16	7.13	4.61	55.73	38.49	114.04	29.79
361.14	SRM610-16	68.68	77.40	492.02	300.15	1477.98	260.90
56.97	AP1-16	0.10	0.18	74.96	71.66	74.67	59.63
52.29	AP2-16	0.88	0.11	109.78	108.21	107.54	94.26
34.32	AP3-16	2.89	0.18	186.22	187.10	188.19	186.23
33.89	AP4-16	3.59	0.19	225.67	227.56	227.75	231.69
certified concentration							
	SRM614		0.87	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
590.04	blank-13	131.32	208.12	609.72	239.96	69.04	42.60
983.69	SRM614-13	153.00	1213.05	902.89	5507.15	4277.90	633.36
1124.29	SRM612-13	613.92	34368.63	1237.05	9483.41	20811.48	28756.52
1181.33	SRM610-13	2467.33	273966.78	3161.18	32135.86	125789.47	206027.84
816.44	AP1-13	133.32	1964.17	1791.81	22893.05	17046.30	390.00
901.01	AP2-13	201.84	1479.05	2515.97	38249.06	27891.92	1964.89
906.37	AP3-13	473.56	2319.13	3917.38	66116.85	48254.27	7394.32
931.41	AP4-13	568.76	2597.49	4554.95	81490.22	58900.49	11081.10
923.81	W3-1	135.04	1914.05	1076.01	12085.63	9418.45	499.88
951.09	W3-2	146.96	857.64	1139.97	12763.79	9448.21	500.28
887.77	W3-3	108.68	850.40	1093.81	12167.83	9233.89	567.96
911.21	W3-4	121.88	820.12	1026.25	11771.83	8640.41	530.52
897.21	W3-5	134.08	684.76	1119.65	12877.15	9702.42	541.08
928.33	W3-6	132.04	702.24	1173.13	13161.75	9809.62	512.52
942.93	W3-7	131.96	965.45	1055.09	11389.26	8593.13	752.92
883.28	W3-8	118.92	760.44	1146.09	13441.24	9732.97	883.60
972.45	W3-9	123.28	661.00	1206.81	13958.64	10465.18	806.40
967.33	W3-10	134.00	1401.97	1482.89	19631.39	14743.08	2126.57
947.85	W3-11	122.92	1397.17	1539.09	19399.31	14678.24	2064.33
925.97	W3-12	102.84	708.08	1462.13	19472.75	14117.56	1559.17
1377.53	SRM614-14	94.72	1254.21	712.00	4946.07	3982.58	643.84
1466.89	SRM612-14	901.85	32532.78	1009.25	8873.73	19396.07	31365.62
1496.45	SRM610-14	2935.38	199890.88	2489.81	25057.58	93617.09	194893.78
931.77	AP1-14	102.00	1466.61	1323.05	17398.38	13468.00	225.16
973.13	AP2-14	200.08	1051.45	1846.13	27749.44	20493.04	1563.53
935.49	AP3-14	527.16	1789.69	3139.98	53430.42	38788.18	6652.96
900.01	AP4-14	620.36	2090.05	3632.30	64953.57	47538.07	9854.46
749.92	blank-14	98.44	434.76	399.44	207.24	229.88	27.40
669.98	blank average	114.88	321.44	504.58	223.60	149.46	35.00
blank subtraction							
313.70	SRM614-13	38.12	891.61	398.30	5283.55	4128.44	598.36
454.30	SRM612-13	499.04	34047.19	732.46	9259.81	20662.02	28721.52
511.34	SRM610-13	2352.45	273645.34	2656.59	31912.26	125640.01	205992.84
146.46	AP1-13	18.44	1642.73	1287.23	22669.45	16896.84	355.00
231.02	AP2-13	86.96	1157.61	2011.39	38025.45	27742.46	1929.89
236.38	AP3-13	358.68	1997.69	3412.80	65893.25	48104.81	7359.32
261.42	AP4-13	453.88	2276.05	4050.36	81266.62	58751.03	11046.10
253.82	W3-1	20.16	1592.61	571.42	11862.03	9268.99	464.88
281.10	W3-2	32.08	536.20	635.38	12540.19	9298.75	465.28
217.78	W3-3	-6.20	528.96	589.22	11944.23	9084.43	532.96
241.22	W3-4	7.00	498.68	521.66	11548.22	8490.95	495.52
227.22	W3-5	19.20	363.32	615.06	12653.55	9552.95	506.08
258.34	W3-6	17.16	380.80	668.54	12938.15	9660.15	477.52
272.94	W3-7	17.08	644.00	550.50	11165.66	8443.67	717.92
213.30	W3-8	4.04	439.00	641.50	13217.63	9583.51	848.60
302.46	W3-9	8.40	339.56	702.22	13735.04	10315.72	771.40
297.34	W3-10	19.12	1080.53	978.31	19407.79	14593.62	2091.57
277.86	W3-11	8.04	1075.73	1034.51	19175.71	14528.78	2029.33
255.98	W3-12	-12.04	386.64	957.55	19249.15	13968.10	1524.17
707.54	SRM614-14	-20.16	932.77	207.42	4722.47	3833.12	608.84
796.90	SRM612-14	786.96	32211.34	504.66	8650.13	19246.61	31330.62
826.46	SRM610-14	2820.50	199569.44	1985.23	24833.98	93467.63	194858.78
261.78	AP1-14	-12.88	1145.17	818.46	17174.78	13318.54	190.16
303.14	AP2-14	85.20	730.00	1341.55	27525.83	20343.57	1528.53
265.50	AP3-14	412.28	1468.25	2635.39	53206.82	38638.72	6617.96
230.02	AP4-14	505.48	1768.61	3127.72	64729.96	47388.61	9819.45
zero correction							
313.70	SRM614-13	38.12	891.61	398.30	5283.55	4128.44	598.36
454.30	SRM612-13	499.04	34047.19	732.46	9259.81	20662.02	28721.52
511.34	SRM610-13	2352.45	273645.34	2656.59	31912.26	125640.01	205992.84
146.46	AP1-13	18.44	1642.73	1287.23	22669.45	16896.84	355.00
231.02	AP2-13	86.96	1157.61	2011.39	38025.45	27742.46	1929.89
236.38	AP3-13	358.68	1997.69	3412.80	65893.25	48104.81	7359.32
261.42	AP4-13	453.88	2276.05	4050.36	81266.62	58751.03	11046.10
253.82	W3-1	20.16	1592.61	571.42	11862.03	9268.99	464.88
281.10	W3-2	32.08	536.20	635.38	12540.19	9298.75	465.28
217.78	W3-3	0.00	528.96	589.22	11944.23	9084.43	532.96
241.22	W3-4	7.00	498.68	521.66	11548.22	8490.95	495.52
227.22	W3-5	19.20	363.32	615.06	12653.55	9552.95	506.08
258.34	W3-6	17.16	380.80	668.54	12938.15	9660.15	477.52
272.94	W3-7	17.08	644.00	550.50	11165.66	8443.67	717.92
213.30	W3-8	4.04	439.00	641.50	13217.63	9583.51	848.60
302.46	W3-9	8.40	339.56	702.22	13735.04	10315.72	771.40

Appendix A. Raw trace element datasheets from laser ablation.

297.34	W3-10	19.12	1080.53	978.31	19407.79	14593.62	200788.09	2091.57
277.86	W3-11	8.04	1075.73	1034.51	19175.71	14528.78	197105.35	2029.33
255.98	W3-12	0.00	386.64	957.55	19249.15	13968.10	197180.64	1524.17
707.54	SRM614-14	0.00	932.77	207.42	4722.47	3833.12	43324.20	608.84
796.90	SRM612-14	786.96	32211.34	504.66	8650.13	19246.61	81936.90	31330.62
826.46	SRM610-14	2820.50	199569.44	1985.23	24833.98	93467.63	261284.35	194858.78
261.78	AP1-14	0.00	1145.17	818.46	17174.78	13318.54	178963.57	190.16
303.14	AP2-14	85.20	730.00	1341.55	27525.83	20343.57	302649.43	1528.53
265.50	AP3-14	412.28	1468.25	2635.39	53206.82	38638.72	646040.68	6617.96
230.02	AP4-14	505.48	1768.61	3127.72	64729.96	47388.61	811907.00	9819.45
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000108	SRM614-13	0.000013	0.000306	0.000137	0.001813	0.001417	0.016401	0.000205
0.000156	SRM612-13	0.000171	0.011691	0.000252	0.003179	0.007095	0.029997	0.009862
0.000432	SRM610-13	0.001988	0.231199	0.002245	0.026962	0.106152	0.281068	0.174041
0.000009	AP1-13	0.000001	0.000105	0.000082	0.001450	0.001080	0.014796	0.000023
0.000014	AP2-13	0.000005	0.000071	0.000123	0.002322	0.001694	0.025380	0.000118
0.000014	AP3-13	0.000021	0.000115	0.000197	0.003810	0.002781	0.046197	0.000425
0.000015	AP4-13	0.000026	0.000130	0.000232	0.004648	0.003360	0.057748	0.000632
0.000042	W3-1	0.000003	0.000264	0.000095	0.001968	0.001538	0.019383	0.000077
0.000044	W3-2	0.000005	0.000083	0.000098	0.001941	0.001439	0.019017	0.000072
0.000035	W3-3	0.000000	0.000084	0.000094	0.001904	0.001448	0.018601	0.000085
0.000042	W3-4	0.000001	0.000086	0.000090	0.001999	0.001470	0.019375	0.000086
0.000036	W3-5	0.000003	0.000058	0.000098	0.002008	0.001516	0.020116	0.000080
0.000040	W3-6	0.000003	0.000059	0.000104	0.002016	0.001505	0.020119	0.000074
0.000052	W3-7	0.000003	0.000122	0.000105	0.002121	0.001604	0.020978	0.000136
0.000035	W3-8	0.000001	0.000073	0.000107	0.002199	0.001595	0.021767	0.000141
0.000049	W3-9	0.000001	0.000055	0.000113	0.002206	0.001657	0.022487	0.000124
0.000034	W3-10	0.000002	0.000124	0.000112	0.002218	0.001668	0.022951	0.000239
0.000032	W3-11	0.000001	0.000123	0.000118	0.002184	0.001655	0.022452	0.000231
0.000029	W3-12	0.000000	0.000043	0.000107	0.002156	0.001565	0.022086	0.000171
0.000300	SRM614-14	0.000000	0.000395	0.000088	0.002001	0.001624	0.018355	0.000258
0.000318	SRM612-14	0.000314	0.012842	0.000201	0.003449	0.007673	0.032668	0.012491
0.000886	SRM610-14	0.003022	0.213843	0.002127	0.026610	0.100153	0.279972	0.208795
0.000020	AP1-14	0.000000	0.000089	0.000064	0.001339	0.001038	0.013954	0.000015
0.000023	AP2-14	0.000006	0.000055	0.000100	0.002056	0.001520	0.022609	0.000114
0.000018	AP3-14	0.000028	0.000101	0.000181	0.003656	0.002655	0.044386	0.000455
0.000016	AP4-14	0.000034	0.000120	0.000213	0.004404	0.003224	0.055240	0.000668
standardize signal averages AP								
0.000015	AP1	0.000001	0.000097	0.000073	0.001394	0.001059	0.014375	0.000019
0.000018	AP2	0.000006	0.000063	0.000112	0.002189	0.001607	0.023994	0.000116
0.000016	AP3	0.000025	0.000108	0.000189	0.003733	0.002718	0.045292	0.000440
0.000015	AP4	0.000030	0.000125	0.000222	0.004526	0.003292	0.056494	0.000650
linest from std sig ave								
4.611836		0.306164	0.004379	2.681144	0.133931	0.183644	0.010997	0.018123
standardize signal averages SRM								
0.000204	srM614-2	0.000007	0.000351	0.000112	0.001907	0.001520	0.017378	0.000232
0.000237	srM612-2	0.000243	0.012266	0.000226	0.003314	0.007384	0.031333	0.011177
0.000659	srM610-2	0.002505	0.222521	0.002186	0.026786	0.103152	0.280520	0.191418
linest from std sig ave								
0.000000		0.502669	0.022612	2.671773	0.217560	0.056612	0.020803	0.027448
concentration data								
42.57	SRM614-13	0.34	0.11	31.43	20.82	22.31	15.47	0.32
61.70	SRM612-13	4.50	4.39	57.83	36.52	111.74	28.29	15.33
170.88	SRM610-13	52.19	86.83	516.11	309.70	1671.88	265.10	270.51

Appendix A. Raw trace element datasheets from laser ablation.

17.23 AP1-13	0.14	0.18	88.04	77.45	79.16	64.91	0.16
25.96 AP2-13	0.65	0.12	131.39	124.08	124.12	111.35	0.85
25.14 AP3-13	2.53	0.20	211.04	203.55	203.75	202.68	3.08
27.51 AP4-13	3.17	0.23	247.76	248.32	246.16	253.36	4.57
77.48 W3-1	0.41	0.46	101.40	105.15	112.66	85.04	0.56
80.04 W3-2	0.61	0.14	105.18	103.69	105.43	83.43	0.52
63.88 W3-3	0.00	0.15	100.48	101.75	106.11	81.61	0.61
76.81 W3-4	0.15	0.15	96.57	106.79	107.67	85.00	0.62
66.35 W3-5	0.37	0.10	104.41	107.30	111.07	88.26	0.58
74.07 W3-6	0.33	0.10	111.43	107.72	110.28	88.27	0.54
95.38 W3-7	0.40	0.21	111.83	113.31	117.49	92.04	0.99
65.30 W3-8	0.08	0.13	114.17	117.51	116.83	95.50	1.02
89.37 W3-9	0.16	0.10	120.63	117.86	121.37	98.66	0.90
62.53 W3-10	0.27	0.22	119.61	118.53	122.21	100.69	1.73
58.23 W3-11	0.11	0.21	126.04	116.70	121.24	98.50	1.67
52.75 W3-12	0.00	0.08	114.72	115.20	114.62	96.90	1.23
118.56 SRM614-14	0.00	0.15	20.21	22.98	25.58	17.31	0.40
125.67 SRM612-14	8.24	4.82	46.27	39.61	120.86	30.81	19.41
350.27 SRM610-14	79.36	80.32	489.14	305.65	1577.39	264.06	324.52
37.55 AP1-14	0.00	0.16	68.26	71.55	76.08	61.22	0.11
41.66 AP2-14	0.78	0.10	107.19	109.87	111.34	99.19	0.83
33.56 AP3-14	3.46	0.18	193.67	195.32	194.49	194.74	3.29
28.79 AP4-14	4.20	0.21	227.61	235.31	236.21	242.35	4.83

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
859.84 blank-11	120.72	274.52	671.08	339.48	153.68	690.24	57.68
1327.45 SRM614-11	158.32	1530.89	1051.61	7566.96	5902.91	66296.25	872.56
1443.89 SRM612-11	698.72	34499.56	1379.37	11944.15	22149.53	110320.86	36057.65
1696.17 SRM610-11	2634.41	267512.19	3460.82	34765.12	125944.51	372532.31	251064.69
986.05 AP1-11	144.48	1634.25	2154.85	30430.17	22834.57	325965.00	599.12
1091.85 AP2-11	236.64	1542.61	2971.58	45811.78	33297.15	522154.25	2628.69
1067.77 AP3-11	707.40	2918.18	5260.87	94357.17	67865.95	1196928.10	10480.82
1116.29 AP4-11	667.56	2511.01	4509.51	77742.12	56534.96	970628.75	11915.83
1202.33 W1-1	144.64	1141.97	2736.46	44993.73	32611.38	544139.31	622.08
1162.29 W1-2	119.96	865.04	2266.53	33193.07	24297.22	390390.50	466.84
1157.17 W1-3	123.00	763.44	1839.89	26628.75	19303.91	299127.28	377.16
1204.57 W1-4	159.60	1110.65	4008.38	68915.70	49697.40	844652.19	1064.89
1217.21 W1-5	177.08	848.52	3537.62	59731.41	42944.52	716339.25	764.40
1207.13 W1-6	165.92	802.68	3326.50	58210.01	42073.32	695824.13	720.88
1214.45 W1-7	141.60	1740.53	3209.46	53304.22	38842.30	626333.13	1222.33
1158.17 W1-8	130.84	859.72	3010.98	48144.27	35127.12	562129.50	842.60
1238.49 W1-9	150.12	1168.37	2999.02	49730.48	35896.12	583217.19	987.69
1233.45 W1-10	172.76	1345.37	3558.38	60690.86	44331.13	734437.50	1129.49
1236.45 W1-11	151.36	837.44	3600.22	60906.31	43997.29	740330.13	972.37
1189.17 W1-12	146.80	1087.65	3455.02	56892.00	40992.35	683769.25	932.45
1193.97 W1-13	130.12	998.05	2935.70	50467.36	36484.84	590834.31	766.20
1234.65 W1-14	127.60	805.96	3118.78	52721.26	38066.17	623117.69	714.72
1187.09 W1-15	133.48	837.00	3031.98	50858.48	36452.16	594073.69	652.60
1189.25 W1-16	134.12	829.40	2149.81	33919.63	24938.02	379599.09	571.80
1083.65 W1-17	103.40	642.96	2172.81	33394.83	24317.74	370957.22	478.12
1180.05 W1-18	114.92	638.36	2066.89	31778.42	23043.37	351934.03	499.44
1346.93 SRM614-12	117.04	1015.93	650.36	4745.51	3990.78	43407.16	692.64
1441.73 SRM612-12	771.24	27632.88	965.41	7931.08	16710.93	73368.73	30616.13
1598.85 SRM610-12	3051.78	212469.36	2556.17	26959.23	99187.68	283323.47	225434.11
1023.65 AP1-12	94.40	1423.09	1332.65	18805.95	13923.08	188311.06	250.96
943.01 AP2-12	157.28	961.33	1848.61	27188.03	19932.23	293872.63	1545.93
917.17 AP3-12	548.76	1748.77	2979.58	51251.81	37153.41	619761.50	6511.44
917.13 AP4-12	710.64	2217.61	3637.18	66771.26	48184.03	833508.63	10766.18
732.20 blank-12	81.84	255.48	351.00	189.44	146.52	534.88	34.16
796.02 blank average	101.28	265.00	511.04	264.46	150.10	612.56	45.92
blank subtraction							
531.42 SRM614-11	57.04	1265.89	540.56	7302.50	5752.81	65683.69	826.64
647.86 SRM612-11	597.44	34234.55	868.32	11679.69	21999.42	109708.30	36011.72
900.15 SRM610-11	2533.13	267247.19	2949.78	34500.66	125794.41	371919.75	251018.77
190.02 AP1-11	43.20	1369.25	1643.81	30165.71	22684.47	325352.44	553.20
295.82 AP2-11	135.36	1277.61	2460.53	45547.32	33147.05	521541.69	2582.77
271.74 AP3-11	606.12	2653.18	4749.83	94092.71	67715.84	1196315.54	10434.90

Appendix A. Raw trace element datasheets from laser ablation.

320.26	AP4-11	566.28	2246.01	3998.46	77477.66	56384.86	970016.19	11869.91
406.30	W1-1	43.36	876.96	2225.41	44729.27	32461.28	543526.75	576.16
366.26	W1-2	18.68	600.04	1755.49	32928.60	24147.11	389777.94	420.92
361.14	W1-3	21.72	498.44	1328.85	26364.29	19153.81	298514.72	331.24
408.54	W1-4	58.32	845.64	3497.34	68651.24	49547.30	844039.63	1018.97
421.18	W1-5	75.80	583.52	3026.58	59466.95	42794.42	715726.69	718.48
411.10	W1-6	64.64	537.68	2815.46	57945.55	41923.22	695211.57	674.96
418.42	W1-7	40.32	1475.53	2698.42	53039.76	38692.20	625720.57	1176.41
362.14	W1-8	29.56	594.72	2499.93	47879.81	34977.02	561516.94	796.68
442.46	W1-9	48.84	903.37	2487.97	49466.02	35746.02	582604.63	941.77
437.42	W1-10	71.48	1080.37	3047.34	60426.40	44181.03	733824.94	1083.57
440.42	W1-11	50.08	572.44	3089.18	60641.84	43847.19	739717.57	926.45
393.14	W1-12	45.52	822.64	2943.98	56627.54	40842.25	683156.69	886.52
397.94	W1-13	28.84	733.04	2424.65	50202.90	36334.74	590221.75	720.28
438.62	W1-14	26.32	540.96	2607.73	52456.80	37916.07	622505.13	668.80
391.06	W1-15	32.20	572.00	2520.93	50594.02	36302.06	593461.13	606.68
393.22	W1-16	32.84	564.40	1638.77	33655.17	24787.92	378986.53	525.88
287.62	W1-17	2.12	377.96	1661.77	33130.37	24167.64	370344.66	432.20
384.02	W1-18	13.64	373.36	1555.85	31513.96	22893.27	351321.47	453.52
550.90	SRM614-12	15.76	750.92	139.32	4481.05	3840.68	42794.60	646.72
645.70	SRM612-12	669.96	27367.87	454.36	7666.62	16560.83	72756.17	30570.21
802.82	SRM610-12	2950.50	212204.36	2045.13	26694.77	99037.58	282710.91	225388.19
227.62	AP1-12	-6.88	1158.09	821.60	18541.48	13772.98	187698.50	205.04
146.98	AP2-12	56.00	696.32	1337.57	26923.57	19782.13	293260.07	1500.01
121.14	AP3-12	447.48	1483.77	2468.53	50987.35	37003.31	619148.94	6465.52
121.10	AP4-12	609.36	1952.61	3126.14	66506.80	48033.93	832896.07	10720.26
zero correction								
531.42	SRM614-11	57.04	1265.89	540.56	7302.50	5752.81	65683.69	826.64
647.86	SRM612-11	597.44	34234.55	868.32	11679.69	21999.42	109708.30	36011.72
900.15	SRM610-11	2533.13	267247.19	2949.78	34500.66	125794.41	371919.75	251018.77
190.02	AP1-11	43.20	1369.25	1643.81	30165.71	22684.47	325352.44	553.20
295.82	AP2-11	135.36	1277.61	2460.53	45547.32	33147.05	521541.69	2582.77
271.74	AP3-11	606.12	2653.18	4749.83	94092.71	67715.84	1196315.54	10434.90
320.26	AP4-11	566.28	2246.01	3998.46	77477.66	56384.86	970016.19	11869.91
406.30	W1-1	43.36	876.96	2225.41	44729.27	32461.28	543526.75	576.16
366.26	W1-2	18.68	600.04	1755.49	32928.60	24147.11	389777.94	420.92
361.14	W1-3	21.72	498.44	1328.85	26364.29	19153.81	298514.72	331.24
408.54	W1-4	58.32	845.64	3497.34	68651.24	49547.30	844039.63	1018.97
421.18	W1-5	75.80	583.52	3026.58	59466.95	42794.42	715726.69	718.48
411.10	W1-6	64.64	537.68	2815.46	57945.55	41923.22	695211.57	674.96
418.42	W1-7	40.32	1475.53	2698.42	53039.76	38692.20	625720.57	1176.41
362.14	W1-8	29.56	594.72	2499.93	47879.81	34977.02	561516.94	796.68
442.46	W1-9	48.84	903.37	2487.97	49466.02	35746.02	582604.63	941.77
437.42	W1-10	71.48	1080.37	3047.34	60426.40	44181.03	733824.94	1083.57
440.42	W1-11	50.08	572.44	3089.18	60641.84	43847.19	739717.57	926.45
393.14	W1-12	45.52	822.64	2943.98	56627.54	40842.25	683156.69	886.52
397.94	W1-13	28.84	733.04	2424.65	50202.90	36334.74	590221.75	720.28
438.62	W1-14	26.32	540.96	2607.73	52456.80	37916.07	622505.13	668.80
391.06	W1-15	32.20	572.00	2520.93	50594.02	36302.06	593461.13	606.68
393.22	W1-16	32.84	564.40	1638.77	33655.17	24787.92	378986.53	525.88
287.62	W1-17	2.12	377.96	1661.77	33130.37	24167.64	370344.66	432.20
384.02	W1-18	13.64	373.36	1555.85	31513.96	22893.27	351321.47	453.52
550.90	SRM614-12	15.76	750.92	139.32	4481.05	3840.68	42794.60	646.72
645.70	SRM612-12	669.96	27367.87	454.36	7666.62	16560.83	72756.17	30570.21
802.82	SRM610-12	2950.50	212204.36	2045.13	26694.77	99037.58	282710.91	225388.19
227.62	AP1-12	0.00	1158.09	821.60	18541.48	13772.98	187698.50	205.04
146.98	AP2-12	56.00	696.32	1337.57	26923.57	19782.13	293260.07	1500.01
121.14	AP3-12	447.48	1483.77	2468.53	50987.35	37003.31	619148.94	6465.52
121.10	AP4-12	609.36	1952.61	3126.14	66506.80	48033.93	832896.07	10720.26
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
0.000152 SRM614-11	0.000016	0.000362	0.000155	0.002090	0.001646	0.018799	0.000237
0.000211 SRM612-11	0.000195	0.011154	0.000283	0.003805	0.007168	0.035745	0.011733
0.000677 SRM610-11	0.001906	0.201056	0.002219	0.025956	0.094638	0.279803	0.188847
0.000010 AP1-11	0.000002	0.000075	0.000089	0.001642	0.001235	0.017714	0.000030
0.000017 AP2-11	0.000008	0.000073	0.000140	0.002592	0.001887	0.029683	0.000147
0.000015 AP3-11	0.000033	0.000144	0.000257	0.005094	0.003666	0.064771	0.000565
0.000020 AP4-11	0.000035	0.000138	0.000246	0.004774	0.003474	0.059765	0.000731
0.000031 W1-1	0.000003	0.000068	0.000172	0.003452	0.002505	0.041950	0.000044
0.000036 W1-2	0.000002	0.000058	0.000171	0.003208	0.002353	0.037978	0.000041
0.000043 W1-3	0.000003	0.000059	0.000157	0.003113	0.002262	0.035251	0.000039
0.000022 W1-4	0.000003	0.000046	0.000192	0.003760	0.002714	0.046228	0.000056
0.000025 W1-5	0.000005	0.000035	0.000182	0.003582	0.002577	0.043106	0.000043
0.000024 W1-6	0.000004	0.000032	0.000167	0.003437	0.002487	0.041240	0.000040
0.000023 W1-7	0.000002	0.000080	0.000146	0.002868	0.002092	0.033833	0.000064
0.000021 W1-8	0.000002	0.000035	0.000145	0.002781	0.002032	0.032619	0.000046
0.000025 W1-9	0.000003	0.000052	0.000142	0.002833	0.002047	0.033367	0.000054
0.000021 W1-10	0.000003	0.000052	0.000148	0.002930	0.002142	0.035584	0.000053
0.000021 W1-11	0.000002	0.000027	0.000148	0.002906	0.002101	0.035450	0.000044
0.000020 W1-12	0.000002	0.000042	0.000152	0.002914	0.002102	0.035159	0.000046
0.000021 W1-13	0.000002	0.000039	0.000129	0.002675	0.001936	0.031451	0.000038
0.000023 W1-14	0.000001	0.000028	0.000134	0.002693	0.001947	0.031963	0.000034
0.000021 W1-15	0.000002	0.000030	0.000134	0.002682	0.001924	0.031455	0.000032
0.000028 W1-16	0.000002	0.000041	0.000119	0.002436	0.001794	0.027428	0.000038
0.000021 W1-17	0.000000	0.000027	0.000120	0.002398	0.001749	0.026808	0.000031
0.000029 W1-18	0.000001	0.000028	0.000116	0.002345	0.001703	0.026137	0.000034
0.000239 SRM614-12	0.000007	0.000326	0.000060	0.001945	0.001667	0.018579	0.000281
0.000293 SRM612-12	0.000304	0.012422	0.000206	0.003480	0.007517	0.033022	0.013875
0.000818 SRM610-12	0.003005	0.216109	0.002083	0.027186	0.100860	0.287913	0.229535
0.000017 AP1-12	0.000000	0.000089	0.000063	0.001420	0.001055	0.014372	0.000016
0.000012 AP2-12	0.000005	0.000057	0.000109	0.002204	0.001619	0.024004	0.000123
0.000009 AP3-12	0.000034	0.000114	0.000189	0.003905	0.002834	0.047422	0.000495
0.000009 AP4-12	0.000045	0.000143	0.000229	0.004874	0.003520	0.061042	0.000786
standardize signal averages AP							
0.000014 AP1	0.000001	0.000082	0.000076	0.001531	0.001145	0.016043	0.000023
0.000014 AP2	0.000006	0.000065	0.000125	0.002398	0.001753	0.026843	0.000135
0.000012 AP3	0.000034	0.000129	0.000223	0.004500	0.003250	0.056097	0.000530
0.000014 AP4	0.000040	0.000141	0.000238	0.004824	0.003497	0.060404	0.000759
linest from std sig ave							
5.466017	0.229091	0.004311	2.401130	0.119325	0.164589	0.009663	0.015356
standardize signal averages SRM							
0.000196 srm614-2	0.000012	0.000344	0.000108	0.002018	0.001657	0.018689	0.000259
0.000252 srm612-2	0.000249	0.011788	0.000245	0.003643	0.007342	0.034384	0.012804
0.000747 srm610-2	0.002455	0.208582	0.002151	0.026571	0.097749	0.283858	0.209191
linest from std sig ave							
0.000000	0.512345	0.024122	2.713398	0.218954	0.059750	0.020540	0.025113
concentration data							
71.30 SRM614-11	0.32	0.13	31.86	21.39	23.24	15.58	0.31
98.95 SRM612-11	3.82	4.12	58.26	38.94	101.18	29.62	15.45
317.46 SRM610-11	37.44	74.34	456.99	265.62	1335.87	231.87	248.71
22.56 AP1-11	0.21	0.13	85.73	78.18	81.09	68.28	0.18
36.71 AP2-11	0.70	0.13	134.14	123.40	123.87	114.42	0.90
32.08 AP3-11	3.00	0.25	246.34	242.51	240.73	249.68	3.46
43.03 AP4-11	3.19	0.24	235.98	227.24	228.10	230.38	4.48
68.38 W1-1	0.31	0.12	164.53	164.34	164.51	161.71	0.27
77.82 W1-2	0.17	0.10	163.85	152.73	154.49	146.40	0.25
93.00 W1-3	0.23	0.10	150.31	148.20	148.51	135.89	0.24
48.79 W1-4	0.29	0.08	183.49	178.99	178.18	178.20	0.34
55.31 W1-5	0.42	0.06	174.61	170.49	169.23	166.16	0.27
53.18 W1-6	0.35	0.05	159.98	163.63	163.29	158.97	0.25
49.33 W1-7	0.20	0.14	139.76	136.52	137.37	130.42	0.39
45.87 W1-8	0.16	0.06	139.11	132.40	133.41	125.74	0.28
55.26 W1-9	0.26	0.09	136.49	134.86	134.42	128.62	0.33
46.25 W1-10	0.32	0.09	141.55	139.48	140.67	137.17	0.32
46.02 W1-11	0.22	0.05	141.81	138.34	137.97	136.65	0.27
44.12 W1-12	0.21	0.07	145.13	138.73	138.02	135.53	0.28
46.24 W1-13	0.14	0.07	123.76	127.34	127.13	121.24	0.24
49.11 W1-14	0.12	0.05	128.26	128.21	127.83	123.21	0.21
45.20 W1-15	0.16	0.05	127.99	127.65	126.34	121.25	0.20
62.06 W1-16	0.22	0.07	113.61	115.95	117.79	105.73	0.23
45.40 W1-17	0.01	0.05	115.23	114.16	114.87	103.34	0.19
62.30 W1-18	0.09	0.05	110.88	111.61	111.83	100.75	0.21

Appendix A. Raw trace element datasheets from laser ablation.

112.12 SRM614-12	0.13	0.12	12.46	19.91	23.54	15.40	0.37
137.39 SRM612-12	5.97	4.59	42.47	35.61	106.10	27.37	18.27
383.27 SRM610-12	59.04	79.91	428.90	278.21	1423.70	238.59	302.30
38.01 AP1-12	0.00	0.15	60.26	67.58	69.25	55.40	0.10
26.23 AP2-12	0.42	0.10	104.87	104.91	106.32	92.53	0.75
20.23 AP3-12	3.13	0.20	181.11	185.90	186.09	182.80	3.03
19.35 AP4-12	4.08	0.25	219.47	232.03	231.15	235.31	4.81
certified concentration							
SRM614	0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612	31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
641.92 blank-9	144.32	228.08	734.96	307.28	111.80	71.04	44.64
876.44 SRM614-9	146.52	1130.93	1081.69	5922.67	4585.23	51534.33	773.52
1076.37 SRM612-9	616.00	36211.45	1485.33	11356.46	22440.17	103095.66	36911.37
1368.61 SRM610-9	2397.09	260939.14	3582.10	35730.16	124970.50	383414.19	261750.95
862.08 AP1-9	164.80	1710.45	2154.81	28618.96	21122.92	299174.88	474.68
901.53 AP2-9	251.00	1460.93	3082.26	48266.35	35144.24	548489.00	2736.06
883.12 AP3-9	605.80	2417.33	4587.23	78567.45	57015.20	965861.13	9232.73
892.21 AP4-9	746.04	2829.82	5328.35	95500.86	69572.83	1208791.50	14339.60
1435.25 T2-1	185.24	2670.42	3681.18	59658.90	43977.33	700667.94	699.44
1394.21 T2-2	165.52	2435.89	3266.62	51890.09	38212.18	596838.00	675.84
1471.21 T2-3	174.12	2025.37	2590.33	42183.16	30939.65	472732.50	564.60
1979.41 T2-4	177.92	5360.07	2975.62	48456.19	37211.81	571348.63	636.48
1973.01 T2-5	180.72	5152.07	2667.53	41830.92	31972.70	487903.84	512.80
2091.33 T2-6	196.60	4909.75	2381.09	36038.00	27682.20	415668.00	493.60
1478.21 T2-7	188.52	1725.61	2179.21	33783.35	25262.66	372926.81	446.64
1556.97 T2-8	171.80	1816.13	2398.53	37134.53	27195.47	412435.88	513.60
1431.85 T2-9	163.76	1455.17	2174.09	33155.35	24378.46	365244.41	493.12
956.65 T2-10	90.40	775.68	971.41	10279.50	7877.44	98762.27	197.00
898.21 T2-11	119.24	739.08	1031.69	11899.63	8690.81	113653.08	191.12
867.64 T2-12	104.00	428.08	1084.33	12263.83	9207.65	121285.20	184.72
877.00 T2-13	123.28	1028.41	1008.85	12526.31	9333.17	120697.00	206.76
788.92 T2-14	101.52	721.04	1149.81	13643.32	9845.58	129948.41	167.76
799.88 T2-15	104.76	864.64	1229.69	14410.80	10529.26	139977.19	189.24
838.96 T2-16	86.36	1181.41	1350.65	18101.62	13478.92	183571.95	308.76
860.00 T2-17	116.88	917.53	1443.45	19923.87	14730.12	204623.03	281.96
836.76 T2-18	113.52	976.81	1600.53	21892.40	16264.73	225978.52	293.96
1096.09 SRM614-10	105.52	815.72	592.08	4117.38	3281.78	35930.36	576.00
1184.37 SRM612-10	757.12	26196.31	1001.37	7864.00	16078.61	71628.05	29668.85
1430.49 SRM610-10	2927.50	223261.45	2700.94	27897.72	104199.66	296912.50	232996.47
879.08 AP1-10	96.88	1344.25	1425.61	19466.83	14774.76	200532.22	246.72
867.00 AP2-10	189.28	1076.33	2102.13	32599.34	23786.77	359149.50	1950.69
840.68 AP3-10	571.00	1802.61	3196.86	54706.43	40083.15	662960.19	7124.20
812.36 AP4-10	696.32	2138.01	3763.50	68814.98	49970.44	860535.31	10809.78
605.56 blank-10	104.80	264.08	353.64	198.56	168.00	369.44	40.36
623.74 blank average	124.56	246.08	544.30	252.92	139.90	220.24	42.50
blank subtraction							
252.70 SRM614-9	21.96	884.85	537.38	5669.75	4445.32	51314.09	731.02
452.62 SRM612-9	491.44	35965.36	941.03	11103.54	22300.27	102875.42	36868.87
744.86 SRM610-9	2272.53	260693.06	3037.80	35477.24	124830.60	383193.95	261708.45
238.34 AP1-9	40.24	1464.37	1610.51	28366.04	20983.02	298954.64	432.18
277.78 AP2-9	126.44	1214.85	2537.95	48013.43	35004.34	548268.76	2693.56
259.38 AP3-9	481.24	2171.25	4042.92	78314.52	56875.30	965640.89	9190.23
268.46 AP4-9	621.48	2583.73	4784.05	95247.94	69432.93	1208571.26	14297.10
811.50 T2-1	60.68	2424.33	3136.88	59405.97	43837.43	700447.70	656.94
770.46 T2-2	40.96	2189.81	2722.32	51637.17	38072.28	596617.76	633.34
847.46 T2-3	49.56	1779.29	2046.03	41930.23	30799.75	472512.26	522.10
1355.67 T2-4	53.36	5113.99	2431.31	48203.27	37071.91	571128.39	593.98
1349.27 T2-5	56.16	4905.99	2123.23	41578.00	31832.80	487683.60	470.30
1467.59 T2-6	72.04	4663.67	1836.79	35785.08	27542.29	415447.76	451.10
854.46 T2-7	63.96	1479.53	1634.91	33530.43	25122.76	372706.57	404.14
933.23 T2-8	47.24	1570.05	1854.23	36881.61	27055.57	412215.64	471.10
808.10 T2-9	39.20	1209.09	1629.79	32902.43	24238.56	365024.17	450.62
332.90 T2-10	-34.16	529.60	427.10	10026.58	7737.54	98542.03	154.50
274.46 T2-11	-5.32	493.00	487.38	11646.71	8550.91	113432.84	148.62
243.90 T2-12	-20.56	182.00	540.02	12010.91	9067.75	121064.96	142.22
253.26 T2-13	-1.28	782.32	464.54	12273.39	9193.27	120476.76	164.26
165.18 T2-14	-23.04	474.96	605.50	13390.39	9705.67	129728.17	125.26
176.14 T2-15	-19.80	618.56	685.38	14157.88	10389.36	139756.95	146.74

Appendix A. Raw trace element datasheets from laser ablation.

215.22 T2-16	-38.20	935.33	806.34	17848.70	13339.02	183351.71	266.26
236.26 T2-17	-7.68	671.44	899.15	19670.95	14590.22	204402.79	239.46
213.02 T2-18	-11.04	730.72	1056.23	21639.48	16124.83	225758.28	251.46
472.34 SRM614-10	-19.04	569.64	47.78	3864.46	3141.88	35710.12	533.50
560.62 SRM612-10	632.56	25950.23	457.06	7611.08	15938.71	71407.81	29626.35
806.74 SRM610-10	2802.94	223015.37	2156.63	27644.80	104059.76	296692.26	232953.97
255.34 AP1-10	-27.68	1098.17	881.30	19213.91	14634.86	200311.98	204.22
243.26 AP2-10	64.72	830.24	1557.83	32346.42	23646.87	358929.26	1908.19
216.94 AP3-10	446.44	1556.53	2652.55	54453.51	39943.24	662739.95	7081.70
188.62 AP4-10	571.76	1891.93	3219.20	68562.06	49830.54	860315.07	10767.28
zero correction							
252.70 SRM614-9	21.96	884.85	537.38	5669.75	4445.32	51314.09	731.02
452.62 SRM612-9	491.44	35965.36	941.03	11103.54	22300.27	102875.42	36868.87
744.86 SRM610-9	2272.53	260693.06	3037.80	35477.24	124830.60	383193.95	261708.45
238.34 AP1-9	40.24	1464.37	1610.51	28366.04	20983.02	298954.64	432.18
277.78 AP2-9	126.44	1214.85	2537.95	48013.43	35004.34	548268.76	2693.56
259.38 AP3-9	481.24	2171.25	4042.92	78314.52	56875.30	956540.89	9190.23
268.46 AP4-9	621.48	2583.73	4784.05	95247.94	69432.93	1208571.26	14297.10
811.50 T2-1	60.68	2424.33	3136.88	59405.97	43837.43	700447.70	656.94
770.46 T2-2	40.96	2189.81	2722.32	51637.17	38072.28	596617.76	633.34
847.46 T2-3	49.56	1779.29	2046.03	41930.23	30799.75	472512.26	522.10
1355.67 T2-4	53.36	5113.99	2431.31	48203.27	37071.91	571128.39	593.98
1349.27 T2-5	56.16	4905.99	2123.23	41578.00	31832.80	487683.60	470.30
1467.59 T2-6	72.04	4663.67	1836.79	35785.08	27542.29	415447.76	451.10
854.46 T2-7	63.96	1479.53	1634.91	33530.43	25122.76	372706.57	404.14
933.23 T2-8	47.24	1570.05	1854.23	36881.61	27055.57	412215.64	471.10
808.10 T2-9	39.20	1209.09	1629.79	32902.43	24238.56	365024.17	450.62
332.90 T2-10	0.00	529.60	427.10	10026.58	7737.54	98542.03	154.50
274.46 T2-11	0.00	493.00	487.38	11646.71	8550.91	113432.84	148.62
243.90 T2-12	0.00	182.00	540.02	12010.91	9067.75	121064.96	142.22
253.26 T2-13	0.00	782.32	464.54	12273.39	9193.27	120476.76	164.26
165.18 T2-14	0.00	474.96	605.50	13390.39	9705.67	129728.17	125.26
176.14 T2-15	0.00	618.56	685.38	14157.88	10389.36	139756.95	146.74
215.22 T2-16	0.00	935.33	806.34	17848.70	13339.02	183351.71	266.26
236.26 T2-17	0.00	671.44	899.15	19670.95	14590.22	204402.79	239.46
213.02 T2-18	0.00	730.72	1056.23	21639.48	16124.83	225758.28	251.46
472.34 SRM614-10	0.00	569.64	47.78	3864.46	3141.88	35710.12	533.50
560.62 SRM612-10	632.56	25950.23	457.06	7611.08	15938.71	71407.81	29626.35
806.74 SRM610-10	2802.94	223015.37	2156.63	27644.80	104059.76	296692.26	232953.97
255.34 AP1-10	0.00	1098.17	881.30	19213.91	14634.86	200311.98	204.22
243.26 AP2-10	64.72	830.24	1557.83	32346.42	23646.87	358929.26	1908.19
216.94 AP3-10	446.44	1556.53	2652.55	54453.51	39943.24	662739.95	7081.70
188.62 AP4-10	571.76	1891.93	3219.20	68562.06	49830.54	860315.07	10767.28
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000094 SRM614-9	0.000008	0.000330	0.000200	0.002112	0.001656	0.019114	0.000272
0.000150 SRM612-9	0.000162	0.011887	0.000311	0.003670	0.007370	0.034001	0.012185
0.000561 SRM610-9	0.001712	0.196348	0.002288	0.026721	0.094020	0.288613	0.197113
0.000013 AP1-9	0.000002	0.000080	0.000088	0.001548	0.001145	0.016311	0.000024
0.000015 AP2-9	0.000007	0.000065	0.000137	0.002584	0.001884	0.029511	0.000145
0.000014 AP3-9	0.000026	0.000118	0.000219	0.004245	0.003083	0.052341	0.000498
0.000014 AP4-9	0.000034	0.000139	0.000258	0.005135	0.003743	0.065153	0.000771
0.000037 T2-1	0.000003	0.000110	0.000142	0.002688	0.001984	0.031694	0.000030
0.000040 T2-2	0.000002	0.000113	0.000140	0.002656	0.001958	0.030684	0.000033
0.000052 T2-3	0.000003	0.000109	0.000126	0.002574	0.001891	0.029007	0.000032
0.000076 T2-4	0.000003	0.000288	0.000137	0.002717	0.002090	0.032197	0.000033
0.000085 T2-5	0.000004	0.000309	0.000134	0.002617	0.002004	0.030700	0.000030
0.000104 T2-6	0.000005	0.000331	0.000130	0.002541	0.001955	0.029495	0.000032
0.000052 T2-7	0.000004	0.000090	0.000100	0.002043	0.001531	0.022711	0.000025

Appendix A. Raw trace element datasheets from laser ablation.

0.000055	T2-8	0.000003	0.000093	0.000110	0.002191	0.001607	0.024490	0.000028
0.000050	T2-9	0.000002	0.000074	0.000100	0.002026	0.001493	0.022478	0.000028
0.000044	T2-10	0.000000	0.000070	0.000057	0.001332	0.001028	0.013093	0.000021
0.000032	T2-11	0.000000	0.000057	0.000057	0.001356	0.000996	0.013209	0.000017
0.000026	T2-12	0.000000	0.000020	0.000059	0.001303	0.000984	0.013138	0.000015
0.000025	T2-13	0.000000	0.000079	0.000047	0.001236	0.000926	0.012129	0.000017
0.000015	T2-14	0.000000	0.000044	0.000056	0.001247	0.000904	0.012079	0.000012
0.000015	T2-15	0.000000	0.000054	0.000060	0.001235	0.000906	0.012193	0.000013
0.000015	T2-16	0.000000	0.000066	0.000057	0.001251	0.000935	0.012849	0.000019
0.000015	T2-17	0.000000	0.000043	0.000057	0.001251	0.000928	0.012995	0.000015
0.000013	T2-18	0.000000	0.000043	0.000062	0.001271	0.000947	0.013256	0.000015
0.000253	SRM614-10	0.000000	0.000305	0.000026	0.002071	0.001684	0.019136	0.000286
0.000264	SRM612-10	0.000298	0.012206	0.000215	0.003580	0.007497	0.033588	0.013935
0.000782	SRM610-10	0.002716	0.216103	0.002090	0.026788	0.100834	0.287496	0.225733
0.000019	AP1-10	0.000000	0.000080	0.000064	0.001393	0.001061	0.014522	0.000015
0.000017	AP2-10	0.000005	0.000058	0.000109	0.002268	0.001658	0.025166	0.000134
0.000016	AP3-10	0.000032	0.000111	0.000190	0.003898	0.002859	0.047441	0.000507
0.000013	AP4-10	0.000041	0.000134	0.000229	0.004870	0.003540	0.061112	0.000765
standardize signal averages AP								
0.000016	AP1	0.000001	0.000080	0.000076	0.001470	0.001103	0.015416	0.000019
0.000016	AP2	0.000006	0.000062	0.000123	0.002426	0.001771	0.027339	0.000139
0.000015	AP3	0.000029	0.000115	0.000205	0.004071	0.002971	0.049891	0.000503
0.000014	AP4	0.000037	0.000137	0.000243	0.005003	0.003641	0.063133	0.000768
linest from std sig ave								
4.942831		0.254347	0.004602	2.462431	0.121840	0.167067	0.009880	0.015511
standardize signal averages SRM								
0.000174	srm614-2	0.000004	0.000317	0.000113	0.002091	0.001670	0.019125	0.000279
0.000207	srm612-2	0.000230	0.012046	0.000263	0.003625	0.007434	0.033794	0.013060
0.000671	srm610-2	0.002214	0.206223	0.002189	0.026754	0.097427	0.288054	0.211423
linest from std sig ave								
0.000000		0.567960	0.024396	2.664956	0.217462	0.059948	0.020247	0.024848
concentration data								
39.90	SRM614-9	0.18	0.13	42.27	22.07	23.72	16.20	0.36
63.41	SRM612-9	3.54	4.69	65.68	38.35	105.60	28.81	16.21
237.82	SRM610-9	37.34	77.50	483.19	279.21	1347.13	244.56	262.21
25.64	AP1-9	0.22	0.15	86.32	75.22	76.30	64.29	0.15
29.48	AP2-9	0.69	0.12	134.20	125.62	125.58	116.32	0.90
27.72	AP3-9	2.65	0.22	215.27	206.33	205.47	206.30	3.08
28.54	AP4-9	3.40	0.26	253.35	249.58	249.47	256.81	4.77
72.40	T2-1	0.28	0.20	139.43	130.65	132.20	124.92	0.18
78.13	T2-2	0.21	0.21	137.54	129.08	130.50	120.94	0.20
102.59	T2-3	0.31	0.20	123.39	125.11	126.02	114.33	0.20
150.70	T2-4	0.31	0.53	134.64	132.08	139.29	126.91	0.21
167.49	T2-5	0.36	0.57	131.30	127.22	133.56	121.01	0.18
205.45	T2-6	0.52	0.61	128.10	123.49	130.32	116.25	0.20
102.67	T2-7	0.40	0.17	97.87	99.31	102.03	89.52	0.15
109.33	T2-8	0.28	0.17	108.22	106.50	107.13	96.53	0.17
98.12	T2-9	0.24	0.14	98.59	98.48	99.48	88.60	0.17
87.22	T2-10	0.00	0.13	55.75	64.75	68.52	51.61	0.13
63.02	T2-11	0.00	0.11	55.75	65.92	66.36	52.06	0.11
52.19	T2-12	0.00	0.04	57.57	63.35	65.58	51.78	0.10
50.28	T2-13	0.00	0.14	45.94	60.06	61.69	47.81	0.10
30.33	T2-14	0.00	0.08	55.38	60.60	60.23	47.61	0.07
30.30	T2-15	0.00	0.10	58.74	60.04	60.41	48.06	0.08
29.74	T2-16	0.00	0.12	55.51	60.80	62.30	50.65	0.12
29.62	T2-17	0.00	0.08	56.15	60.79	61.82	51.22	0.09
24.66	T2-18	0.00	0.08	60.92	61.76	63.10	52.25	0.09
107.30	SRM614-10	0.00	0.12	5.41	21.64	24.12	16.21	0.38
111.79	SRM612-10	6.49	4.82	45.40	37.41	107.42	28.46	18.54
331.39	SRM610-10	59.25	85.29	441.33	279.92	1444.77	243.61	300.28
36.50	AP1-10	0.00	0.15	62.77	67.71	70.71	57.24	0.09
33.63	AP2-10	0.46	0.11	107.30	110.23	110.50	99.19	0.83
30.62	AP3-10	3.24	0.20	186.53	189.46	190.57	186.99	3.14
26.42	AP4-10	4.12	0.25	224.64	236.73	235.92	240.88	4.73
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
740.24 blank-1	168.36	109.68	560.28	218.88	88.72	393.52	26.64
942.49 SRM614-1	144.36	1131.77	775.76	5328.87	4277.86	46777.15	452.00
965.13 SRM612-1	521.28	34869.32	1116.33	11101.02	21772.52	109018.53	17909.50
1162.05 SRM610-1	1798.05	232490.67	2859.02	31280.30	110883.74	330175.06	133518.06
788.44 AP1-1	139.32	1077.13	1174.97	14199.64	10658.78	142777.84	252.96
957.73 AP2-1	236.08	1530.33	2750.46	43411.61	32068.78	496292.03	1815.97
1158.97 AP3-1	1063.53	2425.53	6399.08	123684.41	87119.97	1603295.30	10485.90
964.25 AP4-1	519.68	2298.73	4145.34	72689.25	52602.10	884740.88	7924.32
966.29 41LU1-REDO-1	594.44	751.20	3253.74	58124.77	41870.80	674220.25	1379.41
949.41 41LU1-REDO-2	791.56	574.00	3709.26	65449.65	46844.50	782067.06	836.12
881.96 41LU1-REDO-3	936.29	593.20	4132.78	72478.25	52222.06	878734.31	835.88
884.92 41LU1-REDO-4	698.92	459.88	2815.06	49543.48	35410.00	563705.50	588.60
902.57 41LU1-REDO-5	665.48	401.08	4022.70	74069.74	52358.46	896048.75	791.88
908.45 41LU1-REDO-6	495.12	336.92	2855.14	50225.08	36179.40	576763.44	546.40
903.81 41LU1-REDO-7	1348.29	447.48	2636.37	40890.55	29214.32	451279.38	469.08
857.24 41LU1-REDO-8	1270.69	320.04	2415.05	40896.35	29479.29	454362.59	405.76
790.72 41LU1-REDO-9	1103.57	321.72	2489.09	41178.55	29886.93	459976.94	459.20
837.56 41LU1-REDO-10	1214.05	367.88	3108.50	53007.10	37852.25	607894.13	960.85
868.00 41LU1-REDO-11	1272.37	392.24	2823.54	48445.23	34919.96	555986.25	984.17
788.56 41LU1-REDO-12	1280.77	288.04	2394.13	40175.15	28839.00	444606.88	666.92
876.68 41LU1-REDO-13	529.08	350.32	2307.13	37818.81	27237.63	412150.53	881.48
781.76 41LU1-REDO-14	424.76	317.48	2383.45	40365.91	29069.36	439454.06	826.68
841.08 41LU1-REDO-15	452.96	214.08	2569.73	43751.17	31598.62	487274.91	831.92
1168.05 SRM614-2	136.88	1080.49	610.04	5199.99	4023.46	45227.93	597.68
1223.85 SRM612-2	833.96	31130.81	965.09	8626.57	18745.71	79048.37	24371.38
1593.57 SRM610-2	3291.06	233897.52	3023.82	30442.33	110557.98	314483.16	188336.98
961.81 AP1-2	103.44	889.60	1042.45	13105.75	9707.73	125298.11	147.72
912.09 AP2-2	219.92	916.53	2155.25	35681.16	26161.23	386841.41	1597.89
938.61 AP3-2	913.37	1477.89	4401.94	82707.43	59747.22	1023272.10	8274.29
953.29 AP4-2	610.04	1723.97	3619.90	65715.57	47783.47	784824.13	8448.21
748.20 blank-2	113.08	201.24	305.64	188.52	151.52	746.72	20.80
744.22 blank average	140.72	155.46	432.96	203.70	120.12	570.12	23.72
blank subtraction							
198.26 SRM614-1	3.64	976.31	342.80	5125.17	4157.74	46207.02	428.28
220.90 SRM612-1	380.56	34713.86	683.36	10897.32	21652.40	108448.41	17885.78
417.82 SRM610-1	1657.33	232335.21	2426.05	31076.60	110763.62	329604.94	133494.34
44.22 AP1-1	-1.40	921.67	742.00	13995.94	10538.66	142207.72	229.24
213.50 AP2-1	95.36	1374.87	2317.49	43207.90	31948.66	495721.91	1792.25
414.74 AP3-1	922.81	2270.07	5966.11	123480.71	86999.85	1602725.18	10462.18
220.02 AP4-1	378.96	2143.27	3712.38	72485.55	52481.98	884170.76	7900.60
222.06 41LU1-REDO-1	453.72	595.74	2820.78	57921.07	41750.68	673650.13	1355.69
205.18 41LU1-REDO-2	650.84	418.54	3276.30	65245.95	46724.38	781496.94	812.40
137.74 41LU1-REDO-3	795.56	437.74	3699.82	72274.55	52101.93	878164.19	812.16
140.70 41LU1-REDO-4	558.20	304.42	2382.09	49339.78	35289.88	563135.38	564.88
158.34 41LU1-REDO-5	524.76	245.62	3589.74	73866.04	52238.34	895478.63	768.16
164.22 41LU1-REDO-6	354.40	181.46	2422.17	50021.38	36059.28	576193.32	522.68
159.58 41LU1-REDO-7	1207.57	292.02	2203.41	40686.85	29094.20	450709.26	445.36
113.02 41LU1-REDO-8	1129.97	164.58	1982.09	40692.65	29359.16	453792.47	382.04
46.50 41LU1-REDO-9	962.85	166.26	2056.13	40974.85	29766.81	459406.82	435.48
93.34 41LU1-REDO-10	1073.33	212.42	2675.54	52803.40	37732.13	607324.01	937.13
123.78 41LU1-REDO-11	1131.65	236.78	2390.57	48241.53	34799.84	555416.13	960.45
44.34 41LU1-REDO-12	1140.05	132.58	1961.17	39971.44	28718.88	444036.76	643.20
132.46 41LU1-REDO-13	388.36	194.86	1874.17	37615.11	27117.51	411580.41	857.76
37.54 41LU1-REDO-14	284.04	162.02	1950.49	40162.20	28949.24	438883.94	802.96
96.86 41LU1-REDO-15	312.24	58.62	2136.77	43547.47	31478.50	486704.79	808.20
423.82 SRM614-2	-3.84	925.03	177.08	4996.29	3903.34	44657.81	573.96
479.62 SRM612-2	693.24	30975.35	532.12	8422.87	18625.58	78478.24	24347.66
849.34 SRM610-2	3150.34	233742.06	2590.85	30238.63	110437.86	313913.04	188313.26
217.58 AP1-2	-37.28	734.14	609.48	12902.05	9587.61	124727.99	124.00
167.86 AP2-2	79.20	761.06	1722.29	35477.46	26041.11	386271.29	1574.17
194.38 AP3-2	772.64	1322.43	3968.98	82503.73	59627.09	1022701.98	8250.57
209.06 AP4-2	469.32	1568.51	3186.94	65511.87	47663.35	784254.01	8424.49
zero correction							
198.26 SRM614-1	3.64	976.31	342.80	5125.17	4157.74	46207.02	428.28
220.90 SRM612-1	380.56	34713.86	683.36	10897.32	21652.40	108448.41	17885.78
417.82 SRM610-1	1657.33	232335.21	2426.05	31076.60	110763.62	329604.94	133494.34
44.22 AP1-1	0.00	921.67	742.00	13995.94	10538.66	142207.72	229.24
213.50 AP2-1	95.36	1374.87	2317.49	43207.90	31948.66	495721.91	1792.25
414.74 AP3-1	922.81	2270.07	5966.11	123480.71	86999.85	1602725.18	10462.18
220.02 AP4-1	378.96	2143.27	3712.38	72485.55	52481.98	884170.76	7900.60
222.06 41LU1-REDO-1	453.72	595.74	2820.78	57921.07	41750.68	673650.13	1355.69
205.18 41LU1-REDO-2	650.84	418.54	3276.30	65245.95	46724.38	781496.94	812.40
137.74 41LU1-REDO-3	795.56	437.74	3699.82	72274.55	52101.93	878164.19	812.16

Appendix A. Raw trace element datasheets from laser ablation.

140.70	41LU1-REDO-4	558.20	304.42	2382.09	49339.78	35289.88	563135.38	564.88
158.34	41LU1-REDO-5	524.76	245.62	3589.74	73866.04	52238.34	895478.63	768.16
164.22	41LU1-REDO-6	354.40	181.46	2422.17	50021.38	36059.28	576193.32	522.68
159.58	41LU1-REDO-7	1207.57	292.02	2203.41	40686.85	29094.20	450709.26	445.36
113.02	41LU1REDO-8	1129.97	164.58	1982.09	40692.65	29359.16	453792.47	382.04
46.50	41LU1-REDO-9	962.85	166.26	2056.13	40974.85	29766.81	459406.82	435.48
93.34	41LU1REDO-10	1073.33	212.42	2675.54	52803.40	37732.13	607324.01	937.13
123.78	41LU1-REDO-11	1131.65	236.78	2390.57	48241.53	34799.84	555416.13	960.45
44.34	41LU1REDO-12	1140.05	132.58	1961.17	39971.44	28718.88	444036.76	643.20
132.46	41LU1-REDO-13	388.36	194.86	1874.17	37615.11	27117.51	411580.41	857.76
37.54	41LU1-REDO-14	284.04	162.02	1950.49	40162.20	28949.24	438883.94	802.96
96.86	41LU1-REDO-15	312.24	58.62	2136.77	43547.47	31478.50	486704.79	808.20
423.82	SRM614-2	0.00	925.03	177.08	4996.29	3903.34	44657.81	573.96
479.62	SRM612-2	693.24	30975.35	532.12	8422.87	18625.58	78478.24	24347.66
849.34	SRM610-2	3150.34	233742.06	2590.85	30238.63	110437.86	313913.04	188313.26
217.58	AP1-2	0.00	734.14	609.48	12902.05	9587.61	124727.99	124.00
167.86	AP2-2	79.20	761.06	1722.29	35477.46	26041.11	386271.29	1574.17
194.38	AP3-2	772.64	1322.43	3968.98	82503.73	59627.09	1022701.98	8250.57
209.06	AP4-2	469.32	1568.51	3186.94	65511.87	47663.35	784254.01	8424.49
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000062	SRM614-1	0.000001	0.000304	0.000107	0.001596	0.001295	0.014388	0.000133
0.000074	SRM612-1	0.000128	0.011702	0.000230	0.003674	0.007299	0.036558	0.006029
0.000291	SRM610-1	0.001153	0.161604	0.001687	0.021616	0.077043	0.229262	0.092854
0.000005	AP1-1	0.000000	0.000101	0.000082	0.001538	0.001158	0.015624	0.000025
0.000014	AP2-1	0.000006	0.000090	0.000152	0.002841	0.002101	0.032599	0.000118
0.000019	AP3-1	0.000042	0.000104	0.000272	0.005632	0.003968	0.073105	0.000477
0.000015	AP4-1	0.000025	0.000143	0.000248	0.004848	0.003510	0.059138	0.000528
0.000040	41LU1-REDO-1	0.000081	0.000106	0.000503	0.010325	0.007442	0.120085	0.000242
0.000030	41LU1-REDO-2	0.000096	0.000062	0.000482	0.009602	0.006876	0.115005	0.000120
0.000017	41LU1-REDO-3	0.000100	0.000055	0.000465	0.009079	0.006545	0.110319	0.000102
0.000028	41LU1-REDO-4	0.000113	0.000062	0.000482	0.009992	0.007147	0.114040	0.000114
0.000027	41LU1-REDO-5	0.000089	0.000042	0.000609	0.012532	0.008863	0.151928	0.000130
0.000031	41LU1-REDO-6	0.000066	0.000034	0.000452	0.009325	0.006722	0.107413	0.000097
0.000039	41LU1-REDO-7	0.000296	0.000072	0.000540	0.009963	0.007125	0.110370	0.000109
0.000026	41LU1REDO-8	0.000258	0.000038	0.000452	0.009288	0.006701	0.103576	0.000087
0.000011	41LU1-REDO-9	0.000227	0.000039	0.000485	0.009673	0.007027	0.108454	0.000103
0.000020	41LU1REDO-10	0.000227	0.000045	0.000565	0.011151	0.007968	0.128251	0.000198
0.000027	41LU1-REDO-11	0.000246	0.000051	0.000519	0.010466	0.007550	0.120501	0.000208
0.000011	41LU1REDO-12	0.000270	0.000031	0.000465	0.009483	0.006814	0.105347	0.000153
0.000031	41LU1-REDO-13	0.000090	0.000045	0.000435	0.008734	0.006296	0.095564	0.000199
0.000008	41LU1-REDO-14	0.000059	0.000034	0.000407	0.008374	0.006036	0.091513	0.000167
0.000016	41LU1-REDO-15	0.000052	0.000010	0.000356	0.007252	0.005242	0.081056	0.000135
0.000146	SRM614-2	0.000000	0.000319	0.000061	0.001720	0.001344	0.015377	0.000198
0.000170	SRM612-2	0.000245	0.010957	0.000188	0.002979	0.006589	0.027761	0.008613
0.000629	SRM610-2	0.002332	0.173040	0.001918	0.022386	0.081758	0.232391	0.139409
0.000022	AP1-2	0.000000	0.000073	0.000061	0.001291	0.000959	0.012476	0.000012
0.000011	AP2-2	0.000005	0.000048	0.000108	0.002227	0.001634	0.024242	0.000099
0.000009	AP3-2	0.000036	0.000061	0.000183	0.003805	0.002750	0.047169	0.000381
0.000013	AP4-2	0.000029	0.000096	0.000195	0.004000	0.002910	0.047889	0.000514
standardize signal averages AP								
0.000013	AP1	0.000000	0.000087	0.000071	0.001414	0.001058	0.014050	0.000019
0.000012	AP2	0.000006	0.000069	0.000130	0.002534	0.001868	0.028421	0.000108
0.000014	AP3	0.000039	0.000082	0.000228	0.004719	0.003359	0.060137	0.000429
0.000014	AP4	0.000027	0.000120	0.000221	0.004424	0.003210	0.053513	0.000521
linest from std sig ave								
5.563426		0.233945	0.004820	2.439768	0.120311	0.166985	0.009761	0.020788

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
0.000104	srm614-2	0.000001	0.000311	0.000084	0.001658	0.001319	0.014882	0.000165
0.000122	srm612-2	0.000187	0.011330	0.000209	0.003327	0.006944	0.032160	0.007321
0.000460	srm610-2	0.001742	0.167322	0.001803	0.022001	0.079400	0.230826	0.116132

linest from std sig ave								
0.000000		0.721099	0.030053	3.237019	0.263952	0.073547	0.025212	0.045234

concentration data								
29.46	SRM614-1	0.02	0.13	22.33	16.47	18.54	12.04	0.24
35.53	SRM612-1	2.57	4.84	48.20	37.90	104.53	30.60	10.75
138.67	SRM610-1	23.13	66.80	353.09	223.04	1103.35	191.93	165.55
10.78	AP1-1	0.00	0.19	79.35	73.81	77.13	60.84	0.21
31.16	AP2-1	0.59	0.17	148.33	136.37	139.96	126.94	0.98
41.99	AP3-1	3.93	0.20	264.87	270.33	264.36	284.68	3.96
32.66	AP4-1	2.37	0.28	241.68	232.70	233.84	230.29	4.38
87.86	41LU1-REDO-1	7.55	0.20	489.41	495.56	495.79	467.62	2.00
67.01	41LU1-REDO-2	8.94	0.12	469.27	460.84	458.05	447.84	0.99
38.40	41LU1-REDO-3	9.33	0.11	452.38	435.78	436.02	429.59	0.85
63.24	41LU1-REDO-4	10.55	0.12	469.52	479.57	476.07	444.08	0.95
59.62	41LU1-REDO-5	8.31	0.08	592.79	601.50	590.41	591.62	1.08
67.95	41LU1-REDO-6	6.17	0.07	439.49	447.56	447.80	418.28	0.81
86.73	41LU1-REDO-7	27.60	0.14	525.17	478.21	474.61	429.79	0.90
57.25	41LU1REDO-8	24.07	0.07	440.33	445.79	446.40	403.33	0.72
24.36	41LU1-REDO-9	21.21	0.08	472.44	464.27	468.12	422.33	0.85
43.75	41LU1REDO-10	21.15	0.09	549.92	535.19	530.80	499.42	1.64
59.60	41LU1-REDO-11	22.91	0.10	504.81	502.34	502.96	469.24	1.73
23.35	41LU1REDO-12	25.24	0.06	452.87	455.16	453.89	410.23	1.27
68.26	41LU1-REDO-13	8.42	0.09	423.55	419.19	419.44	372.14	1.65
17.37	41LU1-REDO-14	5.53	0.06	395.85	401.94	402.12	356.36	1.39
35.80	41LU1-REDO-15	4.85	0.02	346.36	348.09	349.23	315.64	1.12
69.63	SRM614-2	0.00	0.13	12.76	17.75	19.25	12.87	0.35
80.95	SRM612-2	4.92	4.53	39.39	30.74	94.36	23.24	15.36
300.01	SRM610-2	46.79	71.53	401.33	230.98	1170.86	194.55	248.55
48.31	AP1-2	0.00	0.14	59.34	61.94	63.89	48.58	0.10
23.38	AP2-2	0.46	0.09	105.21	106.87	108.87	94.40	0.82
19.90	AP3-2	3.33	0.12	178.17	182.64	183.20	183.68	3.16
28.33	AP4-2	2.67	0.18	189.41	192.00	193.88	186.48	4.27

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
	raw data							
378.28	blank-17	97.92	209.76	416.84	242.88	156.36	1307.13	83.44
500.76	SRM614-17	98.88	819.60	533.20	3172.70	2484.85	27662.84	318.60
539.32	SRM612-17	448.64	31603.46	760.08	7178.76	17689.46	66323.45	15142.33
691.08	SRM610-17	1632.81	210658.86	2383.49	25617.15	98113.59	258702.02	130844.30
490.24	AP1-17	115.64	1523.05	1260.05	19247.55	14366.20	195504.14	818.12
520.00	AP2-17	146.48	1204.45	1888.93	30769.77	22465.93	332778.16	1635.25
549.28	AP3-17	345.64	1843.13	2439.21	40898.71	29802.09	463177.53	4526.27
554.72	AP4-17	352.68	1508.49	2527.13	43315.72	32035.94	498803.34	5462.59
535.56	41LU1-1	486.68	1089.45	3294.34	61212.91	43832.01	728787.81	18354.31
561.36	41LU1-2	448.40	1508.69	4055.58	75982.79	54162.98	956806.19	31961.70
525.32	41LU1-3	456.36	720.80	2583.81	44015.69	31945.98	506059.16	10735.02
629.40	41LU1-4	528.52	423.24	5336.83	109215.54	76670.35	1419403.90	74339.70
537.24	41LU1-5	363.40	299.92	3391.22	62280.43	44319.25	769729.31	32998.03
564.48	41LU1-6	437.44	394.44	3631.26	69650.16	49442.52	873557.69	40626.27
1375.01	41LU1-7	2600.45	956.01	42750.56	1207300.40	815330.13	13803861.00	1310255.40
905.09	41LU1-8	1254.93	413.36	18606.39	464332.53	315529.25	5859154.50	428638.84
932.85	41LU1-9	1343.85	458.44	19679.27	494658.75	335360.41	6272860.50	476671.66
1122.45	41LU1-10	2284.53	697.20	36847.01	1019266.60	685899.88	12089521.00	859991.25
1518.77	41LU1-11	3594.50	1356.97	64850.81	1927811.50	1300418.90	20613780.00	1936005.80
1417.01	41LU1-12	3251.46	1027.01	56270.76	1657032.50	1116459.00	18152598.00	1644418.90
921.45	SRM614-18	96.44	741.20	480.16	3878.54	3051.42	33655.59	414.48
1088.49	SRM612-18	766.92	30675.97	780.24	7490.88	17538.78	67584.46	20069.39
1320.57	SRM610-18	3092.02	244303.89	3017.42	32061.38	114979.01	338052.19	215324.33
688.48	AP1-18	85.52	1010.53	1226.65	18920.67	14219.32	190228.31	274.96
635.44	AP2-18	154.80	716.60	1720.61	29745.89	21488.48	316458.25	1405.69
710.64	AP3-18	433.76	794.72	2428.25	42001.72	30573.09	480454.50	4587.23
697.84	AP4-18	344.92	1075.49	2557.37	43573.16	32079.18	504633.88	6342.64
529.40	blank-18	73.32	104.28	279.16	952.65	586.44	6729.36	79.84

Appendix A. Raw trace element datasheets from laser ablation.

453.84 blank average	85.62	157.02	348.00	597.76	371.40	4018.24	81.64
blank subtraction							
46.92 SRM614-17	13.26	662.58	185.20	2574.93	2113.45	23644.59	236.96
85.48 SRM612-17	363.02	31446.44	412.08	6581.00	17318.06	62305.21	15060.68
237.24 SRM610-17	1547.19	210501.84	2035.49	25019.38	97742.19	254683.78	130762.66
36.40 AP1-17	30.02	1366.03	912.05	18649.79	13994.80	191485.90	736.48
66.16 AP2-17	60.86	1047.43	1540.93	30172.01	22094.52	328759.92	1553.61
95.44 AP3-17	260.02	1686.11	2091.21	40300.95	29430.69	459159.29	4444.63
100.88 AP4-17	267.06	1351.47	2179.13	42717.96	31664.54	494785.10	5380.95
81.72 41LU1-1	401.06	932.43	2946.34	60615.14	43460.61	724769.57	18272.66
107.52 41LU1-2	362.78	1351.67	3707.58	75385.03	53791.58	952787.95	31880.06
71.48 41LU1-3	370.74	563.78	2235.81	43417.92	31574.58	502040.92	10653.38
175.56 41LU1-4	442.90	266.22	4988.83	108617.78	76298.95	1415385.66	74258.05
83.40 41LU1-5	277.78	142.90	3043.22	61682.67	43947.85	765711.07	32916.39
110.64 41LU1-6	351.82	237.42	3283.26	69052.39	49071.12	869539.45	40544.63
921.17 41LU1-7	2514.83	798.98	42402.56	1206702.64	814958.73	13799842.76	1310173.76
451.24 41LU1-8	1169.31	256.34	18258.38	463734.77	315157.85	5855136.26	428557.20
479.00 41LU1-9	1258.23	301.42	19331.27	494060.99	334989.01	6268842.26	476590.02
668.60 41LU1-10	2198.91	540.18	36499.01	1018668.84	685528.48	12085502.76	859909.61
1064.93 41LU1-11	3508.88	1199.95	64502.80	1927213.74	1300047.50	20609761.76	1935924.16
963.17 41LU1-12	3165.84	869.98	55922.76	1656434.74	1116087.60	18148579.76	1644337.26
467.60 SRM614-18	10.82	584.18	132.16	3280.78	2680.02	29637.35	332.84
634.64 SRM612-18	681.30	30518.95	432.24	6893.12	17167.38	63566.22	19987.75
866.72 SRM610-18	3006.40	244146.87	2669.42	31463.62	114607.61	334033.95	215242.69
234.64 AP1-18	-0.10	853.50	878.64	18322.90	13847.92	186210.07	193.32
181.60 AP2-18	69.18	559.58	1372.61	29148.12	21117.08	312440.01	1324.05
256.80 AP3-18	348.14	637.70	2080.25	41403.95	30201.69	476436.26	4505.59
244.00 AP4-18	259.30	918.47	2209.37	42975.40	31707.78	500615.64	6261.00
zero correction							
46.92 SRM614-17	13.26	662.58	185.20	2574.93	2113.45	23644.59	236.96
85.48 SRM612-17	363.02	31446.44	412.08	6581.00	17318.06	62305.21	15060.68
237.24 SRM610-17	1547.19	210501.84	2035.49	25019.38	97742.19	254683.78	130762.66
36.40 AP1-17	30.02	1366.03	912.05	18649.79	13994.80	191485.90	736.48
66.16 AP2-17	60.86	1047.43	1540.93	30172.01	22094.52	328759.92	1553.61
95.44 AP3-17	260.02	1686.11	2091.21	40300.95	29430.69	459159.29	4444.63
100.88 AP4-17	267.06	1351.47	2179.13	42717.96	31664.54	494785.10	5380.95
81.72 41LU1-1	401.06	932.43	2946.34	60615.14	43460.61	724769.57	18272.66
107.52 41LU1-2	362.78	1351.67	3707.58	75385.03	53791.58	952787.95	31880.06
71.48 41LU1-3	370.74	563.78	2235.81	43417.92	31574.58	502040.92	10653.38
175.56 41LU1-4	442.90	266.22	4988.83	108617.78	76298.95	1415385.66	74258.05
83.40 41LU1-5	277.78	142.90	3043.22	61682.67	43947.85	765711.07	32916.39
110.64 41LU1-6	351.82	237.42	3283.26	69052.39	49071.12	869539.45	40544.63
921.17 41LU1-7	2514.83	798.98	42402.56	1206702.64	814958.73	13799842.76	1310173.76
451.24 41LU1-8	1169.31	256.34	18258.38	463734.77	315157.85	5855136.26	428557.20
479.00 41LU1-9	1258.23	301.42	19331.27	494060.99	334989.01	6268842.26	476590.02
668.60 41LU1-10	2198.91	540.18	36499.01	1018668.84	685528.48	12085502.76	859909.61
1064.93 41LU1-11	3508.88	1199.95	64502.80	1927213.74	1300047.50	20609761.76	1935924.16
963.17 41LU1-12	3165.84	869.98	55922.76	1656434.74	1116087.60	18148579.76	1644337.26
467.60 SRM614-18	10.82	584.18	132.16	3280.78	2680.02	29637.35	332.84
634.64 SRM612-18	681.30	30518.95	432.24	6893.12	17167.38	63566.22	19987.75
866.72 SRM610-18	3006.40	244146.87	2669.42	31463.62	114607.61	334033.95	215242.69
234.64 AP1-18	0.00	853.50	878.64	18322.90	13847.92	186210.07	193.32
181.60 AP2-18	69.18	559.58	1372.61	29148.12	21117.08	312440.01	1324.05
256.80 AP3-18	348.14	637.70	2080.25	41403.95	30201.69	476436.26	4505.59
244.00 AP4-18	259.30	918.47	2209.37	42975.40	31707.78	500615.64	6261.00
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000025 SRM614-17	0.000007	0.000350	0.000098	0.001362	0.001118	0.012503	0.000125

Appendix A. Raw trace element datasheets from laser ablation.

0.000035	SRM612-17	0.000150	0.012984	0.000170	0.002717	0.007150	0.025725	0.006218
0.000201	SRM610-17	0.001310	0.178230	0.001723	0.021184	0.082757	0.215639	0.110716
0.000003	AP1-17	0.000002	0.000103	0.000069	0.001402	0.001052	0.014392	0.000055
0.000005	AP2-17	0.000005	0.000083	0.000122	0.002398	0.001756	0.026127	0.000123
0.000008	AP3-17	0.000023	0.000146	0.000181	0.003487	0.002547	0.039732	0.000385
0.000009	AP4-17	0.000025	0.000124	0.000200	0.003928	0.002912	0.045497	0.000495
0.000012	41LU1-1	0.000060	0.000140	0.000442	0.009094	0.006520	0.108733	0.002741
0.000017	41LU1-2	0.000057	0.000212	0.000582	0.011826	0.008438	0.149464	0.005001
0.000013	41LU1-3	0.000069	0.000105	0.000417	0.008094	0.005886	0.093590	0.001986
0.000032	41LU1-4	0.000080	0.000048	0.000904	0.019683	0.013826	0.256484	0.013456
0.000019	41LU1-5	0.000064	0.000033	0.000706	0.014317	0.010201	0.177728	0.007640
0.000028	41LU1-6	0.000089	0.000060	0.000834	0.017542	0.012466	0.220891	0.010300
0.000063	41LU1-7	0.000172	0.000055	0.000895	0.082374	0.055632	0.942029	0.089437
0.000043	41LU1-8	0.000112	0.000025	0.001753	0.044531	0.030264	0.562254	0.041153
0.000046	41LU1-9	0.000120	0.000029	0.001849	0.047254	0.032039	0.599572	0.045583
0.000046	41LU1-10	0.000150	0.000037	0.002487	0.069423	0.046720	0.823641	0.058604
0.000053	41LU1-11	0.000174	0.000060	0.003205	0.095767	0.064602	1.024143	0.096200
0.000051	41LU1-12	0.000167	0.000046	0.002950	0.087393	0.058884	0.957513	0.086755
0.000275	SRM614-18	0.000006	0.000344	0.000078	0.001930	0.001576	0.017432	0.000196
0.000287	SRM612-18	0.000309	0.013822	0.000196	0.003122	0.007775	0.028789	0.009052
0.000658	SRM610-18	0.002281	0.185251	0.002025	0.023874	0.086960	0.253454	0.163319
0.000016	AP1-18	0.000000	0.000057	0.000059	0.001227	0.000927	0.012470	0.000013
0.000013	AP2-18	0.000005	0.000041	0.000101	0.002135	0.001547	0.022886	0.000097
0.000019	AP3-18	0.000026	0.000048	0.000156	0.003099	0.002260	0.035655	0.000337
0.000020	AP4-18	0.000021	0.000074	0.000179	0.003475	0.002564	0.040479	0.000506
standardize signal averages AP								
0.000009	AP1	0.000001	0.000080	0.000064	0.001314	0.000990	0.013431	0.000034
0.000009	AP2	0.000005	0.000062	0.000111	0.002266	0.001651	0.024506	0.000110
0.000014	AP3	0.000024	0.000097	0.000168	0.003293	0.002403	0.037693	0.000361
0.000015	AP4	0.000023	0.000099	0.000190	0.003702	0.002738	0.042988	0.000501
linest from std sig ave								
5.988755		0.348226	0.004962	3.029287	0.153701	0.209180	0.013510	0.022818
standardize signal averages SRM								
0.000150	srM614-2	0.000007	0.000347	0.000088	0.001646	0.001347	0.014967	0.000161
0.000161	srM612-2	0.000229	0.013403	0.000183	0.002920	0.007463	0.027257	0.0007635
0.000429	srM610-2	0.001796	0.181740	0.001874	0.022529	0.084859	0.234546	0.137017
linest from std sig ave								
0.000000		0.696461	0.027658	3.116698	0.258499	0.068812	0.024871	0.038348
concentration data								
12.74	SRM614-17	0.21	0.15	25.44	17.95	20.05	14.49	0.25
18.13	SRM612-17	4.48	5.53	44.20	35.82	128.28	29.81	12.17
103.17	SRM610-17	39.12	75.84	447.75	279.24	1484.66	249.85	216.66
6.54	AP1-17	0.31	0.20	82.84	85.95	87.77	77.57	0.50
12.56	AP2-17	0.67	0.16	147.99	147.02	146.53	140.81	1.12
19.73	AP3-17	3.13	0.29	218.69	213.83	212.52	214.14	3.50
22.16	AP4-17	3.41	0.25	242.16	240.86	242.98	245.22	4.50
29.29	41LU1-1	8.36	0.28	534.18	557.60	544.10	586.04	24.95
40.30	41LU1-2	7.91	0.42	702.87	725.11	704.17	805.56	45.52
31.84	41LU1-3	9.60	0.21	503.70	496.29	491.19	504.42	18.08
76.01	41LU1-4	11.15	0.10	1092.51	1206.88	1153.79	1382.37	122.49
46.25	41LU1-5	8.96	0.07	853.62	877.87	851.24	957.90	69.55
67.15	41LU1-6	12.42	0.12	1007.95	1075.59	1040.25	1190.54	93.76
150.23	41LU1-7	23.85	0.11	3498.05	5050.91	4642.46	5077.25	814.13
103.53	41LU1-8	15.60	0.05	2118.86	2730.52	2525.50	3030.38	374.61
109.45	41LU1-9	16.72	0.06	2234.39	2897.44	2673.67	3231.51	414.93
108.86	41LU1-10	20.82	0.07	3006.06	4256.82	3898.72	4439.17	533.46
126.43	41LU1-11	24.22	0.12	3873.56	5872.14	5391.01	5519.82	875.69
121.41	41LU1-12	23.20	0.09	3565.61	5358.65	4913.87	5160.70	789.71
141.26	SRM614-18	0.19	0.15	20.19	25.44	28.28	20.20	0.38
147.63	SRM612-18	9.22	5.88	50.86	41.15	139.48	33.36	17.71
337.77	SRM610-18	68.13	78.83	526.22	314.70	1560.06	293.67	319.60
37.54	AP1-18	0.00	0.11	71.11	75.24	77.39	67.21	0.12
31.78	AP2-18	0.70	0.08	121.50	130.91	129.08	123.35	0.88
45.91	AP3-18	3.62	0.09	188.14	189.99	188.61	192.17	3.07
47.14	AP4-18	2.91	0.15	215.89	213.07	213.95	218.17	4.61
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82

Appendix A. Raw trace element datasheets from laser ablation.

27.72 STD AP4		4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
716.84	blank-19	195.04	377.08	979.61	529.32	263.08	1702.21	50.24
828.48	SRM614-19	185.04	1030.25	1042.17	4030.42	3175.06	34038.07	513.76
849.20	SRM612-19	532.64	23482.53	1137.33	7818.64	14741.00	70972.08	21656.40
1073.93	SRM610-19	1963.61	198648.92	2523.01	25358.02	93438.97	264816.09	177935.52
788.76	AP1-19	128.36	1545.69	1441.01	17564.38	13127.59	176611.34	316.84
808.00	AP2-19	182.84	1378.21	1746.61	23877.73	17634.42	250445.97	1589.17
789.28	AP3-19	320.40	1255.93	2545.81	39828.82	29026.76	454919.69	5223.43
775.80	AP4-19	346.00	1535.45	2819.06	45979.02	33676.35	539919.25	7548.64
880.24	THEO-1	178.40	2750.66	2669.90	46648.82	34268.51	549118.00	1995.93
820.56	THEO-2	226.60	3370.50	4072.38	78196.88	56371.24	989869.25	2473.21
817.76	THEO-2	197.88	2502.65	3692.86	66945.02	48572.56	846852.06	1694.89
958.41	THEO-3	297.60	4624.59	5994.43	117315.63	84044.20	1563833.50	5579.03
915.81	THEO-4	307.80	9245.29	6331.84	128819.69	94129.93	1735102.60	11036.82
915.53	THEO-5	319.16	1969.89	6465.36	137248.92	96372.38	1844157.30	9495.13
925.41	THEO-6	242.28	7286.76	6726.88	138843.66	100947.45	1910544.30	19305.47
877.28	THEO-7	260.44	4983.91	8573.09	179068.05	126655.07	2494261.80	22802.25
841.88	THEO-8	255.12	856.28	6921.60	141768.28	99450.72	1960024.00	8521.57
886.45	THEO-9	279.68	2174.01	8307.53	175046.67	122826.70	2445543.30	23727.77
945.57	THEO-10	305.32	737.44	9080.21	197772.27	137107.89	2769545.30	19453.51
987.49	THEO-11	381.20	3421.38	9225.17	197300.27	138207.53	2761641.30	19237.71
995.05	THEO-12	285.80	7553.12	7416.76	153303.34	110095.94	2102299.50	17602.74
846.28	THEO-13	357.84	1053.61	8776.01	185379.56	129393.37	2488450.30	12750.75
843.84	THEO-14	306.40	2024.97	8337.33	177778.47	124381.38	2335877.80	12484.75
944.05	THEO-15	608.96	3381.38	16894.14	411966.00	283294.38	5023627.50	16278.33
877.52	THEO-16	250.20	5260.39	6848.48	140684.83	100919.09	1937507.90	26748.47
981.93	THEO-17	309.52	4465.27	8394.45	176196.42	124548.82	2462945.30	37217.41
940.57	THEO-18	278.96	2589.89	8860.73	190001.95	133904.44	2662814.50	36831.69
1004.61	SRM614-20	85.72	988.33	559.60	3421.66	2769.34	30009.25	447.68
1060.37	SRM612-20	673.64	17567.22	699.28	5205.03	10854.10	46069.58	18383.98
1167.25	SRM610-20	2509.61	161728.27	1958.81	20766.00	75689.98	211765.39	163794.84
839.28	AP1-20	92.84	1773.25	1078.61	13976.08	10690.90	137959.02	194.60
768.64	AP2-20	139.04	1348.25	1217.37	16880.38	12851.71	172494.25	1061.41
724.56	AP3-20	463.28	1297.01	2385.93	40015.66	29158.05	470887.81	5241.95
720.80	AP4-20	320.16	1401.01	2255.25	36373.65	26587.87	418136.00	6207.84
505.92	blank-20	87.44	450.00	336.44	636.72	591.12	4219.66	34.76
611.38	blank average	141.24	413.54	658.02	583.02	427.10	2960.94	42.50
blank subtraction								
217.10	SRM614-19	43.80	616.70	384.14	3447.40	2747.96	31077.13	471.26
237.82	SRM612-19	391.40	23068.99	479.30	7235.62	14313.90	68011.14	21613.90
462.54	SRM610-19	1822.37	198235.38	1864.99	24775.00	93011.87	261855.15	177893.02
177.38	AP1-19	-12.88	1132.15	782.98	16981.36	12700.49	173650.40	274.34
196.62	AP2-19	41.60	964.67	1088.59	23294.71	17207.32	247485.03	1546.67
177.90	AP3-19	179.16	842.38	1887.79	39245.80	28599.66	451958.75	5180.93
164.42	AP4-19	204.76	1121.91	2161.03	45396.00	33249.25	536958.31	7506.14
268.86	THEO-1	37.16	2337.11	2011.87	46065.80	33841.41	546157.06	1953.43
209.18	THEO-2	85.36	2956.96	3414.36	77613.85	55944.14	986908.31	2430.71
206.38	THEO-2	56.64	2089.11	3034.84	66361.99	48145.45	843891.12	1652.39
347.02	THEO-3	156.36	4211.04	5336.41	116732.61	83617.09	1560872.56	5536.53
304.42	THEO-4	166.56	8831.75	5673.81	128236.67	93702.83	1732141.66	10994.32
304.14	THEO-5	177.92	1556.35	5807.33	136665.90	95945.27	1841196.36	9452.63
314.02	THEO-6	101.04	6873.22	6068.85	138260.64	100520.35	1907583.36	19262.97
265.90	THEO-7	119.20	4570.37	7915.06	178485.03	126227.97	2491300.86	22759.75
230.50	THEO-8	113.88	442.74	6263.57	141185.26	99023.62	1957063.06	8479.07
275.06	THEO-9	138.44	1760.47	7649.50	174463.65	122399.60	2442582.36	23685.27
334.18	THEO-10	164.08	323.90	8422.19	197189.25	136680.79	2766584.36	19411.01
376.10	THEO-11	239.96	3007.84	8567.15	196717.25	137780.43	2758680.36	19195.21
383.66	THEO-12	144.56	7139.58	6758.74	152720.32	109668.84	2099338.56	17560.24
234.90	THEO-13	216.60	640.06	8117.99	184796.54	128966.27	2485489.36	12708.25
232.46	THEO-14	165.16	1611.43	7679.30	177195.45	123954.28	2332916.86	12442.25
332.66	THEO-15	467.72	2967.84	16236.11	411382.98	282867.28	5020666.56	16235.83
266.14	THEO-16	108.96	4846.85	6190.45	140101.81	100491.99	1934546.96	26705.97
370.54	THEO-17	168.28	4051.72	7736.42	175613.40	124121.72	2459984.36	37174.91
329.18	THEO-18	137.72	2176.35	8202.71	189418.93	133477.34	2659853.56	36789.19
393.22	SRM614-20	-55.52	574.78	-98.42	2838.64	2342.23	27048.31	405.18
448.98	SRM612-20	532.40	17153.68	41.26	4622.01	10427.00	43108.64	18341.48
555.86	SRM610-20	2368.37	161314.73	1300.79	20182.97	75262.88	208804.45	163752.34
227.90	AP1-20	-48.40	1359.71	420.58	13393.06	10263.80	134998.08	152.10
157.26	AP2-20	-2.20	934.71	559.34	16297.35	12424.61	169533.31	1018.91
113.18	AP3-20	322.04	883.46	1727.91	39432.64	28730.94	467926.87	5199.45
109.42	AP4-20	178.92	987.47	1597.23	35790.62	26160.77	415175.06	6165.33
zero correction								
217.10	SRM614-19	43.80	616.70	384.14	3447.40	2747.96	31077.13	471.26

Appendix A. Raw trace element datasheets from laser ablation.

237.82	SRM612-19	391.40	23068.99	479.30	7235.62	14313.90	68011.14	21613.90
462.54	SRM610-19	1822.37	198235.38	1864.99	24775.00	93011.87	261855.15	177893.02
177.38	AP1-19	0.00	1132.15	782.98	16981.36	12700.49	173650.40	274.34
196.62	AP2-19	41.60	964.67	1088.59	23294.71	17207.32	247485.03	1546.67
177.90	AP3-19	179.16	842.38	1887.79	39245.80	28599.66	451958.75	5180.93
164.42	AP4-19	204.76	1121.91	2161.03	45396.00	33249.25	536958.31	7506.14
268.86	THEO-1	37.16	2337.11	2011.87	46065.80	33841.41	546157.06	1953.43
209.18	THEO-2	85.36	2956.96	3414.36	77613.85	55944.14	986908.31	2430.71
206.38	THEO-2	56.64	2089.11	3034.84	66361.99	48145.45	843891.12	1652.39
347.02	THEO-3	156.36	4211.04	5336.41	116732.61	83617.09	1560872.56	5536.53
304.42	THEO-4	166.56	8831.75	5673.81	128236.67	93702.83	1732141.66	10994.32
304.14	THEO-5	177.92	1556.35	5807.33	136665.90	95945.27	1841196.36	9452.63
314.02	THEO-6	101.04	6873.22	6068.85	138260.64	100520.35	1907583.36	19262.97
265.90	THEO-7	119.20	4570.37	7915.06	178485.03	126227.97	2491300.86	22759.75
230.50	THEO-8	113.88	442.74	6263.57	141185.26	99023.62	1957063.06	8479.07
275.06	THEO-9	138.44	1760.47	7649.50	174463.65	122399.60	2442582.36	23685.27
334.18	THEO-10	164.08	323.90	8422.19	197189.25	136680.79	2766584.36	19411.01
376.10	THEO-11	239.96	3007.84	8567.15	196717.25	137780.43	2758680.36	19195.21
383.66	THEO-12	144.56	7139.58	6758.74	152720.32	109668.84	2099338.56	17560.24
234.90	THEO-13	216.60	640.06	8117.99	184796.54	128966.27	2485489.36	12708.25
232.46	THEO-14	165.16	1611.43	7679.30	177195.45	123954.28	2332916.86	12442.25
332.66	THEO-15	467.72	2967.84	16236.11	411382.98	282867.28	5020666.56	16235.83
266.14	THEO-16	108.96	4846.85	6190.45	140101.81	100491.99	1934546.96	26705.97
370.54	THEO-17	168.28	4051.72	7736.42	175613.40	124121.72	2459984.36	37174.91
329.18	THEO-18	137.72	2176.35	8202.71	189418.93	133477.34	2659853.56	36789.19
393.22	SRM614-20	0.00	574.78	0.00	2838.64	2342.23	27048.31	405.18
448.98	SRM612-20	532.40	17153.68	41.26	4622.01	10427.00	43108.64	18341.48
555.86	SRM610-20	2368.37	161314.73	1300.79	20182.97	75262.88	208804.45	163752.34
227.90	AP1-20	0.00	1359.71	420.58	13393.06	10263.80	134998.08	152.10
157.26	AP2-20	0.00	934.71	559.34	16297.35	12424.61	169533.31	1018.91
113.18	AP3-20	322.04	883.46	1727.91	39432.64	28730.94	467926.87	5199.45
109.42	AP4-20	178.92	987.47	1597.23	35790.62	26160.77	415175.06	6165.33

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000121	SRM614-19	0.000024	0.000343	0.000214	0.001919	0.001529	0.017296	0.000262
0.000133	SRM612-19	0.000218	0.012858	0.000267	0.004033	0.007978	0.037908	0.012047
0.000501	SRM610-19	0.001972	0.0214519	0.002018	0.026810	0.100652	0.283365	0.192506
0.000014	AP1-19	0.000000	0.000089	0.000062	0.001340	0.001002	0.013701	0.000022
0.000020	AP2-19	0.000004	0.000101	0.000113	0.002427	0.001793	0.025786	0.000161
0.000013	AP3-19	0.000013	0.000063	0.000141	0.002934	0.002138	0.033793	0.000387
0.000013	AP4-19	0.000016	0.000087	0.000167	0.003518	0.002577	0.041613	0.000582
0.000059	THEO-1	0.000008	0.000511	0.000439	0.010063	0.007393	0.119306	0.000427
0.000033	THEO-2	0.000013	0.000467	0.000539	0.012245	0.008827	0.155709	0.000384
0.000027	THEO-2	0.000007	0.000276	0.000401	0.008769	0.006362	0.111506	0.000218
0.000061	THEO-3	0.000028	0.000743	0.000942	0.020598	0.014755	0.275421	0.000977
0.000049	THEO-4	0.000027	0.001428	0.000917	0.020731	0.015148	0.280019	0.001777
0.000039	THEO-5	0.000023	0.000200	0.000746	0.017554	0.012324	0.236491	0.001214
0.000061	THEO-6	0.000020	0.001329	0.001174	0.026740	0.019441	0.368931	0.003726
0.000041	THEO-7	0.000018	0.000699	0.001210	0.027287	0.019298	0.380877	0.003480
0.000042	THEO-8	0.000021	0.000081	0.001146	0.025827	0.018114	0.358004	0.001551
0.000043	THEO-9	0.000022	0.000273	0.001188	0.027101	0.019013	0.379426	0.003679
0.000047	THEO-10	0.000023	0.000046	0.001197	0.028017	0.019420	0.393086	0.002758
0.000057	THEO-11	0.000036	0.000453	0.001291	0.029642	0.020761	0.415680	0.002892
0.000072	THEO-12	0.000027	0.001343	0.001272	0.028731	0.020632	0.394951	0.003304
0.000039	THEO-13	0.000036	0.000107	0.001353	0.030806	0.021499	0.414331	0.002118
0.000042	THEO-14	0.000030	0.000289	0.001378	0.031806	0.022249	0.418745	0.002233
0.000058	THEO-15	0.000081	0.000515	0.002817	0.071385	0.049084	0.871207	0.002817
0.000050	THEO-16	0.000020	0.000904	0.001155	0.026134	0.018745	0.360858	0.004982
0.000053	THEO-17	0.000024	0.000580	0.001108	0.025146	0.017773	0.352238	0.005323
0.000048	THEO-18	0.000020	0.000320	0.001206	0.027852	0.019626	0.391104	0.005409

Appendix A. Raw trace element datasheets from laser ablation.

0.000262	SRM614-20	0.000000	0.000383	0.000000	0.001891	0.001560	0.018018	0.000270
0.000327	SRM612-20	0.000387	0.012476	0.000030	0.003362	0.007584	0.031354	0.013340
0.000721	SRM610-20	0.003070	0.209112	0.001686	0.026163	0.097563	0.270673	0.212272
0.000021	AP1-20	0.000000	0.000127	0.000039	0.001247	0.000956	0.012574	0.000014
0.000020	AP2-20	0.000000	0.000120	0.000072	0.002099	0.001600	0.021830	0.000131
0.000009	AP3-20	0.000026	0.000071	0.000138	0.003153	0.002297	0.037416	0.000416
0.000010	AP4-20	0.000017	0.000091	0.000148	0.003315	0.002423	0.038457	0.000571

standardize signal averages AP								
0.000018	AP1	0.000000	0.000108	0.000050	0.001294	0.000979	0.013138	0.000018
0.000020	AP2	0.000002	0.000110	0.000093	0.002263	0.001696	0.023808	0.000146
0.000011	AP3	0.000020	0.000067	0.000140	0.003044	0.002218	0.035604	0.000402
0.000011	AP4	0.000016	0.000089	0.000158	0.003417	0.002500	0.040035	0.000576

linest from std sig ave								
4.735044		0.450517	0.003382	3.649664	0.163572	0.222377	0.014319	0.019990

standardize signal averages SRM								
0.000191	srM614-2	0.000012	0.000363	0.000107	0.001905	0.001545	0.017657	0.000266
0.000230	srM612-2	0.000303	0.012667	0.000149	0.003697	0.007781	0.034631	0.012694
0.000611	srM610-2	0.002521	0.211816	0.001852	0.026487	0.099108	0.277019	0.202389

linest from std sig ave								
0.000000		0.496948	0.023750	3.154990	0.219633	0.058926	0.021041	0.025956

concentration data								
49.07	SRM614-19	0.94	0.10	66.92	26.92	29.17	21.24	0.45
53.83	SRM612-19	8.43	3.73	83.62	56.58	152.16	46.55	20.65
203.26	SRM610-19	76.20	62.22	631.71	376.10	1919.61	347.98	330.03
26.44	AP1-19	0.00	0.12	89.95	87.43	88.90	78.26	0.17
38.70	AP2-19	0.78	0.14	165.14	158.38	159.05	147.30	1.29
25.13	AP3-19	2.41	0.08	205.51	191.49	189.71	193.03	3.09
24.07	AP4-19	2.85	0.12	243.84	229.57	228.59	237.70	4.64
110.94	THEO-1	1.46	0.69	639.88	656.65	655.82	681.50	3.40
62.34	THEO-2	2.42	0.63	784.34	799.08	783.04	889.44	3.06
51.51	THEO-2	1.35	0.37	583.85	572.20	564.37	636.95	1.74
115.67	THEO-3	4.96	1.00	1370.99	1344.11	1308.94	1573.27	7.79
92.96	THEO-4	4.84	1.93	1335.47	1352.79	1343.85	1599.53	14.17
73.79	THEO-5	4.11	0.27	1086.05	1145.48	1093.28	1350.89	9.68
114.72	THEO-6	3.51	1.79	1708.93	1744.91	1724.68	2107.42	29.71
76.79	THEO-7	3.28	0.94	1761.85	1780.63	1712.01	2175.65	27.75
79.65	THEO-8	3.74	0.11	1668.25	1685.33	1607.00	2045.00	12.37
80.71	THEO-9	3.87	0.37	1730.09	1768.46	1686.75	2167.37	29.34
89.69	THEO-10	4.19	0.06	1742.31	1828.27	1722.84	2245.39	21.99
107.05	THEO-11	6.50	0.61	1879.54	1934.25	1841.79	2374.46	23.07
136.34	THEO-12	4.89	1.81	1851.33	1874.87	1830.37	2256.05	26.35
73.97	THEO-13	6.49	0.14	1970.33	2010.21	1907.24	2366.75	16.89
78.82	THEO-14	5.33	0.39	2006.91	2075.47	1973.81	2391.97	17.81
109.04	THEO-15	14.59	0.69	4102.02	4658.21	4354.48	4976.53	22.47
93.78	THEO-16	3.65	1.22	1681.26	1705.35	1662.96	2061.30	39.73
100.22	THEO-17	4.33	0.78	1612.87	1640.87	1576.68	2012.06	42.45
91.43	THEO-18	3.64	0.43	1756.09	1817.48	1741.15	2234.07	43.14
106.37	SRM614-20	0.00	0.11	0.00	26.53	29.76	22.13	0.46
132.61	SRM612-20	14.96	3.62	9.39	47.16	144.64	38.50	22.87
292.62	SRM610-20	118.62	60.65	527.79	367.03	1860.70	332.39	363.92
40.10	AP1-20	0.00	0.17	57.04	81.40	84.81	71.83	0.11
38.25	AP2-20	0.00	0.16	104.87	136.94	141.93	124.70	1.05
17.10	AP3-20	4.63	0.10	201.17	205.75	203.81	213.73	3.32
19.15	AP4-20	2.98	0.12	215.41	216.33	214.97	219.67	4.55

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
471.16	blank-15	104.28	225.16	489.80	207.00	99.76	162.00	30.88
710.24	SRM614-15	113.60	711.16	623.16	2804.98	2203.81	24353.82	349.36
735.48	SRM612-15	398.96	18424.26	823.48	5502.99	11147.14	48444.55	15238.13
924.77	SRM610-15	1687.49	172745.13	2171.65	21257.16	80690.85	212497.59	137993.38
708.60	AP1-15	110.40	1898.01	1267.61	16128.81	12270.75	157401.48	268.52
718.52	AP2-15	162.84	1717.17	1863.05	28388.32	20884.56	301867.91	1468.89
664.60	AP3-15	419.12	1674.13	3536.78	59669.30	42931.40	715716.06	6887.16

Appendix A. Raw trace element datasheets from laser ablation.

688.52	AP4-15	389.48	1844.57	3459.38	58516.05	42490.24	704516.00	8663.45
684.28	LA3324-2-1	94.88	703.40	1113.13	14393.76	10568.82	143115.00	1480.77
660.28	LA3324-2-2	97.56	645.80	1249.93	17624.78	12878.83	180829.38	2268.49
708.64	LA3324-2-3	110.88	616.04	1644.05	24580.58	17815.98	265400.38	7531.84
611.16	LA3324-2-4	86.20	615.36	1702.85	25511.06	18677.11	271882.31	1634.77
661.80	LA3324-2-5	105.88	591.24	1727.73	27121.11	19678.99	290969.41	1744.65
615.20	LA3324-2-6	75.64	526.92	1941.29	29089.40	21052.32	317093.91	3784.90
637.48	LA3324-2-7	111.36	674.00	1938.41	31387.42	22653.85	354350.28	16128.45
656.80	LA3324-2-8	93.48	571.16	1729.33	26607.19	19472.23	293667.75	11728.75
671.96	LA3324-2-9	89.60	543.96	1708.53	26279.63	19049.95	289780.00	13521.68
656.44	LA3324-2-10	122.96	710.56	2278.69	37490.65	26971.59	430434.13	5966.15
644.12	LA3324-2-11	131.24	552.84	2765.02	49382.04	35606.44	600921.13	6872.92
1020.21	LA3324-2-12	238.68	657.64	7199.76	153927.59	107127.65	2051721.50	60339.98
944.53	SRM614-16	99.80	870.04	489.04	2953.90	2381.65	25458.02	429.64
980.65	SRM612-16	557.32	17296.90	676.24	5297.15	10632.98	46596.02	18348.94
1160.97	SRM610-16	2536.61	171996.77	2230.29	21855.20	80221.93	224347.02	168276.31
791.64	AP1-16	71.44	1561.57	1073.77	14118.60	10810.26	139617.83	181.16
740.40	AP2-16	145.88	1232.97	1599.81	24172.22	18066.50	260141.63	1344.49
720.12	AP3-16	558.52	1560.41	3111.66	55289.67	39898.79	673175.44	6983.44
719.08	AP4-16	415.16	1522.53	3102.42	54971.27	39710.38	667688.13	8487.89
489.20	blank-16	82.08	361.16	310.28	254.72	242.40	1014.81	44.60
480.18	blank average	93.18	293.16	400.04	230.86	171.08	588.40	37.74

blank subtraction								
230.06	SRM614-15	20.42	418.00	223.12	2574.11	2032.73	23765.41	311.62
255.30	SRM612-15	305.78	18131.10	423.44	5272.13	10976.06	47856.15	15200.39
444.58	SRM610-15	1594.31	172451.97	1771.61	21026.30	80519.77	211909.19	137955.64
228.42	AP1-15	17.22	1604.85	867.56	15897.95	12099.67	156813.08	230.78
238.34	AP2-15	69.66	1424.01	1463.01	28157.46	20713.48	301279.51	1431.15
184.42	AP3-15	325.94	1380.97	3136.74	59438.44	42760.32	715127.66	6849.42
208.34	AP4-15	296.30	1551.41	3059.34	58285.19	42319.16	703927.60	8625.71
204.10	LA3324-2-1	1.70	410.24	713.08	14162.90	10397.74	142526.60	1443.03
180.10	LA3324-2-2	4.38	352.64	849.88	17393.92	12707.75	180240.98	2230.75
228.46	LA3324-2-3	17.70	322.88	1244.01	24349.72	17644.90	264811.98	7494.10
130.98	LA3324-2-4	-6.98	322.20	1302.81	25280.20	18506.02	271293.91	1597.03
181.62	LA3324-2-5	12.70	298.08	1327.69	26890.25	19507.91	290381.01	1706.91
135.02	LA3324-2-6	-17.54	233.76	1541.25	28858.54	20881.24	316505.51	3747.16
157.30	LA3324-2-7	18.18	380.84	1538.37	31156.55	22482.77	353761.88	16090.71
176.62	LA3324-2-8	0.30	278.00	1329.29	26376.33	19301.15	293079.35	11691.01
191.78	LA3324-2-9	-3.58	250.80	1308.49	26048.77	18878.87	289191.60	13483.94
176.26	LA3324-2-10	29.78	417.40	1878.65	37259.79	26800.51	429845.73	5928.41
163.94	LA3324-2-11	38.06	259.68	2364.97	49151.18	35435.36	600332.73	6835.18
540.02	LA3324-2-12	145.50	364.48	6799.72	153696.73	106956.57	2051133.10	60302.24
464.34	SRM614-16	6.62	576.88	89.00	2723.04	2210.57	24869.62	391.90
500.46	SRM612-16	464.14	17003.73	276.20	5066.29	10461.90	46007.62	18311.20
680.78	SRM610-16	2443.43	171703.61	1830.25	21624.34	80050.85	223758.62	168238.57
311.46	AP1-16	-21.74	1268.41	673.72	13887.74	10639.18	139029.43	143.42
260.22	AP2-16	52.70	939.81	1199.77	23941.36	17895.42	259553.23	1306.75
239.94	AP3-16	465.34	1267.25	2711.62	55058.81	39727.70	672587.04	6945.70
238.90	AP4-16	321.98	1229.37	2702.38	54740.41	39539.30	667099.73	8450.15

zero correction								
230.06	SRM614-15	20.42	418.00	223.12	2574.11	2032.73	23765.41	311.62
255.30	SRM612-15	305.78	18131.10	423.44	5272.13	10976.06	47856.15	15200.39
444.58	SRM610-15	1594.31	172451.97	1771.61	21026.30	80519.77	211909.19	137955.64
228.42	AP1-15	17.22	1604.85	867.56	15897.95	12099.67	156813.08	230.78
238.34	AP2-15	69.66	1424.01	1463.01	28157.46	20713.48	301279.51	1431.15
184.42	AP3-15	325.94	1380.97	3136.74	59438.44	42760.32	715127.66	6849.42
208.34	AP4-15	296.30	1551.41	3059.34	58285.19	42319.16	703927.60	8625.71
204.10	LA3324-2-1	1.70	410.24	713.08	14162.90	10397.74	142526.60	1443.03
180.10	LA3324-2-2	4.38	352.64	849.88	17393.92	12707.75	180240.98	2230.75
228.46	LA3324-2-3	17.70	322.88	1244.01	24349.72	17644.90	264811.98	7494.10
130.98	LA3324-2-4	0.00	322.20	1302.81	25280.20	18506.02	271293.91	1597.03
181.62	LA3324-2-5	12.70	298.08	1327.69	26890.25	19507.91	290381.01	1706.91
135.02	LA3324-2-6	0.00	233.76	1541.25	28858.54	20881.24	316505.51	3747.16
157.30	LA3324-2-7	18.18	380.84	1538.37	31156.55	22482.77	353761.88	16090.71
176.62	LA3324-2-8	0.30	278.00	1329.29	26376.33	19301.15	293079.35	11691.01
191.78	LA3324-2-9	0.00	250.80	1308.49	26048.77	18878.87	289191.60	13483.94
176.26	LA3324-2-10	29.78	417.40	1878.65	37259.79	26800.51	429845.73	5928.41
163.94	LA3324-2-11	38.06	259.68	2364.97	49151.18	35435.36	600332.73	6835.18
540.02	LA3324-2-12	145.50	364.48	6799.72	153696.73	106956.57	2051133.10	60302.24
464.34	SRM614-16	6.62	576.88	89.00	2723.04	2210.57	24869.62	391.90
500.46	SRM612-16	464.14	17003.73	276.20	5066.29	10461.90	46007.62	18311.20
680.78	SRM610-16	2443.43	171703.61	1830.25	21624.34	80050.85	223758.62	168238.57
311.46	AP1-16	0.00	1268.41	673.72	13887.74	10639.18	139029.43	143.42
260.22	AP2-16	52.70	939.81	1199.77	23941.36	17895.42	259553.23	1306.75
239.94	AP3-16	465.34	1267.25	2711.62	55058.81	39727.70	672587.04	6945.70
238.90	AP4-16	321.98	1229.37	2702.38	54740.41	39539.30	667099.73	8450.15

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000169 SRM614-15	0.000015	0.000307	0.000164	0.001892	0.001494	0.017469	0.000229
0.000178 SRM612-15	0.000213	0.012645	0.000295	0.003677	0.007655	0.033376	0.010601
0.000573 SRM610-15	0.002054	0.222176	0.002282	0.027089	0.103736	0.273010	0.177733
0.000020 AP1-15	0.000001	0.000139	0.000075	0.001379	0.001049	0.013601	0.000020
0.000019 AP2-15	0.000006	0.000116	0.000119	0.002287	0.001682	0.024468	0.000116
0.000011 AP3-15	0.000020	0.000083	0.000188	0.003562	0.002563	0.042857	0.000410
0.000014 AP4-15	0.000020	0.000103	0.000203	0.003864	0.002806	0.046671	0.000572
0.000053 LA3324-2-1	0.000000	0.000107	0.000186	0.003690	0.002709	0.037138	0.000376
0.000039 LA3324-2-2	0.000001	0.000076	0.000182	0.003730	0.002725	0.038647	0.000478
0.000043 LA3324-2-3	0.000003	0.000061	0.000236	0.004619	0.003347	0.050238	0.001422
0.000018 LA3324-2-4	0.000000	0.000045	0.000184	0.003568	0.002612	0.038286	0.000225
0.000025 LA3324-2-5	0.000002	0.000041	0.000183	0.003709	0.002691	0.040058	0.000235
0.000019 LA3324-2-6	0.000000	0.000032	0.000214	0.004000	0.002894	0.043865	0.000519
0.000033 LA3324-2-7	0.000004	0.000080	0.000321	0.006507	0.004695	0.073883	0.003361
0.000033 LA3324-2-8	0.000000	0.000052	0.000248	0.004922	0.003602	0.054689	0.002182
0.000035 LA3324-2-9	0.000000	0.000046	0.000239	0.004754	0.003445	0.052779	0.002461
0.000032 LA3324-2-10	0.000005	0.000076	0.000342	0.006781	0.004877	0.078228	0.001079
0.000024 LA3324-2-11	0.000006	0.000038	0.000349	0.007248	0.005226	0.088531	0.001008
0.000056 LA3324-2-12	0.000015	0.000038	0.000701	0.015839	0.011022	0.211381	0.006214
0.000344 SRM614-16	0.000005	0.000427	0.000066	0.002015	0.001636	0.018405	0.000290
0.000354 SRM612-16	0.000328	0.012024	0.000195	0.003583	0.007398	0.032533	0.012948
0.000822 SRM610-16	0.002950	0.207287	0.002210	0.026106	0.096641	0.270130	0.203104
0.000029 AP1-16	0.000000	0.000117	0.000062	0.001286	0.000985	0.012871	0.000013
0.000023 AP2-16	0.000005	0.000081	0.000104	0.002074	0.001550	0.022480	0.000113
0.000015 AP3-16	0.000029	0.000080	0.000171	0.003470	0.002504	0.042389	0.000438
0.000016 AP4-16	0.000022	0.000085	0.000186	0.003770	0.002723	0.045938	0.000582
standardize signal averages AP							
0.000024 AP1	0.000001	0.000128	0.000069	0.001332	0.001017	0.013236	0.000017
0.000021 AP2	0.000005	0.000099	0.000111	0.002180	0.001616	0.023474	0.000115
0.000013 AP3	0.000024	0.000081	0.000179	0.003516	0.002533	0.042623	0.000424
0.000015 AP4	0.000021	0.000094	0.000194	0.003817	0.002764	0.046305	0.000577
linest from std sig ave							
3.924254	0.355358	0.003217	2.915512	0.148766	0.204735	0.012504	0.019757
standardize signal averages SRM							
0.000256 srm614-2	0.000010	0.000367	0.000115	0.001954	0.001565	0.017937	0.000260
0.000266 srm612-2	0.000271	0.012335	0.000245	0.003630	0.007526	0.032955	0.011775
0.000697 srm610-2	0.002502	0.214731	0.002246	0.026597	0.100188	0.271570	0.190419
linest from std sig ave							
0.000000	0.502103	0.023430	2.599383	0.218783	0.058291	0.021469	0.027588
concentration data							
56.92 SRM614-15	0.46	0.08	41.01	24.14	26.24	18.73	0.39
59.93 SRM612-15	6.50	3.49	73.84	46.91	134.41	35.79	17.96
192.77 SRM610-15	62.60	61.30	570.70	345.62	1821.48	292.77	301.16
31.02 AP1-15	0.21	0.18	87.52	81.83	85.72	67.85	0.16
30.30 AP2-15	0.80	0.15	138.20	135.72	137.40	122.06	0.92
17.30 AP3-15	2.77	0.11	218.64	211.41	209.31	213.79	3.24
21.63 AP4-15	2.79	0.13	235.92	229.34	229.17	232.81	4.51
83.26 LA3324-2-1	0.06	0.14	216.11	219.02	221.29	185.26	2.96
60.46 LA3324-2-2	0.13	0.10	211.95	221.34	222.55	192.78	3.77
67.85 LA3324-2-3	0.48	0.08	274.50	274.16	273.41	250.61	11.21
28.94 LA3324-2-4	0.00	0.06	213.84	211.73	213.31	190.98	1.78
39.22 LA3324-2-5	0.25	0.05	213.03	220.15	219.80	199.82	1.86
29.30 LA3324-2-6	0.00	0.04	248.44	237.37	236.37	218.81	4.09

Appendix A. Raw trace element datasheets from laser ablation.

51.43	LA3324-2-7	0.54	0.10	373.69	386.18	383.51	368.55	26.49
51.60	LA3324-2-8	0.01	0.07	288.50	292.10	294.17	272.81	17.19
54.79	LA3324-2-9	0.00	0.06	277.75	282.14	281.41	263.28	19.40
50.22	LA3324-2-10	0.77	0.10	397.66	402.44	398.37	390.23	8.50
37.85	LA3324-2-11	0.80	0.05	405.65	430.17	426.81	441.62	7.94
87.13	LA3324-2-12	2.13	0.05	815.04	940.03	900.28	1054.45	48.98
115.66	SRM614-16	0.15	0.12	16.47	25.71	28.73	19.74	0.49
119.10	SRM612-16	10.00	3.32	48.84	45.71	129.90	34.89	21.94
276.60	SRM610-16	89.90	57.19	552.48	333.07	1696.88	289.69	344.15
45.14	AP1-16	0.00	0.15	72.55	76.30	80.45	64.21	0.10
35.28	AP2-16	0.65	0.10	120.86	123.06	126.59	112.14	0.89
23.67	AP3-16	4.16	0.10	198.77	205.94	204.50	211.45	3.45
25.75	AP4-16	3.14	0.11	216.44	223.71	222.38	229.15	4.59

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
541.72	blank-13	118.92	177.04	560.12	204.08	92.48	63.72	44.44
776.00	SRM614-13	125.52	928.17	747.84	3948.78	3130.54	33954.11	476.28
903.81	SRM612-13	505.04	20565.32	977.69	6229.23	12754.51	55812.00	20798.20
1032.85	SRM610-13	2009.53	190478.03	2555.81	25470.30	90282.43	265655.78	178423.08
707.40	AP1-13	103.04	1613.25	1631.97	21571.72	16114.77	224759.38	338.80
773.44	AP2-13	146.48	1356.49	1919.45	27173.35	19640.51	287714.09	1569.17
755.52	AP3-13	379.80	1567.41	3285.10	54978.67	39659.86	661404.75	6686.96
797.40	AP4-13	587.32	2158.73	4123.82	73942.62	53579.10	931586.56	10542.46
820.52	LA3324-1-1	228.52	1424.69	3894.10	68500.02	49357.84	859968.88	4223.30
779.16	LA3324-1-2	210.96	828.84	3029.54	53343.86	38102.73	640672.06	2504.93
786.56	LA3324-1-3	223.24	730.76	2664.25	42743.80	31047.06	501235.41	2163.01
911.37	LA3324-1-4	524.80	1146.45	12554.27	280641.03	193469.56	3848683.50	11318.22
859.48	LA3324-1-5	451.96	641.28	9507.53	206237.20	143563.09	2844638.00	7146.92
887.04	LA3324-1-6	415.52	753.68	10471.02	229607.17	158717.25	3141382.80	8902.93
849.08	LA3324-1-7	356.16	557.72	10120.54	222244.02	154240.39	3045496.50	8130.17
789.80	LA3324-1-8	387.88	737.64	12144.95	270425.19	187791.63	3722018.30	12468.23
885.48	LA3324-1-9	417.72	2034.33	12133.19	273716.81	189571.06	3743787.30	15050.52
755.20	LA3324-1-10	153.76	805.96	3182.74	56719.64	40834.55	710068.75	7383.56
663.56	LA3324-1-11	121.04	565.36	2141.49	35157.00	25213.50	398859.66	3978.06
617.52	LA3324-1-12	131.60	687.56	2621.25	42598.20	30733.13	507896.16	4511.71
736.44	LA3324-1-13	199.96	1146.49	3578.50	64569.76	46676.26	820566.56	4551.43
689.64	LA3324-1-14	153.08	757.92	2959.46	50513.88	36297.00	610314.25	4857.83
725.88	LA3324-1-15	175.92	709.12	2867.14	50865.20	36363.65	616404.31	4596.31
711.88	LA3324-1-16	125.88	657.08	2871.14	48947.32	35322.24	587264.63	2513.97
713.28	LA3324-1-17	154.52	634.96	3092.78	55153.95	39491.82	676176.06	2652.17
820.00	LA3324-1-18	131.32	435.60	3123.66	54251.98	38872.82	664973.19	2648.01
937.89	SRM614-14	102.20	737.28	479.44	2993.98	2426.33	26408.99	435.80
1021.21	SRM612-14	583.72	17051.58	659.44	5196.03	10525.82	46334.06	19236.03
1263.29	SRM610-14	2783.34	168972.67	2079.37	22344.45	79969.21	231490.45	183907.00
789.24	AP1-14	103.04	1538.85	1173.17	16843.22	12609.71	169017.59	226.72
793.84	AP2-14	162.56	1126.57	1352.77	19598.83	14412.20	202824.19	1192.77
714.80	AP3-14	458.76	1315.21	2620.45	44697.73	32222.90	528620.00	5834.59
720.24	AP4-14	478.04	1468.01	2819.90	48999.56	35570.68	598640.31	7771.48
531.80	blank-14	73.84	292.00	290.12	345.92	308.92	1871.85	45.92
536.76	blank average	96.38	234.52	425.12	275.00	200.70	967.79	45.18

blank subtraction								
239.24	SRM614-13	29.14	693.64	322.72	3673.78	2929.84	32986.32	431.10
367.04	SRM612-13	408.66	20330.79	552.56	5954.23	12553.81	54844.21	20753.02
496.08	SRM610-13	1913.15	190243.51	2130.69	25195.30	90081.73	264687.99	178377.90
170.64	AP1-13	6.66	1378.73	1206.85	21296.72	15914.07	223791.59	293.62
236.68	AP2-13	50.10	1121.97	1494.33	26898.35	19439.81	286746.30	1523.99
218.76	AP3-13	283.42	1332.89	2859.98	54703.67	39459.16	660436.96	6641.78
260.64	AP4-13	490.94	1924.21	3698.70	73667.62	53378.40	930618.77	10497.28
283.76	LA3324-1-1	132.14	1190.17	3468.98	68225.02	49157.13	859001.09	4178.12
242.40	LA3324-1-2	114.58	594.32	2604.41	53068.86	37902.03	639704.27	2459.75
249.80	LA3324-1-3	126.86	496.24	2239.13	42468.80	30846.35	500267.62	2117.83
374.60	LA3324-1-4	428.42	911.93	12129.15	280366.03	193268.86	3847715.71	11273.04
322.72	LA3324-1-5	355.58	406.76	9082.41	205962.20	143362.39	2843670.21	7101.74
350.28	LA3324-1-6	319.14	519.16	10045.90	229332.17	158516.55	3140415.01	8857.75
312.32	LA3324-1-7	259.78	323.20	9695.41	221969.02	154039.69	3044528.71	8084.99
253.04	LA3324-1-8	291.50	503.12	11719.83	270150.19	187590.93	3721050.51	12423.05
348.72	LA3324-1-9	321.34	1799.81	11708.07	273441.81	189370.36	3742819.51	15005.34

Appendix A. Raw trace element datasheets from laser ablation.

218.44	LA3324-1-10	57.38	571.44	2757.62	56444.64	40633.85	709100.96	7338.38
126.80	LA3324-1-11	24.66	330.84	1716.37	34882.00	25012.80	397891.87	3932.88
80.76	LA3324-1-12	35.22	453.04	2196.13	42323.20	30532.43	506928.37	4466.53
199.68	LA3324-1-13	103.58	911.97	3153.38	64294.76	46475.56	819598.77	4506.25
152.88	LA3324-1-14	56.70	523.40	2534.33	50238.88	36096.30	609346.46	4812.65
189.12	LA3324-1-15	79.54	474.60	2442.01	50590.20	36162.94	615436.52	4551.13
175.12	LA3324-1-16	29.50	422.56	2446.01	48672.31	35121.54	586296.84	2468.79
176.52	LA3324-1-17	58.14	400.44	2667.65	54878.95	39291.12	675208.27	2606.99
283.24	LA3324-1-18	34.94	201.08	2698.54	53976.98	38672.12	664005.40	2602.83
401.12	SRM614-14	5.82	502.76	54.32	2718.98	2225.63	25441.20	390.62
484.44	SRM612-14	487.34	16817.05	234.32	4921.03	10325.12	45366.27	19190.85
726.52	SRM610-14	2686.96	168738.15	1654.25	22069.44	79768.51	230522.66	183861.82
252.48	AP1-14	6.66	1304.33	748.04	16568.21	12409.01	168049.80	181.54
257.08	AP2-14	66.18	892.04	927.65	19323.83	14211.50	201856.40	1147.59
178.04	AP3-14	362.38	1080.69	2195.33	44422.73	32022.20	527652.21	5789.41
183.48	AP4-14	381.66	1233.49	2394.77	48724.55	35369.98	597672.52	7726.30
zero correction								
239.24	SRM614-13	29.14	693.64	322.72	3673.78	2929.84	32986.32	431.10
367.04	SRM612-13	408.66	20330.79	552.56	5954.23	12553.81	54844.21	20753.02
496.08	SRM610-13	1913.15	190243.51	2130.69	25195.30	90081.73	264687.99	178377.90
170.64	AP1-13	6.66	1378.73	1206.85	21296.72	15914.07	223791.59	293.62
236.68	AP2-13	50.10	1121.97	1494.33	26898.35	19439.81	286746.30	1523.99
218.76	AP3-13	283.42	1332.89	2859.98	54703.67	39459.16	660436.96	6641.78
260.64	AP4-13	490.94	1924.21	3698.70	73667.62	53378.40	930618.77	10497.28
283.76	LA3324-1-1	132.14	1190.17	3468.98	68225.02	49157.13	859001.09	4178.12
242.40	LA3324-1-2	114.58	594.32	2604.41	53068.86	37902.03	639704.27	2459.75
249.80	LA3324-1-3	126.86	496.24	2239.13	42468.80	30846.35	500267.62	2117.83
374.60	LA3324-1-4	428.42	911.93	12129.15	280366.03	193268.86	3847715.71	11273.04
322.72	LA3324-1-5	355.58	406.76	9082.41	205962.20	143362.39	2843670.21	7101.74
350.28	LA3324-1-6	319.14	519.16	10045.90	229332.17	158516.55	3140415.01	8857.75
312.32	LA3324-1-7	259.78	323.20	9695.41	221969.02	154039.69	3044528.71	8084.99
253.04	LA3324-1-8	291.50	503.12	11719.83	270150.19	187590.93	3721050.51	12423.05
348.72	LA3324-1-9	321.34	1799.81	11708.07	273441.81	189370.36	3742819.51	15005.34
218.44	LA3324-1-10	57.38	571.44	2757.62	56444.64	40633.85	709100.96	7338.38
126.80	LA3324-1-11	24.66	330.84	1716.37	34882.00	25012.80	397891.87	3932.88
80.76	LA3324-1-12	35.22	453.04	2196.13	42323.20	30532.43	506928.37	4466.53
199.68	LA3324-1-13	103.58	911.97	3153.38	64294.76	46475.56	819598.77	4506.25
152.88	LA3324-1-14	56.70	523.40	2534.33	50238.88	36096.30	609346.46	4812.65
189.12	LA3324-1-15	79.54	474.60	2442.01	50590.20	36162.94	615436.52	4551.13
175.12	LA3324-1-16	29.50	422.56	2446.01	48672.31	35121.54	586296.84	2468.79
176.52	LA3324-1-17	58.14	400.44	2667.65	54878.95	39291.12	675208.27	2606.99
283.24	LA3324-1-18	34.94	201.08	2698.54	53976.98	38672.12	664005.40	2602.83
401.12	SRM614-14	5.82	502.76	54.32	2718.98	2225.63	25441.20	390.62
484.44	SRM612-14	487.34	16817.05	234.32	4921.03	10325.12	45366.27	19190.85
726.52	SRM610-14	2686.96	168738.15	1654.25	22069.44	79768.51	230522.66	183861.82
252.48	AP1-14	6.66	1304.33	748.04	16568.21	12409.01	168049.80	181.54
257.08	AP2-14	66.18	892.04	927.65	19323.83	14211.50	201856.40	1147.59
178.04	AP3-14	362.38	1080.69	2195.33	44422.73	32022.20	527652.21	5789.41
183.48	AP4-14	381.66	1233.49	2394.77	48724.55	35369.98	597672.52	7726.30
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000124	SRM614-13	0.000015	0.000358	0.000167	0.001897	0.001513	0.017034	0.000223
0.000212	SRM612-13	0.000236	0.011761	0.000320	0.003445	0.007262	0.031728	0.012006
0.000514	SRM610-13	0.001983	0.197191	0.002209	0.026115	0.093372	0.274355	0.184892
0.000011	AP1-13	0.000000	0.000092	0.000081	0.001421	0.001062	0.014936	0.000020
0.000020	AP2-13	0.000004	0.000092	0.000123	0.002217	0.001602	0.023632	0.000126
0.000012	AP3-13	0.000016	0.000074	0.000159	0.003046	0.002197	0.036775	0.000370
0.000016	AP4-13	0.000031	0.000121	0.000233	0.004632	0.003356	0.058511	0.000660
0.000034	LA3324-1-1	0.000016	0.000145	0.000421	0.008288	0.005972	0.104352	0.000508

Appendix A. Raw trace element datasheets from laser ablation.

0.000035	LA3324-1-2	0.000016	0.000085	0.000371	0.007561	0.005400	0.091141	0.000350
0.000043	LA3324-1-3	0.000022	0.000085	0.000386	0.007315	0.005313	0.086169	0.000365
0.000032	LA3324-1-4	0.000037	0.000079	0.001046	0.024174	0.016664	0.331755	0.000972
0.000033	LA3324-1-5	0.000036	0.000042	0.000929	0.021072	0.014668	0.290942	0.000727
0.000033	LA3324-1-6	0.000030	0.000049	0.000941	0.021487	0.014852	0.294236	0.000830
0.000028	LA3324-1-7	0.000023	0.000029	0.000869	0.019893	0.013805	0.272858	0.000725
0.000020	LA3324-1-8	0.000023	0.000040	0.000922	0.021251	0.014757	0.292718	0.000977
0.000028	LA3324-1-9	0.000026	0.000145	0.000946	0.022104	0.015308	0.302561	0.001213
0.000038	LA3324-1-10	0.000010	0.000101	0.000485	0.009935	0.007152	0.124813	0.001292
0.000026	LA3324-1-11	0.000005	0.000067	0.000349	0.007096	0.005088	0.080942	0.000800
0.000016	LA3324-1-12	0.000007	0.000091	0.000439	0.008455	0.006100	0.101270	0.000892
0.000028	LA3324-1-13	0.000014	0.000127	0.000439	0.008954	0.006473	0.114143	0.000628
0.000021	LA3324-1-14	0.000008	0.000072	0.000351	0.006954	0.004997	0.084347	0.000666
0.000027	LA3324-1-15	0.000011	0.000067	0.000343	0.007105	0.005078	0.086428	0.000639
0.000027	LA3324-1-16	0.000005	0.000066	0.000384	0.007637	0.005511	0.091996	0.000387
0.000025	LA3324-1-17	0.000008	0.000056	0.000373	0.007675	0.005495	0.094431	0.000365
0.000039	LA3324-1-18	0.000005	0.000028	0.000371	0.007413	0.005311	0.091196	0.000357
0.000303	SRM614-14	0.000004	0.000380	0.000041	0.002057	0.001684	0.019246	0.000295
0.000358	SRM612-14	0.000360	0.012432	0.000173	0.003638	0.007633	0.033538	0.014187
0.000887	SRM610-14	0.003282	0.206081	0.002020	0.026954	0.097422	0.281539	0.224552
0.000020	AP1-14	0.000001	0.000105	0.000060	0.001330	0.000996	0.013492	0.000015
0.000027	AP2-14	0.000007	0.000094	0.000098	0.002047	0.001505	0.021380	0.000122
0.000012	AP3-14	0.000025	0.000074	0.000151	0.003046	0.002196	0.036185	0.000397
0.000015	AP4-14	0.000031	0.000099	0.000191	0.003896	0.002828	0.047789	0.000618
standardize signal averages AP								
0.000016	AP1	0.000000	0.000098	0.000070	0.001376	0.001029	0.014214	0.000017
0.000023	AP2	0.000006	0.000093	0.000111	0.002132	0.001554	0.022506	0.000124
0.000012	AP3	0.000020	0.000074	0.000155	0.003046	0.002197	0.036480	0.000383
0.000016	AP4	0.000031	0.000110	0.000212	0.004264	0.003092	0.053150	0.000639
linest from std sig ave								
4.299534		0.325930	0.004102	2.932613	0.147676	0.203538	0.012243	0.019088
standardize signal averages SRM								
0.000213	srm614-2	0.000010	0.000369	0.000104	0.001977	0.001598	0.018140	0.000259
0.000285	srm612-2	0.000298	0.012097	0.000246	0.003541	0.007448	0.032633	0.013096
0.000701	srm610-2	0.002632	0.201636	0.002114	0.026535	0.095397	0.277947	0.204722
linest from std sig ave								
0.000000		0.476695	0.024949	2.759715	0.219363	0.061223	0.020984	0.025659
concentration data								
45.55	SRM614-13	0.42	0.13	41.91	24.03	26.41	17.88	0.36
78.30	SRM612-13	6.61	4.14	80.40	43.63	126.77	33.31	19.65
189.61	SRM610-13	55.43	69.37	555.46	330.76	1629.90	288.06	302.68
19.53	AP1-13	0.06	0.15	94.23	83.74	86.24	72.95	0.15
33.46	AP2-13	0.54	0.15	144.08	130.60	130.09	115.42	0.96
20.89	AP3-13	2.05	0.12	186.31	179.45	178.41	179.61	2.82
28.11	AP4-13	4.01	0.20	272.06	272.87	272.51	285.77	5.03
59.13	LA3324-1-1	2.09	0.24	493.02	488.27	484.89	509.66	3.87
59.24	LA3324-1-2	2.12	0.14	434.11	445.44	438.48	445.14	2.67
73.80	LA3324-1-3	2.84	0.14	451.22	430.96	431.42	420.85	2.78
55.40	LA3324-1-4	4.80	0.13	1223.50	1424.14	1353.08	1620.31	7.40
56.63	LA3324-1-5	4.73	0.07	1087.14	1241.45	1191.00	1420.97	5.53
56.29	LA3324-1-6	3.89	0.08	1101.17	1265.87	1205.96	1437.06	6.32
48.01	LA3324-1-7	3.03	0.05	1016.58	1171.99	1120.98	1332.65	5.52
34.14	LA3324-1-8	2.98	0.06	1078.61	1252.00	1198.24	1429.65	7.44
48.35	LA3324-1-9	3.38	0.24	1107.28	1302.25	1243.01	1477.72	9.24
65.95	LA3324-1-10	1.31	0.16	567.86	585.31	580.75	609.59	9.84
44.24	LA3324-1-11	0.65	0.11	408.49	418.05	413.16	395.32	6.09
27.67	LA3324-1-12	0.91	0.15	513.28	498.11	495.27	494.61	6.79
47.70	LA3324-1-13	1.88	0.21	513.79	527.52	525.56	557.48	4.78
36.30	LA3324-1-14	1.02	0.12	410.42	409.70	405.71	411.96	5.07
45.55	LA3324-1-15	1.45	0.11	401.21	418.55	412.37	422.12	4.87
47.13	LA3324-1-16	0.60	0.11	449.02	449.93	447.48	449.31	2.95
42.34	LA3324-1-17	1.06	0.09	436.48	452.17	446.19	461.21	2.78
66.72	LA3324-1-18	0.62	0.05	433.60	436.74	431.27	445.40	2.72
111.89	SRM614-14	0.12	0.13	10.34	26.05	29.39	20.21	0.48
132.06	SRM612-14	10.07	4.37	43.57	46.08	133.24	35.21	23.23
327.19	SRM610-14	91.73	72.49	508.14	341.37	1700.60	295.61	367.61
34.77	AP1-14	0.07	0.17	70.26	78.36	80.89	65.89	0.11
46.70	AP2-14	0.91	0.15	114.95	120.58	122.22	104.42	0.93
20.94	AP3-14	3.23	0.12	176.13	179.47	178.31	176.73	3.02
25.16	AP4-14	3.97	0.16	224.02	229.52	229.64	233.40	4.70
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77

Appendix A. Raw trace element datasheets from laser ablation.

SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
	raw data							
400.60	blank-11	96.00	161.24	368.24	153.52	81.08	267.40	27.40
580.36	SRM614-11	105.00	751.96	490.00	3233.10	2522.53	28260.40	318.40
644.52	SRM612-11	385.52	21253.28	803.52	6847.76	13225.15	65696.57	13741.24
782.76	SRM610-11	1584.05	178766.28	2132.77	22626.77	84133.03	230195.66	111055.27
557.16	AP1-11	93.28	1338.73	1189.09	15475.97	11581.23	154300.11	275.60
583.08	AP2-11	152.40	921.85	1601.25	23692.17	17382.90	248130.56	1138.69
604.16	AP3-11	344.64	1184.21	2790.14	45686.78	33316.23	529534.00	4314.78
562.56	AP4-11	316.40	1360.45	3066.86	51977.61	37377.73	610088.31	6348.68
516.20	M17-24-141-1	97.84	523.00	652.40	7110.00	5267.83	66897.30	1887.77
560.32	M17-24-141-2	99.76	313.24	673.48	7944.56	5758.83	74944.98	2268.09
589.80	M17-24-141-3	112.32	331.32	714.16	8629.37	6402.76	82402.23	2560.93
530.88	M17-24-141-4	102.56	396.96	796.84	11042.90	8179.73	107248.60	3662.70
572.16	M17-24-141-5	100.04	337.04	901.49	11436.27	8251.77	108946.09	4042.90
562.68	M17-24-141-6	101.00	384.24	863.80	10815.86	7817.92	103674.34	3082.30
551.64	M17-24-141-7	90.80	660.40	821.08	10614.82	8044.93	106260.68	2039.17
532.88	M17-24-141-8	90.44	262.16	770.76	9572.41	6956.96	91303.95	2042.93
540.48	M17-24-141-9	81.80	277.96	790.04	10460.42	7796.64	100161.69	2215.97
584.16	M17-24-141-10	124.40	1280.85	2285.89	39204.10	28494.28	454855.81	16204.65
583.68	M17-24-141-11	168.56	705.76	3963.78	73194.65	51777.81	914046.06	42781.44
611.92	M17-24-141-12	194.60	995.13	6214.36	120290.59	84372.03	1594251.90	77107.31
855.44	M17-24-141-13	326.48	6952.12	20535.64	504134.91	345606.19	6599729.00	162726.23
871.00	M17-24-141-14	337.48	4476.75	20803.12	504942.38	344996.91	6632257.00	180024.58
891.49	M17-24-141-15	324.08	2680.14	21320.20	521608.53	355883.53	6845655.50	192914.44
961.85	M17-24-141-16	194.68	5697.11	19806.71	482051.50	330722.97	6391912.50	20921.76
897.61	M17-24-141-17	165.16	1319.21	20184.71	491214.59	333754.56	6492791.50	16649.41
915.49	M17-24-141-18	194.56	1957.41	19652.11	482279.06	327372.41	6381060.00	12096.35
866.60	SRM614-12	93.88	644.68	429.04	3365.46	2613.41	28020.12	378.76
933.09	SRM612-12	577.76	22488.61	750.40	6692.16	13532.48	60453.26	19775.31
1221.37	SRM610-12	2771.82	205503.11	2500.17	26228.87	96917.83	271237.59	172437.02
705.40	AP1-12	87.68	936.33	1167.01	15615.49	11610.19	154532.27	233.40
649.12	AP2-12	148.80	730.88	1699.73	25389.70	18697.19	269837.81	1245.41
604.84	AP3-12	496.48	989.13	2973.10	51040.93	37294.89	613488.75	5677.55
623.28	AP4-12	517.00	1614.73	3765.26	68523.19	49763.80	856131.75	9035.65
468.72	blank-12	80.44	182.20	228.60	367.24	268.20	2361.65	25.32
434.66	blank average	88.22	171.72	298.42	260.38	174.64	1314.53	26.36

blank subtraction								
145.70	SRM614-11	16.78	580.24	191.58	2972.72	2347.89	26945.87	292.04
209.86	SRM612-11	297.30	21081.56	505.10	6587.38	13050.51	64382.04	13714.88
348.10	SRM610-11	1495.83	178594.56	1834.35	22366.39	83958.39	228881.13	111028.91
122.50	AP1-11	5.06	1167.01	890.67	15215.59	11406.59	152985.58	249.24
148.42	AP2-11	64.18	750.12	1302.83	23431.79	17208.26	246816.03	1112.33
169.50	AP3-11	256.42	1012.49	2491.71	45426.40	33141.59	528219.47	4288.42
127.90	AP4-11	228.18	1188.73	2768.44	51717.23	37203.09	608773.78	6322.32
81.54	M17-24-141-1	9.62	351.28	353.98	6849.62	5093.19	65582.77	1861.41
125.66	M17-24-141-2	11.54	141.52	375.06	7684.18	5584.19	73630.46	2241.73
155.14	M17-24-141-3	24.10	159.60	415.74	8368.99	6228.11	81087.70	2534.57
96.22	M17-24-141-4	14.34	225.24	498.42	10782.52	8005.09	105934.07	3636.34
137.50	M17-24-141-5	11.82	165.32	603.06	11175.88	8077.13	107631.56	4016.54
128.02	M17-24-141-6	12.78	212.52	565.38	10555.48	7643.28	102359.81	3055.94
116.98	M17-24-141-7	2.58	488.68	522.66	10354.44	7870.28	104946.15	2012.81
98.22	M17-24-141-8	2.22	90.44	472.34	9312.03	6782.32	89989.43	2016.57
105.82	M17-24-141-9	-6.42	106.24	491.62	10200.04	7622.00	98847.16	2189.61
149.50	M17-24-141-10	36.18	1109.13	1987.47	38943.72	28319.64	453541.28	16178.29
149.02	M17-24-141-11	80.34	534.04	3665.36	72934.27	51603.17	912731.53	42755.08
177.26	M17-24-141-12	106.38	823.40	5915.93	120030.21	84197.39	1592937.37	77080.95
420.78	M17-24-141-13	238.26	6780.40	20237.21	503874.53	345431.55	6598414.47	162699.87
436.34	M17-24-141-14	249.26	4305.02	20504.70	504682.00	344822.27	6630942.47	179998.22
456.82	M17-24-141-15	235.86	2508.41	21021.78	521348.15	355708.89	6844340.97	192888.08
527.18	M17-24-141-16	106.46	5525.39	19508.29	481791.12	330548.33	6390597.97	20895.40
462.94	M17-24-141-17	76.94	1147.49	19886.29	490954.21	333579.92	6491476.97	16623.05
480.82	M17-24-141-18	106.34	1785.69	19353.69	482018.68	327197.77	6379745.47	12069.99
431.94	SRM614-12	5.66	472.96	130.62	3105.08	2438.77	26705.59	352.40
498.42	SRM612-12	489.54	22316.88	451.98	6431.78	13357.84	59138.73	19748.95
786.70	SRM610-12	2683.60	205331.39	2201.75	25968.49	96743.19	269923.06	172410.66
270.74	AP1-12	-0.54	764.60	868.58	15355.11	11435.55	153217.74	207.04
214.46	AP2-12	60.58	559.16	1401.31	25129.32	18522.55	268523.28	1219.05
170.18	AP3-12	408.26	817.40	2674.68	50780.54	37120.25	612174.22	5651.19
188.62	AP4-12	428.78	1443.01	3466.84	68262.81	49589.16	854817.22	9009.29

Appendix A. Raw trace element datasheets from laser ablation.

zero correction								
145.70 SRM614-11	16.78	580.24	191.58	2972.72	2347.89	26945.87	292.04	
209.86 SRM612-11	297.30	21081.56	505.10	6587.38	13050.51	64382.04	13714.88	
348.10 SRM610-11	1495.83	178594.56	1834.35	22366.39	83958.39	228881.13	111028.91	
122.50 AP1-11	5.06	1167.01	890.67	15215.59	11406.59	152985.58	249.24	
148.42 AP2-11	64.18	750.12	1302.83	23431.79	17208.26	246816.03	1112.33	
169.50 AP3-11	256.42	1012.49	2491.71	45426.40	33141.59	528219.47	4288.42	
127.90 AP4-11	228.18	1188.73	2768.44	51717.23	37203.09	608773.78	6322.32	
81.54 M17-24-141-1	9.62	351.28	353.98	6849.62	5093.19	65582.77	1861.41	
125.66 M17-24-141-2	11.54	141.52	375.06	7684.18	5584.19	73630.46	2241.73	
155.14 M17-24-141-3	24.10	159.60	415.74	8368.99	6228.11	81087.70	2534.57	
96.22 M17-24-141-4	14.34	225.24	498.42	10782.52	8005.09	105934.07	3636.34	
137.50 M17-24-141-5	11.82	165.32	603.06	11175.88	8077.13	107631.56	4016.54	
128.02 M17-24-141-6	12.78	212.52	565.38	10555.48	7643.28	102359.81	3055.94	
116.98 M17-24-141-7	2.58	488.68	522.66	10354.44	7870.28	104946.15	2012.81	
98.22 M17-24-141-8	2.22	90.44	472.34	9312.03	6782.32	89989.43	2016.57	
105.82 M17-24-141-9	0.00	106.24	491.62	10200.04	7622.00	98847.16	2189.61	
149.50 M17-24-141-10	36.18	1109.13	1987.47	38943.72	28319.64	453541.28	16178.29	
149.02 M17-24-141-11	80.34	534.04	3665.36	72934.27	51603.17	912731.53	42755.08	
177.26 M17-24-141-12	106.38	823.40	5915.93	120030.21	84197.39	1592937.37	77080.95	
420.78 M17-24-141-13	238.26	6780.40	20237.21	503874.53	345431.55	6598414.47	162699.87	
436.34 M17-24-141-14	249.26	4305.02	20504.70	504682.00	344822.27	6630942.47	179998.22	
456.82 M17-24-141-15	235.86	2508.41	21021.78	521348.15	355708.89	6844340.97	192888.08	
527.18 M17-24-141-16	106.46	5525.39	19508.29	481791.12	330548.33	6390597.97	20895.40	
462.94 M17-24-141-17	76.94	1147.49	19886.29	490954.21	333579.92	6491476.97	16623.05	
480.82 M17-24-141-18	106.34	1785.69	19353.69	482018.68	327197.77	6379745.47	12069.99	
431.94 SRM614-12	5.66	472.96	130.62	3105.08	2438.77	26705.59	352.40	
498.42 SRM612-12	489.54	22316.88	451.98	6431.78	13357.84	59138.73	19748.95	
786.70 SRM610-12	2683.60	205331.39	2201.75	25968.49	96743.19	269923.06	172410.66	
270.74 AP1-12	0.00	764.60	868.58	15355.11	11435.55	153217.74	207.04	
214.46 AP2-12	60.58	559.16	1401.31	25129.32	18522.55	268523.28	1219.05	
170.18 AP3-12	408.26	817.40	2674.68	50780.54	37120.25	612174.22	5651.19	
188.62 AP4-12	428.78	1443.01	3466.84	68262.81	49589.16	854817.22	9009.29	

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	0.77	
SRM612		31.63	76.15	76.15	76.15	76.15	38.25	
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90	
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00	
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88	
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82	
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94	

standardized concentration								
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009	
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446	
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246	
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000	
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002	
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007	
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012	

standardized signal								
0.000078 SRM614-11	0.000009	0.000312	0.000103	0.001598	0.001262	0.014484	0.000157	
0.000109 SRM612-11	0.000154	0.010901	0.000261	0.003406	0.006748	0.033291	0.007092	
0.000341 SRM610-11	0.001463	0.174725	0.001795	0.021882	0.082139	0.223922	0.108623	
0.000011 AP1-11	0.000000	0.000102	0.000078	0.001326	0.000994	0.013337	0.000022	
0.000014 AP2-11	0.000006	0.000070	0.000121	0.002183	0.001603	0.022990	0.000104	
0.000012 AP3-11	0.000018	0.000071	0.000175	0.003192	0.002329	0.037113	0.000301	
0.000009 AP4-11	0.000017	0.000088	0.000204	0.003808	0.002739	0.044826	0.000466	
0.000037 M17-24-141-1	0.000004	0.000160	0.000161	0.003118	0.002319	0.029855	0.000847	
0.000051 M17-24-141-2	0.000005	0.000058	0.000153	0.003141	0.002282	0.030095	0.000916	
0.000058 M17-24-141-3	0.000009	0.000059	0.000155	0.003115	0.002318	0.030181	0.000943	
0.000029 M17-24-141-4	0.000004	0.000067	0.000148	0.003199	0.002375	0.031426	0.001079	
0.000043 M17-24-141-5	0.000004	0.000052	0.000189	0.003500	0.002530	0.033709	0.001258	
0.000041 M17-24-141-6	0.000004	0.000067	0.000179	0.003349	0.002425	0.032476	0.000970	
0.000040 M17-24-141-7	0.000001	0.000166	0.000177	0.003508	0.002667	0.035558	0.000682	
0.000035 M17-24-141-8	0.000001	0.000032	0.000167	0.003285	0.002392	0.031742	0.000711	
0.000035 M17-24-141-9	0.000000	0.000035	0.000162	0.003365	0.002514	0.032609	0.000722	
0.000032 M17-24-141-10	0.000008	0.000239	0.000428	0.008383	0.006096	0.097624	0.003482	
0.000023 M17-24-141-11	0.000013	0.000084	0.000573	0.011410	0.008073	0.142793	0.006689	
0.000024 M17-24-141-12	0.000014	0.000111	0.000799	0.016213	0.011373	0.215160	0.010411	
0.000025 M17-24-141-13	0.000014	0.000405	0.001210	0.030121	0.020649	0.394444	0.009726	
0.000026 M17-24-141-14	0.000015	0.000256	0.001220	0.030018	0.020510	0.394404	0.010706	
0.000027 M17-24-141-15	0.000014	0.000148	0.001239	0.030725	0.020963	0.403362	0.011368	
0.000030 M17-24-141-16	0.000006	0.000309	0.001092	0.026980	0.018511	0.357873	0.001170	
0.000025 M17-24-141-17	0.000004	0.000062	0.001082	0.026701	0.018142	0.353046	0.000904	

Appendix A. Raw trace element datasheets from laser ablation.

0.000026	M17-24-141-18	0.000006	0.000096	0.001043	0.025975	0.017632	0.343795	0.000650
0.000293	SRM614-12	0.000004	0.000321	0.000089	0.002109	0.001657	0.018139	0.000239
0.000264	SRM612-12	0.000259	0.011809	0.000239	0.003403	0.007068	0.031293	0.010450
0.000780	SRM610-12	0.002662	0.203689	0.002184	0.025761	0.095969	0.267764	0.171031
0.000022	AP1-12	0.000000	0.000063	0.000072	0.001274	0.000948	0.012707	0.000017
0.000018	AP2-12	0.000005	0.000046	0.000115	0.002064	0.001521	0.022050	0.000100
0.000010	AP3-12	0.000025	0.000049	0.000161	0.003063	0.002239	0.036929	0.000341
0.000012	AP4-12	0.000027	0.000089	0.000215	0.004227	0.003071	0.052935	0.000558
standardize signal averages AP								
0.000017	AP1	0.000000	0.000083	0.000075	0.001300	0.000971	0.013022	0.000019
0.000016	AP2	0.000005	0.000058	0.000118	0.002123	0.001562	0.022520	0.000102
0.000011	AP3	0.000021	0.000060	0.000168	0.003128	0.002284	0.037021	0.000321
0.000011	AP4	0.000022	0.000088	0.000209	0.004018	0.002905	0.048880	0.000512
linest from std sig ave								
5.428401		0.383178	0.005507	2.848837	0.151912	0.208712	0.012855	0.023505
standardize signal averages SRM								
0.000186	srM614-2	0.000006	0.000317	0.000096	0.001854	0.001459	0.016312	0.000198
0.000186	srM612-2	0.000206	0.011355	0.000250	0.003405	0.006908	0.032292	0.008771
0.000560	srM610-2	0.002063	0.189207	0.001989	0.023821	0.089054	0.245843	0.139827
linest from std sig ave								
0.000000		0.610022	0.026588	2.930829	0.244020	0.065582	0.023692	0.037569
concentration data								
36.46	SRM614-11	0.30	0.15	25.16	20.82	22.59	15.97	0.32
50.52	SRM612-11	5.05	5.15	63.81	44.38	120.79	36.70	14.30
158.55	SRM610-11	48.09	82.52	438.47	285.09	1470.27	246.86	218.97
23.13	AP1-11	0.07	0.22	88.24	80.39	82.80	68.39	0.20
29.94	AP2-11	0.91	0.15	137.92	132.27	133.46	117.89	0.97
25.79	AP3-11	2.75	0.16	198.97	193.43	193.88	190.32	2.83
20.39	AP4-11	2.57	0.19	231.67	230.78	228.09	229.87	4.37
80.38	M17-24-141-1	0.67	0.35	183.14	188.97	193.05	153.10	7.95
111.23	M17-24-141-2	0.72	0.13	174.23	190.34	190.04	154.33	8.59
125.05	M17-24-141-3	1.37	0.13	175.86	188.78	193.01	154.77	8.85
61.81	M17-24-141-4	0.65	0.15	168.04	193.85	197.73	161.16	10.12
93.26	M17-24-141-5	0.57	0.11	214.65	212.12	210.63	172.86	11.80
87.96	M17-24-141-6	0.62	0.15	203.87	202.96	201.91	166.54	9.09
85.83	M17-24-141-7	0.13	0.36	201.26	212.61	222.03	182.35	6.40
75.03	M17-24-141-8	0.12	0.07	189.36	199.06	199.19	162.78	6.67
75.60	M17-24-141-9	0.00	0.08	184.32	203.93	209.36	167.22	6.77
69.69	M17-24-141-10	1.19	0.52	486.20	508.01	507.55	500.63	32.65
50.49	M17-24-141-11	1.92	0.18	651.70	691.50	672.19	732.26	62.72
51.85	M17-24-141-12	2.20	0.24	908.15	982.54	946.92	1103.37	97.63
54.47	M17-24-141-13	2.18	0.89	1374.89	1825.43	1719.33	2022.77	91.20
56.20	M17-24-141-14	2.27	0.56	1386.09	1819.20	1707.70	2022.56	100.39
58.30	M17-24-141-15	2.12	0.32	1408.00	1862.04	1745.46	2068.50	106.60
63.93	M17-24-141-16	0.91	0.68	1241.59	1635.10	1541.25	1835.23	10.97
54.52	M17-24-141-17	0.64	0.14	1229.17	1618.17	1510.56	1810.47	8.48
56.11	M17-24-141-18	0.88	0.21	1185.31	1574.19	1468.10	1763.03	6.10
136.59	SRM614-12	0.13	0.15	21.68	27.48	29.65	20.00	0.48
122.78	SRM612-12	8.51	5.58	58.43	44.34	126.52	34.50	21.07
363.32	SRM610-12	87.48	96.19	533.64	335.62	1717.83	295.19	344.78
48.63	AP1-12	0.00	0.14	81.87	77.18	78.97	65.17	0.16
38.14	AP2-12	0.76	0.10	130.78	125.06	126.64	113.08	0.94
22.23	AP3-12	3.76	0.11	183.37	185.65	186.45	189.38	3.20
25.29	AP4-12	4.06	0.20	243.99	256.18	255.68	271.46	5.23
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br								
	raw data	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
574.64	blank-9	118.80	295.52	568.56	220.28	131.36	69.72	37.88
971.89	SRM614-9	125.08	1057.57	798.84	4724.31	3720.14	41816.04	644.24
1015.93	SRM612-9	472.24	21145.40	910.61	6866.72	13302.84	61659.19	21316.64
1268.53	SRM610-9	2376.05	205926.64	2635.77	26799.75	97437.66	283488.31	189711.98
845.16	AP1-9	132.08	2261.53	1497.73	17865.42	13833.48	182314.75	320.84
796.16	AP2-9	144.32	1783.41	2080.49	30175.05	22281.13	327328.34	1707.09
862.80	AP3-9	423.28	1938.69	3301.82	56210.08	40838.23	684471.13	6542.56

Appendix A. Raw trace element datasheets from laser ablation.

876.96	AP4-9	625.24	2465.37	4218.90	73808.22	53208.66	938474.75	10600.58
1051.09	M17-24-97-1	288.20	4561.95	3631.90	64093.92	47448.71	796702.31	184480.08
978.41	M17-24-97-2	251.84	1576.17	3204.18	55299.43	39808.50	682435.81	155645.72
953.97	M17-24-97-3	239.20	1749.09	3440.78	62689.43	45442.02	787845.00	163727.77
843.60	M17-24-97-4	110.32	5776.51	2387.49	39569.82	30842.65	466670.19	1040.13
838.88	M17-24-97-5	113.52	1395.37	2264.25	37503.57	27173.43	439489.81	672.44
807.40	M17-24-97-6	115.00	2027.13	2396.93	40371.59	29761.97	476271.56	644.12
805.24	M17-24-97-7	96.80	3560.34	1982.93	31997.38	24131.18	361801.59	560.72
813.48	M17-24-97-8	112.28	2063.93	1737.61	26313.07	19817.75	293993.75	402.84
823.68	M17-24-97-9	113.08	1386.21	1935.53	31304.73	22694.09	356761.94	421.72
790.32	M17-24-97-10	103.00	2568.61	1892.61	31158.90	23049.49	330574.16	473.48
799.64	M17-24-97-11	134.20	1806.61	2020.13	32439.70	23690.69	361609.28	454.32
786.80	M17-24-97-12	99.04	1818.73	2155.93	34440.59	25419.74	392496.00	481.44
832.04	M17-24-97-13	87.60	10935.34	2134.21	35318.40	30191.37	403403.44	955.81
819.16	M17-24-97-14	91.08	3321.38	2098.61	33105.63	25049.30	379218.56	585.20
817.60	M17-24-97-15	97.24	2259.69	1974.25	32004.90	23538.21	362410.28	521.28
822.60	M17-24-97-16	110.96	8434.17	2520.57	45149.41	35512.72	519308.38	1101.49
798.28	M17-24-97-17	89.40	3523.98	2412.09	40945.63	30382.69	488096.44	760.40
844.16	M17-24-97-18	103.60	5827.59	2675.86	46003.90	35475.32	555794.13	1066.49
1182.81	SRM614-10	100.80	1262.05	571.76	4162.62	3492.26	36859.01	579.84
1158.73	SRM612-10	681.16	16931.10	725.04	5187.11	10385.90	46049.74	19705.51
1312.25	SRM610-10	2779.14	162399.63	2119.13	21783.20	77500.32	229145.05	185337.64
886.77	AP1-10	69.16	1760.89	1105.57	13986.00	10755.86	140190.11	191.72
901.33	AP2-10	170.12	1257.89	1489.85	22326.41	16518.05	240985.16	1320.89
836.68	AP3-10	503.80	1446.17	2788.18	47387.87	34497.20	584932.81	5771.35
917.61	AP4-10	659.04	1855.85	3452.06	60398.14	43750.69	773728.13	9388.85
594.12	blank-10	77.72	510.96	328.88	257.80	287.88	1136.17	30.52
584.38	blank average	98.26	403.24	448.72	239.04	209.62	602.94	34.20

blank subtraction								
387.50	SRM614-9	26.82	654.32	350.12	4485.27	3510.52	41213.09	610.04
431.54	SRM612-9	373.98	20742.16	461.88	6627.68	13093.21	61056.24	21282.44
684.14	SRM610-9	2277.79	205523.40	2187.05	26560.71	97228.04	282885.37	189677.78
260.78	AP1-9	33.82	1858.29	1049.01	17626.38	13623.86	181711.81	286.64
211.78	AP2-9	46.06	1380.17	1631.77	29936.01	22071.50	326725.40	1672.89
278.42	AP3-9	325.02	1535.45	2853.10	55971.04	40628.61	683868.19	6508.36
292.58	AP4-9	526.98	2062.13	3770.18	73569.18	52999.04	937871.81	10566.38
466.70	M17-24-97-1	189.94	4158.70	3183.18	63854.88	47239.09	796099.37	184445.88
394.02	M17-24-97-2	153.58	1172.93	2755.46	55060.39	39598.88	681832.87	155611.52
369.58	M17-24-97-3	140.94	1345.85	2992.06	62450.39	45232.39	787242.06	163693.57
259.22	M17-24-97-4	12.06	5373.27	1938.77	39330.78	30633.03	466067.25	1005.93
254.50	M17-24-97-5	15.26	992.13	1815.53	37264.53	26963.81	438886.87	638.24
223.02	M17-24-97-6	16.74	1623.89	1948.21	40132.54	29552.35	475668.62	609.92
220.86	M17-24-97-7	-1.46	3157.10	1534.21	31758.34	23921.55	361198.65	526.52
229.10	M17-24-97-8	14.02	1660.69	1288.89	26074.03	19608.13	293390.81	368.64
239.30	M17-24-97-9	14.82	982.97	1486.81	31065.69	22484.47	356159.00	387.52
205.94	M17-24-97-10	4.74	2165.37	1443.89	30919.85	22839.87	329971.22	439.28
215.26	M17-24-97-11	35.94	1403.37	1571.41	32200.66	23481.07	361006.34	420.12
202.42	M17-24-97-12	0.78	1415.49	1707.21	34201.55	25210.12	391893.06	447.24
247.66	M17-24-97-13	-10.66	10532.10	1685.49	35079.36	29981.75	402800.50	921.61
234.78	M17-24-97-14	-7.18	2918.14	1649.89	32866.58	24839.68	378615.62	551.00
233.22	M17-24-97-15	-1.02	1856.45	1525.53	31765.86	23328.59	361807.34	487.08
238.22	M17-24-97-16	12.70	8030.92	2071.85	44910.37	35303.10	518705.44	1067.29
213.90	M17-24-97-17	-8.86	3120.74	1963.37	40706.59	30173.07	487493.50	726.20
259.78	M17-24-97-18	5.34	5424.35	2227.13	45764.86	35265.70	555191.19	1032.29
598.42	SRM614-10	2.54	858.80	123.04	3923.58	3282.64	36256.06	545.64
574.34	SRM612-10	582.90	16527.85	276.32	4948.07	10176.28	45446.79	19671.31
727.86	SRM610-10	2680.87	161996.39	1670.41	21544.16	77290.70	228542.11	185303.44
302.38	AP1-10	-29.10	1357.65	656.84	13746.96	10546.24	139587.17	157.52
316.94	AP2-10	71.86	854.64	1041.13	22087.36	16308.43	240382.22	1286.69
252.30	AP3-10	405.54	1042.93	2339.45	47148.83	34287.57	584329.87	5737.15
333.22	AP4-10	560.78	1452.61	3003.34	60159.10	43541.07	773125.19	9354.65

zero correction								
387.50	SRM614-9	26.82	654.32	350.12	4485.27	3510.52	41213.09	610.04
431.54	SRM612-9	373.98	20742.16	461.88	6627.68	13093.21	61056.24	21282.44
684.14	SRM610-9	2277.79	205523.40	2187.05	26560.71	97228.04	282885.37	189677.78
260.78	AP1-9	33.82	1858.29	1049.01	17626.38	13623.86	181711.81	286.64
211.78	AP2-9	46.06	1380.17	1631.77	29936.01	22071.50	326725.40	1672.89
278.42	AP3-9	325.02	1535.45	2853.10	55971.04	40628.61	683868.19	6508.36
292.58	AP4-9	526.98	2062.13	3770.18	73569.18	52999.04	937871.81	10566.38
466.70	M17-24-97-1	189.94	4158.70	3183.18	63854.88	47239.09	796099.37	184445.88
394.02	M17-24-97-2	153.58	1172.93	2755.46	55060.39	39598.88	681832.87	155611.52
369.58	M17-24-97-3	140.94	1345.85	2992.06	62450.39	45232.39	787242.06	163693.57
259.22	M17-24-97-4	12.06	5373.27	1938.77	39330.78	30633.03	466067.25	1005.93
254.50	M17-24-97-5	15.26	992.13	1815.53	37264.53	26963.81	438886.87	638.24
223.02	M17-24-97-6	16.74	1623.89	1948.21	40132.54	29552.35	475668.62	609.92
220.86	M17-24-97-7	0.00	3157.10	1534.21	31758.34	23921.55	361198.65	526.52

Appendix A. Raw trace element datasheets from laser ablation.

229.10	M17-24-97-8	14.02	1660.69	1288.89	26074.03	19608.13	293390.81	368.64
239.30	M17-24-97-9	14.82	982.97	1486.81	31065.69	22484.47	356159.00	387.52
205.94	M17-24-97-10	4.74	2165.37	1443.89	30919.85	22839.87	329971.22	439.28
215.26	M17-24-97-11	35.94	1403.37	1571.41	32200.66	23481.07	361006.34	420.12
202.42	M17-24-97-12	0.78	1415.49	1707.21	34201.55	25210.12	391893.06	447.24
247.66	M17-24-97-13	0.00	10532.10	1685.49	35079.36	29981.75	402800.50	921.61
234.78	M17-24-97-14	0.00	2918.14	1649.89	32866.58	24839.68	378615.62	551.00
233.22	M17-24-97-15	0.00	1856.45	1525.53	31765.86	23328.59	361807.34	487.08
238.22	M17-24-97-16	12.70	8030.92	2071.85	44910.37	35303.10	518705.44	1067.29
213.90	M17-24-97-17	0.00	3120.74	1963.37	40706.59	30173.07	487493.50	726.20
259.78	M17-24-97-18	5.34	5424.35	2227.13	45764.86	35265.70	555191.19	1032.29
598.42	SRM614-10	2.54	858.80	123.04	3923.58	3282.64	36256.06	545.64
574.34	SRM612-10	582.90	16527.85	276.32	4948.07	10176.28	45446.79	19671.31
727.86	SRM610-10	2680.87	161996.39	1670.41	21544.16	77290.70	228542.11	185303.44
302.38	AP1-10	0.00	1357.65	656.84	13746.96	10546.24	139587.17	157.52
316.94	AP2-10	71.86	854.64	1041.13	22087.36	16308.43	240382.22	1286.69
252.30	AP3-10	405.54	1042.93	2339.45	47148.83	34287.57	584329.87	5737.15
333.22	AP4-10	560.78	1452.61	3003.34	60159.10	43541.07	773125.19	9354.65
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000165	SRM614-9	0.000011	0.000278	0.000149	0.001908	0.001493	0.017531	0.000260
0.000239	SRM612-9	0.000207	0.011466	0.000255	0.003664	0.007238	0.033752	0.011765
0.000682	SRM610-9	0.002270	0.204777	0.002179	0.026464	0.096875	0.281858	0.188989
0.000020	AP1-9	0.000003	0.000146	0.000082	0.001384	0.001070	0.014272	0.000023
0.000016	AP2-9	0.000003	0.000103	0.000122	0.002232	0.001645	0.024356	0.000125
0.000016	AP3-9	0.000018	0.000086	0.000160	0.003132	0.002274	0.038270	0.000364
0.000018	AP4-9	0.000032	0.000127	0.000232	0.004533	0.003266	0.057788	0.000651
0.000062	M17-24-97-1	0.000025	0.000554	0.000424	0.008504	0.006291	0.106028	0.024565
0.000057	M17-24-97-2	0.000022	0.000169	0.000398	0.007949	0.005717	0.098434	0.022465
0.000048	M17-24-97-3	0.000018	0.000175	0.000389	0.008115	0.005877	0.102293	0.021270
0.000048	M17-24-97-4	0.000002	0.000997	0.000360	0.007299	0.005685	0.086494	0.000187
0.000047	M17-24-97-5	0.000003	0.000183	0.000335	0.006880	0.004978	0.081026	0.000118
0.000039	M17-24-97-6	0.000003	0.000283	0.000339	0.006987	0.005145	0.082816	0.000106
0.000045	M17-24-97-7	0.000000	0.000638	0.000310	0.006413	0.004831	0.072937	0.000106
0.000050	M17-24-97-8	0.000003	0.000364	0.000282	0.005711	0.004295	0.064266	0.000081
0.000046	M17-24-97-9	0.000003	0.000190	0.000287	0.006005	0.004346	0.068849	0.000075
0.000051	M17-24-97-10	0.000001	0.000538	0.000358	0.007676	0.005670	0.081913	0.000109
0.000046	M17-24-97-11	0.000008	0.000302	0.000339	0.006940	0.005061	0.077807	0.000091
0.000041	M17-24-97-12	0.000000	0.000286	0.000344	0.006898	0.005085	0.079045	0.000090
0.000057	M17-24-97-13	0.000000	0.002417	0.000387	0.008051	0.006881	0.092452	0.000212
0.000050	M17-24-97-14	0.000000	0.000617	0.000349	0.006954	0.005255	0.080106	0.000117
0.000050	M17-24-97-15	0.000000	0.000398	0.000327	0.006815	0.005005	0.077618	0.000104
0.000044	M17-24-97-16	0.000002	0.001493	0.000385	0.008349	0.006563	0.096433	0.000198
0.000036	M17-24-97-17	0.000000	0.000527	0.000331	0.006872	0.005094	0.082303	0.000123
0.000043	M17-24-97-18	0.000001	0.000904	0.000371	0.007628	0.005878	0.092541	0.000172
0.000303	SRM614-10	0.000001	0.000434	0.000062	0.001985	0.001661	0.018341	0.000276
0.000421	SRM612-10	0.000427	0.012102	0.000202	0.003623	0.007451	0.033278	0.014404
0.000907	SRM610-10	0.003342	0.201936	0.002082	0.026856	0.096347	0.284889	0.230989
0.000029	AP1-10	0.000000	0.000131	0.000063	0.001322	0.001014	0.013421	0.000015
0.000029	AP2-10	0.000007	0.000079	0.000096	0.002044	0.001509	0.022245	0.000119
0.000017	AP3-10	0.000028	0.000071	0.000160	0.003226	0.002346	0.039976	0.000392
0.000024	AP4-10	0.000041	0.000106	0.000219	0.004379	0.003170	0.056280	0.000681
standardize signal averages AP								
0.000025	AP1	0.000001	0.000138	0.000073	0.001353	0.001042	0.013847	0.000019
0.000023	AP2	0.000005	0.000091	0.000109	0.002138	0.001577	0.023300	0.000122
0.000016	AP3	0.000023	0.000079	0.000160	0.003179	0.002310	0.039123	0.000378
0.000021	AP4	0.000037	0.000116	0.000225	0.004456	0.003218	0.057034	0.000666
linest from std sig ave								

Appendix A. Raw trace element datasheets from laser ablation.

3.489275	0.278488	0.003319	2.809548	0.142363	0.195902	0.011460	0.018592
standardize signal averages SRM							
0.000234 srm614-2	0.000006	0.000356	0.000106	0.001946	0.001577	0.017936	0.000268
0.000330 srm612-2	0.000317	0.011784	0.000229	0.003643	0.007345	0.033515	0.013084
0.000794 srm610-2	0.002806	0.203357	0.002131	0.026660	0.096611	0.283373	0.209989
linest from std sig ave							
0.000000	0.447286	0.024740	2.740432	0.218269	0.060452	0.020582	0.025017
concentration data							
49.33 SRM614-9	0.27	0.08	35.89	23.30	25.09	17.23	0.41
71.39 SRM612-9	4.94	3.26	61.52	44.73	121.60	33.17	18.76
203.99 SRM610-9	54.21	58.29	525.07	323.12	1627.61	277.02	301.34
28.51 AP1-9	0.30	0.19	92.35	78.63	83.63	65.25	0.17
21.98 AP2-9	0.38	0.14	136.34	126.74	128.58	111.35	0.92
21.69 AP3-9	2.02	0.11	178.95	177.89	177.69	174.96	2.70
25.09 AP4-9	3.61	0.17	260.37	257.45	255.22	264.20	4.83
86.52 M17-24-97-1	2.81	0.73	475.17	483.00	491.69	484.74	182.20
79.18 M17-24-97-2	2.46	0.22	445.86	451.45	446.78	450.02	166.62
66.85 M17-24-97-3	2.03	0.23	435.76	460.87	459.33	467.66	157.76
66.96 M17-24-97-4	0.25	1.32	403.28	414.54	444.29	395.43	1.38
65.40 M17-24-97-5	0.31	0.24	375.68	390.72	389.04	370.43	0.87
54.05 M17-24-97-6	0.32	0.37	380.18	396.83	402.11	378.62	0.79
62.08 M17-24-97-7	0.00	0.84	347.24	364.22	377.52	333.46	0.79
69.86 M17-24-97-8	0.34	0.48	316.44	324.37	335.67	293.81	0.60
64.39 M17-24-97-9	0.32	0.25	322.14	341.07	339.69	314.76	0.56
71.16 M17-24-97-10	0.13	0.71	401.74	435.93	443.11	374.49	0.81
64.58 M17-24-97-11	0.86	0.40	379.61	394.16	395.52	355.72	0.67
56.83 M17-24-97-12	0.02	0.38	385.95	391.79	397.40	361.38	0.67
79.13 M17-24-97-13	0.00	3.20	433.60	457.28	537.80	422.67	1.57
69.15 M17-24-97-14	0.00	0.82	391.25	394.93	410.73	366.23	0.86
69.65 M17-24-97-15	0.00	0.53	366.81	387.03	391.13	354.85	0.78
61.65 M17-24-97-16	0.26	1.98	431.72	474.19	512.93	440.87	1.47
50.27 M17-24-97-17	0.00	0.70	371.53	390.31	398.12	376.27	0.91
60.28 M17-24-97-18	0.10	1.20	416.08	433.24	459.40	423.08	1.28
90.59 SRM614-10	0.03	0.12	15.00	24.23	27.90	18.03	0.44
125.85 SRM612-10	10.19	3.45	48.75	44.24	125.19	32.71	22.97
271.52 SRM610-10	79.82	57.48	501.73	327.90	1618.73	280.00	368.32
40.47 AP1-10	0.00	0.17	70.78	75.07	79.25	61.36	0.11
40.83 AP2-10	0.74	0.10	107.99	116.09	117.95	101.70	0.88
24.03 AP3-10	3.08	0.09	179.39	183.19	183.32	182.76	2.91
33.77 AP4-10	4.54	0.14	245.05	248.72	247.71	257.30	5.05
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
436.48 blank-7	91.60	268.20	326.20	145.00	96.96	169.68	19.24
600.08 SRM614-7	132.88	873.84	529.00	3196.34	2701.14	29438.37	319.36
598.72 SRM612-7	350.80	19425.43	687.28	5184.11	11561.63	47377.15	12389.75
743.12 SRM610-7	1370.37	150337.69	1973.05	19615.43	71785.00	197774.28	100197.33
606.32 AP1-7	91.24	1128.69	1054.69	13487.28	10063.86	131251.58	213.96
615.04 AP2-7	142.32	967.81	1725.25	26392.35	19204.75	278894.63	1226.73
599.52 AP3-7	475.56	1381.89	3494.58	59977.02	43649.37	734480.31	5555.35
648.40 AP4-7	490.84	1702.41	3365.94	58713.41	42602.80	715403.31	7243.88
615.80 34HP45-837-1	128.60	447.08	1453.37	21188.04	15289.53	218363.28	7373.24
679.52 34HP45-837-2	110.84	440.08	1459.93	22816.93	16372.53	240223.11	9116.77
642.00 34HP45-837-3	136.76	529.28	1303.49	18989.07	13941.20	196259.44	8476.49
660.36 34HP45-837-4	125.36	577.76	2873.94	50408.81	35986.52	595528.38	16457.57
725.48 34HP45-837-5	141.36	464.20	2727.06	47373.59	34171.83	565263.75	10566.30
715.28 34HP45-837-6	121.72	591.24	2469.97	42172.12	30214.57	491956.81	11532.06
739.28 34HP45-837-7	134.04	1222.77	3528.46	63767.28	45531.26	790278.63	17238.02
747.52 34HP45-837-8	144.88	599.00	3108.66	56778.96	40049.34	677777.75	27286.87
804.72 34HP45-837-9	162.68	689.44	2670.14	46031.46	33230.27	541505.19	34829.68
668.76 34HP45-837-10	115.84	754.68	1848.45	30029.33	21625.52	329839.00	1007.81
638.36 34HP45-837-11	128.24	294.72	1940.93	31841.26	22894.41	355322.94	1013.89
643.16 34HP45-837-12	116.68	405.52	2155.17	35925.65	25838.47	408996.66	1230.85
755.84 34HP45-837-13	109.36	2583.25	2098.05	37594.49	27327.43	436480.53	745.92
703.52 34HP45-837-14	95.76	1135.01	1640.65	27014.79	19582.03	299165.22	432.76
712.76 34HP45-837-15	100.28	1092.25	1810.97	29576.09	21409.64	329013.38	510.56

Appendix A. Raw trace element datasheets from laser ablation.

1023.57	SRM614-8	118.80	843.68	607.12	3995.66	3104.42	34758.40	525.28
1153.09	SRM612-8	657.48	20879.80	769.68	6145.07	12863.07	57028.52	21086.76
1383.93	SRM610-8	3316.34	230866.78	2790.26	29270.61	108030.80	316926.16	217862.34
913.65	AP1-8	73.56	1361.41	1374.21	18041.06	13551.12	183378.16	244.40
751.72	AP2-8	190.96	1028.01	2190.41	34977.72	25670.34	398048.56	1799.65
710.08	AP3-8	747.28	1565.17	3927.70	71536.60	51063.37	914053.06	7993.96
755.20	AP4-8	685.68	1867.25	3974.82	73186.85	53105.26	942887.13	10508.94
545.20	blank-8	97.64	221.56	322.20	212.76	159.08	812.76	31.68
490.84	blank average	94.62	244.88	324.20	178.88	128.02	491.22	25.46
blank subtraction								
109.24	SRM614-7	38.26	628.96	204.80	3017.46	2573.11	28947.14	293.90
107.88	SRM612-7	256.18	19180.55	363.08	5005.23	11433.60	46885.93	12364.29
252.28	SRM610-7	1275.75	150092.81	1648.85	19436.55	71656.98	197283.06	100171.87
115.48	AP1-7	-3.38	883.80	730.48	13308.39	9935.84	130760.36	188.50
124.20	AP2-7	47.70	722.92	1401.05	26213.47	19076.73	278403.41	1201.27
108.68	AP3-7	380.94	1137.01	3170.38	59798.13	43521.35	733989.09	5529.89
157.56	AP4-7	396.22	1457.53	3041.74	58534.53	42474.78	714912.09	7218.42
124.96	34HP45-837-1	33.98	202.20	1129.17	21009.16	15161.51	217872.06	7347.78
188.68	34HP45-837-2	16.22	195.20	1135.73	22638.05	16244.51	239731.89	9091.31
151.16	34HP45-837-3	42.14	284.40	979.29	18810.18	13813.18	195768.22	8451.03
169.52	34HP45-837-4	30.74	332.88	2549.73	50229.92	35858.50	595037.16	16432.11
234.64	34HP45-837-5	46.74	219.32	2402.85	47194.70	34043.81	564772.53	10540.84
224.44	34HP45-837-6	22.40	346.36	2145.77	41993.24	30086.55	491465.59	11506.60
248.44	34HP45-837-7	39.42	977.89	3204.26	63588.40	45403.24	789787.41	17212.56
256.68	34HP45-837-8	50.26	354.12	2784.46	56600.08	39921.32	677286.53	27261.41
313.88	34HP45-837-9	68.06	444.56	2345.93	45852.58	33102.25	541013.97	34804.22
177.92	34HP45-837-10	21.22	509.80	1524.25	29850.45	21497.50	329347.78	982.35
147.52	34HP45-837-11	33.62	49.84	1616.73	31662.38	22766.39	354831.72	988.43
152.32	34HP45-837-12	22.06	160.64	1830.97	35746.76	25710.44	408505.44	1205.39
265.00	34HP45-837-13	14.74	2338.37	1773.85	37415.61	27199.41	435989.31	720.46
212.68	34HP45-837-14	1.14	890.12	1316.45	26835.91	19454.01	298674.00	407.30
221.92	34HP45-837-15	5.66	847.36	1486.77	29397.20	21281.62	328522.16	485.10
532.72	SRM614-8	24.18	598.80	282.92	3816.78	2976.40	34267.17	499.82
662.24	SRM612-8	562.86	20634.92	445.48	5966.19	12735.05	56537.30	21061.30
893.08	SRM610-8	3221.72	230621.90	2466.05	29091.72	107902.78	316434.94	217836.88
422.80	AP1-8	-21.06	1116.53	1050.01	17862.18	13423.10	182886.94	218.94
260.88	AP2-8	96.34	783.12	1866.21	34798.84	25542.32	397557.34	1774.19
219.24	AP3-8	652.66	1320.29	3603.50	71357.72	50935.35	913561.84	7968.50
264.36	AP4-8	591.06	1622.37	3650.62	73007.97	52977.24	942395.91	10483.48
zero correction								
109.24	SRM614-7	38.26	628.96	204.80	3017.46	2573.11	28947.14	293.90
107.88	SRM612-7	256.18	19180.55	363.08	5005.23	11433.60	46885.93	12364.29
252.28	SRM610-7	1275.75	150092.81	1648.85	19436.55	71656.98	197283.06	100171.87
115.48	AP1-7	0.00	883.80	730.48	13308.39	9935.84	130760.36	188.50
124.20	AP2-7	47.70	722.92	1401.05	26213.47	19076.73	278403.41	1201.27
108.68	AP3-7	380.94	1137.01	3170.38	59798.13	43521.35	733989.09	5529.89
157.56	AP4-7	396.22	1457.53	3041.74	58534.53	42474.78	714912.09	7218.42
124.96	34HP45-837-1	33.98	202.20	1129.17	21009.16	15161.51	217872.06	7347.78
188.68	34HP45-837-2	16.22	195.20	1135.73	22638.05	16244.51	239731.89	9091.31
151.16	34HP45-837-3	42.14	284.40	979.29	18810.18	13813.18	195768.22	8451.03
169.52	34HP45-837-4	30.74	332.88	2549.73	50229.92	35858.50	595037.16	16432.11
234.64	34HP45-837-5	46.74	219.32	2402.85	47194.70	34043.81	564772.53	10540.84
224.44	34HP45-837-6	22.40	346.36	2145.77	41993.24	30086.55	491465.59	11506.60
248.44	34HP45-837-7	39.42	977.89	3204.26	63588.40	45403.24	789787.41	17212.56
256.68	34HP45-837-8	50.26	354.12	2784.46	56600.08	39921.32	677286.53	27261.41
313.88	34HP45-837-9	68.06	444.56	2345.93	45852.58	33102.25	541013.97	34804.22
177.92	34HP45-837-10	21.22	509.80	1524.25	29850.45	21497.50	329347.78	982.35
147.52	34HP45-837-11	33.62	49.84	1616.73	31662.38	22766.39	354831.72	988.43
152.32	34HP45-837-12	22.06	160.64	1830.97	35746.76	25710.44	408505.44	1205.39
265.00	34HP45-837-13	14.74	2338.37	1773.85	37415.61	27199.41	435989.31	720.46
212.68	34HP45-837-14	1.14	890.12	1316.45	26835.91	19454.01	298674.00	407.30
221.92	34HP45-837-15	5.66	847.36	1486.77	29397.20	21281.62	328522.16	485.10
532.72	SRM614-8	24.18	598.80	282.92	3816.78	2976.40	34267.17	499.82
662.24	SRM612-8	562.86	20634.92	445.48	5966.19	12735.05	56537.30	21061.30
893.08	SRM610-8	3221.72	230621.90	2466.05	29091.72	107902.78	316434.94	217836.88
422.80	AP1-8	0.00	1116.53	1050.01	17862.18	13423.10	182886.94	218.94
260.88	AP2-8	96.34	783.12	1866.21	34798.84	25542.32	397557.34	1774.19
219.24	AP3-8	652.66	1320.29	3603.50	71357.72	50935.35	913561.84	7968.50
264.36	AP4-8	591.06	1622.37	3650.62	73007.97	52977.24	942395.91	10483.48
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88

Appendix A. Raw trace element datasheets from laser ablation.

25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal							
0.000049 SRM614-7	0.000017	0.000283	0.000092	0.001360	0.001159	0.013043	0.000132
0.000058 SRM612-7	0.000138	0.010317	0.000195	0.002692	0.006150	0.025220	0.006651
0.000261 SRM610-7	0.001318	0.155015	0.001703	0.020074	0.074007	0.203753	0.103457
0.000011 AP1-7	0.000000	0.000085	0.000070	0.001277	0.000953	0.012545	0.000018
0.000010 AP2-7	0.000004	0.000060	0.000116	0.002174	0.001582	0.023085	0.000100
0.000007 AP3-7	0.000023	0.000069	0.000193	0.003633	0.002644	0.044594	0.000336
0.000011 AP4-7	0.000027	0.000101	0.000210	0.004045	0.002935	0.049405	0.000499
0.000031 34HP45-837-1	0.000008	0.000050	0.000277	0.005155	0.003720	0.053457	0.001803
0.000047 34HP45-837-2	0.000004	0.000049	0.000286	0.005695	0.004086	0.060307	0.002287
0.000046 34HP45-837-3	0.000013	0.000086	0.000296	0.005680	0.004171	0.059118	0.002552
0.000018 34HP45-837-4	0.000003	0.000036	0.000277	0.005457	0.003896	0.064646	0.001785
0.000028 34HP45-837-5	0.000005	0.000026	0.000282	0.005533	0.003991	0.066208	0.001236
0.000028 34HP45-837-6	0.000003	0.000044	0.000271	0.005299	0.003796	0.062013	0.001452
0.000031 34HP45-837-7	0.000005	0.000123	0.000405	0.008028	0.005732	0.099713	0.002173
0.000032 34HP45-837-8	0.000006	0.000044	0.000347	0.007060	0.004980	0.084482	0.003400
0.000049 34HP45-837-9	0.000011	0.000069	0.000364	0.007111	0.005133	0.083898	0.005397
0.000037 34HP45-837-10	0.000004	0.000105	0.000314	0.006144	0.004425	0.067789	0.000202
0.000028 34HP45-837-11	0.000006	0.000009	0.000304	0.005961	0.004286	0.066800	0.000186
0.000027 34HP45-837-12	0.000004	0.000028	0.000320	0.006253	0.004497	0.071457	0.000211
0.000073 34HP45-837-13	0.000004	0.000648	0.000491	0.010361	0.007532	0.120727	0.000199
0.000058 34HP45-837-14	0.000000	0.000241	0.000357	0.007280	0.005277	0.081019	0.000110
0.000056 34HP45-837-15	0.000001	0.000212	0.000372	0.007355	0.005324	0.082191	0.000121
0.000297 SRM614-8	0.000013	0.000334	0.000158	0.002131	0.001661	0.019128	0.000279
0.000406 SRM612-8	0.000345	0.012643	0.000273	0.003656	0.007803	0.034642	0.012905
0.000902 SRM610-8	0.003253	0.232896	0.002490	0.029379	0.108967	0.319556	0.219985
0.000032 AP1-8	0.000000	0.000084	0.000079	0.001346	0.001011	0.013779	0.000016
0.000017 AP2-8	0.000006	0.000050	0.000120	0.002232	0.001639	0.025503	0.000114
0.000011 AP3-8	0.000034	0.000068	0.000185	0.003664	0.002615	0.046910	0.000409
0.000016 AP4-8	0.000035	0.000096	0.000216	0.004326	0.003139	0.055846	0.000621

standardize signal averages AP							
0.000021 AP1	0.000000	0.000084	0.000075	0.001311	0.000982	0.013162	0.000017
0.000014 AP2	0.000005	0.000055	0.000118	0.002203	0.001610	0.024294	0.000107
0.000009 AP3	0.000028	0.000068	0.000189	0.003649	0.002630	0.045752	0.000373
0.000013 AP4	0.000031	0.000098	0.000213	0.004186	0.003037	0.052625	0.000560

linest from std sig ave							
4.851601	0.281233	0.005424	2.715424	0.140541	0.193824	0.011380	0.021123

standardize signal averages SRM							
0.000173 srm614-2	0.000015	0.000309	0.000125	0.001745	0.001410	0.016086	0.000206
0.000232 srm612-2	0.000241	0.011480	0.000234	0.003174	0.006977	0.029931	0.009778
0.000581 srm610-2	0.002286	0.193956	0.002097	0.024726	0.091487	0.261654	0.161721

linest from std sig ave							
0.000000	0.549925	0.025938	2.783550	0.235585	0.063835	0.022299	0.032486

concentration data							
20.48 SRM614-7	0.42	0.13	21.49	16.39	19.27	12.73	0.24
24.15 SRM612-7	3.32	4.80	45.48	32.45	102.23	24.61	12.05
108.41 SRM610-7	31.78	72.11	396.58	241.95	1230.21	198.86	187.42
21.44 AP1-7	0.00	0.18	75.92	71.59	73.71	56.95	0.15
19.93 AP2-7	0.44	0.13	125.85	121.87	122.31	104.80	0.84
12.78 AP3-7	2.60	0.15	208.66	203.70	204.46	202.45	2.83
21.07 AP4-7	3.07	0.22	227.71	226.79	226.96	224.29	4.20
59.34 34HP45-837-1	0.94	0.11	300.12	289.01	287.64	242.68	15.19
91.87 34HP45-837-2	0.46	0.11	309.50	319.29	315.98	273.78	19.27
88.35 34HP45-837-3	1.43	0.19	320.35	318.48	322.54	268.39	21.51
35.65 34HP45-837-4	0.37	0.08	300.08	305.96	301.23	293.48	15.04
53.24 34HP45-837-5	0.61	0.06	305.14	310.19	308.59	300.57	10.41
54.81 34HP45-837-6	0.38	0.09	293.30	297.08	293.55	281.53	12.24
60.71 34HP45-837-7	0.56	0.27	438.24	450.12	443.24	452.68	18.31
61.97 34HP45-837-8	0.70	0.10	376.25	395.84	385.04	383.54	28.66
94.21 34HP45-837-9	1.18	0.15	394.09	398.67	396.93	380.88	45.48
70.88 34HP45-837-10	0.49	0.23	339.86	344.48	342.14	307.75	1.70

Appendix A. Raw trace element datasheets from laser ablation.

53.75	34HP45-837-11	0.71	0.02	329.71	334.20	331.40	303.26	1.57
51.57	34HP45-837-12	0.43	0.06	346.95	350.58	347.75	324.40	1.78
142.03	34HP45-837-13	0.46	1.40	532.09	580.88	582.37	548.08	1.68
111.66	34HP45-837-14	0.03	0.52	386.84	408.14	408.05	367.81	0.93
107.46	34HP45-837-15	0.16	0.46	402.94	412.35	411.69	373.13	1.02
123.73	SRM614-8	0.33	0.16	36.78	25.68	27.62	18.67	0.51
168.84	SRM612-8	8.32	5.88	63.57	44.06	129.71	33.81	23.38
375.27	SRM610-8	78.47	108.34	579.97	354.11	1811.35	311.88	398.53
61.65	AP1-8	0.00	0.18	85.70	75.45	78.20	62.55	0.14
32.39	AP2-8	0.69	0.11	129.69	125.16	126.70	115.78	0.96
21.79	AP3-8	3.76	0.15	200.44	205.43	202.24	212.96	3.45
30.32	AP4-8	3.93	0.21	234.35	242.57	242.75	253.53	5.24

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610		109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
531.80	blank-5	96.28	288.76	420.88	215.92	145.80	462.56	30.96
727.88	SRM614-5	105.28	671.88	548.08	2690.62	2111.57	22899.97	282.16
841.12	SRM612-5	343.52	18261.22	840.72	6640.00	12017.19	60994.66	12681.87
943.81	SRM610-5	1619.57	177692.36	2150.45	23121.45	84234.63	231890.47	114608.84
689.76	AP1-5	131.28	1460.93	1309.61	17945.22	13441.20	178952.53	295.92
712.28	AP2-5	167.96	1259.77	2040.33	32692.70	23968.81	351119.78	1511.77
742.80	AP3-5	574.04	1569.61	3777.66	66222.66	47791.59	793393.13	6735.96
788.64	AP4-5	494.80	1610.41	3587.70	61857.55	44625.29	736790.06	8037.48
922.61	34HP45-718-1	157.32	11060.42	3212.94	55892.44	44912.01	675731.44	8311.85
909.61	34HP45-718-2	156.24	2571.89	4013.18	72044.73	52571.90	887173.13	22053.89
1003.01	34HP45-718-3	182.72	7499.76	5347.91	97242.11	72378.25	1239896.60	17782.74
2410.73	34HP45-718-4	377.20	1681.81	20067.15	483244.75	330230.31	6269796.00	80580.13
2096.25	34HP45-718-5	298.44	1120.37	14793.36	334629.28	229773.33	4471244.00	49654.72
2021.53	34HP45-718-6	278.24	2132.89	14116.80	312023.00	216069.94	4188420.00	45433.98
1988.05	34HP45-718-7	326.92	2519.13	16071.69	365097.13	252961.06	4838682.50	45862.70
2018.05	34HP45-718-8	329.72	1717.97	17084.98	389973.44	268709.59	5156674.50	53007.70
2414.53	34HP45-718-9	398.40	2419.89	18593.19	439516.84	300705.63	5747371.00	77786.44
2042.53	34HP45-718-10	362.08	5292.19	15646.65	356839.72	248385.72	4711845.00	26684.39
1943.61	34HP45-718-11	428.92	2221.61	17075.38	399106.31	274425.75	5221060.00	23013.33
2004.89	34HP45-718-12	265.92	2110.73	16725.41	391158.69	269386.22	5185065.50	21737.60
1233.61	34HP45-718-13	1687.13	26900.23	28643.28	621170.00	440007.84	7426654.00	20591.72
1187.33	34HP45-718-14	1375.53	23531.45	22507.49	488654.34	346352.50	6025611.50	15773.65
1185.29	34HP45-718-15	561.20	14885.80	13382.84	281794.69	200753.22	3802269.00	9679.45
1367.29	34HP45-718-16	200.72	1782.45	10840.06	244509.56	169374.00	3388319.80	5857.47
1504.45	34HP45-718-17	199.40	625.96	12133.99	273315.78	188358.19	3787913.80	4741.03
1320.05	34HP45-718-18	181.84	662.48	10526.58	233384.83	160785.83	3255841.80	4554.47
1104.41	SRM614-6	120.64	618.92	478.84	2998.42	2385.73	26128.51	384.60
1185.57	SRM612-6	747.08	17770.94	715.16	5883.71	11247.62	53052.94	18793.07
1588.37	SRM610-6	3391.78	224357.81	2616.97	27332.11	103326.98	297484.84	200553.33
923.57	AP1-6	96.12	1197.09	1351.25	18624.98	13893.76	194030.86	230.36
817.24	AP2-6	206.64	862.08	2031.45	33107.91	23967.70	378890.09	1701.89
804.04	AP3-6	807.92	1381.61	3918.46	73317.57	52707.54	961931.56	8597.61
803.64	AP4-6	487.32	1212.37	3520.86	64312.65	46468.18	822242.19	9754.34
609.76	blank-6	100.88	233.84	299.32	354.68	265.72	2139.73	35.72
570.78	blank average	98.58	261.30	360.10	285.30	205.76	1301.15	33.34

blank subtraction								
157.10	SRM614-5	6.70	410.58	187.98	2405.31	1905.81	21598.82	248.82
270.34	SRM612-5	244.94	17999.92	480.62	6354.70	11811.43	59693.52	12648.53
373.02	SRM610-5	1520.99	177431.06	1790.35	22836.15	84028.87	230589.32	114575.50
118.98	AP1-5	32.70	1199.63	949.51	17659.92	13235.43	177651.38	262.58
141.50	AP2-5	69.38	998.47	1680.23	32407.40	23763.05	349818.63	1478.43
172.02	AP3-5	475.46	1308.31	3417.56	65937.35	47585.83	792091.98	6702.62
217.86	AP4-5	396.22	1349.11	3227.60	61572.25	44419.53	735488.91	8004.14
351.82	34HP45-718-1	58.74	10799.12	2852.84	55607.14	44706.25	674430.29	8278.51
338.82	34HP45-718-2	57.66	2310.59	3653.08	71759.43	52366.13	885871.98	22020.54
432.22	34HP45-718-3	84.14	7238.46	4987.81	96956.81	72172.49	1238595.45	17749.40
1839.95	34HP45-718-4	278.62	1420.51	19707.05	482959.45	330024.55	6268494.85	80546.79
1525.47	34HP45-718-5	199.86	859.06	14433.26	334343.98	229567.57	4469942.85	49621.38
1450.75	34HP45-718-6	179.66	1871.59	13756.70	311737.70	215864.18	4187118.85	45400.64
1417.27	34HP45-718-7	228.34	2257.83	15711.59	364811.83	252755.30	4837381.35	45829.36
1447.27	34HP45-718-8	231.14	1456.67	16724.87	389688.14	268503.83	5155373.35	52974.36
1843.75	34HP45-718-9	299.82	2158.59	18233.08	439231.54	300499.87	5746069.85	77753.10
1471.75	34HP45-718-10	263.50	5030.89	15286.55	356554.42	248179.96	4710543.85	26651.05

Appendix A. Raw trace element datasheets from laser ablation.

1372.83	34HP45-718-11	330.34	1960.31	16715.27	398821.01	274219.99	5219758.85	22979.99
1434.11	34HP45-718-12	167.34	1849.43	16365.31	390873.39	269180.46	5183764.35	21704.26
662.82	34HP45-718-13	1588.55	26638.93	28283.18	620884.70	439802.08	7425352.85	20558.37
616.54	34HP45-718-14	1276.95	23270.15	22147.39	488369.04	346146.74	6024310.35	15740.31
614.50	34HP45-718-15	462.62	14624.50	13022.73	281509.39	200547.46	3800967.85	9646.11
796.50	34HP45-718-16	102.14	1521.15	10479.96	244224.26	169168.24	3387018.65	5824.13
933.67	34HP45-718-17	100.82	364.66	11773.89	273030.48	188152.43	3786612.65	4707.69
749.26	34HP45-718-18	83.26	401.18	10166.48	233099.53	160580.07	3254540.65	4521.13
533.62	SRM614-6	22.06	357.62	118.74	2713.12	2179.97	24827.36	351.26
614.78	SRM612-6	648.50	17509.64	355.06	5598.41	11041.86	51751.79	18759.73
1017.59	SRM610-6	3293.20	224096.51	2256.87	27046.81	103121.22	296183.69	200519.99
352.78	AP1-6	-2.46	935.79	991.15	18339.68	13688.00	192729.71	197.02
246.46	AP2-6	108.06	600.78	1671.35	32822.60	23761.93	377588.94	1668.55
233.26	AP3-6	709.34	1120.31	3558.36	73032.27	52501.77	960630.41	8564.27
232.86	AP4-6	388.74	951.07	3160.76	64027.34	46262.42	820941.04	9720.99

zero correction								
157.10	SRM614-5	6.70	410.58	187.98	2405.31	1905.81	21598.82	248.82
270.34	SRM612-5	244.94	17999.92	480.62	6354.70	11811.43	59693.52	12648.53
373.02	SRM610-5	1520.99	177431.06	1790.35	22836.15	84028.87	230589.32	114575.50
118.98	AP1-5	32.70	1199.63	949.51	17659.92	13235.43	177651.38	262.58
141.50	AP2-5	69.38	998.47	1680.23	32407.40	23763.05	349818.63	1478.43
172.02	AP3-5	475.46	1308.31	3417.56	65937.35	47585.83	792091.98	6702.62
217.86	AP4-5	396.22	1349.11	3227.60	61572.25	44419.53	735488.91	8004.14
351.82	34HP45-718-1	58.74	10799.12	2852.84	55607.14	44706.25	674430.29	8278.51
338.82	34HP45-718-2	57.66	2310.59	3653.08	71759.43	52366.13	885871.98	22020.54
432.22	34HP45-718-3	84.14	7238.46	4987.81	96956.81	72172.49	1238595.45	17749.40
1839.95	34HP45-718-4	278.62	1420.51	19707.05	482959.45	330024.55	6268494.85	80546.79
1525.47	34HP45-718-5	199.86	859.06	14433.26	334343.98	229567.57	4469942.85	49621.38
1450.75	34HP45-718-6	179.66	1871.59	13756.70	311737.70	215864.18	4187118.85	45400.64
1417.27	34HP45-718-7	228.34	2257.83	15711.59	364811.83	252755.30	4837381.35	45829.36
1447.27	34HP45-718-8	231.14	1456.67	16724.87	389688.14	268503.83	5155373.35	52974.36
1843.75	34HP45-718-9	299.82	2158.59	18233.08	439231.54	300499.87	5746069.85	77753.10
1471.75	34HP45-718-10	263.50	5030.89	15286.55	356554.42	248179.96	4710543.85	26651.05
1372.83	34HP45-718-11	330.34	1960.31	16715.27	398821.01	274219.99	5219758.85	22979.99
1434.11	34HP45-718-12	167.34	1849.43	16365.31	390873.39	269180.46	5183764.35	21704.26
662.82	34HP45-718-13	1588.55	26638.93	28283.18	620884.70	439802.08	7425352.85	20558.37
616.54	34HP45-718-14	1276.95	23270.15	22147.39	488369.04	346146.74	6024310.35	15740.31
614.50	34HP45-718-15	462.62	14624.50	13022.73	281509.39	200547.46	3800967.85	9646.11
796.50	34HP45-718-16	102.14	1521.15	10479.96	244224.26	169168.24	3387018.65	5824.13
933.67	34HP45-718-17	100.82	364.66	11773.89	273030.48	188152.43	3786612.65	4707.69
749.26	34HP45-718-18	83.26	401.18	10166.48	233099.53	160580.07	3254540.65	4521.13
533.62	SRM614-6	22.06	357.62	118.74	2713.12	2179.97	24827.36	351.26
614.78	SRM612-6	648.50	17509.64	355.06	5598.41	11041.86	51751.79	18759.73
1017.59	SRM610-6	3293.20	224096.51	2256.87	27046.81	103121.22	296183.69	200519.99
352.78	AP1-6	0.00	935.79	991.15	18339.68	13688.00	192729.71	197.02
246.46	AP2-6	108.06	600.78	1671.35	32822.60	23761.93	377588.94	1668.55
233.26	AP3-6	709.34	1120.31	3558.36	73032.27	52501.77	960630.41	8564.27
232.86	AP4-6	388.74	951.07	3160.76	64027.34	46262.42	820941.04	9720.99

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000105	SRM614-5	0.000004	0.000273	0.000125	0.001600	0.001268	0.014371	0.000166
0.000156	SRM612-5	0.000141	0.010370	0.000277	0.003661	0.006805	0.034390	0.007287
0.000350	SRM610-5	0.001428	0.166563	0.001681	0.021437	0.078882	0.216465	0.107557
0.000009	AP1-5	0.000002	0.000092	0.000072	0.001347	0.001010	0.013553	0.000020
0.000010	AP2-5	0.000005	0.000071	0.000119	0.002293	0.001681	0.024751	0.000105
0.000010	AP3-5	0.000028	0.000076	0.000199	0.003831	0.002765	0.046018	0.000389
0.000013	AP4-5	0.000024	0.000081	0.000194	0.003701	0.002670	0.044212	0.000481
0.000042	34HP45-718-1	0.000007	0.001276	0.000337	0.006572	0.005284	0.079710	0.000978
0.000027	34HP45-718-2	0.000005	0.000182	0.000288	0.005649	0.004122	0.069731	0.001733

Appendix A. Raw trace element datasheets from laser ablation.

0.000029	34HP45-718-3	0.000006	0.000483	0.000333	0.006468	0.004815	0.082628	0.001184
0.000087	34HP45-718-4	0.000013	0.000067	0.000931	0.022804	0.015583	0.295977	0.003803
0.000092	34HP45-718-5	0.000012	0.000052	0.000875	0.020273	0.013920	0.271040	0.003009
0.000092	34HP45-718-6	0.000011	0.000119	0.000874	0.019799	0.013710	0.265925	0.002883
0.000082	34HP45-718-7	0.000013	0.000131	0.000911	0.021159	0.014660	0.280567	0.002658
0.000079	34HP45-718-8	0.000013	0.000080	0.000919	0.021402	0.014747	0.283143	0.002909
0.000097	34HP45-718-9	0.000016	0.000113	0.000955	0.023016	0.015746	0.301099	0.004074
0.000093	34HP45-718-10	0.000017	0.000317	0.000963	0.022462	0.015635	0.296756	0.001679
0.000081	34HP45-718-11	0.000019	0.000115	0.000985	0.023498	0.016157	0.307539	0.001354
0.000079	34HP45-718-12	0.000009	0.000102	0.000900	0.021486	0.014797	0.284951	0.001193
0.000042	34HP45-718-13	0.000100	0.001676	0.001779	0.039060	0.027668	0.467125	0.001293
0.000038	34HP45-718-14	0.000079	0.001440	0.001371	0.030221	0.021420	0.372790	0.000974
0.000034	34HP45-718-15	0.000026	0.000819	0.000729	0.015768	0.011233	0.212899	0.000540
0.000050	34HP45-718-16	0.000006	0.000095	0.000657	0.015322	0.010613	0.212489	0.000365
0.000050	34HP45-718-17	0.000005	0.000020	0.000632	0.014661	0.010103	0.203334	0.000253
0.000045	34HP45-718-18	0.000005	0.000024	0.000604	0.013851	0.009542	0.193391	0.000269
0.000439	SRM614-6	0.000018	0.000294	0.000098	0.002234	0.001795	0.020445	0.000289
0.000408	SRM612-6	0.000430	0.011609	0.000235	0.003712	0.007321	0.034311	0.012437
0.001016	SRM610-6	0.003287	0.223668	0.002253	0.026995	0.102924	0.295618	0.00137
0.000025	AP1-6	0.000000	0.000067	0.000071	0.001312	0.000979	0.013790	0.000014
0.000016	AP2-6	0.000007	0.000040	0.000110	0.002159	0.001563	0.024833	0.000110
0.000013	AP3-6	0.000038	0.000060	0.000191	0.003916	0.002815	0.051506	0.000459
0.000014	AP4-6	0.000023	0.000056	0.000186	0.003768	0.002722	0.048311	0.000572
standardize signal averages AP								
0.000017	AP1	0.000001	0.000079	0.000072	0.001330	0.000995	0.013671	0.000017
0.000013	AP2	0.000006	0.000055	0.000114	0.002226	0.001622	0.024792	0.000107
0.000011	AP3	0.000033	0.000068	0.000195	0.003873	0.002790	0.048762	0.000424
0.000013	AP4	0.000023	0.000069	0.000190	0.003735	0.002696	0.046262	0.000527
linest from std sig ave								
5.359965		0.274912	0.005444	2.825785	0.143430	0.198407	0.011672	0.020797
standardize signal averages SRM								
0.000272	srm614-2	0.000011	0.000284	0.000111	0.001917	0.001532	0.017408	0.000227
0.000282	srm612-2	0.000286	0.010989	0.000256	0.003686	0.007063	0.034350	0.009862
0.000683	srm610-2	0.002357	0.195116	0.001967	0.024216	0.090903	0.256041	0.153847
linest from std sig ave								
0.000000		0.531330	0.025787	2.962977	0.239709	0.064250	0.022739	0.034143
concentration data								
48.05	SRM614-5	0.11	0.13	30.31	19.69	21.58	14.39	0.30
71.60	SRM612-5	3.33	4.84	67.10	45.03	115.79	34.43	13.00
160.97	SRM610-5	33.66	77.77	407.31	263.70	1342.25	216.69	191.84
19.41	AP1-5	0.27	0.20	81.66	77.09	79.92	63.11	0.17
21.41	AP2-5	0.54	0.15	134.02	131.20	133.08	115.25	0.87
21.37	AP3-5	3.03	0.17	223.83	219.19	218.82	214.28	3.23
28.00	AP4-5	2.61	0.18	218.72	211.78	211.35	205.87	3.99
88.91	34HP45-718-1	0.76	2.77	380.10	376.05	418.22	371.17	8.12
57.03	34HP45-718-2	0.50	0.40	324.16	323.20	326.26	324.70	14.38
61.66	34HP45-718-3	0.62	1.05	375.10	370.10	381.09	384.76	9.82
185.77	34HP45-718-4	1.44	0.15	1048.96	1304.81	1233.39	1378.21	31.55
197.79	34HP45-718-5	1.33	0.11	986.59	1160.03	1101.80	1262.10	24.96
197.02	34HP45-718-6	1.25	0.26	984.92	1132.86	1085.14	1238.28	23.92
175.77	34HP45-718-7	1.45	0.28	1027.28	1210.71	1160.34	1306.46	22.05
169.97	34HP45-718-8	1.39	0.17	1035.50	1224.63	1167.23	1318.45	24.14
206.59	34HP45-718-9	1.72	0.25	1077.06	1316.97	1246.36	1402.06	33.80
198.26	34HP45-718-10	1.82	0.69	1085.62	1285.28	1237.53	1381.84	13.93
172.95	34HP45-718-11	2.13	0.25	1110.21	1344.53	1278.82	1432.05	11.23
168.57	34HP45-718-12	1.01	0.22	1014.12	1229.43	1171.19	1326.87	9.90
89.16	34HP45-718-13	10.96	3.64	2005.80	2234.96	2189.94	2175.16	10.73
81.58	34HP45-718-14	8.67	3.13	1544.98	1729.21	1695.42	1735.89	8.08
73.60	34HP45-718-15	2.84	1.78	822.29	902.23	889.11	991.36	4.48
106.85	34HP45-718-16	0.70	0.21	741.17	876.70	840.03	989.45	3.03
107.21	34HP45-718-17	0.59	0.04	712.72	838.91	799.70	946.82	2.10
95.20	34HP45-718-18	0.54	0.05	681.02	792.56	755.26	900.52	2.23
202.00	SRM614-6	0.43	0.14	23.70	27.48	30.55	20.47	0.52
187.36	SRM612-6	10.14	5.42	57.05	45.66	124.57	34.35	22.18
466.88	SRM610-6	77.50	104.44	545.90	332.07	1751.35	295.93	356.97
53.97	AP1-6	0.00	0.15	79.94	75.08	77.52	64.21	0.12
34.66	AP2-6	0.78	0.09	123.91	123.51	123.69	115.63	0.91
26.74	AP3-6	4.17	0.13	215.08	224.06	222.81	239.84	3.81
29.30	AP4-6	2.51	0.12	209.69	215.60	215.49	224.96	4.75
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25

Appendix A. Raw trace element datasheets from laser ablation.

	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1		0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2		0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3		2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4		4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
660.44	blank-3	145.52	221.24	455.80	217.92	124.76	312.16	27.44
838.52	SRM614-3	125.32	1106.57	656.20	4104.30	3321.54	35882.96	417.88
958.09	SRM612-3	433.48	28384.12	966.37	8822.85	17379.54	81109.02	16691.06
1144.57	SRM610-3	1739.93	181306.78	2501.05	26506.95	88520.54	272128.16	129237.01
904.25	AP1-3	131.52	1667.41	1579.61	21606.04	16216.53	219303.80	376.48
789.24	AP2-3	229.76	1379.93	2532.41	40455.35	29685.25	444805.69	1952.49
951.93	AP3-3	1019.73	2418.41	6291.20	117255.38	83656.91	1504690.00	11865.67
913.81	AP4-3	570.72	2064.65	4673.07	81762.18	59090.61	1008434.30	9978.42
1508.45	34HP45-856-1	396.36	1854.93	19450.79	457276.13	312905.25	5938725.50	9947.70
1461.77	34HP45-856-2	390.04	1592.93	18867.79	436687.34	300011.53	5701268.00	8536.73
1421.77	34HP45-856-3	293.92	1725.57	17305.06	389748.69	270347.31	5144109.00	6499.92
1249.33	34HP45-856-4	220.68	8775.37	13497.44	296308.50	209607.22	3952117.30	5865.27
1341.09	34HP45-856-5	253.80	9983.58	15253.77	343009.28	241543.05	4556048.00	6906.32
1262.25	34HP45-856-6	284.36	8184.57	16467.37	375438.06	263532.91	4939327.50	7281.40
1265.41	34HP45-856-7	198.68	16394.45	12907.99	277764.69	201055.45	3701234.00	6857.16
1252.69	34HP45-856-8	216.76	23650.01	13630.28	303045.44	220853.41	4013752.00	8535.93
1176.25	34HP45-856-9	232.52	14586.88	13396.52	294955.53	210394.22	3939911.80	7006.32
1243.53	34HP45-856-10	219.64	2141.61	15193.73	350904.13	241483.80	4704881.50	4715.43
1239.29	34HP45-856-11	219.96	2111.41	16050.81	369713.81	255188.28	4925425.00	4885.51
1333.65	34HP45-856-12	201.52	4616.75	16607.69	383455.69	266266.13	5090032.00	6217.48
1202.85	34HP45-856-13	231.32	1691.85	14301.96	327591.13	226561.95	4386562.50	4794.67
1227.89	34HP45-856-14	208.24	2043.45	11811.03	260166.11	180800.86	3511823.80	4045.46
1092.41	34HP45-856-15	211.76	1019.21	9167.01	193176.53	135280.45	2615827.80	3131.42
896.25	34HP45-856-16	164.72	2219.37	3612.14	63366.84	45827.66	780430.25	3967.30
833.32	34HP45-856-17	131.72	1096.73	3282.34	58585.13	42442.40	717543.44	2164.17
809.52	34HP45-856-18	164.84	1219.61	2827.54	49747.08	36135.97	590703.81	2483.37
1299.21	SRM614-4	122.32	785.60	565.36	3626.02	2892.26	31557.42	483.64
1505.09	SRM612-4	784.80	24296.02	827.56	7448.12	15124.33	68041.95	24134.82
1988.93	SRM610-4	3998.86	291411.19	3306.74	34725.79	133654.98	382710.13	256952.17
1028.05	AP1-4	105.12	1386.41	1540.01	22015.65	16451.29	229512.13	285.44
1038.49	AP2-4	243.68	964.21	2484.85	39941.47	29305.13	462603.09	2051.21
972.33	AP3-4	1274.73	2060.53	5922.51	114422.73	81937.90	1519759.00	12920.31
925.57	AP4-4	924.93	2349.17	5331.23	101649.01	72958.25	1341574.50	13613.12
704.80	blank-4	133.48	265.36	338.28	384.68	325.12	1975.97	38.76
682.62	blank average	139.50	243.30	397.04	301.30	224.94	1144.07	33.10

blank subtraction								
155.90	SRM614-3	-14.18	863.26	259.16	3803.00	3096.60	34738.89	384.78
275.46	SRM612-3	293.98	28140.82	569.32	8521.55	17154.60	79964.95	16657.95
461.94	SRM610-3	1600.43	181063.48	2104.01	26205.65	88295.60	270984.09	129203.91
221.62	AP1-3	-7.98	1424.11	1182.57	21304.74	15991.59	218159.73	343.38
106.62	AP2-3	90.26	1136.63	2135.37	40154.05	29460.31	443661.62	1919.39
269.30	AP3-3	880.23	2175.11	5894.15	116954.08	83431.97	1503545.93	11832.57
231.18	AP4-3	431.22	1821.35	4276.02	81460.88	58865.67	1007290.23	9945.32
825.82	34HP45-856-1	256.86	1611.63	19053.75	456974.83	312680.31	5937581.43	9914.60
779.14	34HP45-856-2	250.54	1349.63	18470.74	436386.04	299786.59	5700123.93	8503.63
739.14	34HP45-856-3	154.42	1482.27	16908.01	389447.39	270122.37	5142964.93	6466.82
566.70	34HP45-856-4	81.18	8532.07	13100.39	296007.20	209382.28	3950973.23	5832.17
658.46	34HP45-856-5	114.30	9740.27	14856.72	342707.98	241318.11	4554903.93	6873.22
579.62	34HP45-856-6	144.86	7941.27	16070.33	375136.76	263307.97	4938183.43	7248.30
582.78	34HP45-856-7	59.18	16151.15	12510.95	277463.39	200830.51	3700089.93	6824.06
570.06	34HP45-856-8	77.26	23406.71	13233.23	302744.14	220628.47	4012607.93	8502.83
493.62	34HP45-856-9	93.02	14343.58	12999.47	294654.23	210169.28	3938767.73	6973.22
560.90	34HP45-856-10	80.14	1898.31	14796.68	350602.83	241258.86	4703737.43	4682.33
556.66	34HP45-856-11	80.46	1868.11	15653.77	369412.51	254963.34	4924280.93	4852.41
651.02	34HP45-856-12	62.02	4373.44	16210.65	383154.39	266041.19	5088887.93	6184.37
520.22	34HP45-856-13	91.82	1448.55	13904.92	327289.83	226337.01	4385418.43	4761.57
545.26	34HP45-856-14	68.74	1800.15	11413.98	259864.81	180575.92	3510679.73	4012.36
409.78	34HP45-856-15	72.26	775.90	8769.97	192875.23	135055.51	2614683.73	3098.32
213.62	34HP45-856-16	25.22	1976.07	3215.10	63065.53	45602.71	779286.18	3934.20
150.70	34HP45-856-17	-7.78	853.42	2885.30	58283.83	42217.46	716399.37	2131.07
126.90	34HP45-856-18	25.34	976.31	2430.49	49445.78	35911.02	589559.74	2450.27
616.58	SRM614-4	-17.18	542.30	168.32	3324.72	2667.32	30413.35	450.54
822.46	SRM612-4	645.30	24052.72	430.52	7146.82	14899.38	66897.88	24101.72
1306.31	SRM610-4	3859.36	291167.89	2909.70	34424.49	133430.04	381566.06	256919.07
345.42	AP1-4	-34.38	1143.11	1142.97	21714.34	16226.35	228368.06	252.34
355.86	AP2-4	104.18	720.90	2087.81	39640.16	29080.18	461459.02	2018.11
289.70	AP3-4	1135.23	1817.23	5525.47	114121.43	81712.96	1518614.93	12887.21
242.94	AP4-4	785.42	2105.87	4934.19	101347.71	72733.31	1340430.43	13580.02

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
155.90 SRM614-3	0.00	863.26	259.16	3803.00	3096.60	34738.89	384.78
275.46 SRM612-3	293.98	28140.82	569.32	8521.55	17154.60	79964.95	16657.95
461.94 SRM610-3	1600.43	181063.48	2104.01	26205.65	88295.60	270984.09	129203.91
221.62 AP1-3	0.00	1424.11	1182.57	21304.74	15991.59	218159.73	343.38
106.62 AP2-3	90.26	1136.63	2135.37	40154.05	29460.31	443661.62	1919.39
269.30 AP3-3	880.23	2175.11	5894.15	116954.08	83431.97	1503545.93	11832.57
231.18 AP4-3	431.22	1821.35	4276.02	81460.88	58865.67	1007290.23	9945.32
825.82 34HP45-856-1	256.86	1611.63	19053.75	456974.83	312680.31	5937581.43	9914.60
779.14 34HP45-856-2	250.54	1349.63	18470.74	436386.04	299786.59	5700123.93	8503.63
739.14 34HP45-856-3	154.42	1482.27	16908.01	389447.39	270122.37	5142964.93	6466.82
566.70 34HP45-856-4	81.18	8532.07	13100.39	296007.20	209382.28	3950973.23	5832.17
658.46 34HP45-856-5	114.30	9740.27	14856.72	342707.98	241318.11	4554903.93	6873.22
579.62 34HP45-856-6	144.86	7941.27	16070.33	375136.76	263307.97	4938183.43	7248.30
582.78 34HP45-856-7	59.18	16151.15	12510.95	277463.39	200830.51	3700089.93	6824.06
570.06 34HP45-856-8	77.26	23406.71	13233.23	302744.14	220628.47	4012607.93	8502.83
493.62 34HP45-856-9	93.02	14343.58	12999.47	294654.23	210169.28	3938767.73	6973.22
560.90 34HP45-856-10	80.14	1898.31	14796.68	350602.83	241258.86	4703737.43	4682.33
556.66 34HP45-856-11	80.46	1868.11	15653.77	369412.51	254963.34	4924280.93	4852.41
651.02 34HP45-856-12	62.02	4373.44	16210.65	383154.39	266041.19	5088887.93	6184.37
520.22 34HP45-856-13	91.82	1448.55	13904.92	327289.83	226337.01	4385418.43	4761.57
545.26 34HP45-856-14	68.74	1800.15	11413.98	259864.81	180575.92	3510679.73	4012.36
409.78 34HP45-856-15	72.26	775.90	8769.97	192875.23	135055.51	2614683.73	3098.32
213.62 34HP45-856-16	25.22	1976.07	3215.10	63065.53	45602.71	779286.18	3934.20
150.70 34HP45-856-17	0.00	853.42	2885.30	58283.83	42217.46	716399.37	2131.07
126.90 34HP45-856-18	25.34	976.31	2430.49	49445.78	35911.02	589559.74	2450.27
616.58 SRM614-4	0.00	542.30	168.32	3324.72	2667.32	30413.35	450.54
822.46 SRM612-4	645.30	24052.72	430.52	7146.82	14899.38	66897.88	24101.72
1306.31 SRM610-4	3859.36	291167.89	2909.70	34424.49	133430.04	381566.06	256919.07
345.42 AP1-4	0.00	1143.11	1142.97	21714.34	16226.35	228368.06	252.34
355.86 AP2-4	104.18	720.90	2087.81	39640.16	29080.18	461459.02	2018.11
289.70 AP3-4	1135.23	1817.23	5525.47	114121.43	81712.96	1518614.93	12887.21
242.94 AP4-4	785.42	2105.87	4934.19	101347.71	72733.31	1340430.43	13580.02

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal							
0.000066 SRM614-3	0.000000	0.000364	0.000109	0.001605	0.001307	0.014664	0.000162
0.000111 SRM612-3	0.000119	0.011387	0.000230	0.003448	0.006941	0.032357	0.006740
0.000334 SRM610-3	0.001157	0.130920	0.001521	0.018948	0.063843	0.195938	0.093422
0.000015 AP1-3	0.000000	0.000094	0.000078	0.001404	0.001054	0.014375	0.000023
0.000007 AP2-3	0.000006	0.000070	0.000131	0.002466	0.001809	0.027243	0.000118
0.000012 AP3-3	0.000039	0.000097	0.000264	0.005241	0.003739	0.067383	0.000530
0.000012 AP4-3	0.000023	0.000097	0.000227	0.004327	0.003127	0.053501	0.000528
0.000049 34HP45-856-1	0.000015	0.000095	0.001120	0.026872	0.018387	0.349156	0.000583
0.000047 34HP45-856-2	0.000015	0.000082	0.001125	0.026578	0.018259	0.347167	0.000518
0.000049 34HP45-856-3	0.000010	0.000098	0.001118	0.025756	0.017864	0.340126	0.000428
0.000045 34HP45-856-4	0.000006	0.000671	0.001031	0.023286	0.016471	0.310809	0.000459
0.000046 34HP45-856-5	0.000008	0.000676	0.001031	0.023790	0.016752	0.316197	0.000477
0.000037 34HP45-856-6	0.000009	0.000507	0.001027	0.023967	0.016822	0.315491	0.000463
0.000043 34HP45-856-7	0.000004	0.001196	0.000927	0.020548	0.014873	0.274019	0.000505
0.000041 34HP45-856-8	0.000006	0.001685	0.000953	0.021796	0.015884	0.288882	0.000612
0.000037 34HP45-856-9	0.000007	0.001067	0.000967	0.021921	0.015636	0.293034	0.000519
0.000038 34HP45-856-10	0.000005	0.000128	0.000995	0.023579	0.016226	0.316344	0.000315
0.000037 34HP45-856-11	0.000005	0.000123	0.001032	0.024345	0.016803	0.324523	0.000320
0.000043 34HP45-856-12	0.000004	0.000287	0.001062	0.025109	0.017434	0.333486	0.000405
0.000033 34HP45-856-13	0.000006	0.000092	0.000885	0.020831	0.014405	0.279112	0.000303
0.000038 34HP45-856-14	0.000005	0.000125	0.000793	0.018049	0.012542	0.243836	0.000279
0.000033 34HP45-856-15	0.000006	0.000062	0.000700	0.015391	0.010777	0.208639	0.000247
0.000023 34HP45-856-16	0.000003	0.000209	0.000341	0.006686	0.004835	0.082617	0.000417
0.000016 34HP45-856-17	0.000000	0.000089	0.000300	0.006057	0.004387	0.074448	0.000221
0.000016 34HP45-856-18	0.000003	0.000124	0.000309	0.006282	0.004562	0.074898	0.000311

Appendix A. Raw trace element datasheets from laser ablation.

0.000415	SRM614-4	0.000000	0.000365	0.000113	0.002237	0.001795	0.020466	0.000303
0.000436	SRM612-4	0.000342	0.012758	0.000228	0.003791	0.007903	0.035484	0.012784
0.001055	SRM610-4	0.003117	0.235145	0.002350	0.027801	0.107757	0.308149	0.207486
0.000022	AP1-4	0.000000	0.000074	0.000074	0.001407	0.001051	0.014792	0.000016
0.000021	AP2-4	0.000006	0.000043	0.000124	0.002358	0.001730	0.027448	0.000120
0.000013	AP3-4	0.000049	0.000079	0.000239	0.004937	0.003535	0.065694	0.000557
0.000012	AP4-4	0.000038	0.000102	0.000240	0.004920	0.003531	0.065076	0.000659
standardize signal averages AP								
0.000018	AP1	0.000000	0.000084	0.000076	0.001405	0.001052	0.014584	0.000019
0.000014	AP2	0.000006	0.000056	0.000128	0.002412	0.001769	0.027345	0.000119
0.000012	AP3	0.000044	0.000088	0.000252	0.005089	0.003637	0.066539	0.000544
0.000012	AP4	0.000031	0.000099	0.000233	0.004623	0.003329	0.059288	0.000594
linest from std sig ave								
5.160182		0.205682	0.005119	2.278858	0.114360	0.159133	0.008904	0.017286
standardize signal averages SRM								
0.000240	srm614-2	0.000000	0.000365	0.000111	0.001921	0.001551	0.017565	0.000233
0.000274	srm612-2	0.000231	0.012072	0.000229	0.003619	0.007422	0.033920	0.009762
0.000694	srm610-2	0.002137	0.183032	0.001936	0.023375	0.085800	0.252044	0.150454
linest from std sig ave								
0.000000		0.587887	0.027477	3.013773	0.248191	0.068068	0.023097	0.034912
concentration data								
29.12	SRM614-3	0.00	0.16	21.38	15.74	17.84	11.20	0.24
49.33	SRM612-3	2.10	5.00	45.02	33.82	94.73	24.71	9.99
147.82	SRM610-3	20.41	57.48	297.33	185.84	871.31	149.62	138.50
30.06	AP1-3	0.00	0.19	70.84	64.05	66.89	51.06	0.16
13.48	AP2-3	0.45	0.14	119.21	112.49	114.84	96.77	0.81
24.85	AP3-3	3.24	0.20	240.15	239.13	237.37	239.35	3.66
25.28	AP4-3	1.88	0.20	206.47	197.39	198.49	190.04	3.64
99.97	34HP45-856-1	1.24	0.19	1018.62	1225.97	1167.28	1240.21	4.02
97.69	34HP45-856-2	1.25	0.17	1022.72	1212.56	1159.12	1233.15	3.57
100.63	34HP45-856-3	0.84	0.20	1016.58	1175.04	1134.10	1208.14	2.95
91.77	34HP45-856-4	0.52	1.37	936.90	1062.36	1045.66	1104.00	3.16
94.10	34HP45-856-5	0.65	1.38	937.61	1085.38	1063.49	1123.14	3.29
76.23	34HP45-856-6	0.76	1.04	933.40	1093.43	1067.94	1120.64	3.19
88.85	34HP45-856-7	0.36	2.44	842.32	937.46	944.19	973.33	3.49
84.49	34HP45-856-8	0.46	3.44	866.12	994.37	1008.37	1026.12	4.22
75.60	34HP45-856-9	0.57	2.18	879.23	1000.11	992.64	1040.87	3.58
77.66	34HP45-856-10	0.44	0.26	904.69	1075.75	1030.06	1123.67	2.17
75.52	34HP45-856-11	0.44	0.25	937.87	1110.69	1066.71	1152.72	2.21
87.83	34HP45-856-12	0.33	0.59	965.77	1145.53	1106.79	1184.56	2.79
68.16	34HP45-856-13	0.48	0.19	804.56	950.34	914.51	991.42	2.09
77.96	34HP45-856-14	0.39	0.26	720.72	823.44	796.21	866.11	1.92
67.31	34HP45-856-15	0.47	0.13	636.20	702.15	684.15	741.10	1.70
46.62	34HP45-856-16	0.22	0.43	309.87	305.03	306.92	293.46	2.88
32.24	34HP45-856-17	0.00	0.18	272.59	276.33	278.52	264.44	1.53
33.19	34HP45-856-18	0.26	0.25	280.71	286.58	289.62	266.04	2.15
183.62	SRM614-4	0.00	0.16	22.14	21.94	24.50	15.63	0.45
193.06	SRM612-4	6.04	5.60	44.63	37.18	107.86	27.10	18.95
466.88	SRM610-4	54.98	103.24	459.26	272.67	1470.64	235.31	307.60
9.90	AP1-4	0.00	0.03	14.47	13.79	14.34	11.30	0.02
9.37	AP2-4	0.11	0.02	24.27	23.13	23.61	20.96	0.18
5.55	AP3-4	0.87	0.03	46.72	48.42	48.24	50.17	0.83
24.28	AP4-4	3.13	0.21	217.78	224.48	224.17	231.15	4.55
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br								
	raw data	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
783.92	blank-1	121.20	145.76	579.76	204.84	55.84	72.72	20.32
1161.29	SRM614-1	159.84	874.96	782.44	3961.02	3160.50	34185.11	398.80
1292.69	SRM612-1	606.92	26011.79	1145.53	8364.57	16021.57	75916.51	20292.75
1653.13	SRM610-1	3006.22	292647.34	3489.62	35299.72	135246.97	375876.75	201470.69
1151.89	AP1-1	174.68	1455.77	1758.05	21892.28	16373.21	222796.02	313.28
1212.37	AP2-1	261.32	1307.57	2795.18	42031.28	30881.53	468693.22	1999.81
1138.29	AP3-1	694.88	1985.45	4829.79	84175.11	60343.90	1034208.90	8974.69
1255.29	AP4-1	851.56	2654.05	5734.63	104470.34	74351.58	1319583.90	14220.76

Appendix A. Raw trace element datasheets from laser ablation.

1341.57	34HP45-695-1	190.60	1300.45	3766.42	64096.40	46086.22	760806.75	2799.58
1379.17	34HP45-695-2	165.48	982.09	2911.82	47212.15	34141.07	536986.06	2162.93
1395.01	34HP45-695-3	177.84	1273.97	3136.42	50524.36	36800.85	580081.69	2407.65
1659.81	34HP45-695-4	248.52	8398.93	13983.76	300460.69	212907.84	3932154.30	4878.59
1634.65	34HP45-695-5	228.64	7514.92	13010.79	277504.31	197148.67	3628605.30	5187.03
1618.89	34HP45-695-6	186.68	13345.68	10973.42	226262.95	164052.84	2965912.30	4345.22
1453.49	34HP45-695-7	206.08	5158.79	11817.91	256021.84	180725.91	3352523.00	4555.95
1425.53	34HP45-695-8	209.44	8625.09	12550.23	269846.69	190877.31	3535379.00	4660.79
1384.05	34HP45-695-9	222.32	5491.71	12829.55	280701.47	197514.31	3677169.00	6593.20
1348.73	34HP45-695-10	193.28	4878.63	7024.28	140432.88	101695.66	1841729.90	3111.42
1301.57	34HP45-695-11	188.80	3205.34	5542.03	104384.27	75022.38	1342055.30	2849.66
1270.29	34HP45-695-12	154.44	7162.60	4640.07	82134.95	61608.02	1038533.50	3137.98
1367.21	34HP45-695-13	199.68	6985.36	6958.40	136341.13	98698.88	1787448.50	3192.02
1266.17	34HP45-695-14	184.16	1926.97	5860.07	112003.99	80021.77	1462233.60	2255.53
1274.37	34HP45-695-15	155.44	4930.87	7262.12	143455.58	103052.30	1889724.50	2756.46
1119.73	34HP45-695-16	202.44	2739.66	6104.39	119692.80	86134.20	1554363.50	2791.82
1088.65	34HP45-695-17	173.88	961.33	5633.43	107989.61	76768.27	1414584.80	2428.45
1133.37	34HP45-695-18	189.76	1319.53	6116.47	117417.23	82837.33	1543197.30	2374.89
1513.13	SRM614-2	151.28	832.64	675.84	3747.38	2993.34	32899.70	503.80
1751.65	SRM612-2	831.96	21862.44	869.76	7190.16	13756.80	63521.52	25027.46
2227.29	SRM610-2	4381.06	263043.47	3222.18	33075.47	122818.73	359895.72	264575.13
1234.17	AP1-2	127.80	1453.69	1527.77	20480.72	15553.85	213701.08	257.24
1198.69	AP2-2	246.56	1110.45	2302.61	35700.52	26132.83	404217.34	1828.45
1227.69	AP3-2	833.24	1540.33	4161.50	74023.30	53355.26	931716.19	8876.37
1185.13	AP4-2	1040.53	2264.33	5377.87	101016.17	72711.33	1325916.00	15500.21
829.00	blank-2	99.36	280.76	428.32	386.20	321.48	1561.93	36.52
806.46	blank average	110.28	213.26	504.04	295.52	188.66	817.32	28.42

blank subtraction								
354.82	SRM614-1	49.56	661.70	278.40	3665.50	2971.84	33367.79	370.38
486.22	SRM612-1	496.64	25798.52	641.48	8069.05	15832.91	75099.18	20264.33
846.66	SRM610-1	2895.94	292434.08	2985.58	35004.20	135058.31	375059.43	201442.27
345.42	AP1-1	64.40	1242.51	1254.01	21596.76	16184.55	221978.70	284.86
405.90	AP2-1	151.04	1094.31	2291.13	41735.76	30692.87	467875.90	1971.39
331.82	AP3-1	584.60	1772.19	4325.74	83879.59	60155.24	1033391.58	8946.27
448.82	AP4-1	741.28	2440.79	5230.59	104174.82	74162.92	1318766.58	14192.34
535.10	34HP45-695-1	80.32	1087.19	3262.38	63800.88	45897.56	759989.43	2771.16
572.70	34HP45-695-2	55.20	768.82	2407.77	46916.62	33952.41	536168.74	2134.51
588.54	34HP45-695-3	67.56	1060.71	2632.37	50228.84	36612.19	579264.37	2379.23
853.34	34HP45-695-4	138.24	8185.67	13479.72	300165.17	212719.18	3931336.98	4850.17
828.18	34HP45-695-5	118.36	7301.66	12506.75	277208.79	196960.01	3627787.98	5158.61
812.42	34HP45-695-6	76.40	13132.41	10469.38	225967.43	163864.18	2965094.98	4316.80
647.02	34HP45-695-7	95.80	4945.53	11313.86	255726.32	180537.25	3351705.68	4527.53
619.06	34HP45-695-8	99.16	8411.83	12046.19	269551.17	190688.65	3534561.68	4632.37
577.58	34HP45-695-9	112.04	5278.45	12325.51	280405.95	197325.65	3676351.68	6564.78
542.26	34HP45-695-10	83.00	4665.37	6520.24	140137.36	101507.00	1840912.58	3083.00
495.10	34HP45-695-11	78.52	2992.08	5037.99	104088.75	74833.72	1341237.98	2821.24
463.82	34HP45-695-12	44.16	6949.34	4136.02	81839.42	61419.36	1037716.18	3109.56
560.74	34HP45-695-13	89.40	6772.10	6454.36	136045.61	98510.21	1786631.18	3163.60
459.70	34HP45-695-14	73.88	1713.71	5356.03	111708.47	79833.11	1461416.28	2227.11
467.90	34HP45-695-15	45.16	4717.61	6758.08	143160.06	102863.64	1888907.18	2728.04
313.26	34HP45-695-16	92.16	2526.39	5600.35	119397.28	85945.54	1553546.18	2763.40
282.18	34HP45-695-17	63.60	748.06	5129.39	107694.09	76579.61	1413767.48	2400.03
326.90	34HP45-695-18	79.48	1106.27	5612.43	117121.71	82648.57	1542379.98	2346.47
706.66	SRM614-2	41.00	619.38	171.80	3451.86	2804.68	32082.38	475.38
945.19	SRM612-2	721.68	21649.18	365.72	6894.64	13568.14	62704.19	24999.04
1420.83	SRM610-2	4270.78	262830.21	2718.14	32779.94	122630.07	359078.40	264546.71
427.70	AP1-2	17.52	1240.43	1023.73	20185.19	15365.19	212883.76	228.82
392.22	AP2-2	136.28	897.19	1798.57	35405.00	25944.16	403400.02	1800.03
421.22	AP3-2	722.96	1327.07	3657.46	73727.78	53166.60	930898.87	8847.95
378.66	AP4-2	930.25	2051.07	4873.83	100720.65	72522.67	1325098.68	15471.79

zero correction								
354.82	SRM614-1	49.56	661.70	278.40	3665.50	2971.84	33367.79	370.38
486.22	SRM612-1	496.64	25798.52	641.48	8069.05	15832.91	75099.18	20264.33
846.66	SRM610-1	2895.94	292434.08	2985.58	35004.20	135058.31	375059.43	201442.27
345.42	AP1-1	64.40	1242.51	1254.01	21596.76	16184.55	221978.70	284.86
405.90	AP2-1	151.04	1094.31	2291.13	41735.76	30692.87	467875.90	1971.39
331.82	AP3-1	584.60	1772.19	4325.74	83879.59	60155.24	1033391.58	8946.27
448.82	AP4-1	741.28	2440.79	5230.59	104174.82	74162.92	1318766.58	14192.34
535.10	34HP45-695-1	80.32	1087.19	3262.38	63800.88	45897.56	759989.43	2771.16
572.70	34HP45-695-2	55.20	768.82	2407.77	46916.62	33952.41	536168.74	2134.51
588.54	34HP45-695-3	67.56	1060.71	2632.37	50228.84	36612.19	579264.37	2379.23
853.34	34HP45-695-4	138.24	8185.67	13479.72	300165.17	212719.18	3931336.98	4850.17
828.18	34HP45-695-5	118.36	7301.66	12506.75	277208.79	196960.01	3627787.98	5158.61
812.42	34HP45-695-6	76.40	13132.41	10469.38	225967.43	163864.18	2965094.98	4316.80
647.02	34HP45-695-7	95.80	4945.53	11313.86	255726.32	180537.25	3351705.68	4527.53
619.06	34HP45-695-8	99.16	8411.83	12046.19	269551.17	190688.65	3534561.68	4632.37

Appendix A. Raw trace element datasheets from laser ablation.

577.58	34HP45-695-9	112.04	5278.45	12325.51	280405.95	197325.65	3676351.68	6564.78
542.26	34HP45-695-10	83.00	4665.37	6520.24	140137.36	101507.00	1840912.58	3083.00
495.10	34HP45-695-11	78.52	2992.08	5037.99	104088.75	74833.72	1341237.98	2821.24
463.82	34HP45-695-12	44.16	6949.34	4136.02	81839.42	61419.36	1037716.18	3109.56
560.74	34HP45-695-13	89.40	6772.10	6454.36	136045.61	98510.21	1786631.18	3163.60
459.70	34HP45-695-14	73.88	1713.71	5356.03	111708.47	79833.11	1461416.28	2227.11
467.90	34HP45-695-15	45.16	4717.61	6758.08	143160.06	102863.64	1888907.18	2728.04
313.26	34HP45-695-16	92.16	2526.39	5600.35	119397.28	85945.54	1553546.18	2763.40
282.18	34HP45-695-17	63.60	748.06	5129.39	107694.09	76579.61	1413767.48	2400.03
326.90	34HP45-695-18	79.48	1106.27	5612.43	117121.71	82648.57	1542379.98	2346.47
706.66	SRM614-2	41.00	619.38	171.80	3451.86	2804.68	32082.38	475.38
945.19	SRM612-2	721.68	21649.18	365.72	6894.64	13568.14	62704.19	24999.04
1420.83	SRM610-2	4270.78	262830.21	2718.14	32779.94	122630.07	359078.40	264546.71
427.70	AP1-2	17.52	1240.43	1023.73	20185.19	15365.19	212883.76	228.82
392.22	AP2-2	136.28	897.19	1798.57	35405.00	25944.16	403400.02	1800.03
421.22	AP3-2	722.96	1327.07	3657.46	73727.78	53166.60	930898.87	8847.95
378.66	AP4-2	930.25	2051.07	4873.83	100720.65	72522.67	1325098.68	15471.79

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612			31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000174	SRM614-1	0.000024	0.000324	0.000136	0.001797	0.001457	0.016360	0.000182
0.000211	SRM612-1	0.000215	0.011178	0.000278	0.003496	0.006860	0.032539	0.008780
0.000551	SRM610-1	0.001886	0.190469	0.001945	0.022799	0.087967	0.244285	0.131204
0.000022	AP1-1	0.000004	0.000078	0.000079	0.001360	0.001019	0.013980	0.000018
0.000023	AP2-1	0.000009	0.000062	0.000129	0.002352	0.001729	0.026364	0.000111
0.000015	AP3-1	0.000026	0.000079	0.000193	0.003749	0.002689	0.046188	0.000400
0.000020	AP4-1	0.000033	0.000108	0.000231	0.004608	0.003281	0.058335	0.000628
0.000048	34HP45-695-1	0.000007	0.000099	0.000296	0.005782	0.004160	0.068880	0.000251
0.000069	34HP45-695-2	0.000007	0.000093	0.000290	0.005653	0.004091	0.064599	0.000257
0.000068	34HP45-695-3	0.000008	0.000122	0.000304	0.005796	0.004225	0.066839	0.000275
0.000051	34HP45-695-4	0.000008	0.000490	0.000807	0.017961	0.012728	0.235233	0.000290
0.000056	34HP45-695-5	0.000008	0.000495	0.000848	0.018803	0.013359	0.246067	0.000350
0.000068	34HP45-695-6	0.000006	0.0001092	0.000870	0.018786	0.013623	0.246500	0.000359
0.000042	34HP45-695-7	0.000006	0.000322	0.000737	0.016651	0.011755	0.218234	0.000295
0.000041	34HP45-695-8	0.000007	0.000554	0.000793	0.017739	0.012549	0.232608	0.000305
0.000036	34HP45-695-9	0.000007	0.000330	0.000771	0.017529	0.012336	0.229824	0.000410
0.000042	34HP45-695-10	0.000006	0.000358	0.000500	0.010740	0.007779	0.141084	0.000236
0.000039	34HP45-695-11	0.000006	0.000235	0.000396	0.008174	0.005877	0.105329	0.000222
0.000042	34HP45-695-12	0.000004	0.000624	0.000371	0.007349	0.005515	0.093178	0.000279
0.000041	34HP45-695-13	0.000007	0.000500	0.000477	0.010045	0.007274	0.131916	0.000234
0.000036	34HP45-695-14	0.000006	0.000135	0.000421	0.008771	0.006268	0.114750	0.000175
0.000036	34HP45-695-15	0.000004	0.000366	0.000525	0.011116	0.007987	0.146670	0.000212
0.000026	34HP45-695-16	0.000008	0.000206	0.000456	0.009721	0.006998	0.126489	0.000225
0.000024	34HP45-695-17	0.000005	0.000064	0.000437	0.009175	0.006524	0.120447	0.000204
0.000026	34HP45-695-18	0.000006	0.000089	0.000450	0.009392	0.006628	0.123687	0.000188
0.000449	SRM614-2	0.000026	0.000394	0.000109	0.002194	0.001783	0.020395	0.000302
0.000539	SRM612-2	0.000411	0.012339	0.000208	0.003930	0.007733	0.035739	0.014248
0.001226	SRM610-2	0.003686	0.226854	0.002346	0.028293	0.105844	0.309927	0.228335
0.000030	AP1-2	0.000001	0.000088	0.000072	0.001429	0.001088	0.015076	0.000016
0.000026	AP2-2	0.000009	0.000060	0.000121	0.002373	0.001739	0.027039	0.000121
0.000022	AP3-2	0.000038	0.000070	0.000193	0.003900	0.002813	0.049248	0.000468
0.000019	AP4-2	0.000046	0.000102	0.000241	0.004989	0.003592	0.065634	0.000766

standardize signal averages AP								
0.000026	AP1	0.000003	0.000083	0.000076	0.001395	0.001054	0.014528	0.000017
0.000025	AP2	0.000009	0.000061	0.000125	0.002362	0.001734	0.026701	0.000116
0.000019	AP3	0.000032	0.000075	0.000193	0.003825	0.002751	0.047718	0.000434
0.000019	AP4	0.000039	0.000105	0.000236	0.004798	0.003436	0.061985	0.000697

linest from std sig ave								
3.351852		0.232340	0.005245	2.542484	0.127741	0.177388	0.010159	0.017379

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM								
0.000312	srM614-2	0.000025	0.000359	0.000123	0.001996	0.001620	0.018378	0.000242
0.000375	srM612-2	0.000313	0.011759	0.000243	0.003713	0.007297	0.034139	0.011514
0.000889	srM610-2	0.002786	0.208661	0.002145	0.025546	0.096906	0.277106	0.179770

linest from std sig ave								
0.000000		0.450427	0.024113	2.720243	0.227468	0.060270	0.021036	0.029220

concentration data								
50.01	SRM614-1	0.48	0.15	29.76	19.69	22.17	14.25	0.27
60.56	SRM612-1	4.29	5.03	60.60	38.30	104.36	28.35	13.09
158.52	SRM610-1	37.58	85.68	424.02	249.77	1338.27	212.83	195.55
29.09	AP1-1	0.38	0.16	80.10	69.31	72.13	56.66	0.12
30.58	AP2-1	0.79	0.13	130.95	119.85	122.39	106.84	0.77
19.83	AP3-1	2.42	0.17	196.10	191.05	190.27	187.18	2.77
26.55	AP4-1	3.04	0.23	234.68	234.83	232.16	236.41	4.35
64.85	34HP45-695-1	0.67	0.21	299.90	294.68	294.38	279.15	1.74
92.27	34HP45-695-2	0.62	0.19	294.24	288.06	289.48	261.80	1.78
90.81	34HP45-695-3	0.72	0.26	308.08	295.35	298.96	270.87	1.90
68.28	34HP45-695-4	0.77	1.02	818.09	915.27	900.73	953.32	2.01
75.11	34HP45-695-5	0.74	1.04	860.43	958.19	945.40	997.22	2.43
90.31	34HP45-695-6	0.59	2.28	882.80	957.32	964.03	998.98	2.49
56.33	34HP45-695-7	0.58	0.67	747.18	848.52	831.86	884.42	2.04
54.48	34HP45-695-8	0.60	1.16	804.08	903.99	888.06	942.68	2.11
48.28	34HP45-695-9	0.65	0.69	781.53	893.30	872.95	931.39	2.85
55.57	34HP45-695-10	0.59	0.75	506.84	547.31	550.51	571.76	1.64
51.99	34HP45-695-11	0.57	0.49	401.29	416.56	415.88	426.86	1.54
55.69	34HP45-695-12	0.37	1.31	376.69	374.48	390.27	377.62	1.94
55.36	34HP45-695-13	0.61	1.05	483.37	511.90	514.72	534.61	1.62
48.27	34HP45-695-14	0.54	0.28	426.56	446.99	443.60	465.04	1.21
48.58	34HP45-695-15	0.33	0.77	532.25	566.48	565.22	594.40	1.47
34.11	34HP45-695-16	0.70	0.43	462.49	495.40	495.20	512.62	1.56
32.15	34HP45-695-17	0.50	0.13	443.24	467.56	461.70	488.13	1.42
35.05	34HP45-695-18	0.59	0.19	456.51	478.63	469.03	501.26	1.30
129.14	SRM614-2	0.52	0.18	23.81	24.04	27.12	17.77	0.45
154.86	SRM612-2	8.20	5.55	45.45	43.05	117.65	31.14	21.24
352.53	SRM610-2	73.45	102.05	511.56	309.96	1610.24	270.02	340.32
40.50	AP1-2	0.11	0.18	73.53	72.84	77.00	61.10	0.11
35.15	AP2-2	0.85	0.13	122.28	120.93	123.06	109.58	0.84
29.80	AP3-2	3.55	0.15	196.26	198.77	199.04	199.58	3.25
25.08	AP4-2	4.27	0.21	244.86	254.23	254.20	265.99	5.31

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
	raw data							
1372.41	blank-1	252.36	259.76	1451.37	538.80	124.96	97.48	47.60
2453.01	SRM614-1	286.36	2597.49	1961.37	11147.58	8827.65	98708.80	1285.33
1995.41	SRM612-1	460.84	16708.98	1543.25	6050.59	11039.58	52985.50	18256.74
2279.45	SRM610-1	1582.41	114761.57	2739.54	22401.17	60471.94	215994.78	149557.20
1670.53	AP1-1	206.16	1430.77	2615.17	32360.34	23856.14	327101.63	599.92
1844.65	AP2-1	244.80	1179.45	3494.90	50332.72	36538.61	534920.75	2660.25
1638.09	AP3-1	664.48	2023.09	5457.23	90647.43	65682.73	1044808.20	9798.98
1707.77	AP4-1	1150.45	3057.58	6750.96	117297.10	85451.64	1378599.60	18139.18
1574.05	MZ1-1	147.04	906.05	3969.14	64660.88	46273.70	721177.88	1002.13
1561.65	MZ1-2	155.72	857.24	3405.42	52388.65	38285.50	570333.81	844.36
1429.93	MZ1-3	151.84	596.20	2799.18	41962.68	30214.01	442773.44	619.28
1494.09	MZ1-4	131.16	1787.05	3670.70	56627.92	41839.96	627871.69	770.92
1518.77	MZ1-5	124.52	1675.85	3445.74	51655.41	37631.01	566485.38	701.64
1416.13	MZ1-6	110.28	1733.85	2665.21	39097.94	28423.96	410785.06	587.92
1389.49	MZ1-7	128.44	1709.09	2906.46	44286.17	32405.14	470754.56	674.64
1408.37	MZ1-8	142.16	1902.17	3293.14	51310.13	37917.65	561987.13	740.48
1287.77	MZ1-9	108.16	1624.93	2785.34	42744.28	31945.46	461080.25	575.84
1322.93	MZ1-10	96.56	1277.69	2447.17	37504.09	27609.56	398313.28	475.72
1308.29	MZ1-11	99.88	1466.65	2181.33	30720.69	22768.77	317430.50	421.44
1308.49	MZ1-12	105.20	1449.65	2091.73	29644.97	21896.40	303275.09	420.72
1339.29	MZ1-13	111.84	2766.14	2410.25	36676.29	27295.23	385787.97	1128.53
1452.17	MZ1-14	122.68	3645.18	2911.94	45549.90	34387.47	490700.25	1428.93
1348.53	MZ1-15	90.48	3545.02	2908.82	44393.61	33260.39	471886.47	1343.65
1320.45	MZ1-16	113.68	1864.37	1874.29	26109.87	19446.23	262877.28	496.68

Appendix A. Raw trace element datasheets from laser ablation.

1289.21	MZ1-17	127.48	1558.77	2042.61	28609.04	21103.64	288463.47	435.68
1658.49	MZ1-18	103.08	2821.38	4055.78	69728.23	50745.48	798677.38	980.29
1997.33	MZ1-19	134.12	1751.93	6235.44	110921.50	80080.77	1313276.90	1236.85
1864.45	MZ1-20	162.20	1692.57	5790.15	106944.88	77251.12	1256295.10	1134.73
2047.13	MZ1-21	124.04	2092.93	6150.27	109537.98	79078.88	1294712.40	1241.13
1742.37	srm614-2	131.32	1461.81	823.96	6928.84	5493.03	60870.46	912.13
1418.85	srm612-2	377.40	13230.27	728.48	3510.94	7739.36	30346.45	11766.47
1638.37	srm610-2	1873.29	120015.95	1828.73	17392.86	59016.45	168014.11	125077.06
1194.33	AP1-2	89.80	728.48	1321.61	15784.13	11494.39	148957.75	215.04
1207.93	AP2-2	163.96	620.00	1631.69	23532.57	16901.42	235005.80	1336.09
1104.25	AP3-2	598.20	949.25	3189.10	52014.86	37942.01	585413.75	6536.84
1277.53	AP4-2	918.25	1824.81	4227.38	71648.52	52485.38	832244.63	11974.51
861.56	blank-2	94.80	228.16	457.80	210.00	143.96	651.08	24.44
1116.99	blank ave	173.58	243.96	954.59	374.40	134.46	374.28	36.02

blank subtraction								
1336.03	SRM614-1	112.78	2353.53	1006.79	10773.18	8693.19	98334.51	1249.31
878.43	SRM612-1	287.26	16465.01	588.66	5676.19	10905.12	52611.22	18220.72
1162.47	SRM610-1	1408.83	114517.61	1784.95	22026.76	60337.48	215620.50	149521.18
553.54	AP1-1	32.58	1186.81	1660.59	31985.94	23721.67	326727.35	563.90
727.66	AP2-1	71.22	935.49	2540.31	49958.32	36404.14	534546.47	2624.23
521.10	AP3-1	490.90	1779.13	4502.65	90273.03	65548.27	1044433.92	9762.96
590.78	AP4-1	976.87	2813.62	5796.37	116922.70	85317.18	1378225.32	18103.16
457.06	MZ1-1	-26.54	662.08	3014.56	64286.48	46139.24	720803.60	966.11
444.66	MZ1-2	-17.86	613.28	2450.83	52014.25	38151.04	569959.53	808.34
312.94	MZ1-3	-21.74	352.24	1844.59	41588.27	30079.55	442399.16	583.26
377.10	MZ1-4	-42.42	1543.09	2716.12	56253.52	41705.50	627497.41	734.90
401.78	MZ1-5	-49.06	1431.89	2491.15	51281.01	37496.55	566111.10	665.62
299.14	MZ1-6	-63.30	1489.89	1710.63	38723.54	28289.50	410410.78	551.90
272.50	MZ1-7	-45.14	1465.13	1951.87	43911.77	32270.68	470380.28	638.62
291.38	MZ1-8	-31.42	1658.21	2338.55	50935.73	37783.19	561612.85	704.46
170.78	MZ1-9	-65.42	1380.97	1830.75	42369.88	31811.00	460705.97	539.82
205.94	MZ1-10	-77.02	1033.73	1492.59	37129.69	27475.10	397939.00	439.70
191.30	MZ1-11	-73.70	1222.69	1226.75	30346.29	22634.31	317056.22	385.42
191.50	MZ1-12	-68.38	1205.69	1137.15	29270.56	21761.94	302900.81	384.70
222.30	MZ1-13	-61.74	2522.17	1455.67	36301.88	27160.77	385413.69	1092.51
335.18	MZ1-14	-50.90	3401.22	1957.35	45175.49	34253.01	490325.97	1392.91
231.54	MZ1-15	-83.10	3301.06	1954.23	44019.21	33125.93	471512.19	1307.63
203.46	MZ1-16	-59.90	1620.41	919.71	25735.46	19311.77	262503.00	460.66
172.22	MZ1-17	-46.10	1314.81	1088.03	28234.64	20969.18	288089.19	399.66
541.50	MZ1-18	-70.50	2577.41	3101.20	69353.83	50611.02	798303.10	944.27
880.34	MZ1-19	-39.46	1507.97	5280.85	110547.10	79946.31	1312902.62	1200.83
747.46	MZ1-20	-11.38	1448.61	4835.57	106570.48	77116.66	1255920.82	1098.71
930.15	MZ1-21	-49.54	1848.97	5195.69	109163.58	78944.42	1294338.12	1205.11
625.38	srm614-2	-42.26	1217.85	-130.62	6554.44	5358.57	60496.18	876.10
301.86	srm612-2	203.82	12986.31	-226.10	3136.54	7604.90	29972.17	11730.45
521.38	srm610-2	1699.71	119771.99	874.14	17018.45	58881.99	167639.83	125041.04
77.34	AP1-2	-83.78	484.52	367.02	15409.73	11359.92	148583.47	179.02
90.94	AP2-2	-9.62	376.04	677.10	23158.17	16766.96	234631.52	1300.07
-12.74	AP3-2	424.62	705.28	2234.51	51640.45	37807.55	585039.47	6500.82
160.54	AP4-2	744.66	1580.85	3272.80	71274.12	52350.91	831870.35	11938.49

zero correction								
1336.03	SRM614-1	112.78	2353.53	1006.79	10773.18	8693.19	98334.51	1249.31
878.43	SRM612-1	287.26	16465.01	588.66	5676.19	10905.12	52611.22	18220.72
1162.47	SRM610-1	1408.83	114517.61	1784.95	22026.76	60337.48	215620.50	149521.18
553.54	AP1-1	32.58	1186.81	1660.59	31985.94	23721.67	326727.35	563.90
727.66	AP2-1	71.22	935.49	2540.31	49958.32	36404.14	534546.47	2624.23
521.10	AP3-1	490.90	1779.13	4502.65	90273.03	65548.27	1044433.92	9762.96
590.78	AP4-1	976.87	2813.62	5796.37	116922.70	85317.18	1378225.32	18103.16
457.06	MZ1-1	0.00	662.08	3014.56	64286.48	46139.24	720803.60	966.11
444.66	MZ1-2	0.00	613.28	2450.83	52014.25	38151.04	569959.53	808.34
312.94	MZ1-3	0.00	352.24	1844.59	41588.27	30079.55	442399.16	583.26
377.10	MZ1-4	0.00	1543.09	2716.12	56253.52	41705.50	627497.41	734.90
401.78	MZ1-5	0.00	1431.89	2491.15	51281.01	37496.55	566111.10	665.62
299.14	MZ1-6	0.00	1489.89	1710.63	38723.54	28289.50	410410.78	551.90
272.50	MZ1-7	0.00	1465.13	1951.87	43911.77	32270.68	470380.28	638.62
291.38	MZ1-8	0.00	1658.21	2338.55	50935.73	37783.19	561612.85	704.46
170.78	MZ1-9	0.00	1380.97	1830.75	42369.88	31811.00	460705.97	539.82
205.94	MZ1-10	0.00	1033.73	1492.59	37129.69	27475.10	397939.00	439.70
191.30	MZ1-11	0.00	1222.69	1226.75	30346.29	22634.31	317056.22	385.42
191.50	MZ1-12	0.00	1205.69	1137.15	29270.56	21761.94	302900.81	384.70
222.30	MZ1-13	0.00	2522.17	1455.67	36301.88	27160.77	385413.69	1092.51
335.18	MZ1-14	0.00	3401.22	1957.35	45175.49	34253.01	490325.97	1392.91
231.54	MZ1-15	0.00	3301.06	1954.23	44019.21	33125.93	471512.19	1307.63
203.46	MZ1-16	0.00	1620.41	919.71	25735.46	19311.77	262503.00	460.66
172.22	MZ1-17	0.00	1314.81	1088.03	28234.64	20969.18	288089.19	399.66
541.50	MZ1-18	0.00	2577.41	3101.20	69353.83	50611.02	798303.10	944.27

Appendix A. Raw trace element datasheets from laser ablation.

880.34	MZ1-19	0.00	1507.97	5280.85	110547.10	79946.31	1312902.62	1200.83
747.46	MZ1-20	0.00	1448.61	4835.57	106570.48	77116.66	1255920.82	1098.71
930.15	MZ1-21	0.00	1848.97	5195.69	109163.58	78944.42	1294338.12	1205.11
625.38	srM614-2	0.00	1217.85	0.00	6554.44	5358.57	60496.18	876.10
301.86	srM612-2	203.82	12986.31	0.00	3136.54	7604.90	29972.17	11730.45
521.38	srM610-2	1699.71	119771.99	874.14	17018.45	58881.99	167639.83	125041.04
77.34	AP1-2	0.00	484.52	367.02	15409.73	11359.92	148583.47	179.02
90.94	AP2-2	0.00	376.04	677.10	23158.17	16766.96	234631.52	1300.07
0.00	AP3-2	424.62	705.28	2234.51	51640.45	37807.55	585039.47	6500.82
160.54	AP4-2	744.66	1580.85	3272.80	71274.12	52350.91	831870.35	11938.49
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000298	SRM614-1	0.000025	0.000525	0.000225	0.002403	0.001939	0.021936	0.000279
0.000688	SRM612-1	0.000225	0.012889	0.000461	0.004444	0.008537	0.041186	0.014264
0.001693	SRM610-1	0.002051	0.166742	0.002599	0.032072	0.087854	0.313951	0.217708
0.000032	AP1-1	0.000002	0.000069	0.000097	0.001860	0.001379	0.019000	0.000033
0.000050	AP2-1	0.000005	0.000065	0.000175	0.003451	0.002515	0.036923	0.000181
0.000028	AP3-1	0.000026	0.000094	0.000239	0.004793	0.003480	0.055457	0.000518
0.000034	AP4-1	0.000057	0.000164	0.000337	0.006806	0.004966	0.080224	0.001054
0.000039	MZ1-1	0.000000	0.000057	0.000259	0.005526	0.003966	0.061965	0.000083
0.000043	MZ1-2	0.000000	0.000060	0.000239	0.005076	0.003723	0.055625	0.000079
0.000035	MZ1-3	0.000000	0.000039	0.000207	0.004659	0.003370	0.049560	0.000065
0.000036	MZ1-4	0.000000	0.000147	0.000259	0.005355	0.003970	0.059737	0.000070
0.000040	MZ1-5	0.000000	0.000143	0.000249	0.005116	0.003741	0.056482	0.000066
0.000034	MZ1-6	0.000000	0.000172	0.000197	0.004464	0.003261	0.047308	0.000064
0.000023	MZ1-7	0.000000	0.000124	0.000165	0.003705	0.002723	0.039684	0.000054
0.000023	MZ1-8	0.000000	0.000131	0.000185	0.004038	0.002995	0.044519	0.000056
0.000015	MZ1-9	0.000000	0.000124	0.000164	0.003805	0.002857	0.041378	0.000048
0.000026	MZ1-10	0.000000	0.000130	0.000188	0.004666	0.003453	0.050010	0.000055
0.000023	MZ1-11	0.000000	0.000147	0.000148	0.003652	0.002724	0.038161	0.000046
0.000023	MZ1-12	0.000000	0.000144	0.000135	0.003487	0.002593	0.036087	0.000046
0.000023	MZ1-13	0.000000	0.000258	0.000149	0.003711	0.002777	0.039400	0.000112
0.000028	MZ1-14	0.000000	0.000284	0.000163	0.003771	0.002859	0.040930	0.000116
0.000019	MZ1-15	0.000000	0.000274	0.000162	0.003660	0.002754	0.039204	0.000109
0.000026	MZ1-16	0.000000	0.000206	0.000117	0.003270	0.002454	0.033351	0.000059
0.000019	MZ1-17	0.000000	0.000143	0.000118	0.003064	0.002275	0.031262	0.000043
0.000040	MZ1-18	0.000000	0.000192	0.000232	0.005179	0.003779	0.059615	0.000071
0.000049	MZ1-19	0.000000	0.000083	0.000291	0.006102	0.004413	0.072469	0.000066
0.000042	MZ1-20	0.000000	0.000081	0.000269	0.005928	0.004290	0.069863	0.000061
0.000049	MZ1-21	0.000000	0.000098	0.000274	0.005763	0.004168	0.068330	0.000064
0.000222	srM614-2	0.000000	0.000432	0.000000	0.002325	0.001901	0.021462	0.000311
0.000394	srM612-2	0.000266	0.016949	0.000000	0.004094	0.009926	0.039118	0.015310
0.000946	srM610-2	0.003085	0.217387	0.001587	0.030889	0.106871	0.304267	0.226950
0.000008	AP1-2	0.000000	0.000051	0.000039	0.001619	0.001194	0.015613	0.000019
0.000011	AP2-2	0.000000	0.000046	0.000083	0.002851	0.002064	0.028885	0.000160
0.000000	AP3-2	0.000034	0.000057	0.000179	0.004148	0.003037	0.046992	0.000522
0.000013	AP4-2	0.000060	0.000127	0.000263	0.005728	0.004207	0.066854	0.000959
standardize signal averages AP								
0.000020	AP1	0.000001	0.000060	0.000068	0.001740	0.001287	0.017306	0.000026
0.000031	AP2	0.000002	0.000055	0.000129	0.003151	0.002289	0.032904	0.000171
0.000014	AP3	0.000030	0.000076	0.000209	0.004471	0.003259	0.051225	0.000520
0.000024	AP4	0.000058	0.000145	0.000300	0.006267	0.004587	0.073539	0.001007
linest from std sig ave								
3.206620		0.183206	0.005536	2.160046	0.100884	0.138086	0.008787	0.012575
standardize signal averages SRM								
0.000260	srM614-2	0.000013	0.000479	0.000112	0.002364	0.001920	0.021699	0.000295
0.000541	srM612-2	0.000245	0.014919	0.000230	0.004269	0.009231	0.040152	0.014787

Appendix A. Raw trace element datasheets from laser ablation.

0.001319	srm610-2	0.002568	0.192064	0.002093	0.031480	0.097362	0.309109	0.222329
linest from std sig ave								
0.000000		0.490397	0.026163	2.789425	0.184849	0.059975	0.018842	0.023624
concentration data								
81.96	SRM614-1	0.40	0.25	41.61	20.79	22.97	16.53	0.30
189.11	SRM612-1	3.53	6.12	85.37	38.45	101.10	31.04	15.38
465.48	SRM610-1	32.23	79.17	481.46	277.49	1040.42	236.59	234.80
41.18	AP1-1	0.14	0.15	83.21	74.86	75.99	66.60	0.16
64.30	AP2-1	0.36	0.14	151.21	138.88	138.52	129.43	0.91
35.40	AP3-1	1.91	0.21	206.02	192.91	191.73	194.40	2.60
43.99	AP4-1	4.16	0.36	290.74	273.91	273.57	281.21	5.29
50.26	MZ1-1	0.00	0.13	223.31	222.42	218.50	217.21	0.42
55.51	MZ1-2	0.00	0.13	206.11	204.30	205.11	194.99	0.40
44.85	MZ1-3	0.00	0.09	178.07	187.50	185.63	173.72	0.33
45.92	MZ1-4	0.00	0.32	222.82	215.53	218.71	209.40	0.35
51.28	MZ1-5	0.00	0.32	214.18	205.91	206.09	197.99	0.33
44.11	MZ1-6	0.00	0.38	169.92	179.65	179.64	165.83	0.32
29.41	MZ1-7	0.00	0.27	141.90	149.10	149.98	139.11	0.27
29.55	MZ1-8	0.00	0.29	159.74	162.50	164.99	156.06	0.28
19.62	MZ1-9	0.00	0.27	141.69	153.16	157.39	145.05	0.24
33.11	MZ1-10	0.00	0.29	161.64	187.80	190.21	175.30	0.28
29.45	MZ1-11	0.00	0.33	127.23	147.00	150.07	133.77	0.23
29.19	MZ1-12	0.00	0.32	116.74	140.35	142.82	126.50	0.23
29.07	MZ1-13	0.00	0.57	128.23	149.36	152.96	138.11	0.56
35.79	MZ1-14	0.00	0.63	140.80	151.77	157.51	143.48	0.58
24.63	MZ1-15	0.00	0.61	140.02	147.30	151.73	137.43	0.55
33.07	MZ1-16	0.00	0.45	100.69	131.59	135.16	116.91	0.29
23.91	MZ1-17	0.00	0.32	101.74	123.31	125.35	109.58	0.22
51.73	MZ1-18	0.00	0.43	199.56	208.44	208.20	208.97	0.35
62.16	MZ1-19	0.00	0.18	251.18	245.58	243.09	254.03	0.33
53.19	MZ1-20	0.00	0.18	231.79	238.59	236.31	244.90	0.31
62.82	MZ1-21	0.00	0.22	236.36	231.93	229.58	239.52	0.32
61.01	srm614-2	0.00	0.21	0.00	20.12	22.51	16.17	0.34
108.35	srm612-2	4.18	8.05	0.00	35.42	117.55	29.48	16.51
260.24	srm610-2	48.47	103.22	293.92	267.25	1265.64	229.29	244.76
10.40	AP1-2	0.00	0.11	33.23	65.17	65.76	54.73	0.09
14.32	AP2-2	0.00	0.10	71.83	114.74	113.71	101.25	0.80
0.00	AP3-2	2.49	0.13	154.66	166.94	167.29	164.72	2.62
16.50	AP4-2	4.37	0.28	226.65	230.53	231.76	234.35	4.81
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
416.36	blank-5	69.04	171.08	206.24	114.88	119.32	164.12	51.68
1232.05	SRM614-5	111.44	839.44	622.84	3242.18	2688.81	28131.56	374.52
1395.33	SRM612-5	683.40	27855.68	917.81	6603.32	15964.65	59105.73	21467.04
1522.93	SRM610-5	2205.29	154160.27	2358.65	22208.97	76178.91	217346.17	169501.03
1113.17	AP1-5	91.20	1272.85	1085.33	11788.63	8827.73	109301.77	168.44
1032.49	AP2-5	137.40	1018.69	1650.01	22413.89	16758.49	223510.38	1105.17
1007.05	AP3-5	318.40	1111.21	1936.37	27650.96	20508.64	284590.41	3829.94
967.81	AP4-5	395.20	1277.13	2990.54	47574.91	34636.48	519302.47	7329.44
919.13	MZ2-1b	81.24	567.40	1530.41	19971.43	14302.88	195245.06	234.92
922.69	MZ2-2b	85.44	586.96	1626.81	22448.05	16653.85	226739.08	369.28
888.13	MZ2-3b	80.64	552.68	1356.77	17472.94	13007.95	172743.97	246.08
967.29	MZ2-4b	75.04	619.20	1191.89	14147.12	10545.38	135630.59	198.08
930.81	MZ2-5b	88.20	584.28	1443.21	18699.35	13798.04	186985.69	276.04
885.80	MZ2-6b	60.88	486.44	1344.85	16610.37	12141.15	163357.28	196.68
858.60	MZ2-7b	100.08	1320.05	1298.33	15779.65	12010.03	153316.83	487.76
851.28	MZ2-8b	92.44	979.73	1260.65	16104.93	12085.63	155632.64	428.76
873.08	MZ2-9b	88.68	573.36	1214.89	14806.52	10782.62	139124.39	222.00
865.84	MZ2-10b	84.72	633.80	1209.97	14050.72	10198.54	133139.03	262.92
862.32	MZ2-11b	56.60	596.80	1078.57	12585.47	9246.65	119255.11	268.08
872.92	MZ2-12b	92.56	485.24	982.05	10550.14	7869.12	99035.16	181.12
847.52	MZ2-13b	83.48	723.64	1364.01	17487.06	12908.91	167457.22	341.92
846.16	MZ2-14b	84.52	869.96	1563.17	20632.32	15297.89	203466.19	360.36
871.16	MZ2-15b	93.20	1427.09	1727.89	22937.01	17325.78	228209.53	580.48
1037.49	srm614-6	95.48	847.56	626.80	2483.81	2107.45	21118.84	325.40
1149.49	srm612-6	588.08	20875.64	816.16	4867.59	11979.31	42595.08	16141.89

Appendix A. Raw trace element datasheets from laser ablation.

1233.45	srm610-6	1648.61	120980.48	1866.25	18434.15	60306.30	175872.39	144066.33
904.37	AP1-6	79.04	1089.89	914.13	8853.53	6848.24	82388.91	139.28
964.05	AP2-6	107.56	779.92	1337.81	17020.70	12434.03	165820.38	900.97
853.56	AP3-6	298.44	902.17	1665.69	24148.62	17585.86	243603.53	3397.66
884.96	AP4-6	341.24	1165.85	2660.86	42660.56	31373.30	461789.44	6971.92
698.20	blank-6	73.56	373.92	437.80	178.08	172.12	363.96	30.32
557.28	blank ave	71.30	272.50	322.02	146.48	145.72	264.04	41.00
blank subtraction								
674.76	SRM614-5	40.14	566.94	300.82	3095.70	2543.09	27867.52	333.52
838.04	SRM612-5	612.10	27583.17	595.78	6456.84	15818.93	58841.69	21426.04
965.65	SRM610-5	2133.99	153887.77	2036.63	22062.48	76033.19	217082.13	169460.03
555.88	AP1-5	19.90	1000.35	763.30	11642.15	8682.01	109037.73	127.44
475.20	AP2-5	66.10	746.18	1327.99	22267.41	16612.77	223246.34	1064.17
449.76	AP3-5	247.10	838.70	1614.35	27504.47	20362.91	284326.37	3788.94
410.52	AP4-5	323.90	1004.63	2668.52	47428.43	34490.76	519038.43	7288.44
361.84	MZ2-1b	9.94	294.90	1208.39	19824.95	14157.16	194981.02	193.92
365.40	MZ2-2b	14.14	314.46	1304.79	22301.57	16508.13	226475.04	328.28
330.84	MZ2-3b	9.34	280.18	1034.75	17326.46	12862.23	172479.93	205.08
410.00	MZ2-4b	3.74	346.70	869.86	14000.64	10399.66	135366.55	157.08
373.52	MZ2-5b	16.90	311.78	1121.19	18552.87	13652.32	186721.65	235.04
328.52	MZ2-6b	-10.42	213.94	1022.83	16463.89	11995.43	163093.24	155.68
301.32	MZ2-7b	28.78	1047.55	976.31	15633.17	11864.31	153052.79	446.76
294.00	MZ2-8b	21.14	707.22	938.63	15958.45	11939.91	155368.60	387.76
315.80	MZ2-9b	17.38	300.86	892.86	14660.04	10636.90	138860.35	181.00
308.56	MZ2-10b	13.42	361.30	887.94	13904.24	10052.82	132874.99	221.92
305.04	MZ2-11b	-14.70	324.30	756.54	12438.99	9100.93	118991.07	227.08
315.64	MZ2-12b	21.26	212.74	660.02	10403.66	7723.40	98771.11	140.12
290.24	MZ2-13b	12.18	451.14	1041.99	17340.58	12763.19	167193.18	300.92
288.88	MZ2-14b	13.22	597.46	1241.15	20485.84	15152.17	203202.15	319.36
313.88	MZ2-15b	21.90	1154.59	1405.87	22790.53	17180.06	227945.49	539.48
480.20	srm614-6	24.18	575.06	304.78	2337.33	1961.73	20854.80	284.40
592.20	srm612-6	516.78	20603.14	494.14	4721.11	11833.59	42331.04	16100.89
676.16	srm610-6	1577.31	120707.98	1544.23	18287.66	60160.58	175608.35	144025.33
347.08	AP1-6	7.74	817.38	592.10	8707.05	6702.52	82124.86	98.28
406.76	AP2-6	36.26	507.42	1015.79	16874.21	12288.31	165556.34	859.96
296.28	AP3-6	227.14	629.66	1343.67	24002.13	17440.14	243339.49	3356.66
327.68	AP4-6	269.94	893.35	2338.83	42514.08	31227.58	461525.40	6930.92
zero correction								
674.76	SRM614-5	40.14	566.94	300.82	3095.70	2543.09	27867.52	333.52
838.04	SRM612-5	612.10	27583.17	595.78	6456.84	15818.93	58841.69	21426.04
965.65	SRM610-5	2133.99	153887.77	2036.63	22062.48	76033.19	217082.13	169460.03
555.88	AP1-5	19.90	1000.35	763.30	11642.15	8682.01	109037.73	127.44
475.20	AP2-5	66.10	746.18	1327.99	22267.41	16612.77	223246.34	1064.17
449.76	AP3-5	247.10	838.70	1614.35	27504.47	20362.91	284326.37	3788.94
410.52	AP4-5	323.90	1004.63	2668.52	47428.43	34490.76	519038.43	7288.44
361.84	MZ2-1b	9.94	294.90	1208.39	19824.95	14157.16	194981.02	193.92
365.40	MZ2-2b	14.14	314.46	1304.79	22301.57	16508.13	226475.04	328.28
330.84	MZ2-3b	9.34	280.18	1034.75	17326.46	12862.23	172479.93	205.08
410.00	MZ2-4b	3.74	346.70	869.86	14000.64	10399.66	135366.55	157.08
373.52	MZ2-5b	16.90	311.78	1121.19	18552.87	13652.32	186721.65	235.04
328.52	MZ2-6b	0.00	213.94	1022.83	16463.89	11995.43	163093.24	155.68
301.32	MZ2-7b	28.78	1047.55	976.31	15633.17	11864.31	153052.79	446.76
294.00	MZ2-8b	21.14	707.22	938.63	15958.45	11939.91	155368.60	387.76
315.80	MZ2-9b	17.38	300.86	892.86	14660.04	10636.90	138860.35	181.00
308.56	MZ2-10b	13.42	361.30	887.94	13904.24	10052.82	132874.99	221.92
305.04	MZ2-11b	0.00	324.30	756.54	12438.99	9100.93	118991.07	227.08
315.64	MZ2-12b	21.26	212.74	660.02	10403.66	7723.40	98771.11	140.12
290.24	MZ2-13b	12.18	451.14	1041.99	17340.58	12763.19	167193.18	300.92
288.88	MZ2-14b	13.22	597.46	1241.15	20485.84	15152.17	203202.15	319.36
313.88	MZ2-15b	21.90	1154.59	1405.87	22790.53	17180.06	227945.49	539.48
480.20	srm614-6	24.18	575.06	304.78	2337.33	1961.73	20854.80	284.40
592.20	srm612-6	516.78	20603.14	494.14	4721.11	11833.59	42331.04	16100.89
676.16	srm610-6	1577.31	120707.98	1544.23	18287.66	60160.58	175608.35	144025.33
347.08	AP1-6	7.74	817.38	592.10	8707.05	6702.52	82124.86	98.28
406.76	AP2-6	36.26	507.42	1015.79	16874.21	12288.31	165556.34	859.96
296.28	AP3-6	227.14	629.66	1343.67	24002.13	17440.14	243339.49	3356.66
327.68	AP4-6	269.94	893.35	2338.83	42514.08	31227.58	461525.40	6930.92
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000564 SRM614-5	0.000034	0.000474	0.000252	0.002589	0.002127	0.023306	0.000279
0.000564 SRM612-5	0.000412	0.018556	0.000401	0.004344	0.010642	0.039585	0.014414
0.001439 SRM610-5	0.003181	0.229377	0.003036	0.032885	0.113331	0.323571	0.252588
0.000076 AP1-5	0.000003	0.000137	0.000105	0.001596	0.001190	0.014945	0.000017
0.000061 AP2-5	0.000008	0.000095	0.000170	0.002844	0.002121	0.028509	0.000136
0.000066 AP3-5	0.000036	0.000124	0.000238	0.004052	0.003000	0.041891	0.000558
0.000040 AP4-5	0.000032	0.000099	0.000263	0.004679	0.003402	0.051200	0.000719
0.000107 MZ2-1b	0.000003	0.000088	0.000359	0.005885	0.004203	0.057880	0.000058
0.000098 MZ2-2b	0.000004	0.000084	0.000350	0.005976	0.004424	0.060690	0.000088
0.000099 MZ2-3b	0.000003	0.000084	0.000311	0.005205	0.003864	0.051817	0.000062
0.000090 MZ2-4b	0.000001	0.000076	0.000190	0.003062	0.002275	0.029609	0.000034
0.000080 MZ2-5b	0.000004	0.000066	0.000239	0.003954	0.002909	0.039789	0.000050
0.000081 MZ2-6b	0.000000	0.000053	0.000252	0.004053	0.002953	0.040147	0.000038
0.000058 MZ2-7b	0.000006	0.000202	0.000189	0.003019	0.002291	0.029556	0.000086
0.000056 MZ2-8b	0.000004	0.000135	0.000180	0.003056	0.002286	0.029752	0.000074
0.000069 MZ2-9b	0.000004	0.000066	0.000195	0.003198	0.002320	0.030291	0.000039
0.000076 MZ2-10b	0.000003	0.000089	0.000218	0.003419	0.002472	0.032677	0.000055
0.000082 MZ2-11b	0.000000	0.000087	0.000202	0.003329	0.002436	0.031844	0.000061
0.000098 MZ2-12b	0.000007	0.000066	0.000205	0.003239	0.002404	0.030749	0.000044
0.000062 MZ2-13b	0.000003	0.000096	0.000222	0.003688	0.002714	0.035554	0.000064
0.000052 MZ2-14b	0.000002	0.000108	0.000225	0.003711	0.002745	0.036810	0.000058
0.000053 MZ2-15b	0.000004	0.000194	0.000236	0.003823	0.002882	0.038242	0.000091
0.000050 srm614-6	0.000027	0.000635	0.000336	0.002579	0.002165	0.023015	0.000314
0.000549 srm612-6	0.000479	0.019085	0.000458	0.004373	0.010962	0.039211	0.014914
0.001223 srm610-6	0.002852	0.218271	0.002792	0.033069	0.108786	0.317545	0.260435
0.000062 AP1-6	0.000001	0.000145	0.000105	0.001549	0.001192	0.014607	0.000017
0.000066 AP2-6	0.000006	0.000082	0.000164	0.002726	0.001985	0.026742	0.000139
0.000049 AP3-6	0.000038	0.000105	0.000224	0.004000	0.002906	0.040549	0.000559
0.000036 AP4-6	0.000030	0.000099	0.000259	0.004709	0.003459	0.051122	0.000768
standardize signal averages AP							
0.000069 AP1	0.000002	0.000141	0.000105	0.001572	0.001191	0.014776	0.000017
0.000063 AP2	0.000007	0.000089	0.000167	0.002785	0.002053	0.027625	0.000137
0.000058 AP3	0.000037	0.000114	0.000231	0.004026	0.002953	0.041220	0.000559
0.000038 AP4	0.000031	0.000099	0.000261	0.004694	0.003431	0.051161	0.000743
linest from std sig ave							
1.272077	0.235578	0.003030	2.154224	0.123693	0.168569	0.011803	0.015224
standardize signal averages SRM							
0.000547 srm614-2	0.000030	0.000554	0.000294	0.002584	0.002146	0.023161	0.000296
0.000556 srm612-2	0.000445	0.018820	0.000429	0.004358	0.010802	0.039398	0.014664
0.001331 srm610-2	0.003016	0.223824	0.002914	0.032977	0.111058	0.320558	0.256511
linest from std sig ave							
1.066307	1.051716	1.024536	1.037646	0.997234	1.020122	1.009315	0.984699
concentration data							
61.57 SRM614-5	0.68	0.12	46.48	27.46	30.75	23.59	0.36
61.51 SRM612-5	8.32	4.82	74.05	46.08	153.85	40.07	18.82
157.03 SRM610-5	64.26	59.60	560.85	348.85	1638.42	327.53	329.79
38.66 AP1-5	0.26	0.17	89.91	78.74	80.02	70.37	0.11
30.80 AP2-5	0.79	0.12	145.74	140.32	142.67	134.24	0.83
33.63 AP3-5	3.42	0.15	204.41	199.97	201.75	197.25	3.39
20.55 AP4-5	3.00	0.12	226.22	230.87	228.80	241.08	4.37
54.51 MZ2-1b	0.28	0.11	308.27	290.40	282.61	272.53	0.35
49.69 MZ2-2b	0.36	0.10	300.49	294.90	297.49	285.76	0.53
50.44 MZ2-3b	0.26	0.10	267.15	256.86	259.85	243.98	0.37
45.51 MZ2-4b	0.08	0.09	163.52	151.12	152.97	139.42	0.21
40.39 MZ2-5b	0.34	0.08	205.33	195.09	195.64	187.35	0.30
41.04 MZ2-6b	0.00	0.06	216.38	199.99	198.57	189.04	0.23
29.53 MZ2-7b	0.52	0.24	162.03	148.97	154.08	139.17	0.52
28.57 MZ2-8b	0.38	0.16	154.47	150.80	153.76	140.09	0.45
34.96 MZ2-9b	0.36	0.08	167.38	157.80	156.04	142.63	0.24
38.51 MZ2-10b	0.31	0.11	187.66	168.73	166.25	153.86	0.33
41.43 MZ2-11b	0.00	0.10	174.00	164.26	163.79	149.94	0.37
49.87 MZ2-12b	0.62	0.08	176.58	159.82	161.69	144.78	0.26

Appendix A. Raw trace element datasheets from laser ablation.

31.32	MZ2-13b	0.24	0.12	190.43	181.96	182.52	167.41	0.39
26.56	MZ2-14b	0.23	0.13	193.22	183.12	184.58	173.32	0.35
26.72	MZ2-15b	0.35	0.23	202.69	188.67	193.82	180.06	0.55
57.81	srm614-6	0.54	0.16	62.14	27.36	31.30	23.30	0.41
59.85	srm612-6	9.67	4.96	84.57	46.39	158.47	39.69	19.47
133.39	srm610-6	57.63	56.72	515.90	350.80	1572.71	321.43	340.04
31.33	AP1-6	0.13	0.18	90.50	76.42	80.17	68.78	0.11
33.34	AP2-6	0.55	0.10	141.01	134.50	133.48	125.92	0.84
25.05	AP3-6	3.56	0.13	192.42	197.36	195.43	190.93	3.40
18.42	AP4-6	2.81	0.12	222.64	232.38	232.61	240.71	4.66
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
Br		Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data								
673.88	blank-7	157.88	211.24	700.60	284.84	115.12	84.56	34.60
932.41	SRM614-7	173.32	1343.09	979.09	5833.79	4621.47	50959.41	704.48
1088.13	SRM612-7	705.76	32609.86	1323.53	9934.38	19938.51	90574.83	31457.18
1642.73	SRM610-7	3514.46	315150.34	4268.46	44280.21	150423.48	480903.22	322728.38
913.73	AP1-7	151.00	1432.85	1970.33	24648.02	18085.74	252885.06	395.76
894.61	AP2-7	228.12	1338.57	2623.25	39443.94	28439.12	429396.78	2237.29
984.57	AP3-7	504.60	1892.45	4455.23	75051.22	54430.43	914006.63	8569.97
997.89	AP4-7	599.20	1743.21	4382.38	74915.42	54630.87	913993.81	12127.07
1072.53	T1-1	136.32	1082.37	2188.73	31909.10	23416.77	344023.28	430.96
991.45	T1-2	148.16	793.56	1650.97	20710.12	15229.09	213379.16	301.84
914.93	T1-3	134.60	533.60	1249.73	13060.15	9598.21	127847.16	197.64
821.76	T1-4	159.40	634.12	1460.61	17738.82	13129.07	178470.61	243.60
839.44	T1-5	123.48	523.00	1501.61	18810.23	13641.64	188387.58	262.44
863.00	T1-6	122.48	557.00	1562.61	19176.23	14399.16	194573.50	266.16
894.81	T1-7	113.96	537.16	1260.33	14886.96	10967.86	145306.70	222.52
859.08	T1-8	148.20	406.44	1271.01	14628.48	10612.38	142478.20	164.84
852.88	T1-9	126.72	449.08	1327.89	15672.89	11352.46	155309.75	202.88
858.84	T1-10	112.08	588.28	1327.69	15846.13	11654.07	157323.80	241.20
877.60	T1-11	117.52	476.80	1314.97	16930.46	12162.99	167045.94	262.12
851.20	T1-12	122.64	459.88	1333.21	16990.02	12526.63	168794.14	227.48
825.08	T1-13	127.56	682.96	1509.17	19828.31	14423.40	202228.42	319.00
910.73	T1-14	147.52	476.60	1613.37	21775.00	15936.13	224757.98	291.24
876.44	T1-15	130.80	473.12	1561.33	20506.16	15049.21	208262.48	255.20
853.52	T1-16	122.08	898.89	1463.25	19728.31	14453.00	199793.44	271.24
904.41	T1-17	140.16	921.65	1625.73	23261.53	16983.02	240152.23	328.24
879.24	T1-18	102.20	784.36	1666.69	23291.97	17118.14	240698.64	286.72
1154.73	SRM614-8	119.84	843.68	609.20	3945.62	3109.86	34666.68	556.92
1287.69	SRM612-8	756.08	22982.73	873.16	7062.56	14359.24	65955.29	27623.16
1687.65	SRM610-8	3911.54	219312.36	3084.34	32150.74	106726.96	346607.13	282465.72
936.25	AP1-8	96.40	1416.01	1300.53	16795.90	12642.67	167852.70	246.08
860.08	AP2-8	184.40	1014.33	1966.81	28755.52	21121.92	310852.16	1800.09
839.48	AP3-8	563.16	1799.77	3522.30	60352.78	43555.65	729105.13	7447.24
900.93	AP4-8	528.64	1582.01	3233.26	55959.75	40601.51	672558.69	9590.93
603.20	blank-8	93.56	262.20	425.48	172.56	139.88	332.28	26.96
638.54	blank average	125.72	236.72	563.04	228.70	127.50	208.42	30.78
blank subtraction								
293.86	SRM614-7	47.60	1106.37	416.04	5605.09	4493.97	50750.98	673.70
449.58	SRM612-7	580.04	32373.14	760.48	9705.67	19811.01	90366.41	31426.40
1004.19	SRM610-7	3388.74	314913.62	3705.42	44051.51	150295.98	480694.80	322697.60
275.18	AP1-7	25.28	1196.13	1407.29	24419.32	17958.24	252676.64	364.98
256.06	AP2-7	102.40	1101.85	2060.21	39215.24	28311.62	429188.36	2206.51
346.02	AP3-7	378.88	1655.73	3892.18	74822.52	54302.93	913798.21	8539.19
359.34	AP4-7	473.48	1506.49	3819.34	74686.72	54503.37	913785.39	12096.29
433.98	T1-1	10.60	845.64	1625.69	31680.40	23289.27	343814.86	400.18
352.90	T1-2	22.44	556.84	1087.93	20481.42	15101.59	213170.74	271.06
276.38	T1-3	8.88	296.88	686.68	12831.45	9470.71	127638.74	166.86
183.22	T1-4	33.68	397.40	897.57	17510.12	13001.57	178262.19	212.82
200.90	T1-5	-2.24	286.28	938.57	18581.53	13514.14	188179.16	231.66
224.46	T1-6	-3.24	320.28	999.57	18947.53	14271.66	194365.08	235.38
256.26	T1-7	-11.76	300.44	697.28	14658.26	10840.36	145098.28	191.74
220.54	T1-8	22.48	169.72	707.96	14399.78	10484.88	142269.78	134.06
214.34	T1-9	1.00	212.36	764.84	15444.19	11224.96	155101.33	172.10
220.30	T1-10	-13.64	351.56	764.64	15617.43	11526.56	157115.38	210.42
239.06	T1-11	-8.20	240.08	751.92	16701.75	12035.49	166837.52	231.34
212.66	T1-12	-3.08	223.16	770.16	16761.31	12399.13	168585.72	196.70

Appendix A. Raw trace element datasheets from laser ablation.

186.54	T1-13	1.84	446.24	946.13	19599.61	14295.90	202020.00	288.22
272.18	T1-14	21.80	239.88	1050.33	21546.30	15808.63	224549.56	260.46
237.90	T1-15	5.08	236.40	998.29	20277.45	14921.70	208054.06	224.42
214.98	T1-16	-3.64	662.16	900.21	19499.61	14325.50	199585.02	240.46
265.86	T1-17	14.44	684.92	1062.69	23032.83	16855.52	239943.81	297.46
240.70	T1-18	-23.52	547.64	1103.65	23063.27	16990.64	240490.22	255.94
516.18	SRM614-8	-5.88	606.96	46.16	3716.92	2982.36	34458.25	526.14
649.14	SRM612-8	630.36	22746.01	310.12	6833.86	14231.74	65746.87	27592.38
1049.11	SRM610-8	3785.82	219075.64	2521.29	31922.04	106599.46	346398.71	282434.94
297.70	AP1-8	-29.32	1179.29	737.48	16567.19	12515.17	167644.28	215.30
221.54	AP2-8	58.68	777.60	1403.77	28526.82	20994.42	310643.74	1769.31
200.94	AP3-8	437.44	1563.05	2959.26	60124.08	43428.14	728896.71	7416.46
262.38	AP4-8	402.92	1345.29	2670.22	55731.05	40474.01	672350.27	9560.15
zero correction								
293.86	SRM614-7	47.60	1106.37	416.04	5605.09	4493.97	50750.98	673.70
449.58	SRM612-7	580.04	32373.14	760.48	9705.67	19811.01	90366.41	31426.40
1004.19	SRM610-7	3388.74	314913.62	3705.42	44051.51	150295.98	480694.80	322697.60
275.18	AP1-7	25.28	1196.13	1407.29	24419.32	17958.24	252676.64	364.98
256.06	AP2-7	102.40	1101.85	2060.21	39215.24	28311.62	429188.36	2206.51
346.02	AP3-7	378.88	1655.73	3892.18	74822.52	54302.93	913798.21	8539.19
359.34	AP4-7	473.48	1506.49	3819.34	74686.72	54503.37	913785.39	12096.29
433.98	T1-1	10.60	845.64	1625.69	31680.40	23289.27	343814.86	400.18
352.90	T1-2	22.44	556.84	1087.93	20481.42	15101.59	213170.74	271.06
276.38	T1-3	8.88	296.88	686.68	12831.45	9470.71	127638.74	166.86
183.22	T1-4	33.68	397.40	897.57	17510.12	13001.57	178262.19	212.82
200.90	T1-5	0.00	286.28	938.57	18581.53	13514.14	188179.16	231.66
224.46	T1-6	0.00	320.28	999.57	18947.53	14271.66	194365.08	235.38
256.26	T1-7	0.00	300.44	697.28	14658.26	10840.36	145098.28	191.74
220.54	T1-8	22.48	169.72	707.96	14399.78	10484.88	142269.78	134.06
214.34	T1-9	1.00	212.36	764.84	15444.19	11224.96	155101.33	172.10
220.30	T1-10	0.00	351.56	764.64	15617.43	11526.56	157115.38	210.42
239.06	T1-11	0.00	240.08	751.92	16701.75	12035.49	166837.52	231.34
212.66	T1-12	0.00	223.16	770.16	16761.31	12399.13	168585.72	196.70
186.54	T1-13	1.84	446.24	946.13	19599.61	14295.90	202020.00	288.22
272.18	T1-14	21.80	239.88	1050.33	21546.30	15808.63	224549.56	260.46
237.90	T1-15	5.08	236.40	998.29	20277.45	14921.70	208054.06	224.42
214.98	T1-16	0.00	662.16	900.21	19499.61	14325.50	199585.02	240.46
265.86	T1-17	14.44	684.92	1062.69	23032.83	16855.52	239943.81	297.46
240.70	T1-18	0.00	547.64	1103.65	23063.27	16990.64	240490.22	255.94
516.18	SRM614-8	0.00	606.96	46.16	3716.92	2982.36	34458.25	526.14
649.14	SRM612-8	630.36	22746.01	310.12	6833.86	14231.74	65746.87	27592.38
1049.11	SRM610-8	3785.82	219075.64	2521.29	31922.04	106599.46	346398.71	282434.94
297.70	AP1-8	0.00	1179.29	737.48	16567.19	12515.17	167644.28	215.30
221.54	AP2-8	58.68	777.60	1403.77	28526.82	20994.42	310643.74	1769.31
200.94	AP3-8	437.44	1563.05	2959.26	60124.08	43428.14	728896.71	7416.46
262.38	AP4-8	402.92	1345.29	2670.22	55731.05	40474.01	672350.27	9560.15
certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000104	SRM614-7	0.000017	0.000390	0.000147	0.001975	0.001583	0.017881	0.000237
0.000163	SRM612-7	0.000211	0.011772	0.000277	0.003529	0.007204	0.032861	0.011428
0.000608	SRM610-7	0.002051	0.190571	0.002242	0.026658	0.090952	0.290895	0.195282
0.000017	AP1-7	0.000002	0.000074	0.000087	0.001508	0.001109	0.015602	0.000023
0.000015	AP2-7	0.000006	0.000065	0.000122	0.002316	0.001672	0.025347	0.000130
0.000017	AP3-7	0.000018	0.000081	0.000190	0.003653	0.002651	0.044614	0.000417
0.000021	AP4-7	0.000027	0.000087	0.000220	0.004296	0.003135	0.052557	0.000696
0.000029	T1-1	0.000001	0.000056	0.000108	0.002112	0.001553	0.022920	0.000027
0.000031	T1-2	0.000002	0.000049	0.000097	0.001820	0.001342	0.018941	0.000024
0.000032	T1-3	0.000001	0.000035	0.000080	0.001503	0.001109	0.014949	0.000020
0.000013	T1-4	0.000002	0.000028	0.000063	0.001237	0.000919	0.012594	0.000015

Appendix A. Raw trace element datasheets from laser ablation.

0.000014	T1-5	0.000000	0.000020	0.000064	0.001268	0.000922	0.012837	0.000016
0.000015	T1-6	0.000000	0.000021	0.000066	0.001245	0.000938	0.012769	0.000015
0.000023	T1-7	0.000000	0.000027	0.000063	0.001319	0.000975	0.013054	0.000017
0.000021	T1-8	0.000002	0.000016	0.000067	0.001365	0.000994	0.013487	0.000013
0.000018	T1-9	0.000000	0.000018	0.000063	0.001279	0.000930	0.012843	0.000014
0.000019	T1-10	0.000000	0.000030	0.000066	0.001344	0.000992	0.013522	0.000018
0.000019	T1-11	0.000000	0.000019	0.000061	0.001352	0.000974	0.013503	0.000019
0.000017	T1-12	0.000000	0.000018	0.000062	0.001354	0.001001	0.013614	0.000016
0.000014	T1-13	0.000000	0.000033	0.000071	0.001464	0.001068	0.015087	0.000022
0.000019	T1-14	0.000002	0.000017	0.000074	0.001510	0.001108	0.015739	0.000018
0.000018	T1-15	0.000000	0.000018	0.000074	0.001512	0.001112	0.015509	0.000017
0.000018	T1-16	0.000000	0.000057	0.000077	0.001672	0.001228	0.017112	0.000021
0.000019	T1-17	0.000001	0.000050	0.000077	0.001676	0.001227	0.017460	0.000022
0.000018	T1-18	0.000000	0.000041	0.000082	0.001714	0.001263	0.017871	0.000019
0.000292	SRM614-8	0.000000	0.000343	0.000026	0.002102	0.001686	0.019484	0.000297
0.000337	SRM612-8	0.000328	0.011818	0.000161	0.003550	0.007394	0.034158	0.014335
0.000894	SRM610-8	0.003224	0.186589	0.002147	0.027188	0.090792	0.295031	0.240553
0.000025	AP1-8	0.000000	0.000101	0.000063	0.001416	0.001069	0.014325	0.000018
0.000017	AP2-8	0.000004	0.000058	0.000105	0.002141	0.001576	0.023313	0.000133
0.000012	AP3-8	0.000027	0.000097	0.000183	0.003715	0.002684	0.045043	0.000458
0.000020	AP4-8	0.000030	0.000101	0.000200	0.004173	0.003030	0.050340	0.000716

standardize signal averages AP

0.000021	AP1	0.000001	0.000087	0.000075	0.001462	0.001089	0.014963	0.000020
0.000016	AP2	0.000005	0.000062	0.000114	0.002228	0.001624	0.024330	0.000132
0.000015	AP3	0.000023	0.000089	0.000186	0.003684	0.002667	0.044829	0.000438
0.000020	AP4	0.000029	0.000094	0.000210	0.004234	0.003083	0.051448	0.000706

linest from std sig ave

4.072387		0.325771	0.004874	2.761862	0.138595	0.190561	0.011583	0.017140
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standardize signal averages SRM

0.000198	srm614-2	0.000008	0.000366	0.000086	0.002038	0.001635	0.018682	0.000267
0.000250	srm612-2	0.000269	0.011795	0.000219	0.003540	0.007299	0.033510	0.012882
0.000751	srm610-2	0.002638	0.188580	0.002195	0.026923	0.090872	0.292963	0.217917

linest from std sig ave

0.000000		0.476889	0.026673	2.661392	0.216228	0.064274	0.019914	0.024109
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concentration data

36.16	SRM614-7	0.47	0.16	34.72	23.47	25.88	17.76	0.35
57.10	SRM612-7	5.89	4.92	65.50	41.95	117.74	32.64	16.80
212.24	SRM610-7	57.30	79.66	531.14	316.87	1486.44	288.98	287.06
27.60	AP1-7	0.20	0.14	95.74	83.37	84.30	72.09	0.15
24.57	AP2-7	0.79	0.13	134.06	128.05	127.11	117.13	0.89
27.45	AP3-7	2.40	0.16	209.37	201.98	201.55	206.16	2.85
33.58	AP4-7	3.54	0.17	242.03	237.51	238.31	242.86	4.76
47.00	T1-1	0.09	0.11	119.41	116.77	118.03	105.91	0.18
50.94	T1-2	0.26	0.10	106.51	100.62	102.01	87.53	0.16
52.59	T1-3	0.14	0.07	88.61	83.09	84.33	69.08	0.13
21.03	T1-4	0.31	0.05	69.87	68.40	69.83	58.19	0.10
22.27	T1-5	0.00	0.04	70.55	70.09	70.09	59.32	0.11
23.96	T1-6	0.00	0.04	72.35	68.82	71.27	59.00	0.11
37.46	T1-7	0.00	0.05	69.12	72.92	74.14	60.32	0.12
33.97	T1-8	0.28	0.03	73.95	75.47	75.56	62.32	0.09
28.84	T1-9	0.01	0.03	69.78	70.71	70.66	59.35	0.10
30.80	T1-10	0.00	0.06	72.51	74.32	75.42	62.48	0.12
31.43	T1-11	0.00	0.04	67.05	74.74	74.05	62.39	0.13
27.90	T1-12	0.00	0.04	68.53	74.84	76.12	62.91	0.11
22.63	T1-13	0.02	0.06	77.85	80.93	81.16	69.72	0.15
30.99	T1-14	0.20	0.03	81.11	83.50	84.24	72.73	0.12
28.81	T1-15	0.05	0.03	81.99	83.58	84.56	71.67	0.11
29.95	T1-16	0.00	0.11	85.04	92.44	93.37	79.07	0.14
31.43	T1-17	0.14	0.10	85.20	92.67	93.24	80.68	0.15
29.06	T1-18	0.00	0.08	90.36	94.76	95.99	82.58	0.13
101.94	SRM614-8	0.00	0.14	6.18	24.98	27.56	19.36	0.44
117.79	SRM612-8	9.15	4.94	38.16	42.20	120.84	33.93	21.07
312.08	SRM610-8	90.09	78.00	508.65	323.17	1483.82	293.08	353.61
41.33	AP1-8	0.00	0.20	69.43	78.27	81.30	66.19	0.13
27.01	AP2-8	0.57	0.11	116.08	118.37	119.78	107.73	0.91
20.17	AP3-8	3.51	0.19	201.49	205.43	204.02	208.14	3.13
31.92	AP4-8	3.92	0.20	220.28	230.71	230.37	232.62	4.89

certified concentration

	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00

Appendix A. Raw trace element datasheets from laser ablation.

33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
541.88 blank-5	126.72	258.76	715.60	262.84	105.36	141.48	43.48
826.84 SRM614-5	119.32	1742.61	1052.17	7689.68	6305.52	69559.11	837.08
867.16 SRM612-5	697.12	41283.75	1435.01	12542.15	25352.06	117870.30	35202.88
1143.85 SRM610-5	2593.41	303972.34	3483.14	37298.61	141537.59	389566.09	227805.72
713.40 AP1-5	149.72	1654.29	2056.85	28210.00	20597.36	289229.91	445.48
740.68 AP2-5	224.60	1612.05	3100.50	50152.56	36624.85	558134.88	2576.97
787.12 AP3-5	964.61	3766.34	7715.08	147575.59	106042.04	1855292.30	13686.60
851.80 AP4-5	571.36	2018.73	4820.15	81621.58	59674.22	988938.81	11641.47
683.56 TGP12-1	114.76	568.48	984.45	8989.33	6513.56	83683.31	174.88
692.80 TGP12-2	127.84	515.52	896.73	8144.25	6104.71	77294.31	131.96
656.52 TGP12-3	116.68	449.44	881.40	7676.24	5607.03	70605.95	130.72
726.60 TGP12-4	120.00	990.85	1472.49	19511.31	14369.44	198418.08	396.32
696.64 TGP12-5	109.40	925.33	2197.21	34218.51	24925.42	389073.75	456.16
830.40 TGP12-6	150.32	1801.25	4890.71	89902.79	64867.65	1100953.80	1137.33
872.28 TGP12-7	152.28	2369.97	6152.95	114002.84	82874.38	1437222.60	1625.65
898.05 TGP12-8	143.88	1499.01	5386.07	99145.08	71269.84	1234579.40	1196.93
852.16 TGP12-9	150.40	1508.17	5402.95	97429.59	70246.95	1214804.50	1247.37
882.28 TGP12-10	141.32	1055.41	3431.98	57224.32	41548.59	664359.31	781.44
814.72 TGP12-11	118.56	706.12	3143.46	54732.31	39665.34	630611.25	670.84
819.20 TGP12-12	132.64	619.32	3316.86	56682.56	41094.87	656497.94	607.84
674.44 TGP12-13	109.96	407.04	1041.33	12161.43	9181.13	118239.10	173.92
662.08 TGP12-14	101.84	364.28	1076.89	12288.63	9125.01	118484.83	171.08
639.12 TGP12-15	94.44	381.96	1008.21	12784.31	9379.49	121697.96	166.84
664.32 TGP12-16	114.80	1052.49	1667.13	24113.90	17757.58	248669.31	358.76
648.36 TGP12-17	91.04	1072.25	1637.41	23370.25	17199.46	239152.39	347.68
603.08 TGP12-18	99.84	703.76	1453.53	20098.35	14632.76	201894.25	262.36
1027.41 SRM614-6	100.56	1097.45	667.04	4985.47	3969.58	44108.93	685.32
1046.29 SRM612-6	758.80	26473.11	910.37	7592.24	16033.01	69903.59	28108.68
1344.25 SRM610-6	2645.37	204617.80	2464.13	25526.15	95564.09	261291.75	198877.92
822.32 AP1-6	103.28	1508.65	1448.09	18999.63	14321.36	188534.19	225.60
817.64 AP2-6	177.80	1144.05	2218.05	34466.27	25412.86	373329.53	1995.45
720.44 AP3-6	931.93	2633.81	5419.95	98823.56	71440.52	1234684.00	10939.18
753.32 AP4-6	593.72	1653.45	3564.26	62389.83	45122.73	742995.88	9646.81
518.52 blank-6	62.92	267.76	394.16	181.00	151.76	491.24	26.08
530.20 blank average	94.82	263.26	554.88	221.92	128.56	316.36	34.78

blank subtraction							
296.64 SRM614-5	24.50	1479.35	497.28	7467.76	6176.95	69242.75	802.30
336.96 SRM612-5	602.30	41020.49	880.12	12320.23	25223.50	117553.94	35168.10
613.64 SRM610-5	2498.59	303709.08	2928.26	37076.69	141409.03	389249.73	227770.94
183.20 AP1-5	54.90	1391.03	1501.97	27988.08	20468.79	288913.55	410.70
210.48 AP2-5	129.78	1348.79	2545.61	49930.64	36496.29	557818.52	2542.19
256.92 AP3-5	869.78	3503.08	7160.20	147353.67	105913.48	1854975.94	13651.82
321.60 AP4-5	476.54	1755.47	4265.26	81399.66	59545.65	988622.45	11606.69
153.36 TGP12-1	19.94	305.22	429.56	8767.41	6385.00	83366.95	140.10
162.60 TGP12-2	33.02	252.26	341.84	7922.32	5976.15	76977.95	97.18
126.32 TGP12-3	21.86	186.18	326.52	7454.32	5478.47	70289.59	95.94
196.40 TGP12-4	25.18	727.58	917.61	19289.39	14240.88	198101.72	361.54
166.44 TGP12-5	14.58	662.06	1642.33	33996.59	24796.86	388757.39	421.38
300.20 TGP12-6	55.50	1537.99	4335.82	89680.87	64739.08	1100637.44	1102.55
342.08 TGP12-7	57.46	2106.71	5598.07	113780.92	82745.82	1436906.24	1590.87
367.84 TGP12-8	49.06	1235.75	4831.19	98923.16	71141.28	1234263.04	1162.15
321.96 TGP12-9	55.58	1244.91	4848.07	97207.66	70118.39	1214488.14	1212.59
352.08 TGP12-10	46.50	792.14	2877.10	57002.40	41420.03	664042.95	746.66
284.52 TGP12-11	23.74	442.86	2588.57	54510.39	39536.78	630294.89	636.06
289.00 TGP12-12	37.82	356.06	2761.98	56460.64	40966.31	656181.58	573.06
144.24 TGP12-13	15.14	143.78	486.44	11939.51	9052.57	117922.74	139.14
131.88 TGP12-14	7.02	101.02	522.00	12066.71	8996.45	118168.47	136.30
108.92 TGP12-15	-0.38	118.70	453.32	12562.39	9250.93	121381.60	132.06
134.12 TGP12-16	19.98	789.22	1112.25	23891.97	17629.02	248352.95	323.98
118.16 TGP12-17	-3.78	808.98	1082.53	23148.33	17070.90	238836.03	312.90
72.88 TGP12-18	5.02	440.50	898.65	19876.43	14504.20	201577.89	227.58
497.20 SRM614-6	5.74	834.18	112.16	4763.55	3841.02	43792.56	650.54
516.08 SRM612-6	663.98	26209.85	355.48	7370.32	15904.45	69587.23	28073.90
814.04 SRM610-6	2550.55	204354.54	1909.25	25304.22	95435.53	260975.39	198843.14
292.12 AP1-6	8.46	1245.39	893.20	18777.71	14192.80	188217.83	190.82
287.44 AP2-6	82.98	880.78	1663.17	34244.35	25284.30	373013.17	1960.67
190.24 AP3-6	837.10	2370.55	4865.07	98601.63	71311.96	1234367.64	10904.40
223.12 AP4-6	498.90	1390.19	3009.38	62167.91	44994.17	742679.52	9612.03

zero correction							
296.64 SRM614-5	24.50	1479.35	497.28	7467.76	6176.95	69242.75	802.30

Appendix A. Raw trace element datasheets from laser ablation.

336.96	SRM612-5	602.30	41020.49	880.12	12320.23	25223.50	117553.94	35168.10
613.64	SRM610-5	2498.59	303709.08	2928.26	37076.69	141409.03	389249.73	227770.94
183.20	AP1-5	54.90	1391.03	1501.97	27988.08	20468.79	288913.55	410.70
210.48	AP2-5	129.78	1348.79	2545.61	49930.64	36496.29	557818.52	2542.19
256.92	AP3-5	869.78	3503.08	7160.20	147353.67	105913.48	1854975.94	13651.82
321.60	AP4-5	476.54	1755.47	4265.26	81399.66	59545.65	988622.45	11606.69
153.36	TGP12-1	19.94	305.22	429.56	8767.41	6385.00	83366.95	140.10
162.60	TGP12-2	33.02	252.26	341.84	7922.32	5976.15	76977.95	97.18
126.32	TGP12-3	21.86	186.18	326.52	7454.32	5478.47	70289.59	95.94
196.40	TGP12-4	25.18	727.58	917.61	19289.39	14240.88	198101.72	361.54
166.44	TGP12-5	14.58	662.06	1642.33	33996.59	24796.86	388757.39	421.38
300.20	TGP12-6	55.50	1537.99	4335.82	89680.87	64739.08	1100637.44	1102.55
342.08	TGP12-7	57.46	2106.71	5598.07	113780.92	82745.82	1436906.24	1590.87
367.84	TGP12-8	49.06	1235.75	4831.19	98923.16	71141.28	1234263.04	1162.15
321.96	TGP12-9	55.58	1244.91	4848.07	97207.66	70118.39	1214488.14	1212.59
352.08	TGP12-10	46.50	792.14	2877.10	57002.40	41420.03	664042.95	746.66
284.52	TGP12-11	23.74	442.86	2588.57	54510.39	39536.78	630294.89	636.06
289.00	TGP12-12	37.82	356.06	2761.98	56460.64	40966.31	656181.58	573.06
144.24	TGP12-13	15.14	143.78	486.44	11939.51	9052.57	117922.74	139.14
131.88	TGP12-14	7.02	101.02	522.00	12066.71	8996.45	118168.47	136.30
108.92	TGP12-15	0.00	118.70	453.32	12562.39	9250.93	121381.60	132.06
134.12	TGP12-16	19.98	789.22	1112.25	23891.97	17629.02	248352.95	323.98
118.16	TGP12-17	0.00	808.98	1082.53	23148.33	17070.90	238836.03	312.90
72.88	TGP12-18	5.02	440.50	898.65	19876.43	14504.20	201577.89	227.58
497.20	SRM614-6	5.74	834.18	112.16	4763.55	3841.02	43792.56	650.54
516.08	SRM612-6	663.98	26209.85	355.48	7370.32	15904.45	69587.23	28073.90
814.04	SRM610-6	2550.55	204354.54	1909.25	25304.22	95435.53	260975.39	198843.14
292.12	AP1-6	8.46	1245.39	893.20	18777.71	14192.80	188217.83	190.82
287.44	AP2-6	82.98	880.78	1663.17	34244.35	25284.30	373013.17	1960.67
190.24	AP3-6	837.10	2370.55	4865.07	98601.63	71311.96	1234367.64	10904.40
223.12	AP4-6	498.90	1390.19	3009.38	62167.91	44994.17	742679.52	9612.03
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000079	SRM614-5	0.000007	0.000393	0.000132	0.001984	0.001641	0.018398	0.000213
0.000105	SRM612-5	0.000187	0.012768	0.000274	0.003835	0.007851	0.036590	0.010946
0.000431	SRM610-5	0.001756	0.213393	0.002057	0.026051	0.099357	0.273496	0.160037
0.000011	AP1-5	0.000003	0.000083	0.000090	0.001680	0.001228	0.017338	0.000025
0.000011	AP2-5	0.000007	0.000072	0.000136	0.002676	0.001956	0.029901	0.000136
0.000010	AP3-5	0.000034	0.000135	0.000276	0.005686	0.004087	0.071574	0.000527
0.000020	AP4-5	0.000030	0.000109	0.000264	0.005045	0.003691	0.061277	0.000719
0.000036	TGP12-1	0.000005	0.000072	0.000101	0.002055	0.001497	0.019541	0.000033
0.000040	TGP12-2	0.000008	0.000062	0.000085	0.001962	0.001480	0.019061	0.000024
0.000035	TGP12-3	0.000006	0.000052	0.000091	0.002075	0.001525	0.019570	0.000027
0.000032	TGP12-4	0.000004	0.000117	0.000147	0.003097	0.002287	0.031808	0.000058
0.000021	TGP12-5	0.000002	0.000082	0.000203	0.004209	0.003070	0.048129	0.000052
0.000019	TGP12-6	0.000004	0.000098	0.000276	0.005708	0.004120	0.070053	0.000070
0.000018	TGP12-7	0.000003	0.000110	0.000291	0.005917	0.004303	0.074722	0.000083
0.000019	TGP12-8	0.000003	0.000065	0.000255	0.005220	0.003754	0.065126	0.000061
0.000017	TGP12-9	0.000003	0.000067	0.000261	0.005241	0.003780	0.065480	0.000065
0.000025	TGP12-10	0.000003	0.000057	0.000206	0.004086	0.002969	0.047596	0.000054
0.000020	TGP12-11	0.000002	0.000031	0.000184	0.003870	0.002807	0.044743	0.000045
0.000021	TGP12-12	0.000003	0.000026	0.000199	0.004075	0.002956	0.047355	0.000041
0.000021	TGP12-13	0.000002	0.000021	0.000072	0.001777	0.001348	0.017556	0.000021
0.000019	TGP12-14	0.000001	0.000015	0.000076	0.001751	0.001306	0.017149	0.000020
0.000015	TGP12-15	0.000000	0.000017	0.000064	0.001772	0.001305	0.017119	0.000019
0.000011	TGP12-16	0.000002	0.000063	0.000088	0.001901	0.001403	0.019760	0.000026
0.000010	TGP12-17	0.000000	0.000066	0.000089	0.001902	0.001403	0.019628	0.000026
0.000007	TGP12-18	0.000000	0.000041	0.000083	0.001834	0.001339	0.018604	0.000021
0.000209	SRM614-6	0.000002	0.000351	0.000047	0.002003	0.001615	0.018419	0.000274
0.000248	SRM612-6	0.000319	0.012581	0.000171	0.003538	0.007634	0.033402	0.013476

Appendix A. Raw trace element datasheets from laser ablation.

0.000878	SRM610-6	0.002750	0.220301	0.002058	0.027279	0.102883	0.281340	0.214359
0.000022	AP1-6	0.000001	0.000095	0.000068	0.001427	0.001078	0.014302	0.000014
0.000020	AP2-6	0.000006	0.000060	0.000113	0.002324	0.001716	0.025314	0.000133
0.000009	AP3-6	0.000039	0.000112	0.000229	0.004643	0.003358	0.058125	0.000513
0.000016	AP4-6	0.000037	0.000103	0.000222	0.004593	0.003324	0.054867	0.000710

standardize signal averages AP								
0.000017	AP1	0.000002	0.000089	0.000079	0.001553	0.001153	0.015820	0.000020
0.000015	AP2	0.000006	0.000066	0.000125	0.002500	0.001836	0.027607	0.000135
0.000009	AP3	0.000036	0.000123	0.000253	0.005164	0.003722	0.064850	0.000520
0.000018	AP4	0.000033	0.000106	0.000243	0.004819	0.003507	0.058072	0.000715

linest from std sig ave								
4.826972		0.234476	0.004251	2.241880	0.111266	0.153473	0.009100	0.016032

standardize signal averages SRM								
0.000144	srM614-2	0.000004	0.000372	0.000090	0.001994	0.001628	0.018408	0.000243
0.000176	srM612-2	0.000253	0.012674	0.000222	0.003686	0.007743	0.034996	0.012211
0.000654	srM610-2	0.002253	0.216847	0.002058	0.026665	0.101120	0.277418	0.187198

linest from std sig ave								
0.000000		0.557182	0.023201	2.837387	0.218166	0.057756	0.021007	0.028059

concentration data								
32.63	SRM614-5	0.13	0.14	25.40	18.93	21.60	14.36	0.29
43.42	SRM612-5	3.77	4.66	52.67	36.59	103.34	28.55	15.05
178.49	SRM610-5	35.30	77.80	395.59	248.59	1307.77	213.44	220.05
21.17	AP1-5	0.31	0.14	80.61	74.55	75.21	62.94	0.16
21.73	AP2-5	0.65	0.12	122.04	118.80	119.78	108.54	0.87
19.09	AP3-5	3.14	0.23	247.09	252.37	250.21	259.83	3.37
38.38	AP4-5	2.76	0.18	236.44	223.95	225.97	222.44	4.60
69.22	TGP12-1	0.44	0.12	90.05	91.22	91.63	70.94	0.21
77.53	TGP12-2	0.76	0.11	75.71	87.08	90.60	69.20	0.15
67.73	TGP12-3	0.57	0.09	81.31	92.12	93.39	71.04	0.17
60.73	TGP12-4	0.38	0.20	131.77	137.48	140.00	115.47	0.37
39.68	TGP12-5	0.17	0.14	181.85	186.82	187.96	174.72	0.33
36.79	TGP12-6	0.33	0.17	246.81	253.36	252.28	254.30	0.45
34.26	TGP12-7	0.28	0.19	260.36	262.64	263.45	271.25	0.53
37.38	TGP12-8	0.24	0.11	227.99	231.69	229.83	236.42	0.39
33.43	TGP12-9	0.28	0.11	233.78	232.64	231.46	237.70	0.42
48.60	TGP12-10	0.31	0.10	184.43	181.35	181.77	172.78	0.34
38.89	TGP12-11	0.16	0.05	164.35	171.76	171.84	162.42	0.29
40.16	TGP12-12	0.26	0.04	178.27	180.87	181.01	171.91	0.26
41.35	TGP12-13	0.21	0.04	64.77	78.90	82.51	63.73	0.13
36.85	TGP12-14	0.10	0.02	67.75	77.73	79.93	62.25	0.13
29.58	TGP12-15	0.00	0.03	57.18	78.64	79.88	62.14	0.12
20.55	TGP12-16	0.15	0.11	79.15	84.38	85.88	71.73	0.16
18.70	TGP12-17	0.00	0.11	79.57	84.44	85.90	71.25	0.16
12.95	TGP12-18	0.04	0.07	74.18	81.43	81.96	67.53	0.13
86.57	SRM614-6	0.05	0.13	9.07	19.12	21.26	14.37	0.38
102.55	SRM612-6	6.41	4.59	32.81	33.76	100.48	26.07	18.53
363.29	SRM610-6	55.29	80.32	395.74	260.31	1354.17	219.56	294.74
42.74	AP1-6	0.06	0.16	60.70	63.33	66.03	51.92	0.09
37.56	AP2-6	0.53	0.10	100.95	103.15	105.06	91.89	0.85
17.25	AP3-6	3.69	0.19	204.89	206.10	205.60	211.00	3.28
31.74	AP4-6	3.45	0.17	198.84	203.86	203.52	199.17	4.54

certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y	
raw data								
1167.17	blank-1	195.92	294.76	1214.41	474.76	143.00	331.52	45.76
1583.01	SRM614-1	217.40	1758.17	1554.77	9002.65	7044.84	81150.98	1086.81
1783.65	SRM612-1	925.93	43291.36	1969.41	14291.76	27277.51	135014.64	50214.88
2291.49	SRM610-1	3118.26	299458.84	4268.78	40903.03	143274.45	441744.78	310595.91
1427.05	AP1-1	196.48	1471.61	2790.46	36735.97	26463.47	392300.88	611.08
1458.01	AP2-1	283.12	1845.61	4504.59	71118.72	51787.29	850456.13	4103.34
1493.61	AP3-1	1022.29	3390.42	7466.32	139576.50	99906.73	1770112.30	15874.37
1537.37	AP4-1	1159.09	3745.38	8521.45	160791.95	115523.33	2062658.40	22679.89
1509.21	TGP18-1	161.24	853.92	3490.90	53578.62	38594.38	614530.94	737.68
1389.73	TGP18-2	164.72	662.72	2999.86	44615.21	32471.98	503779.81	600.52

Appendix A. Raw trace element datasheets from laser ablation.

1331.61	TGP18-3	143.56	644.72	2788.70	40785.11	29529.81	452958.44	549.84
1533.17	TGP18-4	233.76	2635.58	5722.63	101398.81	73103.13	1260493.80	1331.97
1527.13	TGP18-5	227.28	2341.21	5346.71	95901.42	69402.23	1184306.00	1303.21
1467.89	TGP18-6	169.84	862.64	3802.98	63296.84	45998.34	750934.38	806.04
1436.29	TGP18-7	167.84	1052.17	4520.47	77575.12	56002.43	938425.50	972.73
1380.09	TGP18-8	179.08	929.89	4607.59	77685.76	56240.00	941272.38	939.17
1461.13	TGP18-9	178.48	1023.45	4710.35	82540.31	59128.06	1006845.00	1018.69
1330.85	TGP18-10	196.28	1810.45	5536.67	100540.13	73013.05	1261833.90	1204.93
1426.41	TGP18-11	223.64	1641.49	6255.28	116688.22	83265.59	1476286.10	1393.53
1291.81	TGP18-12	182.40	1870.45	6424.08	119557.35	85898.68	1518771.00	1442.01
1538.61	SRM614-2	149.48	901.97	725.12	4479.79	3453.06	38451.30	625.08
1792.73	SRM612-2	899.81	30685.41	1220.09	9829.94	19278.87	88942.18	37393.33
2009.09	SRM610-2	3356.10	239783.42	2948.70	30369.29	111923.51	320871.41	249628.73
1250.45	AP1-2	120.68	1128.49	1692.45	24208.38	17749.82	251006.38	328.20
1243.13	AP2-2	274.64	946.89	2820.34	45815.14	33389.47	529809.56	2781.78
1136.73	AP3-2	1209.33	2713.18	5553.43	104318.30	75635.06	1333743.50	12629.91
1214.25	AP4-2	1352.57	3349.46	6798.76	130577.09	94101.93	1702733.50	19386.31
955.01	blank-2	111.40	169.72	486.16	240.20	128.28	529.48	31.88
1061.09	blank ave	153.66	232.24	850.28	357.48	135.64	430.50	38.82

blank subtraction								
521.92	SRM614-1	63.74	1525.93	704.48	8645.17	6909.20	80720.47	1047.99
722.56	SRM612-1	772.26	43059.12	1119.13	13934.28	27141.87	134584.14	50176.06
1230.41	SRM610-1	2964.60	299226.60	3418.50	40545.55	143138.81	441314.28	310557.09
365.96	AP1-1	42.82	1239.37	1940.17	36378.48	26327.83	391870.38	572.26
396.92	AP2-1	129.46	1613.37	3654.30	70761.24	51651.65	850025.63	4064.52
432.52	AP3-1	868.62	3158.18	6616.04	139219.02	99771.09	1769681.80	15835.55
476.28	AP4-1	1005.43	3513.14	7671.16	160434.47	115387.69	2062227.90	22641.07
448.12	TGP18-1	7.58	621.68	2640.61	53221.14	38458.74	614100.44	698.86
328.64	TGP18-2	11.06	430.48	2149.57	44257.73	32336.34	503349.31	561.70
270.52	TGP18-3	-10.10	412.48	1938.41	40427.63	29394.17	452527.94	511.02
472.08	TGP18-4	80.10	2403.33	4872.35	101041.33	72967.49	1260063.30	1293.15
466.04	TGP18-5	73.62	2108.97	4496.43	95543.94	69266.59	1183875.50	1264.39
406.80	TGP18-6	16.18	630.40	2952.70	62939.35	45862.70	750503.88	767.22
375.20	TGP18-7	14.18	819.92	3670.18	77217.63	55866.79	937995.00	933.91
319.00	TGP18-8	25.42	697.64	3757.30	77328.28	56104.36	940841.88	900.35
400.04	TGP18-9	24.82	791.20	3860.06	82182.82	58992.41	1006414.50	979.87
269.76	TGP18-10	42.62	1578.21	4686.39	100182.65	72877.41	1261403.40	1166.11
365.32	TGP18-11	69.98	1409.25	5404.99	116330.74	83129.95	1475855.60	1354.71
230.72	TGP18-12	28.74	1638.21	5573.79	119199.87	85763.04	1518340.50	1403.19
477.52	SRM614-2	-4.18	669.72	-125.16	4122.30	3317.42	38020.79	586.26
731.64	SRM612-2	746.14	30453.17	369.80	9472.45	19143.23	88511.68	37354.51
948.01	SRM610-2	3202.44	239551.18	2098.41	30011.81	111787.87	320440.91	249589.91
189.36	AP1-2	-32.98	896.24	842.16	23850.89	17614.18	250575.88	289.38
182.04	AP2-2	120.98	714.64	1970.05	45457.65	33253.83	529379.06	2742.96
75.64	AP3-2	1055.67	2480.93	4703.15	103960.82	75499.42	1333313.00	12591.09
153.16	AP4-2	1198.91	3117.22	5948.47	130219.61	93966.29	1702303.00	19347.49

zero correction								
521.92	SRM614-1	63.74	1525.93	704.48	8645.17	6909.20	80720.47	1047.99
722.56	SRM612-1	772.26	43059.12	1119.13	13934.28	27141.87	134584.14	50176.06
1230.41	SRM610-1	2964.60	299226.60	3418.50	40545.55	143138.81	441314.28	310557.09
365.96	AP1-1	42.82	1239.37	1940.17	36378.48	26327.83	391870.38	572.26
396.92	AP2-1	129.46	1613.37	3654.30	70761.24	51651.65	850025.63	4064.52
432.52	AP3-1	868.62	3158.18	6616.04	139219.02	99771.09	1769681.80	15835.55
476.28	AP4-1	1005.43	3513.14	7671.16	160434.47	115387.69	2062227.90	22641.07
448.12	TGP18-1	7.58	621.68	2640.61	53221.14	38458.74	614100.44	698.86
328.64	TGP18-2	11.06	430.48	2149.57	44257.73	32336.34	503349.31	561.70
270.52	TGP18-3	0.00	412.48	1938.41	40427.63	29394.17	452527.94	511.02
472.08	TGP18-4	80.10	2403.33	4872.35	101041.33	72967.49	1260063.30	1293.15
466.04	TGP18-5	73.62	2108.97	4496.43	95543.94	69266.59	1183875.50	1264.39
406.80	TGP18-6	16.18	630.40	2952.70	62939.35	45862.70	750503.88	767.22
375.20	TGP18-7	14.18	819.92	3670.18	77217.63	55866.79	937995.00	933.91
319.00	TGP18-8	25.42	697.64	3757.30	77328.28	56104.36	940841.88	900.35
400.04	TGP18-9	24.82	791.20	3860.06	82182.82	58992.41	1006414.50	979.87
269.76	TGP18-10	42.62	1578.21	4686.39	100182.65	72877.41	1261403.40	1166.11
365.32	TGP18-11	69.98	1409.25	5404.99	116330.74	83129.95	1475855.60	1354.71
230.72	TGP18-12	28.74	1638.21	5573.79	119199.87	85763.04	1518340.50	1403.19
477.52	SRM614-2	0.00	669.72	0.00	4122.30	3317.42	38020.79	586.26
731.64	SRM612-2	746.14	30453.17	369.80	9472.45	19143.23	88511.68	37354.51
948.01	SRM610-2	3202.44	239551.18	2098.41	30011.81	111787.87	320440.91	249589.91
189.36	AP1-2	0.00	896.24	842.16	23850.89	17614.18	250575.88	289.38
182.04	AP2-2	120.98	714.64	1970.05	45457.65	33253.83	529379.06	2742.96
75.64	AP3-2	1055.67	2480.93	4703.15	103960.82	75499.42	1333313.00	12591.09
153.16	AP4-2	1198.91	3117.22	5948.47	130219.61	93966.29	1702303.00	19347.49

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77

Appendix A. Raw trace element datasheets from laser ablation.

SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal							
0.000132 SRM614-1	0.000016	0.000386	0.000178	0.002185	0.001746	0.020398	0.000265
0.000197 SRM612-1	0.000211	0.011761	0.000306	0.003806	0.007414	0.036761	0.013705
0.000856 SRM610-1	0.002063	0.208191	0.002378	0.028210	0.099591	0.307051	0.216075
0.000017 AP1-1	0.000002	0.000056	0.000088	0.001656	0.001199	0.017842	0.000026
0.000017 AP2-1	0.000005	0.000068	0.000154	0.002977	0.002173	0.035762	0.000171
0.000018 AP3-1	0.000036	0.000132	0.000277	0.005822	0.004172	0.074003	0.000662
0.000021 AP4-1	0.000045	0.000158	0.000344	0.007199	0.005178	0.092540	0.001016
0.000019 TGP18-1	0.000000	0.000027	0.000113	0.002284	0.001650	0.026352	0.000030
0.000017 TGP18-2	0.000001	0.000022	0.000110	0.002270	0.001659	0.025820	0.000029
0.000015 TGP18-3	0.000000	0.000023	0.000109	0.002271	0.001651	0.025418	0.000029
0.000015 TGP18-4	0.000003	0.000076	0.000155	0.003204	0.002314	0.039961	0.000041
0.000015 TGP18-5	0.000002	0.000069	0.000147	0.003124	0.002265	0.038713	0.000041
0.000017 TGP18-6	0.000001	0.000027	0.000126	0.002688	0.001959	0.032050	0.000033
0.000013 TGP18-7	0.000001	0.000029	0.000132	0.002772	0.002005	0.033667	0.000034
0.000011 TGP18-8	0.000001	0.000025	0.000134	0.002761	0.002003	0.033595	0.000032
0.000014 TGP18-9	0.000001	0.000027	0.000134	0.002855	0.002049	0.034964	0.000034
0.000009 TGP18-10	0.000001	0.000053	0.000158	0.003374	0.002454	0.042477	0.000039
0.000011 TGP18-11	0.000002	0.000044	0.000169	0.003628	0.002592	0.046021	0.000042
0.000007 TGP18-12	0.000001	0.000050	0.000170	0.003642	0.002621	0.046395	0.000043
0.000257 SRM614-2	0.000000	0.000360	0.000000	0.002216	0.001783	0.020440	0.000315
0.000292 SRM612-2	0.000298	0.012146	0.000147	0.003778	0.007635	0.035301	0.014898
0.000886 SRM610-2	0.002993	0.223893	0.001961	0.028050	0.104481	0.299496	0.233276
0.000012 AP1-2	0.000000	0.000057	0.000053	0.001512	0.001117	0.015888	0.000018
0.000010 AP2-2	0.000007	0.000040	0.000109	0.002525	0.001847	0.029399	0.000152
0.000004 AP3-2	0.000056	0.000132	0.000250	0.005529	0.004015	0.070913	0.000670
0.000008 AP4-2	0.000066	0.000171	0.000327	0.007163	0.005169	0.093644	0.001064

standardize signal averages AP							
0.000014 AP1	0.000001	0.000057	0.000071	0.001584	0.001158	0.016865	0.000022
0.000013 AP2	0.000006	0.000054	0.000132	0.002751	0.002010	0.032581	0.000162
0.000011 AP3	0.000046	0.000132	0.000263	0.005675	0.004094	0.072458	0.000666
0.000015 AP4	0.000056	0.000165	0.000336	0.007181	0.005173	0.093092	0.001040

linest from std sig ave							
5.523236	0.165485	0.004547	1.875958	0.087577	0.121419	0.006816	0.011562

standardize signal averages SRM							
0.000194 srm614-2	0.000008	0.000373	0.000089	0.002200	0.001765	0.020419	0.000290
0.000245 srm612-2	0.000254	0.011954	0.000227	0.003792	0.007524	0.036031	0.014302
0.000871 srm610-2	0.002528	0.216042	0.002170	0.028130	0.102036	0.303273	0.224675

linest from std sig ave							
0.957109	0.816111	0.963722	1.100366	1.002800	0.976092	1.012504	0.961706

concentration data							
62.47 SRM614-1	0.23	0.15	28.64	16.41	18.18	11.92	0.26
93.49 SRM612-1	2.99	4.59	49.18	28.59	77.20	21.49	13.59
405.51 SRM610-1	29.27	81.19	382.67	211.88	1037.06	179.49	214.27
36.71 AP1-1	0.13	0.10	66.11	57.87	58.06	48.51	0.12
36.80 AP2-1	0.36	0.12	115.06	104.01	105.26	97.24	0.79
39.85 AP3-1	2.40	0.24	207.05	203.40	202.09	201.22	3.05
47.09 AP4-1	2.98	0.29	257.62	251.53	250.81	251.63	4.69
42.37 TGP18-1	0.02	0.05	84.80	79.79	79.94	71.65	0.14
37.15 TGP18-2	0.04	0.04	82.52	79.32	80.35	70.21	0.13
33.48 TGP18-3	0.00	0.04	81.48	79.34	79.97	69.11	0.13
32.99 TGP18-4	0.17	0.14	115.64	111.95	112.09	108.66	0.19
33.58 TGP18-5	0.16	0.13	110.04	109.15	109.71	105.26	0.19
38.28 TGP18-6	0.05	0.05	94.37	93.91	94.87	87.15	0.15
29.67 TGP18-7	0.03	0.05	98.59	96.83	97.13	91.54	0.15
25.10 TGP18-8	0.06	0.05	100.41	96.47	97.04	91.35	0.15
30.62 TGP18-9	0.06	0.05	100.36	99.75	99.27	95.07	0.16

Appendix A. Raw trace element datasheets from laser ablation.

20.02 TGP18-10	0.09	0.10	118.10	117.86	118.87	115.50	0.18	
25.10 TGP18-11	0.14	0.08	126.14	126.74	125.56	125.14	0.19	
15.53 TGP18-12	0.06	0.09	127.46	127.25	126.94	126.15	0.20	
565.66 SRM614-2	0.00	0.65	0.00	77.43	86.39	55.58	1.45	
138.22 SRM612-2	4.22	4.74	23.73	28.38	79.50	20.64	14.77	
419.71 SRM610-2	42.48	87.31	315.54	210.68	1087.98	175.07	231.32	
5.69 AP1-2	0.00	0.02	8.59	11.36	11.63	9.29	0.02	
22.28 AP2-2	0.44	0.07	81.88	88.20	89.45	79.94	0.70	
8.86 AP3-2	3.71	0.24	187.20	193.18	194.50	192.82	3.09	
18.56 AP4-2	4.35	0.31	244.89	250.27	250.38	254.63	4.91	
certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	0.77	
SRM612		31.63	76.15	76.15	76.15	76.15	38.25	
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90	
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00	
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88	
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82	
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94	
Br								
raw data								
392 blank-7b		54	153	186	115	100	75	40
1080 SRM614-7b		138	942	680	3664	2844	31654	444
1263 SRM612-7		766	28364	976	6728	15971	59587	21721
1519 SRM610-7		2322	153621	2405	23189	76681	222453	176079
1008 AP1-7		104	1198	1204	14402	10603	134545	203
1017 AP2-7		158	926	1712	24945	18176	249006	1237
1019 AP3-7		230	862	1824	24845	18037	251653	3111
981 AP4-7		369	1324	2317	35763	26077	379385	5019
921 MZ3-1		84	544	1327	17020	12343	163350	618
972 MZ3-2		88	568	1431	19102	14090	189268	515
890 MZ3-3		103	500	1221	14653	10797	140038	426
1199 MZ3-4		114	1550	7261	136999	98338	1668860	1640
1073 MZ3-5		112	1203	4833	83567	60419	991615	1064
1117 MZ3-6		111	1402	5860	108921	78010	1299683	1371
1058 MZ3-7		116	1361	5600	103021	73936	1221298	1428
1053 MZ3-8		148	1352	5345	98104	70485	1155916	1315
1021 MZ3-9		123	1182	5364	98042	70249	1152044	1162
1028 srm614-8		113	824	598	2699	2185	23090	351
1186 srm612-8		553	20359	764	4945	11607	42375	16181
1360 srm610-8		1981	127366	2004	19882	63885	190693	156684
931 AP1-8		104	1133	1021	10840	8257	102070	160
917 AP2-8		145	765	1395	19388	14357	191534	1010
878 AP3-8		210	766	1724	24448	17826	246053	3379
882 AP4-8		330	926	2032	31068	22868	322536	5133
760 blank-8		79	614	420	173	240	557	32
576 blank ave		67	383	303	144	170	316	36
blank subtraction								
503.76 SRM614-7b		71.14	558.28	377.20	3519.88	2674.28	31338.02	408.34
687.36 SRM612-7		699.50	27980.96	672.80	6583.46	15800.83	59271.46	21684.70
942.81 SRM610-7		2254.75	153237.71	2102.13	23045.23	76510.49	222136.84	176042.69
432.40 AP1-7		37.18	814.40	901.37	14258.22	10433.16	134229.31	166.78
441.24 AP2-7		91.50	542.16	1409.01	24801.20	18005.72	248690.16	1201.23
442.68 AP3-7		162.70	478.84	1520.61	24700.56	17866.80	251337.33	3074.56
404.60 AP4-7		302.34	940.41	2013.65	35618.62	25906.69	379068.53	4982.93
344.72 MZ3-1		17.22	160.40	1023.61	16876.31	12173.01	163033.59	582.18
396.24 MZ3-2		21.50	184.08	1128.01	18957.61	13920.18	188951.91	479.06
313.96 MZ3-3		35.66	116.16	918.09	14509.26	10627.08	139722.19	389.38
622.60 MZ3-4		47.46	1166.21	6957.76	136855.08	98168.13	1668543.80	1603.71
497.04 MZ3-5		45.58	819.44	4529.59	83422.65	60249.28	991298.88	1028.03
541.00 MZ3-6		44.38	1018.73	5557.03	108777.03	77839.94	1299367.00	1334.91
482.40 MZ3-7		48.70	977.65	5296.55	102876.76	73766.35	1220981.90	1391.39
477.08 MZ3-8		81.34	968.53	5042.43	97960.17	70315.06	1155600.00	1278.39
445.40 MZ3-9		55.90	798.52	5061.35	97897.97	70078.45	1151728.40	1125.79
451.72 srm614-8		46.34	440.20	295.48	2555.23	2014.55	22773.53	314.70
610.28 srm612-8		486.46	19975.71	461.44	4800.37	11437.33	42059.16	16144.59
783.64 srm610-8		1914.63	126982.64	1700.93	19737.93	63715.30	190377.03	156647.50
355.52 AP1-8		37.42	749.04	717.76	10695.36	8087.27	101754.45	123.58
341.40 AP2-8		78.22	382.00	1092.37	19244.09	14186.50	191217.80	973.39
302.00 AP3-8		143.42	382.68	1420.65	24303.40	17656.12	245736.55	3342.48
306.40 AP4-8		262.86	542.96	1729.13	30924.20	22698.23	322219.94	5097.05
zero correction								
503.76 SRM614-7b		71.14	558.28	377.20	3519.88	2674.28	31338.02	408.34
687.36 SRM612-7		699.50	27980.96	672.80	6583.46	15800.83	59271.46	21684.70
942.81 SRM610-7		2254.75	153237.71	2102.13	23045.23	76510.49	222136.84	176042.69

Appendix A. Raw trace element datasheets from laser ablation.

432.40	AP1-7	37.18	814.40	901.37	14258.22	10433.16	134229.31	166.78
441.24	AP2-7	91.50	542.16	1409.01	24801.20	18005.72	248690.16	1201.23
442.68	AP3-7	162.70	478.84	1520.61	24700.56	17866.80	251337.33	3074.56
404.60	AP4-7	302.34	940.41	2013.65	35618.62	25906.69	379068.53	4982.93
344.72	MZ3-1	17.22	160.40	1023.61	16876.31	12173.01	163033.59	582.18
396.24	MZ3-2	21.50	184.08	1128.01	18957.61	13920.18	188951.91	479.06
313.96	MZ3-3	35.66	116.16	918.09	14509.26	10627.08	139722.19	389.38
622.60	MZ3-4	47.46	1166.21	6957.76	136855.08	98168.13	1668543.80	1603.71
497.04	MZ3-5	45.58	819.44	4529.59	83422.65	60249.28	991298.88	1028.03
541.00	MZ3-6	44.38	1018.73	5557.03	108777.03	77839.94	1299367.00	1334.91
482.40	MZ3-7	48.70	977.65	5296.55	102876.76	73766.35	1220981.90	1391.39
477.08	MZ3-8	81.34	968.53	5042.43	97960.17	70315.06	1155600.00	1278.39
445.40	MZ3-9	55.90	798.52	5061.35	97897.97	70078.45	1151728.40	1125.79
451.72	srM614-8	46.34	440.20	295.48	2555.23	2014.55	22773.53	314.70
610.28	srM612-8	486.46	19975.71	461.44	4800.37	11437.33	42059.16	16144.59
783.64	srM610-8	1914.63	126982.64	1700.93	19737.93	63715.30	190377.03	156647.50
355.52	AP1-8	37.42	749.04	717.76	10695.36	8087.27	101754.45	123.58
341.40	AP2-8	78.22	382.00	1092.37	19244.09	14186.50	191217.80	973.39
302.00	AP3-8	143.42	382.68	1420.65	24303.40	17656.12	245736.55	3342.48
306.40	AP4-8	262.86	542.96	1729.13	30924.20	22698.23	322219.94	5097.05

certified concentration								
SRM614		0.87	44.30	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012

standardized signal								
0.000356	SRM614-7b	0.000050	0.000394	0.000266	0.002485	0.001888	0.022124	0.000288
0.000445	SRM612-7	0.000453	0.018132	0.000436	0.004266	0.010239	0.038408	0.014052
0.001329	SRM610-7	0.003178	0.215991	0.002963	0.032483	0.107843	0.313106	0.248135
0.000048	AP1-7	0.000004	0.000090	0.000100	0.001574	0.001152	0.014823	0.000018
0.000053	AP2-7	0.000011	0.000065	0.000168	0.002958	0.002147	0.029657	0.000143
0.000053	AP3-7	0.000019	0.000057	0.000182	0.002955	0.002138	0.030069	0.000368
0.000052	AP4-7	0.000039	0.000120	0.000258	0.004560	0.003316	0.048526	0.000638
0.000076	MZ3-1	0.000004	0.000035	0.000226	0.003731	0.002691	0.036039	0.000129
0.000087	MZ3-2	0.000005	0.000040	0.000247	0.004143	0.003042	0.041292	0.000105
0.000076	MZ3-3	0.000009	0.000028	0.000223	0.003523	0.002581	0.033930	0.000095
0.000047	MZ3-4	0.000004	0.000087	0.000520	0.010233	0.007341	0.124766	0.000120
0.000048	MZ3-5	0.000004	0.000079	0.000437	0.008048	0.005812	0.095632	0.000099
0.000042	MZ3-6	0.000003	0.000080	0.000436	0.008533	0.006106	0.101924	0.000105
0.000038	MZ3-7	0.000004	0.000077	0.000419	0.008130	0.005829	0.096486	0.000110
0.000038	MZ3-8	0.000007	0.000078	0.000405	0.007868	0.005647	0.092810	0.000103
0.000036	MZ3-9	0.000004	0.000064	0.000405	0.007831	0.005606	0.092127	0.000090
0.000445	srM614-8	0.000046	0.000434	0.000291	0.002517	0.001984	0.022432	0.000310
0.000558	srM612-8	0.000445	0.018255	0.000422	0.004387	0.010452	0.038437	0.014754
0.001257	srM610-8	0.003072	0.203730	0.002729	0.031667	0.102224	0.305439	0.251323
0.000050	AP1-8	0.000005	0.000106	0.000102	0.001519	0.001148	0.014450	0.000018
0.000048	AP2-8	0.000011	0.000054	0.000155	0.002727	0.002010	0.027094	0.000138
0.000039	AP3-8	0.000019	0.000050	0.000184	0.003145	0.002285	0.031803	0.000433
0.000043	AP4-8	0.000037	0.000077	0.000245	0.004387	0.003220	0.045712	0.000723

standardize signal averages AP								
0.000049	AP1	0.000005	0.000098	0.000101	0.001547	0.001150	0.014636	0.000018
0.000050	AP2	0.000011	0.000059	0.000161	0.002842	0.002079	0.028376	0.000141
0.000046	AP3	0.000019	0.000053	0.000183	0.003050	0.002211	0.030936	0.000400
0.000048	AP4	0.000038	0.000099	0.000252	0.004473	0.003268	0.047119	0.000680

linest from std sig ave								
1.548010		0.270739	0.004927	2.361362	0.135992	0.186218	0.013215	0.017979

standardize signal averages SRM								
0.000400	srM614-2	0.000048	0.000414	0.000279	0.002501	0.001936	0.022278	0.000299
0.000502	srM612-2	0.000449	0.018193	0.000429	0.004326	0.010346	0.038422	0.014403
0.001293	srM610-2	0.003125	0.209860	0.002846	0.032075	0.105034	0.309272	0.249729

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
1.000131	1.016868	1.028970	1.039785	1.012123	1.026374	1.012104	0.993557
concentration data							
47.22 SRM614-7b	1.17	0.17	53.93	28.98	30.15	25.07	0.44
59.13 SRM612-7	10.52	7.66	88.29	49.76	163.52	43.53	21.67
176.43 SRM610-7	73.79	91.27	600.06	378.85	1722.32	354.86	382.60
29.49 AP1-7	0.44	0.18	93.77	85.42	85.59	78.14	0.13
32.50 AP2-7	1.18	0.13	158.29	160.46	159.52	156.35	1.03
32.71 AP3-7	2.10	0.11	171.37	160.32	158.79	158.52	2.64
31.99 AP4-7	4.18	0.24	242.83	247.37	246.37	255.83	4.58
47.06 MZ3-1	0.41	0.07	213.16	202.39	199.90	190.00	0.92
53.47 MZ3-2	0.51	0.08	232.21	224.75	225.99	217.69	0.75
47.08 MZ3-3	0.94	0.06	210.03	191.15	191.72	178.88	0.68
28.75 MZ3-4	0.38	0.17	490.11	555.18	545.32	657.76	0.86
29.61 MZ3-5	0.47	0.16	411.65	436.62	431.80	504.17	0.71
26.21 MZ3-6	0.38	0.16	410.63	462.91	453.60	537.33	0.75
23.54 MZ3-7	0.42	0.15	394.29	441.05	433.05	508.67	0.79
23.66 MZ3-8	0.71	0.15	381.50	426.83	419.53	489.29	0.74
22.00 MZ3-9	0.48	0.13	381.39	424.84	416.43	485.69	0.65
59.07 srm614-8	1.06	0.18	58.94	29.35	31.69	25.42	0.48
74.04 srm612-8	10.32	7.71	85.40	51.17	166.93	43.56	22.75
166.92 srm610-8	71.33	86.09	552.66	369.34	1632.59	346.17	387.52
31.18 AP1-8	0.57	0.21	96.02	82.40	85.32	76.18	0.13
29.87 AP2-8	1.20	0.11	145.81	147.93	149.33	142.84	0.99
24.14 AP3-8	2.00	0.10	173.20	170.64	169.75	167.66	3.10
26.84 AP4-8	4.03	0.15	231.09	238.01	239.22	240.99	5.19

certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
773.64 blank-5	135.76	215.44	397.60	208.84	128.04	453.60	40.52
1391.77 SRM614-5	167.64	1966.29	957.69	9018.89	7257.88	83042.43	1155.69
1274.33 SRM612-5	1167.37	48840.88	1450.49	13582.96	29051.48	125595.03	46215.54
1491.17 SRM610-5	3168.02	261421.98	3142.58	32483.62	122363.53	324471.00	236483.73
943.29 AP1-5	96.56	1746.85	1755.29	24791.78	18690.15	248564.84	370.00
1026.37 AP2-5	312.64	1903.29	3843.10	64567.65	47657.51	724619.38	3399.82
1055.81 AP3-5	1052.13	1941.41	4971.07	89984.59	64700.68	1046139.40	11082.82
1076.93 AP4-5	2173.45	4641.07	8619.21	166082.66	120332.00	2044062.50	23226.05
1312.97 V1-1	121.00	5771.55	2173.57	33916.91	26576.35	352614.91	2136.17
1485.81 V1-2	128.16	2868.34	2899.98	48889.80	36460.97	543882.75	2205.69
1229.61 V1-3	111.20	2848.58	2181.01	32846.75	24858.26	347043.03	1395.17
996.97 V1-4	119.52	6718.88	2071.65	30678.93	24920.98	316282.56	1211.53
958.17 V1-5	113.76	3530.26	2038.57	30438.49	23700.73	318339.31	830.96
950.21 V1-6	121.24	2944.18	1894.33	27393.64	21028.76	278915.72	1127.41
950.97 V1-7	120.52	3922.22	1919.25	28907.96	22529.29	297809.84	1561.57
920.77 V1-8	89.40	3017.42	2043.73	29923.97	22470.65	305348.13	1368.45
964.13 V1-9	121.60	3709.62	2568.61	40434.43	30637.53	431584.50	3321.22
845.84 V1-10	114.88	2021.57	1585.85	22522.01	16745.90	223423.38	593.64
856.20 V1-11	102.36	1656.97	1636.89	23891.78	18090.26	240402.36	656.00
844.40 V1-12	115.48	1653.85	1574.17	21990.76	16487.89	219748.20	555.08
917.25 V1-13	81.24	6613.36	1584.77	21834.20	18426.06	218444.34	735.52
905.45 V1-14	91.52	1763.05	1503.21	19710.15	14771.04	192586.13	575.20
812.28 V1-15	125.40	3484.58	1577.49	22455.05	17555.90	224083.42	641.84
1141.29 SRM614-6	115.28	944.13	570.68	2960.74	2331.01	24743.58	409.48
1385.25 SRM612-6	926.89	33510.71	1117.09	9087.33	19779.55	81631.14	33196.39
1520.29 SRM610-6	3369.78	288848.75	2975.70	31969.94	131946.58	324680.34	252127.22
959.41 AP1-6	70.72	1604.17	1258.41	15939.61	12288.99	153777.31	201.56
1016.81 AP2-6	231.00	1242.45	2634.65	42471.20	31144.86	463206.19	2517.53
938.97 AP3-6	760.96	1596.93	4112.38	70625.59	51321.81	815711.38	9123.89
920.65 AP4-6	1363.49	3049.82	5473.95	99528.00	71799.36	1187248.80	15138.25
625.04 blank-6	93.24	354.28	422.88	186.12	187.44	665.24	38.36
699.34 blank average	114.50	284.86	410.24	197.48	157.74	559.42	39.44

blank subtraction							
692.42 SRM614-5	53.14	1681.43	547.44	8821.41	7100.14	82483.01	1116.25
574.98 SRM612-5	1052.87	48556.01	1040.25	13385.47	28893.74	125035.61	46176.10
791.82 SRM610-5	3053.52	261137.12	2732.34	32286.14	122205.79	323911.58	236444.29
243.94 AP1-5	-17.94	1461.99	1345.05	24594.30	18532.40	248005.42	330.56
327.02 AP2-5	198.14	1618.43	3432.86	64370.16	47499.77	724059.96	3360.38

Appendix A. Raw trace element datasheets from laser ablation.

356.46	AP3-5	937.63	1656.55	4560.83	88787.10	64542.94	1045579.98	11043.38
377.58	AP4-5	2058.95	4356.20	8208.97	165885.18	120174.26	2043503.08	23186.61
613.62	V1-1	6.50	5486.69	1763.33	33719.43	26418.61	352055.49	2096.73
786.46	V1-2	13.66	2583.47	2489.73	48692.32	36303.22	543323.33	2166.25
530.26	V1-3	-3.30	2563.71	1770.77	32649.26	24700.52	346483.61	1355.73
297.62	V1-4	5.02	6434.02	1661.41	30481.45	24763.24	315723.14	1172.09
258.82	V1-5	-0.74	3245.40	1628.33	30241.01	23542.99	317779.89	791.52
250.86	V1-6	6.74	2659.31	1484.09	27196.15	20871.02	278356.30	1087.97
251.62	V1-7	6.02	3637.36	1509.01	28710.48	22371.55	297250.42	1522.13
221.42	V1-8	-25.10	2732.56	1633.49	29726.49	22312.91	304788.71	1329.01
264.78	V1-9	7.10	3424.76	2158.37	40236.95	30479.79	431025.08	3281.78
146.50	V1-10	0.38	1736.71	1175.61	22324.52	16588.15	222863.96	554.20
156.86	V1-11	-12.14	1372.11	1226.65	23694.29	17932.52	239842.94	616.56
145.06	V1-12	0.98	1368.99	1163.93	21793.28	16330.15	219188.78	515.64
217.90	V1-13	-33.26	6328.50	1174.53	21636.72	18268.32	217884.92	696.08
206.10	V1-14	-22.98	1478.19	1092.97	19512.67	14613.30	192026.71	535.76
112.94	V1-15	10.90	3199.72	1167.25	22257.57	17398.16	223524.00	602.40
441.94	SRM614-6	0.78	659.26	160.44	2763.26	2173.27	24184.15	370.04
685.90	SRM612-6	812.38	33225.85	706.84	8889.85	19621.81	81071.72	33156.95
820.94	SRM610-6	3255.28	288563.89	2565.45	31772.46	131788.84	324120.92	252087.78
260.06	AP1-6	-43.78	1319.31	848.16	15742.13	12131.25	153217.89	162.12
317.46	AP2-6	116.50	957.59	2224.41	42273.72	30987.11	462646.77	2478.09
239.62	AP3-6	646.46	1312.07	3702.14	70428.11	51164.07	815151.96	9084.45
221.30	AP4-6	1248.99	2764.96	5063.71	99330.52	71641.62	1186689.38	15098.80
zero correction								
692.42	SRM614-5	53.14	1681.43	547.44	8821.41	7100.14	82483.01	1116.25
574.98	SRM612-5	1052.87	48556.01	1040.25	13385.47	28893.74	125035.61	46176.10
791.82	SRM610-5	3053.52	261137.12	2732.34	32286.14	122205.79	323911.58	236444.29
243.94	AP1-5	0.00	1461.99	1345.05	24594.30	18532.40	248005.42	330.56
327.02	AP2-5	198.14	1618.43	3432.86	64370.16	47499.77	724059.96	3360.38
356.46	AP3-5	937.63	1656.55	4560.83	88787.10	64542.94	1045579.98	11043.38
377.58	AP4-5	2058.95	4356.20	8208.97	165885.18	120174.26	2043503.08	23186.61
613.62	V1-1	6.50	5486.69	1763.33	33719.43	26418.61	352055.49	2096.73
786.46	V1-2	13.66	2583.47	2489.73	48692.32	36303.22	543323.33	2166.25
530.26	V1-3	0.00	2563.71	1770.77	32649.26	24700.52	346483.61	1355.73
297.62	V1-4	5.02	6434.02	1661.41	30481.45	24763.24	315723.14	1172.09
258.82	V1-5	0.00	3245.40	1628.33	30241.01	23542.99	317779.89	791.52
250.86	V1-6	6.74	2659.31	1484.09	27196.15	20871.02	278356.30	1087.97
251.62	V1-7	6.02	3637.36	1509.01	28710.48	22371.55	297250.42	1522.13
221.42	V1-8	0.00	2732.56	1633.49	29726.49	22312.91	304788.71	1329.01
264.78	V1-9	7.10	3424.76	2158.37	40236.95	30479.79	431025.08	3281.78
146.50	V1-10	0.38	1736.71	1175.61	22324.52	16588.15	222863.96	554.20
156.86	V1-11	0.00	1372.11	1226.65	23694.29	17932.52	239842.94	616.56
145.06	V1-12	0.98	1368.99	1163.93	21793.28	16330.15	219188.78	515.64
217.90	V1-13	0.00	6328.50	1174.53	21636.72	18268.32	217884.92	696.08
206.10	V1-14	0.00	1478.19	1092.97	19512.67	14613.30	192026.71	535.76
112.94	V1-15	10.90	3199.72	1167.25	22257.57	17398.16	223524.00	602.40
441.94	SRM614-6	0.78	659.26	160.44	2763.26	2173.27	24184.15	370.04
685.90	SRM612-6	812.38	33225.85	706.84	8889.85	19621.81	81071.72	33156.95
820.94	SRM610-6	3255.28	288563.89	2565.45	31772.46	131788.84	324120.92	252087.78
260.06	AP1-6	0.00	1319.31	848.16	15742.13	12131.25	153217.89	162.12
317.46	AP2-6	116.50	957.59	2224.41	42273.72	30987.11	462646.77	2478.09
239.62	AP3-6	646.46	1312.07	3702.14	70428.11	51164.07	815151.96	9084.45
221.30	AP4-6	1248.99	2764.96	5063.71	99330.52	71641.62	1186689.38	15098.80
certified concentration								
	SRM614		0.87	44.30	44.30	44.30	44.30	0.77
	SRM612		31.63	76.15	76.15	76.15	76.15	38.25
	SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22	STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44	STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69	STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72	STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration								
0.000000	SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000	SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000	SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081	STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084	STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064	STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069	STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal								
0.000174	SRM614-5	0.000013	0.000423	0.000138	0.002221	0.001787	0.020764	0.000281
0.000164	SRM612-5	0.000301	0.013884	0.000297	0.003827	0.008262	0.035752	0.013203
0.000728	SRM610-5	0.002807	0.240091	0.002512	0.029684	0.112357	0.297806	0.217388

Appendix A. Raw trace element datasheets from laser ablation.

0.000016 AP1-5	0.000000	0.000094	0.000086	0.001581	0.001191	0.015943	0.000021
0.000015 AP2-5	0.000009	0.000074	0.000156	0.002928	0.002160	0.032933	0.000153
0.000018 AP3-5	0.000048	0.000086	0.000235	0.004583	0.003331	0.053967	0.000570
0.000019 AP4-5	0.000105	0.000222	0.000419	0.008467	0.006134	0.104303	0.001183
0.000066 V1-1	0.000001	0.000590	0.000190	0.003627	0.002842	0.037866	0.000226
0.000070 V1-2	0.000001	0.000229	0.000221	0.004317	0.003219	0.048174	0.000192
0.000062 V1-3	0.000000	0.000302	0.000209	0.003847	0.002910	0.040825	0.000160
0.000033 V1-4	0.000001	0.000718	0.000185	0.003399	0.002762	0.035209	0.000131
0.000027 V1-5	0.000000	0.000337	0.000169	0.003136	0.002441	0.032950	0.000082
0.000029 V1-6	0.000001	0.000302	0.000169	0.003093	0.002373	0.031653	0.000124
0.000030 V1-7	0.000001	0.000429	0.000178	0.003384	0.002637	0.035033	0.000179
0.000025 V1-8	0.000000	0.000313	0.000187	0.003402	0.002553	0.034877	0.000152
0.000023 V1-9	0.000001	0.000303	0.000191	0.003555	0.002693	0.038076	0.000290
0.000021 V1-10	0.000000	0.000254	0.000172	0.003270	0.002430	0.032648	0.000081
0.000022 V1-11	0.000000	0.000191	0.000171	0.003300	0.002498	0.033409	0.000086
0.000022 V1-12	0.000000	0.000206	0.000175	0.003278	0.002457	0.032972	0.000078
0.000035 V1-13	0.000000	0.001010	0.000187	0.003452	0.002915	0.034763	0.000111
0.000035 V1-14	0.000000	0.000250	0.000185	0.003299	0.002471	0.032469	0.000091
0.000017 V1-15	0.000002	0.000494	0.000180	0.003434	0.002685	0.034490	0.000093
0.000383 SRM614-6	0.000001	0.000571	0.000139	0.002394	0.001883	0.020949	0.000321
0.000301 SRM612-6	0.000357	0.014595	0.000311	0.003905	0.008619	0.035613	0.014565
0.000745 SRM610-6	0.002955	0.261951	0.002329	0.028842	0.119635	0.294229	0.228839
0.000025 AP1-6	0.000000	0.000128	0.000082	0.001526	0.001176	0.014849	0.000016
0.000019 AP2-6	0.000007	0.000057	0.000133	0.002522	0.001849	0.027603	0.000148
0.000013 AP3-6	0.000036	0.000074	0.000208	0.003957	0.002875	0.045798	0.000510
0.000016 AP4-6	0.000092	0.000203	0.000372	0.007298	0.005264	0.087188	0.001109
standardize signal averages AP							
0.000020 AP1	0.000000	0.000111	0.000084	0.001553	0.001184	0.015396	0.000018
0.000017 AP2	0.000008	0.000065	0.000144	0.002725	0.002005	0.030268	0.000150
0.000016 AP3	0.000042	0.000080	0.000222	0.004270	0.003103	0.049882	0.000540
0.000018 AP4	0.000098	0.000213	0.000396	0.007882	0.005699	0.095746	0.001146
linest from std sig ave							
4.185186	0.111528	0.003787	1.737814	0.087944	0.121421	0.007303	0.011264
standardize signal averages SRM							
0.000279 srm614-2	0.000007	0.000497	0.000138	0.002307	0.001835	0.020857	0.000301
0.000233 srm612-2	0.000329	0.014240	0.000304	0.003866	0.008441	0.035683	0.013884
0.000737 srm610-2	0.002881	0.251021	0.002420	0.029263	0.115996	0.296018	0.223114
linest from std sig ave							
0.000000	0.435431	0.020044	2.408496	0.198884	0.050348	0.019693	0.023545
concentration data							
62.57 SRM614-5	0.13	0.14	20.54	16.75	18.61	13.01	0.27
59.01 SRM612-5	2.88	4.51	44.33	28.87	86.03	22.39	12.75
261.31 SRM610-5	26.85	77.98	374.41	223.89	1170.02	186.53	210.00
26.18 AP1-5	0.00	0.14	59.94	55.47	57.71	46.45	0.10
24.83 AP2-5	0.40	0.11	108.25	102.72	104.65	95.95	0.69
30.72 AP3-5	2.15	0.13	163.20	160.78	161.37	157.23	2.56
32.18 AP4-5	4.68	0.34	290.48	297.05	297.12	303.89	5.32
110.19 V1-1	0.03	0.89	131.49	127.24	137.64	110.32	1.01
116.43 V1-2	0.05	0.35	153.04	151.47	155.92	140.35	0.86
104.32 V1-3	0.00	0.46	144.65	134.97	140.98	118.94	0.72
55.42 V1-4	0.02	1.08	128.45	119.26	133.77	102.58	0.59
44.81 V1-5	0.00	0.51	117.05	110.01	118.25	96.00	0.37
47.63 V1-6	0.03	0.46	117.00	108.50	114.96	92.22	0.56
49.51 V1-7	0.03	0.65	123.30	118.71	127.72	102.07	0.81
42.30 V1-8	0.00	0.47	129.59	119.34	123.68	101.61	0.68
39.05 V1-9	0.03	0.46	132.19	124.71	130.43	110.94	1.30
35.83 V1-10	0.00	0.38	119.39	114.74	117.71	95.12	0.36
36.48 V1-11	0.00	0.29	118.46	115.79	121.00	97.34	0.39
36.43 V1-12	0.01	0.31	121.38	115.02	118.99	96.06	0.35
58.05 V1-13	0.00	1.53	129.91	121.11	141.18	101.28	0.50
58.18 V1-14	0.00	0.38	128.12	115.75	119.69	94.60	0.41
29.10 V1-15	0.07	0.75	124.86	120.49	130.04	100.49	0.42
137.41 SRM614-6	0.01	0.19	20.71	18.05	19.60	13.12	0.31
108.15 SRM612-6	3.41	4.74	46.28	29.45	89.76	22.31	14.07
267.49 SRM610-6	28.27	85.08	347.09	217.54	1245.81	184.29	221.06
42.08 AP1-6	0.00	0.19	56.99	53.53	56.95	43.26	0.07
31.62 AP2-6	0.31	0.09	92.01	88.49	89.55	80.42	0.66
22.48 AP3-6	1.62	0.11	144.20	138.82	139.24	133.43	2.29
27.15 AP4-6	4.08	0.31	257.93	256.04	254.97	254.02	4.98
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Br	Se	Rb	Sr84	Sr86	Sr87	Sr88	Y
raw data							
730.56 blank-3	107.16	155.08	456.32	192.32	89.60	219.84	47.80
1336.25 SRM614-3	148.00	2199.93	873.32	6681.80	5662.11	60764.50	878.12
1438.13 SRM612-3	998.21	38101.13	1254.13	10833.46	23094.73	101872.41	39471.42
1632.93 SRM610-3	3027.30	255601.00	2993.86	30401.01	118726.70	312410.63	218977.55
1056.29 AP1-3	110.48	1747.17	2671.22	41258.47	30424.65	440325.88	555.28
1018.53 AP2-3	265.52	1329.85	3473.50	58504.17	42578.60	656882.88	3078.38
1096.01 AP3-3	892.77	1804.81	5385.39	94730.01	69165.59	1144665.80	11649.27
968.13 AP4-3	1237.09	2905.82	6239.16	114411.16	82726.23	1398199.90	18263.14
870.56 V3-1	94.76	3816.90	1698.93	23278.85	18401.02	233961.36	396.88
820.44 V3-2	103.76	954.85	1860.81	27402.72	20220.40	284785.09	417.40
811.72 V3-3	118.96	1378.65	2009.61	29205.48	21554.72	306845.97	407.88
887.64 V3-4	142.32	3421.46	3515.06	62571.99	45552.98	735730.50	848.52
891.57 V3-5	142.68	1405.53	3358.22	58584.97	41877.27	686908.50	766.76
978.49 V3-6	149.72	1401.81	4290.90	77775.40	55923.79	929188.38	869.24
1159.21 V3-7	250.84	3632.34	8620.61	166642.14	119713.79	2082487.90	2194.61
1223.17 V3-8	201.44	1062.41	9259.21	180273.14	128562.92	2266054.00	1981.41
1231.97 V3-9	252.32	935.69	9784.38	195644.47	138676.94	2460600.00	2166.69
1293.33 SRM614-4	117.04	1099.41	632.72	4615.67	3646.74	40372.59	655.00
1479.29 SRM612-4	801.68	27259.03	1023.89	7879.40	16689.01	71374.68	29338.56
1599.97 SRM610-4	2604.89	225269.31	2447.85	24696.66	102252.41	247904.31	182324.50
971.25 AP1-4	106.84	1256.77	1969.57	28965.60	21416.20	303664.78	366.64
948.69 AP2-4	236.36	996.17	2254.57	36337.56	26230.95	388853.34	2079.81
828.92 AP3-4	756.20	1470.09	4324.54	77508.12	56260.96	924072.81	9761.54
928.65 AP4-4	959.49	1967.53	4575.11	84098.07	60820.70	1017463.90	14210.40
632.12 blank-4	101.68	312.20	400.24	238.40	225.52	1061.21	32.56
681.34 blank average	104.42	233.64	428.28	215.36	157.56	640.52	40.18

blank subtraction							
654.90 SRM614-3	43.58	1966.29	445.04	6466.44	5504.55	60123.98	837.94
756.78 SRM612-3	893.79	37867.49	825.84	10618.10	22937.17	101231.89	39431.24
951.59 SRM610-3	2922.88	255367.36	2565.57	30185.65	118569.14	311770.11	218937.37
374.94 AP1-3	6.06	1513.53	2242.93	41043.11	30267.09	439685.36	515.10
337.18 AP2-3	161.10	1096.21	3045.22	58288.81	42421.04	656242.36	3038.20
414.66 AP3-3	788.34	1571.17	4957.11	94514.65	69008.03	1143825.28	11609.09
286.78 AP4-3	1132.67	2672.18	5810.87	114195.80	82568.67	1397559.38	18222.96
189.22 V3-1	-9.66	3583.26	1270.65	23063.49	18243.46	233320.84	356.70
139.10 V3-2	-0.66	721.20	1432.53	27187.35	20062.83	284144.57	377.22
130.38 V3-3	14.54	1145.01	1581.33	28990.12	21397.16	306205.45	367.70
206.30 V3-4	37.90	3187.82	3086.78	62356.63	45395.42	735089.98	808.34
210.22 V3-5	38.26	1171.89	2929.94	58369.61	41719.71	686267.98	726.58
297.14 V3-6	45.30	1168.17	3862.62	77560.04	55766.23	928547.86	829.06
477.86 V3-7	146.42	3398.70	8192.33	166426.78	119556.23	2081847.38	2154.43
541.82 V3-8	97.02	828.76	8830.93	180057.78	128405.36	2265413.48	1941.23
550.62 V3-9	147.90	702.04	9356.09	195429.11	138519.38	2459419.48	2126.51
611.98 SRM614-4	12.62	865.76	204.44	4400.30	3489.18	39732.06	614.82
797.94 SRM612-4	697.26	27025.39	595.60	7664.04	16531.45	70734.16	29298.38
918.63 SRM610-4	2500.47	225035.67	2019.57	24481.30	102094.85	247263.79	182284.32
289.90 AP1-4	2.42	1023.13	1541.29	28750.24	21258.64	303024.26	326.46
267.34 AP2-4	131.94	762.52	1826.29	36122.20	26073.39	388212.82	2039.63
147.58 AP3-4	651.78	1236.45	3896.26	77292.76	56103.40	923432.29	9721.35
247.30 AP4-4	855.06	1733.89	4146.82	83882.71	60663.14	1016823.38	14170.22

zero correction							
654.90 SRM614-3	43.58	1966.29	445.04	6466.44	5504.55	60123.98	837.94
756.78 SRM612-3	893.79	37867.49	825.84	10618.10	22937.17	101231.89	39431.24
951.59 SRM610-3	2922.88	255367.36	2565.57	30185.65	118569.14	311770.11	218937.37
374.94 AP1-3	6.06	1513.53	2242.93	41043.11	30267.09	439685.36	515.10
337.18 AP2-3	161.10	1096.21	3045.22	58288.81	42421.04	656242.36	3038.20
414.66 AP3-3	788.34	1571.17	4957.11	94514.65	69008.03	1143825.28	11609.09
286.78 AP4-3	1132.67	2672.18	5810.87	114195.80	82568.67	1397559.38	18222.96
189.22 V3-1	0.00	3583.26	1270.65	23063.49	18243.46	233320.84	356.70
139.10 V3-2	0.00	721.20	1432.53	27187.35	20062.83	284144.57	377.22
130.38 V3-3	14.54	1145.01	1581.33	28990.12	21397.16	306205.45	367.70
206.30 V3-4	37.90	3187.82	3086.78	62356.63	45395.42	735089.98	808.34
210.22 V3-5	38.26	1171.89	2929.94	58369.61	41719.71	686267.98	726.58
297.14 V3-6	45.30	1168.17	3862.62	77560.04	55766.23	928547.86	829.06
477.86 V3-7	146.42	3398.70	8192.33	166426.78	119556.23	2081847.38	2154.43
541.82 V3-8	97.02	828.76	8830.93	180057.78	128405.36	2265413.48	1941.23
550.62 V3-9	147.90	702.04	9356.09	195429.11	138519.38	2459419.48	2126.51
611.98 SRM614-4	12.62	865.76	204.44	4400.30	3489.18	39732.06	614.82

Appendix A. Raw trace element datasheets from laser ablation.

797.94 SRM612-4	697.26	27025.39	595.60	7664.04	16531.45	70734.16	29298.38
918.63 SRM610-4	2500.47	225035.67	2019.57	24481.30	102094.85	247263.79	182284.32
289.90 AP1-4	2.42	1023.13	1541.29	28750.24	21258.64	303024.26	326.46
267.34 AP2-4	131.94	762.52	1826.29	36122.20	26073.39	388212.82	2039.63
147.58 AP3-4	651.78	1236.45	3896.26	77292.76	56103.40	923432.29	9721.35
247.30 AP4-4	855.06	1733.89	4146.82	83882.71	60663.14	1016823.38	14170.22
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94
standardized concentration							
0.000000 SRM614	0.000000	0.000010	0.000517	0.000517	0.000517	0.000517	0.000009
0.000000 SRM612	0.000000	0.000369	0.000888	0.000888	0.000888	0.000888	0.000446
0.000000 SRM610	0.001271	0.005027	0.005800	0.005800	0.005800	0.005800	0.005246
0.000081 STD AP1	0.000000	0.000000	0.000264	0.000264	0.000264	0.000264	0.000000
0.000084 STD AP2	0.000002	0.000000	0.000333	0.000333	0.000333	0.000333	0.000002
0.000064 STD AP3	0.000006	0.000000	0.000481	0.000481	0.000481	0.000481	0.000007
0.000069 STD AP4	0.000010	0.000001	0.000579	0.000579	0.000579	0.000579	0.000012
standardized signal							
0.000239 SRM614-3	0.000016	0.000718	0.000162	0.002361	0.002009	0.021948	0.000306
0.000288 SRM612-3	0.0000340	0.014389	0.000314	0.004035	0.008715	0.038465	0.014983
0.000969 SRM610-3	0.002977	0.260100	0.002613	0.030745	0.120766	0.317548	0.222995
0.000016 AP1-3	0.000000	0.000065	0.000096	0.001750	0.001290	0.018743	0.000022
0.000018 AP2-3	0.000009	0.000060	0.000167	0.003191	0.002322	0.035924	0.000166
0.000019 AP3-3	0.000036	0.000073	0.000229	0.004364	0.003186	0.052816	0.000536
0.000015 AP4-3	0.000061	0.000143	0.000312	0.006130	0.004432	0.075023	0.000978
0.000031 V3-1	0.000000	0.000586	0.000208	0.003770	0.002982	0.038143	0.000058
0.000020 V3-2	0.000000	0.000102	0.000202	0.003829	0.002826	0.040019	0.000053
0.000016 V3-3	0.000002	0.000143	0.000198	0.003630	0.002679	0.038341	0.000046
0.000022 V3-4	0.000004	0.000338	0.000328	0.006617	0.004817	0.078002	0.000086
0.000023 V3-5	0.000004	0.000129	0.000323	0.006437	0.004601	0.075677	0.000080
0.000025 V3-6	0.000004	0.000098	0.000324	0.006498	0.004672	0.077798	0.000069
0.000022 V3-7	0.000007	0.000154	0.000372	0.007557	0.005429	0.094528	0.000098
0.000023 V3-8	0.000004	0.000035	0.000372	0.007577	0.005403	0.095331	0.000082
0.000022 V3-9	0.000006	0.000028	0.000374	0.007810	0.005536	0.098291	0.000085
0.000324 SRM614-4	0.000007	0.000459	0.000108	0.002333	0.001850	0.021062	0.000326
0.000410 SRM612-4	0.000358	0.013875	0.000306	0.003935	0.008487	0.036315	0.015042
0.001098 SRM610-4	0.002988	0.268895	0.002413	0.029253	0.121993	0.295455	0.217811
0.000016 AP1-4	0.000000	0.000056	0.000084	0.001570	0.001161	0.016548	0.000018
0.000020 AP2-4	0.000010	0.000057	0.000136	0.002691	0.001942	0.028916	0.000152
0.000008 AP3-4	0.000035	0.000066	0.000209	0.004147	0.003010	0.049539	0.000522
0.000016 AP4-4	0.000054	0.000109	0.000261	0.005270	0.003811	0.063879	0.000890
standardize signal averages AP							
0.000016 AP1	0.000000	0.000060	0.000090	0.001660	0.001226	0.017645	0.000020
0.000019 AP2	0.000009	0.000058	0.000151	0.002941	0.002132	0.032420	0.000159
0.000014 AP3	0.000036	0.000069	0.000219	0.004255	0.003098	0.051177	0.000529
0.000015 AP4	0.000057	0.000126	0.000286	0.005700	0.004122	0.069451	0.000934
linest from std sig ave							
4.637447	0.178256	0.005858	2.145270	0.109075	0.150418	0.009115	0.013291
standardize signal averages SRM							
0.000282 srm614-2	0.000011	0.000588	0.000135	0.002347	0.001930	0.021505	0.000316
0.000349 srm612-2	0.000349	0.014132	0.000310	0.003985	0.008601	0.037390	0.015012
0.001033 srm610-2	0.002982	0.264497	0.002513	0.029999	0.121380	0.306502	0.220403
linest from std sig ave							
0.000000	0.420388	0.019025	2.320373	0.193999	0.048114	0.019017	0.023828
concentration data							
95.08 SRM614-3	0.24	0.36	29.89	22.08	25.92	17.16	0.35
114.37 SRM612-3	5.19	7.23	57.73	37.74	112.43	30.07	17.08
385.48 SRM610-3	45.51	130.68	480.77	287.61	1557.93	248.24	254.19
29.57 AP1-3	0.02	0.15	81.83	76.13	77.42	68.16	0.12
34.15 AP2-3	0.63	0.14	142.67	138.85	139.35	130.63	0.88
35.42 AP3-3	2.59	0.17	195.89	189.90	191.21	192.06	2.84
28.48 AP4-3	4.32	0.34	266.96	266.75	265.98	272.81	5.19
57.23 V3-1	0.00	1.37	177.77	164.06	178.97	138.70	0.31
36.24 V3-2	0.00	0.24	172.67	166.62	169.56	145.53	0.28
30.20 V3-3	0.13	0.34	169.46	157.95	160.77	139.42	0.24

Appendix A. Raw trace element datasheets from laser ablation.

40.50 V3-4	0.29	0.79	280.32	287.92	289.06	283.65	0.45
42.89 V3-5	0.30	0.30	276.51	280.08	276.07	275.19	0.42
46.06 V3-6	0.27	0.23	276.97	282.77	280.38	282.91	0.37
40.14 V3-7	0.47	0.36	318.35	328.82	325.75	343.74	0.52
42.18 V3-8	0.29	0.08	318.04	329.71	324.25	346.66	0.43
40.71 V3-9	0.42	0.07	320.01	339.86	332.20	357.42	0.45
129.03 SRM614-4	0.10	0.23	19.94	21.82	23.86	16.47	0.37
162.93 SRM612-4	5.47	6.97	56.26	36.81	109.49	28.39	17.15
436.56 SRM610-4	45.68	135.10	443.99	273.65	1573.75	230.97	248.28
29.29 AP1-4	0.01	0.13	72.03	68.32	69.66	60.17	0.09
36.84 AP2-4	0.70	0.13	116.42	117.08	116.54	105.15	0.81
14.65 AP3-4	2.49	0.16	178.89	180.43	180.61	180.14	2.77
28.74 AP4-4	3.82	0.25	222.95	229.31	228.69	232.29	4.72
certified concentration							
SRM614		0.87	44.30	44.30	44.30	44.30	0.77
SRM612		31.63	76.15	76.15	76.15	76.15	38.25
SRM610	109.00	431.10	497.40	497.40	497.40	497.40	449.90
32.22 STD AP1	0.00	0.00	105.50	105.50	105.50	105.50	0.00
33.44 STD AP2	0.69	0.00	132.69	132.69	132.69	132.69	0.88
25.69 STD AP3	2.52	0.17	191.90	191.90	191.90	191.90	2.82
27.72 STD AP4	4.08	0.42	230.87	230.87	230.87	230.87	4.94

Appendix A. Raw trace element datasheets from laser ablation.

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-3	117.88	111.88	11.32	19.68	12.04	16.24	91.80	96.32	189.60
SRM614-3	714.96	681.72	85.12	6073.91	1712.25	824.80	431.00	2698.82	2960.34
SRM612-3	22283.09	22355.85	46.40	2850.14	1397.21	36150.52	15059.32	118305.19	45121.13
SRM610-3	117584.58	107383.16	86.68	1733.37	2936.22	136342.61	53050.06	666347.00	227315.80
AP1-3	476.32	4336.14	38.44	373.08	62.48	150.32	242.32	157781.38	1653.17
AP2-3	2036.85	10196.70	61.76	421.40	464.04	2645.05	3304.98	177646.88	8195.89
AP3-3	7718.52	15184.17	115.64	1035.49	3061.74	31681.66	28304.84	607301.63	52100.73
AP4-3	10840.70	21085.08	151.52	864.88	3925.02	29847.65	34599.79	422472.00	69773.39
EVA2.5-1	1066.33	325.04	26.60	489.20	56.36	354.76	229.00	156.92	273.60
EVA2.5-2	955.41	346.36	18.16	304.40	37.12	168.32	242.08	130.44	253.48
EVA2.5-3	1220.25	279.92	16.32	328.04	40.20	359.92	155.40	127.64	226.96
EVA2.5-4	728.76	377.32	28.48	456.76	30.32	108.56	106.24	209.12	239.08
EVA2.5-5	488.24	470.68	28.60	609.04	33.44	64.32	100.84	120.80	228.16
EVA2.5-6	485.44	528.64	19.72	608.72	36.36	84.08	81.60	78.64	230.68
EVA2.5-7	389.24	641.56	15.68	263.92	26.04	97.32	109.56	372.36	292.20
EVA2.5-8	215.32	649.20	25.68	279.72	33.96	51.20	105.12	120.52	264.96
EVA2.5-9	329.28	617.80	21.40	272.08	22.52	38.56	78.80	43.80	226.16
EVA2.5-10	218.68	301.76	15.20	219.80	24.00	93.92	109.96	224.24	360.52
EVA2.5-11	190.84	344.92	17.56	288.80	34.40	42.68	114.12	146.28	179.16
EVA2.5-12	235.56	269.64	19.08	306.60	21.36	48.72	96.76	67.00	222.60
EVA2.5-13	207.20	319.60	25.08	222.76	24.92	49.84	108.52	196.08	257.44
EVA2.5-14	229.24	312.68	14.32	213.60	31.24	27.52	117.68	80.12	251.96
EVA2.5-15	197.00	315.36	23.24	269.16	29.64	39.00	89.24	81.12	230.16
SRM614-4	517.08	522.00	65.44	3586.34	995.17	455.20	334.24	1590.57	1951.53
SRM612-4	16676.45	15837.05	39.48	1813.53	840.16	20481.83	9956.38	71948.09	28605.80
SRM610-4	100071.48	88971.58	76.32	1210.01	1937.89	102879.02	42580.44	508066.34	169462.28
AP1-4	260.08	3119.02	31.48	184.52	45.36	39.92	133.52	80591.09	991.17
AP2-4	1329.17	5980.27	33.52	211.28	210.16	1327.57	1577.77	78696.28	4538.75
AP3-4	5539.03	10762.06	79.56	633.52	1862.25	16052.25	17942.30	352747.75	33031.55
AP4-4	6534.16	10409.50	68.40	349.68	1658.13	11475.10	14244.44	144290.53	29858.21
blank-4	75.84	111.68	15.04	81.28	17.20	18.12	78.68	96.36	110.36
blank average	96.86	111.78	13.18	50.48	14.62	17.18	85.24	96.34	149.98
blank subtraction									
SRM614-3	618.10	569.94	71.94	6023.43	1697.63	807.62	345.76	2602.47	2810.36
SRM612-3	22186.23	22244.07	33.22	2799.66	1382.59	36133.34	14974.08	118208.85	44971.15
SRM610-3	117487.72	107271.38	73.50	1682.89	2921.60	136325.43	52964.82	666250.66	227165.82
AP1-3	379.46	4224.36	25.26	322.60	47.86	133.14	157.08	157685.04	1503.19
AP2-3	1939.99	10084.92	48.58	370.92	449.42	2627.87	3219.74	177550.54	8045.91
AP3-3	7621.66	15072.39	102.46	985.01	3047.12	31664.48	28219.60	607205.29	51950.75
AP4-3	10743.84	20973.30	138.34	814.40	3910.40	29830.47	34514.55	422375.66	69623.41
EVA2.5-1	969.47	213.26	13.42	438.72	41.74	337.58	143.76	60.58	123.62
EVA2.5-2	858.54	234.58	4.98	253.92	22.50	151.14	156.84	34.10	103.50
EVA2.5-3	1123.39	168.14	3.14	277.56	25.58	342.74	70.16	31.30	76.98
EVA2.5-4	631.90	265.54	15.30	406.28	15.70	91.38	21.00	112.78	89.10
EVA2.5-5	391.38	358.90	15.42	558.56	18.82	47.14	15.60	24.46	78.18
EVA2.5-6	388.58	416.86	6.54	558.24	21.74	66.90	-3.64	-17.70	80.70
EVA2.5-7	292.38	529.78	2.50	213.44	11.42	80.14	24.32	276.02	142.22
EVA2.5-8	118.46	537.42	12.50	229.24	19.34	34.02	19.88	24.18	114.98
EVA2.5-9	232.42	506.02	8.22	221.60	7.90	21.38	-6.44	-52.54	76.18
EVA2.5-10	121.82	189.98	2.02	169.32	9.38	76.74	24.72	127.90	210.54
EVA2.5-11	93.98	233.14	4.38	238.32	19.78	25.50	28.88	49.94	29.18
EVA2.5-12	138.70	157.86	5.90	256.12	6.74	31.54	11.52	-29.34	72.62
EVA2.5-13	110.34	207.82	11.90	172.28	10.30	32.66	23.28	99.74	107.46
EVA2.5-14	132.38	200.90	1.14	163.12	16.62	10.34	32.44	-16.22	101.98
EVA2.5-15	100.14	203.58	10.06	218.68	15.02	21.82	4.00	-15.22	80.18
SRM614-4	420.22	410.22	52.26	3535.86	980.55	438.02	249.00	1494.23	1801.55
SRM612-4	16579.59	15725.27	26.30	1763.05	825.54	20464.65	9871.14	71851.75	28455.82
SRM610-4	99974.62	88859.80	63.14	1159.53	1923.27	102861.84	42495.20	507970.00	169312.30
AP1-4	163.22	3007.24	18.30	134.04	30.74	22.74	48.28	80494.75	841.18
AP2-4	1232.31	5868.49	20.34	160.80	195.54	1310.39	1492.53	78599.94	4388.76
AP3-4	5442.17	10650.28	66.38	583.04	1847.63	16035.07	17857.06	352651.41	32881.57
AP4-4	6437.30	10297.72	55.22	299.20	1643.51	11457.92	14159.20	144194.19	29708.23
zero correction									
SRM614-3	618.10	569.94	71.94	6023.43	1697.63	807.62	345.76	2602.47	2810.36
SRM612-3	22186.23	22244.07	33.22	2799.66	1382.59	36133.34	14974.08	118208.85	44971.15

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	117487.72	107271.38	73.50	1682.89	2921.60	136325.43	52964.82	666250.66	227165.82
AP1-3	379.46	4224.36	25.26	322.60	47.86	133.14	157.08	157685.04	1503.19
AP2-3	1939.99	10084.92	48.58	370.92	449.42	2627.87	3219.74	177550.54	8045.91
AP3-3	7621.66	15072.39	102.46	985.01	3047.12	31664.48	28219.60	607205.29	51950.75
AP4-3	10743.84	20973.30	138.34	814.40	3910.40	29830.47	34514.55	422375.66	69623.41
EVA2.5-1	969.47	213.26	13.42	438.72	41.74	337.58	143.76	60.58	123.62
EVA2.5-2	858.54	234.58	4.98	253.92	22.50	151.14	156.84	34.10	103.50
EVA2.5-3	1123.39	168.14	3.14	277.56	25.58	342.74	70.16	31.30	76.98
EVA2.5-4	631.90	265.54	15.30	406.28	15.70	91.38	21.00	112.78	89.10
EVA2.5-5	391.38	358.90	15.42	558.56	18.82	47.14	15.60	24.46	78.18
EVA2.5-6	388.58	416.86	6.54	558.24	21.74	66.90	0.00	0.00	80.70
EVA2.5-7	292.38	529.78	2.50	213.44	11.42	80.14	24.32	276.02	142.22
EVA2.5-8	118.46	537.42	12.50	229.24	19.34	34.02	19.88	24.18	114.98
EVA2.5-9	232.42	506.02	8.22	221.60	7.90	21.38	0.00	0.00	76.18
EVA2.5-10	121.82	189.98	2.02	169.32	9.38	76.74	24.72	127.90	210.54
EVA2.5-11	93.98	233.14	4.38	238.32	19.78	25.50	28.88	49.94	29.18
EVA2.5-12	138.70	157.86	5.90	256.12	6.74	31.54	11.52	0.00	72.62
EVA2.5-13	110.34	207.82	11.90	172.28	10.30	32.66	23.28	99.74	107.46
EVA2.5-14	132.38	200.90	1.14	163.12	16.62	10.34	32.44	0.00	101.98
EVA2.5-15	100.14	203.58	10.06	218.68	15.02	21.82	4.00	0.00	80.18
SRM614-4	420.22	410.22	52.26	3535.86	980.55	438.02	249.00	1494.23	1801.55
SRM612-4	16579.59	15725.27	26.30	1763.05	825.54	20464.65	9871.14	71851.75	28455.82
SRM610-4	99974.62	88859.80	63.14	1159.53	1923.27	102861.84	42495.20	507970.00	169312.30
AP1-4	163.22	3007.24	18.30	134.04	30.74	22.74	48.28	80494.75	841.18
AP2-4	1232.31	5868.49	20.34	160.80	195.54	1310.39	1492.53	78599.94	4388.76
AP3-4	5442.17	10650.28	66.38	583.04	1847.63	16035.07	17857.06	352651.41	32881.57
AP4-4	6437.30	10297.72	55.22	299.20	1643.51	11457.92	14159.20	144194.19	29708.23

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-3	0.000152	0.000140	0.000018	0.001479	0.000417	0.000198	0.000085	0.000639	0.000690
SRM612-3	0.006226	0.006242	0.000009	0.000786	0.000388	0.010140	0.004202	0.033172	0.012620
SRM610-3	0.091185	0.083256	0.000057	0.001306	0.002268	0.105805	0.041107	0.517092	0.176309
AP1-3	0.000019	0.000211	0.000001	0.000016	0.000002	0.000007	0.000008	0.007869	0.000075
AP2-3	0.000092	0.000481	0.000002	0.000018	0.000021	0.000125	0.000154	0.008465	0.000384
AP3-3	0.000326	0.000644	0.000004	0.000042	0.000130	0.001353	0.001206	0.025954	0.002221
AP4-3	0.000533	0.001040	0.000007	0.000040	0.000194	0.001479	0.001711	0.020937	0.003451
EVA2.5-1	0.000084	0.000018	0.000001	0.000038	0.000004	0.000029	0.000012	0.000005	0.000011
EVA2.5-2	0.000108	0.000030	0.000001	0.000032	0.000003	0.000019	0.000020	0.000004	0.000013
EVA2.5-3	0.000129	0.000019	0.000000	0.000032	0.000003	0.000039	0.000008	0.000004	0.000009
EVA2.5-4	0.000043	0.000018	0.000001	0.000028	0.000001	0.000006	0.000001	0.000008	0.000006
EVA2.5-5	0.000022	0.000020	0.000001	0.000032	0.000001	0.000003	0.000001	0.000001	0.000004
EVA2.5-6	0.000021	0.000022	0.000000	0.000030	0.000001	0.000004	0.000000	0.000000	0.000004
EVA2.5-7	0.000025	0.000045	0.000000	0.000018	0.000001	0.000007	0.000002	0.000023	0.000012
EVA2.5-8	0.000009	0.000042	0.000001	0.000018	0.000002	0.000003	0.000002	0.000002	0.000009
EVA2.5-9	0.000017	0.000037	0.000001	0.000016	0.000001	0.000002	0.000000	0.000000	0.000006
EVA2.5-10	0.000013	0.000020	0.000000	0.000018	0.000001	0.000008	0.000003	0.000014	0.000022
EVA2.5-11	0.000008	0.000021	0.000000	0.000021	0.000002	0.000002	0.000003	0.000004	0.000003
EVA2.5-12	0.000012	0.000013	0.000000	0.000022	0.000001	0.000003	0.000001	0.000000	0.000006
EVA2.5-13	0.000009	0.000018	0.000001	0.000015	0.000001	0.000003	0.000002	0.000009	0.000009
EVA2.5-14	0.000010	0.000016	0.000000	0.000013	0.000001	0.000001	0.000003	0.000000	0.000008

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000008	0.000016	0.000001	0.000017	0.000001	0.000002	0.000000	0.000000	0.000006
SRM614-4	0.000174	0.000170	0.000022	0.001463	0.000406	0.000181	0.000103	0.000618	0.000746
SRM612-4	0.007322	0.006945	0.000012	0.000779	0.000365	0.009038	0.004360	0.031734	0.012568
SRM610-4	0.106095	0.094300	0.000067	0.001231	0.002041	0.109159	0.045097	0.539068	0.179677
AP1-4	0.000011	0.000209	0.000001	0.000009	0.000002	0.000002	0.000003	0.005598	0.000059
AP2-4	0.000084	0.000400	0.000001	0.000011	0.000013	0.000089	0.000102	0.005362	0.000299
AP3-4	0.000327	0.000640	0.000004	0.000035	0.000111	0.000964	0.001074	0.021207	0.001977
AP4-4	0.000484	0.000774	0.000004	0.000022	0.000124	0.000861	0.001064	0.010841	0.002233

standardize signal averages AP

AP1	0.000015	0.000210	0.000001	0.000013	0.000002	0.000004	0.000006	0.006734	0.000067
AP2	0.000088	0.000441	0.000002	0.000014	0.000017	0.000107	0.000128	0.006913	0.000341
AP3	0.000327	0.000642	0.000004	0.000039	0.000121	0.001159	0.001140	0.023581	0.002099
AP4	0.000508	0.000907	0.000006	0.000031	0.000159	0.001170	0.001388	0.015889	0.002842

linest from std sig ave

0.018421	0.037268	0.000000	0.000000	0.000000	0.008495	0.023785	0.004395	0.012431
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standardize signal averages SRM

srM614-2	0.000163	0.000155	0.000020	0.001471	0.000411	0.000190	0.000094	0.000629	0.000718
srM612-2	0.006774	0.006594	0.000010	0.000782	0.000376	0.009589	0.004281	0.032453	0.012594
srM610-2	0.098640	0.088778	0.000062	0.001268	0.002154	0.107482	0.043102	0.528080	0.177993

linest from std sig ave

0.052046	0.049589	0.000000	0.000000	0.000000	0.025976	0.070241	0.009767	0.026007
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concentration data

SRM614-3	0.24	0.45	0.00	0.00	0.00	0.14	0.17	0.24	0.74
SRM612-3	9.84	19.95	0.00	0.00	0.00	7.39	8.57	12.50	13.45
SRM610-3	144.05	266.10	0.00	0.00	0.00	77.09	83.85	194.91	187.97
AP1-3	0.14	3.13	0.00	0.00	0.00	0.02	0.07	13.80	0.37
AP2-3	0.68	7.15	0.00	0.00	0.00	0.42	1.46	14.84	1.90
AP3-3	2.39	9.58	0.00	0.00	0.00	4.59	11.45	45.51	11.01
AP4-3	3.91	15.46	0.00	0.00	0.00	5.01	16.23	36.71	17.12
EVA2.5-1	0.62	0.27	0.00	0.00	0.00	0.10	0.12	0.01	0.05
EVA2.5-2	0.80	0.44	0.00	0.00	0.00	0.06	0.19	0.01	0.06
EVA2.5-3	0.95	0.29	0.00	0.00	0.00	0.13	0.08	0.01	0.04
EVA2.5-4	0.32	0.27	0.00	0.00	0.00	0.02	0.01	0.01	0.03
EVA2.5-5	0.16	0.30	0.00	0.00	0.00	0.01	0.01	0.00	0.02
EVA2.5-6	0.15	0.33	0.00	0.00	0.00	0.01	0.00	0.00	0.02
EVA2.5-7	0.18	0.67	0.00	0.00	0.00	0.02	0.02	0.04	0.06
EVA2.5-8	0.07	0.62	0.00	0.00	0.00	0.01	0.01	0.00	0.04
EVA2.5-9	0.13	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.03
EVA2.5-10	0.09	0.30	0.00	0.00	0.00	0.03	0.02	0.02	0.11
EVA2.5-11	0.06	0.31	0.00	0.00	0.00	0.01	0.02	0.01	0.01
EVA2.5-12	0.09	0.20	0.00	0.00	0.00	0.01	0.01	0.00	0.03
EVA2.5-13	0.07	0.27	0.00	0.00	0.00	0.01	0.02	0.02	0.05
EVA2.5-14	0.08	0.23	0.00	0.00	0.00	0.00	0.02	0.00	0.04
EVA2.5-15	0.06	0.24	0.00	0.00	0.00	0.01	0.00	0.00	0.03
SRM614-4	0.27	0.54	0.00	0.00	0.00	0.13	0.21	0.23	0.79
SRM612-4	11.57	22.20	0.00	0.00	0.00	6.58	8.89	11.96	13.40
SRM610-4	167.61	301.40	0.00	0.00	0.00	79.53	91.99	203.20	191.56
AP1-4	0.08	3.11	0.00	0.00	0.00	0.01	0.03	9.82	0.29
AP2-4	0.62	5.95	0.00	0.00	0.00	0.30	0.97	9.40	1.48
AP3-4	2.40	9.52	0.00	0.00	0.00	3.27	10.19	37.18	9.81
AP4-4	3.56	11.51	0.00	0.00	0.00	2.92	10.10	19.01	11.08

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	111.28	87.80	17.24	15.96	11.64	19.84	76.28	39.68	176.00
SRM614-5	516.88	459.80	54.64	3813.18	1085.89	586.52	307.60	1771.05	2205.61
SRM612-5	18680.82	18308.02	55.16	2337.09	1199.33	30831.01	12569.71	96551.78	37503.85
SRM610-5	109959.14	101239.37	101.40	1562.85	2908.14	133167.47	52494.86	641942.31	212799.52
AP1-5	354.96	3176.26	22.96	236.96	51.64	77.24	185.72	88106.49	1239.57
AP2-5	1491.13	7172.68	41.32	323.84	276.24	1806.61	2032.81	97528.55	5491.15
AP3-5	5598.19	10729.50	118.56	633.72	1683.93	17138.26	14313.76	290587.03	29779.17
AP4-5	8112.65	13062.83	99.36	495.76	2176.69	9961.46	18254.66	206705.52	39135.02
EVA3-1	933.49	196.52	28.24	815.48	33.24	544.60	99.36	110.84	364.68
EVA3-2	598.96	179.80	25.44	794.84	39.88	137.56	99.52	103.20	272.32
EVA3-3	900.37	338.80	27.56	648.88	32.32	151.60	105.36	114.08	305.84
SRM614-6	378.12	325.56	38.52	2214.17	663.76	381.24	233.52	1019.01	1354.57
SRM612-6	15370.61	14056.76	39.48	1711.97	812.60	21054.16	9546.29	68448.42	27371.67
SRM610-6	103877.46	91711.35	59.28	1391.89	2429.01	123676.18	50259.84	578005.00	183740.16
AP1-6	300.88	2565.97	27.48	160.28	47.04	41.96	112.64	52711.38	965.33
AP2-6	1238.17	6341.60	38.56	246.88	233.44	1238.17	1634.05	74368.26	4360.42
AP3-6	5327.87	11562.79	90.40	743.76	1891.29	20868.60	16852.17	343411.44	32947.71
AP4-6	7543.56	14418.40	106.64	546.20	2380.85	10405.46	21095.88	240041.20	44725.37
blank-6	92.40	130.72	17.40	91.40	15.20	21.76	81.60	39.88	101.60
blank average	101.84	109.26	17.32	53.68	13.42	20.80	78.94	39.78	138.80

blank subtraction									
SRM614-5	415.04	350.54	37.32	3759.50	1072.47	565.72	228.66	1731.27	2066.81
SRM612-5	18578.98	18198.76	37.84	2283.41	1185.91	30810.21	12490.77	96512.00	37365.05
SRM610-5	109857.30	101130.11	84.08	1509.17	2894.72	133146.67	52415.91	641902.53	212660.72
AP1-5	253.12	3067.00	5.64	183.28	38.22	56.44	106.78	88066.71	1100.77
AP2-5	1389.29	7063.42	24.00	270.16	262.82	1785.81	1953.87	97488.77	5352.35
AP3-5	5496.35	10620.24	101.24	580.04	1670.51	17117.46	14234.82	290547.25	29640.37
AP4-5	8010.80	12953.57	82.04	442.08	2163.27	9940.66	18175.72	206665.74	38996.22
EVA3-1	831.64	87.26	10.92	761.80	19.82	523.80	20.42	71.06	225.88
EVA3-2	497.12	70.54	8.12	741.16	26.46	116.76	20.58	63.42	133.52
EVA3-3	798.52	229.54	10.24	595.20	18.90	130.80	26.42	74.30	167.04
SRM614-6	276.28	216.30	21.20	2160.49	650.34	360.44	154.58	979.23	1215.77
SRM612-6	15268.77	13947.50	22.16	1658.29	799.18	21033.36	9467.35	68408.64	27232.87
SRM610-6	103775.62	91602.09	41.96	1338.21	2415.59	123655.38	50180.90	577965.22	183601.36
AP1-6	199.04	2456.71	10.16	106.60	33.62	21.16	33.70	52671.59	826.52
AP2-6	1136.33	6232.34	21.24	193.20	220.02	1217.37	1555.11	74328.48	4221.62
AP3-6	5226.03	11453.52	73.08	690.08	1877.87	20847.80	16773.23	343371.66	32808.91
AP4-6	7441.72	14309.14	89.32	492.52	2367.43	10384.66	21016.94	240001.42	44586.57

zero correction									
SRM614-5	415.04	350.54	37.32	3759.50	1072.47	565.72	228.66	1731.27	2066.81
SRM612-5	18578.98	18198.76	37.84	2283.41	1185.91	30810.21	12490.77	96512.00	37365.05
SRM610-5	109857.30	101130.11	84.08	1509.17	2894.72	133146.67	52415.91	641902.53	212660.72
AP1-5	253.12	3067.00	5.64	183.28	38.22	56.44	106.78	88066.71	1100.77
AP2-5	1389.29	7063.42	24.00	270.16	262.82	1785.81	1953.87	97488.77	5352.35
AP3-5	5496.35	10620.24	101.24	580.04	1670.51	17117.46	14234.82	290547.25	29640.37
AP4-5	8010.80	12953.57	82.04	442.08	2163.27	9940.66	18175.72	206665.74	38996.22
EVA3-1	831.64	87.26	10.92	761.80	19.82	523.80	20.42	71.06	225.88
EVA3-2	497.12	70.54	8.12	741.16	26.46	116.76	20.58	63.42	133.52
EVA3-3	798.52	229.54	10.24	595.20	18.90	130.80	26.42	74.30	167.04
SRM614-6	276.28	216.30	21.20	2160.49	650.34	360.44	154.58	979.23	1215.77
SRM612-6	15268.77	13947.50	22.16	1658.29	799.18	21033.36	9467.35	68408.64	27232.87
SRM610-6	103775.62	91602.09	41.96	1338.21	2415.59	123655.38	50180.90	577965.22	183601.36
AP1-6	199.04	2456.71	10.16	106.60	33.62	21.16	33.70	52671.59	826.52
AP2-6	1136.33	6232.34	21.24	193.20	220.02	1217.37	1555.11	74328.48	4221.62
AP3-6	5226.03	11453.52	73.08	690.08	1877.87	20847.80	16773.23	343371.66	32808.91
AP4-6	7441.72	14309.14	89.32	492.52	2367.43	10384.66	21016.94	240001.42	44586.57

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
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Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000150	0.000127	0.000013	0.001357	0.000387	0.000204	0.000083	0.000625	0.000746
SRM612-5	0.006340	0.006211	0.000013	0.000779	0.000405	0.010514	0.004263	0.032936	0.012751
SRM610-5	0.091566	0.084292	0.000070	0.001258	0.002413	0.110977	0.043688	0.535023	0.177252
AP1-5	0.000015	0.000181	0.000000	0.000011	0.000002	0.000003	0.000006	0.005200	0.000065
AP2-5	0.000083	0.000422	0.000001	0.000016	0.000016	0.000107	0.000117	0.005824	0.000320
AP3-5	0.000270	0.000521	0.000005	0.000028	0.000082	0.000840	0.000698	0.014256	0.001454
AP4-5	0.000447	0.000722	0.000005	0.000025	0.000121	0.000554	0.001013	0.011524	0.002174
EVA3-1	0.000045	0.000005	0.000001	0.000041	0.000001	0.000028	0.000001	0.000004	0.000012
EVA3-2	0.000029	0.000004	0.000000	0.000044	0.000002	0.000007	0.000001	0.000004	0.000008
EVA3-3	0.000053	0.000015	0.000001	0.000039	0.000001	0.000009	0.000002	0.000005	0.000011
SRM614-6	0.000171	0.000134	0.000013	0.001337	0.000403	0.000223	0.000096	0.000606	0.000752
SRM612-6	0.006807	0.006218	0.000010	0.000739	0.000356	0.009377	0.004221	0.030496	0.012140
SRM610-6	0.097469	0.086036	0.000039	0.001257	0.002269	0.116141	0.047132	0.542844	0.172444
AP1-6	0.000014	0.000173	0.000001	0.000007	0.000002	0.000001	0.000002	0.003701	0.000058
AP2-6	0.000076	0.000419	0.000001	0.000013	0.000015	0.000082	0.000105	0.004998	0.000284
AP3-6	0.000290	0.000635	0.000004	0.000038	0.000104	0.001156	0.000930	0.019034	0.001819
AP4-6	0.000482	0.000928	0.000006	0.000032	0.000153	0.000673	0.001362	0.015557	0.002890

standardize signal averages AP

AP1	0.000014	0.000177	0.000001	0.000009	0.000002	0.000002	0.000004	0.004451	0.000062
AP2	0.000080	0.000421	0.000001	0.000015	0.000015	0.000094	0.000111	0.005411	0.000302
AP3	0.000280	0.000578	0.000005	0.000033	0.000093	0.000998	0.000814	0.016645	0.001637
AP4	0.000465	0.000825	0.000005	0.000028	0.000137	0.000614	0.001188	0.013540	0.002532

linest from std sig ave

	0.020570	0.040863	0.000000	0.000000	0.000000	0.011000	0.029992	0.005870	0.014626
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standardize signal averages SRM

srM614-2	0.000160	0.000130	0.000013	0.001347	0.000395	0.000214	0.000089	0.000616	0.000749
srM612-2	0.006574	0.006214	0.000011	0.000759	0.000380	0.009946	0.004242	0.031716	0.012446
srM610-2	0.094518	0.085164	0.000055	0.001257	0.002341	0.113559	0.045410	0.538933	0.174848

linest from std sig ave

	0.054314	0.051696	0.000000	0.000000	0.000000	0.024590	0.066704	0.009571	0.026474
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concentration data

SRM614-5	0.26	0.44	0.00	0.00	0.00	0.19	0.21	0.31	0.94
SRM612-5	11.19	21.77	0.00	0.00	0.00	9.92	10.96	16.58	15.99
SRM610-5	161.54	295.40	0.00	0.00	0.00	104.70	112.38	269.36	222.33
AP1-5	0.12	2.95	0.00	0.00	0.00	0.01	0.08	12.18	0.38
AP2-5	0.68	6.88	0.00	0.00	0.00	0.47	1.40	13.64	1.87
AP3-5	2.21	8.49	0.00	0.00	0.00	3.69	8.36	33.39	8.49
AP4-5	3.67	11.77	0.00	0.00	0.00	2.43	12.13	26.99	12.69
EVA3-1	0.37	0.08	0.00	0.00	0.00	0.12	0.01	0.01	0.07
EVA3-2	0.24	0.07	0.00	0.00	0.00	0.03	0.01	0.01	0.05
EVA3-3	0.43	0.25	0.00	0.00	0.00	0.04	0.02	0.01	0.06
SRM614-6	0.30	0.47	0.00	0.00	0.00	0.21	0.25	0.31	0.94
SRM612-6	12.01	21.79	0.00	0.00	0.00	8.85	10.86	15.35	15.23
SRM610-6	171.95	301.51	0.00	0.00	0.00	109.57	121.23	273.30	216.30
AP1-6	0.11	2.81	0.00	0.00	0.00	0.01	0.03	8.67	0.34
AP2-6	0.63	6.83	0.00	0.00	0.00	0.36	1.25	11.71	1.66
AP3-6	2.38	10.35	0.00	0.00	0.00	5.07	11.12	44.57	10.61
AP4-6	3.96	15.12	0.00	0.00	0.00	2.95	16.30	36.43	16.86

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-3	111.60	111.40	18.76	17.56	32.24	21.88	229.96	28.00	140.56
SRM614-3	313.84	337.16	39.64	1614.21	375.04	208.20	314.76	832.68	1322.61
SRM612-3	302.88	276.56	23.72	1433.61	340.32	167.64	194.76	676.56	1074.17
SRM610-3	59047.81	52822.62	67.88	734.04	898.45	25494.10	15485.61	189684.91	80964.38
AP1-3	795.60	3657.90	33.28	504.56	142.88	217.32	355.56	149751.97	1775.89
AP2-3	1656.65	10476.26	44.64	525.80	520.72	5615.71	4619.79	189772.11	9559.73
AP3-3	6880.00	14631.92	107.68	1099.97	3555.54	26409.03	35211.44	658671.00	56295.72
AP4-3	11965.27	32312.34	197.04	1326.65	5616.15	56106.68	54653.47	675795.19	102975.74
MZ5-1	1119.89	2846.58	38.76	494.68	44.12	215.08	266.00	343.72	814.40
MZ5-2	894.81	4295.26	32.96	425.92	53.04	133.12	177.48	80.64	688.12
MZ5-3	1314.89	2629.33	39.60	537.88	41.60	397.44	173.56	153.92	777.72
MZ5-4	459.56	3814.18	22.44	283.08	30.32	108.92	127.84	225.52	441.20
MZ5-5	489.84	4661.07	30.32	333.48	24.00	66.84	103.16	83.04	333.88

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	376.52	4806.15	36.32	383.48	43.32	107.96	109.36	124.32	401.96
MZ5-7	459.48	3993.46	27.96	367.00	31.96	74.56	128.36	228.76	479.64
MZ5-8	517.32	4175.62	25.84	389.36	35.80	71.44	150.08	200.76	441.40
MZ5-9	416.76	3497.86	30.56	455.52	34.60	73.04	118.60	72.00	416.44
MZ5-10	916.49	2814.94	32.76	433.40	47.88	148.84	156.40	440.20	469.04
MZ5-11	518.76	3121.46	26.60	471.20	38.00	104.36	111.24	121.00	437.36
MZ5-12	474.12	2849.30	33.72	445.72	37.36	112.24	113.52	192.80	492.08
MZ5-13	463.00	1741.85	38.68	306.60	39.88	194.52	155.04	426.60	492.12
MZ5-14	452.12	1711.77	19.52	289.40	37.96	78.20	126.48	226.08	518.20
MZ5-15	572.24	1946.41	29.32	347.68	39.36	72.92	114.60	143.24	502.32
MZ5-16	878.44	1394.41	30.60	482.52	28.12	203.04	135.64	390.44	1112.17
MZ5-17	977.93	1415.89	28.16	446.08	42.84	220.68	115.60	166.60	522.12
MZ5-18	730.88	1357.73	33.72	430.24	34.56	319.40	125.80	143.88	512.60
SRM614-4	210.48	287.28	37.80	1035.33	266.32	151.64	167.00	715.80	879.40
SRM612-4	5643.87	7746.32	21.80	976.01	428.32	7641.12	5497.31	35192.76	13965.48
SRM610-4	47348.59	53260.38	58.16	807.36	893.77	33656.19	20330.04	240355.88	91580.27
AP1-4	248.48	2448.93	31.12	252.56	88.40	65.92	200.40	70940.84	923.01
AP2-4	1007.57	5774.31	38.92	222.12	246.88	1129.41	1648.25	68688.03	3815.90
AP3-4	4152.42	8565.97	88.00	589.64	1751.77	13152.27	17056.90	304455.84	28629.16
AP4-4	6709.80	16613.41	105.12	670.52	2663.14	36862.73	25506.94	278926.84	47704.55
blank-4	55.32	151.84	17.92	96.56	21.76	11.64	74.88	29.00	133.68
blank average	83.46	131.62	18.34	57.06	27.00	16.76	152.42	28.50	137.12

blank subtraction									
SRM614-3	230.38	205.54	21.30	1557.15	348.04	191.44	162.34	804.18	1185.49
SRM612-3	219.42	144.94	5.38	1376.55	313.32	150.88	42.34	648.06	937.05
SRM610-3	58964.35	52691.00	49.54	676.98	871.44	25477.34	15333.19	189656.41	80827.25
AP1-3	712.14	3526.28	14.94	447.50	115.88	200.56	203.14	149723.47	1638.77
AP2-3	1573.19	10344.64	26.30	468.74	493.72	5598.95	4467.37	189743.61	9422.61
AP3-3	6796.54	14500.30	89.34	1042.91	3528.54	26392.27	35059.02	658642.50	56158.59
AP4-3	11881.81	32180.72	178.70	1269.59	5589.15	56089.92	54501.05	675766.69	102838.62
MZ5-1	1036.43	2714.96	20.42	437.62	17.12	198.32	113.58	315.22	677.28
MZ5-2	811.34	4163.64	14.62	368.86	26.04	116.36	25.06	52.14	551.00
MZ5-3	1231.43	2497.71	21.26	480.82	14.60	380.68	21.14	125.42	640.60
MZ5-4	376.10	3682.56	4.10	226.02	3.32	92.16	-24.58	197.02	304.08
MZ5-5	406.38	4529.45	11.98	276.42	-3.00	50.08	-49.26	54.54	196.76
MZ5-6	293.06	4674.53	17.98	326.42	16.32	91.20	-43.06	95.82	264.84
MZ5-7	376.02	3861.84	9.62	309.94	4.96	57.80	-24.06	200.26	342.52
MZ5-8	433.86	4044.00	7.50	332.30	8.80	54.68	-2.34	172.26	304.28
MZ5-9	333.30	3366.24	12.22	398.46	7.60	56.28	-33.82	43.50	279.32
MZ5-10	833.02	2683.32	14.42	376.34	20.88	132.08	3.98	411.70	331.92
MZ5-11	435.30	2989.84	8.26	414.14	11.00	87.60	-41.18	92.50	300.24
MZ5-12	390.66	2717.68	15.38	388.66	10.36	95.48	-38.90	164.30	354.96
MZ5-13	379.54	1610.23	20.34	249.54	12.88	177.76	2.62	398.10	355.00
MZ5-14	368.66	1580.15	1.18	232.34	10.96	61.44	-25.94	197.58	381.08
MZ5-15	488.78	1814.79	10.98	290.62	12.36	56.16	-37.82	114.74	365.20
MZ5-16	794.98	1262.79	12.26	425.46	1.12	186.28	-16.78	361.94	975.05
MZ5-17	894.47	1284.27	9.82	389.02	15.84	203.92	-36.82	138.10	385.00
MZ5-18	647.42	1226.11	15.38	373.18	7.56	302.64	-26.62	115.38	375.48
SRM614-4	127.02	155.66	19.46	978.27	239.32	134.88	14.58	687.30	742.28
SRM612-4	5560.41	7614.70	3.46	918.95	401.32	7624.36	5344.89	35164.26	13828.36
SRM610-4	47265.13	53128.76	39.82	750.30	866.76	33639.43	20177.61	240327.38	91443.15
AP1-4	165.02	2317.31	12.78	195.50	61.40	49.16	47.98	70912.34	785.88
AP2-4	924.11	5642.69	20.58	165.06	219.88	1112.65	1495.83	68659.53	3678.78
AP3-4	4068.96	8434.35	69.66	532.58	1724.77	13135.51	16904.48	304427.34	28492.04
AP4-4	6626.34	16481.79	86.78	613.46	2636.13	36845.97	25354.52	278898.34	47567.43

zero correction									
SRM614-3	230.38	205.54	21.30	1557.15	348.04	191.44	162.34	804.18	1185.49
SRM612-3	219.42	144.94	5.38	1376.55	313.32	150.88	42.34	648.06	937.05
SRM610-3	58964.35	52691.00	49.54	676.98	871.44	25477.34	15333.19	189656.41	80827.25
AP1-3	712.14	3526.28	14.94	447.50	115.88	200.56	203.14	149723.47	1638.77
AP2-3	1573.19	10344.64	26.30	468.74	493.72	5598.95	4467.37	189743.61	9422.61
AP3-3	6796.54	14500.30	89.34	1042.91	3528.54	26392.27	35059.02	658642.50	56158.59
AP4-3	11881.81	32180.72	178.70	1269.59	5589.15	56089.92	54501.05	675766.69	102838.62
MZ5-1	1036.43	2714.96	20.42	437.62	17.12	198.32	113.58	315.22	677.28
MZ5-2	811.34	4163.64	14.62	368.86	26.04	116.36	25.06	52.14	551.00
MZ5-3	1231.43	2497.71	21.26	480.82	14.60	380.68	21.14	125.42	640.60
MZ5-4	376.10	3682.56	4.10	226.02	3.32	92.16	0.00	197.02	304.08
MZ5-5	406.38	4529.45	11.98	276.42	0.00	50.08	0.00	54.54	196.76
MZ5-6	293.06	4674.53	17.98	326.42	16.32	91.20	0.00	95.82	264.84
MZ5-7	376.02	3861.84	9.62	309.94	4.96	57.80	0.00	200.26	342.52
MZ5-8	433.86	4044.00	7.50	332.30	8.80	54.68	0.00	172.26	304.28
MZ5-9	333.30	3366.24	12.22	398.46	7.60	56.28	0.00	43.50	279.32
MZ5-10	833.02	2683.32	14.42	376.34	20.88	132.08	3.98	411.70	331.92
MZ5-11	435.30	2989.84	8.26	414.14	11.00	87.60	0.00	92.50	300.24
MZ5-12	390.66	2717.68	15.38	388.66	10.36	95.48	0.00	164.30	354.96
MZ5-13	379.54	1610.23	20.34	249.54	12.88	177.76	2.62	398.10	355.00

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	368.66	1580.15	1.18	232.34	10.96	61.44	0.00	197.58	381.08
MZ5-15	488.78	1814.79	10.98	290.62	12.36	56.16	0.00	114.74	365.20
MZ5-16	794.98	1262.79	12.26	425.46	1.12	186.28	0.00	361.94	975.05
MZ5-17	894.47	1284.27	9.82	389.02	15.84	203.92	0.00	138.10	385.00
MZ5-18	647.42	1226.11	15.38	373.18	7.56	302.64	0.00	115.38	375.48
SRM614-4	127.02	155.66	19.46	978.27	239.32	134.88	14.58	687.30	742.28
SRM612-4	5560.41	7614.70	3.46	918.95	401.32	7624.36	5344.89	35164.26	13828.36
SRM610-4	47265.13	53128.76	39.82	750.30	866.76	33639.43	20177.61	240327.38	91443.15
AP1-4	165.02	2317.31	12.78	195.50	61.40	49.16	47.98	70912.34	785.88
AP2-4	924.11	5642.69	20.58	165.06	219.88	1112.65	1495.83	68659.53	3678.78
AP3-4	4068.96	8434.35	69.66	532.58	1724.77	13135.51	16904.48	304427.34	28492.04
AP4-4	6626.34	16481.79	86.78	613.46	2636.13	36845.97	25354.52	278898.34	47567.43

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-3	0.000196	0.000175	0.000018	0.001326	0.000296	0.000163	0.000138	0.000685	0.001010
SRM612-3	0.000255	0.000169	0.000006	0.001602	0.000365	0.000176	0.000049	0.000754	0.001091
SRM610-3	0.118322	0.105733	0.000099	0.001358	0.001749	0.051125	0.030769	0.380578	0.162194
AP1-3	0.000054	0.000269	0.000001	0.000034	0.000009	0.000015	0.000015	0.011414	0.000125
AP2-3	0.000108	0.000712	0.000002	0.000032	0.000034	0.000386	0.000308	0.013066	0.000649
AP3-3	0.000458	0.000977	0.000006	0.000070	0.000238	0.001778	0.002361	0.044361	0.003782
AP4-3	0.000728	0.001972	0.000011	0.000078	0.000343	0.003438	0.003340	0.041416	0.006303
MZ5-1	0.000082	0.000214	0.000002	0.000034	0.000001	0.000016	0.000009	0.000025	0.000053
MZ5-2	0.000059	0.000304	0.000001	0.000027	0.000002	0.000008	0.000002	0.000004	0.000040
MZ5-3	0.000105	0.000213	0.000002	0.000041	0.000001	0.000033	0.000002	0.000011	0.000055
MZ5-4	0.000044	0.000436	0.000000	0.000027	0.000000	0.000011	0.000000	0.000023	0.000036
MZ5-5	0.000044	0.000486	0.000001	0.000030	0.000000	0.000005	0.000000	0.000006	0.000021
MZ5-6	0.000029	0.000469	0.000002	0.000033	0.000002	0.000009	0.000000	0.000010	0.000027
MZ5-7	0.000026	0.000264	0.000001	0.000021	0.000000	0.000004	0.000000	0.000014	0.000023
MZ5-8	0.000027	0.000254	0.000000	0.000021	0.000001	0.000003	0.000000	0.000011	0.000019
MZ5-9	0.000022	0.000224	0.000001	0.000027	0.000001	0.000004	0.000000	0.000003	0.000019
MZ5-10	0.000050	0.000162	0.000001	0.000023	0.000001	0.000008	0.000000	0.000025	0.000020
MZ5-11	0.000024	0.000162	0.000000	0.000022	0.000001	0.000005	0.000000	0.000005	0.000016
MZ5-12	0.000023	0.000162	0.000001	0.000023	0.000001	0.000006	0.000000	0.000010	0.000021
MZ5-13	0.000030	0.000126	0.000002	0.000020	0.000001	0.000014	0.000000	0.000031	0.000028
MZ5-14	0.000027	0.000117	0.000000	0.000017	0.000001	0.000005	0.000000	0.000015	0.000028
MZ5-15	0.000034	0.000127	0.000001	0.000020	0.000001	0.000004	0.000000	0.000008	0.000026
MZ5-16	0.000055	0.000087	0.000001	0.000029	0.000000	0.000013	0.000000	0.000025	0.000067
MZ5-17	0.000059	0.000084	0.000001	0.000026	0.000001	0.000013	0.000000	0.000009	0.000025
MZ5-18	0.000041	0.000078	0.000001	0.000024	0.000000	0.000019	0.000000	0.000007	0.000024
SRM614-4	0.000191	0.000235	0.000029	0.001475	0.000361	0.000203	0.000022	0.001036	0.001119
SRM612-4	0.007835	0.010729	0.000005	0.001295	0.000565	0.010743	0.007531	0.049547	0.019484
SRM610-4	0.104951	0.117972	0.000088	0.001666	0.001925	0.074696	0.044804	0.533643	0.203048
AP1-4	0.000018	0.000247	0.000001	0.000021	0.000007	0.000005	0.000005	0.007564	0.000084
AP2-4	0.000092	0.000560	0.000002	0.000016	0.000022	0.000110	0.000148	0.006812	0.000365
AP3-4	0.000375	0.000777	0.000006	0.000049	0.000159	0.001210	0.001557	0.028040	0.002624
AP4-4	0.000592	0.001472	0.000008	0.000055	0.000235	0.003291	0.002265	0.024910	0.004248

standardize signal averages AP									
AP1	0.000036	0.000258	0.000001	0.000027	0.000008	0.000010	0.000010	0.009489	0.000104
AP2	0.000100	0.000636	0.000002	0.000024	0.000028	0.000248	0.000228	0.009939	0.000507
AP3	0.000416	0.000877	0.000006	0.000060	0.000198	0.001494	0.001959	0.036201	0.003203
AP4	0.000660	0.001722	0.000009	0.000066	0.000289	0.003364	0.002802	0.033163	0.005276

linest from std sig ave									
	0.014289	0.021660	0.000000	0.000000	0.000000	0.003845	0.012620	0.002556	0.007149

standardize signal averages SRM									
srm614-2	0.000194	0.000205	0.000024	0.001400	0.000329	0.000183	0.000080	0.000860	0.001064
srm612-2	0.004045	0.005449	0.000006	0.001448	0.000465	0.005459	0.003790	0.025151	0.010287
srm610-2	0.111637	0.111853	0.000094	0.001512	0.001837	0.062910	0.037786	0.457110	0.182621

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave									
	0.046022	0.039380	0.000000	0.000000	0.000000	0.044389	0.080115	0.011285	0.025359
concentration data									
SRM614-3	0.24	0.33	0.00	0.00	0.00	0.05	0.15	0.15	0.62
SRM612-3	0.31	0.31	0.00	0.00	0.00	0.06	0.05	0.17	0.67
SRM610-3	145.00	196.41	0.00	0.00	0.00	16.86	33.30	83.42	99.44
AP1-3	0.31	2.32	0.00	0.00	0.00	0.02	0.08	11.64	0.36
AP2-3	0.62	6.16	0.00	0.00	0.00	0.59	1.55	13.32	1.85
AP3-3	2.61	8.44	0.00	0.00	0.00	2.73	11.89	45.23	10.79
AP4-3	4.15	17.04	0.00	0.00	0.00	5.27	16.82	42.23	17.98
MZ5-1	0.47	1.85	0.00	0.00	0.00	0.02	0.05	0.03	0.15
MZ5-2	0.34	2.63	0.00	0.00	0.00	0.01	0.01	0.00	0.11
MZ5-3	0.60	1.84	0.00	0.00	0.00	0.05	0.01	0.01	0.16
MZ5-4	0.25	3.76	0.00	0.00	0.00	0.02	0.00	0.02	0.10
MZ5-5	0.25	4.20	0.00	0.00	0.00	0.01	0.00	0.01	0.06
MZ5-6	0.17	4.05	0.00	0.00	0.00	0.01	0.00	0.01	0.08
MZ5-7	0.15	2.28	0.00	0.00	0.00	0.01	0.00	0.01	0.07
MZ5-8	0.16	2.20	0.00	0.00	0.00	0.01	0.00	0.01	0.05
MZ5-9	0.13	1.94	0.00	0.00	0.00	0.01	0.00	0.00	0.05
MZ5-10	0.29	1.40	0.00	0.00	0.00	0.01	0.00	0.03	0.06
MZ5-11	0.13	1.40	0.00	0.00	0.00	0.01	0.00	0.01	0.05
MZ5-12	0.13	1.40	0.00	0.00	0.00	0.01	0.00	0.01	0.06
MZ5-13	0.17	1.09	0.00	0.00	0.00	0.02	0.00	0.03	0.08
MZ5-14	0.16	1.01	0.00	0.00	0.00	0.01	0.00	0.01	0.08
MZ5-15	0.20	1.10	0.00	0.00	0.00	0.01	0.00	0.01	0.07
MZ5-16	0.31	0.75	0.00	0.00	0.00	0.02	0.00	0.03	0.19
MZ5-17	0.33	0.73	0.00	0.00	0.00	0.02	0.00	0.01	0.07
MZ5-18	0.23	0.67	0.00	0.00	0.00	0.03	0.00	0.01	0.07
SRM614-4	0.23	0.44	0.00	0.00	0.00	0.07	0.02	0.23	0.69
SRM612-4	9.60	19.93	0.00	0.00	0.00	3.54	8.15	10.86	11.95
SRM610-4	128.62	219.15	0.00	0.00	0.00	24.63	48.49	116.96	124.49
AP1-4	0.10	2.14	0.00	0.00	0.00	0.01	0.03	7.71	0.24
AP2-4	0.52	4.84	0.00	0.00	0.00	0.17	0.75	6.95	1.04
AP3-4	2.14	6.71	0.00	0.00	0.00	1.86	7.84	28.59	7.48
AP4-4	3.37	12.72	0.00	0.00	0.00	5.05	11.40	25.40	12.12
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	63.20	135.40	18.44	19.44	16.72	20.76	109.88	24.04	197.16
SRM614-1	284.48	292.68	37.72	1599.05	440.24	215.76	264.08	696.60	1132.73
SRM612-1	9186.41	13456.68	42.28	1610.09	810.28	18238.58	8715.61	62800.79	25168.18
SRM610-1	44208.17	45157.90	55.48	736.16	945.61	54129.23	17234.26	194121.30	79423.73
AP1-1	475.68	2437.65	29.28	275.24	85.04	222.24	289.52	99268.95	1227.41
AP2-1	662.20	8131.73	41.48	198.48	232.44	2855.26	1378.05	45684.90	2941.02
AP3-1	1702.01	3769.42	45.16	233.72	532.80	3903.26	4241.34	71932.65	8862.81
AP4-1	3589.18	8599.05	51.44	328.00	1112.97	8308.81	9698.69	100122.13	19477.79
MZ4-1	250.92	1286.37	27.64	190.40	21.12	80.00	131.20	97.12	306.12
MZ4-2	288.44	1465.09	25.00	244.00	36.80	77.84	141.80	101.52	351.52
MZ4-3	607.88	1203.25	23.76	292.44	26.44	114.48	149.36	155.20	341.04
MZ4-4	244.32	1636.29	30.96	185.72	25.28	60.96	140.44	135.56	352.12
MZ4-5	193.12	1690.37	15.96	199.32	32.12	47.64	102.72	89.64	285.28
MZ4-6	380.08	1631.53	18.96	167.16	32.12	80.64	94.88	55.24	319.88
MZ4-7	308.80	2665.46	24.88	168.96	34.64	113.48	159.64	82.60	317.00
MZ4-8	301.04	2472.97	27.96	180.28	27.20	75.64	140.28	49.00	306.12
MZ4-9	278.64	2477.05	21.96	185.12	33.08	73.64	126.08	84.48	325.56
MZ4-10	228.24	1504.69	22.76	137.48	35.12	36.72	149.92	81.00	312.16
MZ4-11	206.72	1998.13	27.28	166.64	18.96	34.16	139.52	33.08	302.12
MZ4-12	2278.77	2297.01	33.08	191.72	32.60	17.92	149.96	36.00	330.04
SRM614-2	231.80	356.56	42.44	2016.53	605.56	223.88	227.88	767.64	1170.93
SRM612-2	7406.24	10716.50	44.92	1278.01	526.84	13806.76	6711.64	48195.39	19050.19
SRM610-2	47606.11	49175.60	64.32	783.92	982.97	53475.54	19135.91	225667.95	83716.31
AP1-2	132.32	1794.21	27.88	146.72	45.12	31.96	119.68	39532.58	637.16
AP2-2	523.24	6406.44	32.48	166.60	145.84	1047.69	942.21	38860.22	2223.97
AP3-2	1681.29	3945.26	44.44	241.04	643.28	3721.74	4997.59	82436.02	9537.69
AP4-2	3545.78	7879.20	41.16	244.16	897.09	6320.32	7929.80	82899.74	16835.90
blank-2	38.96	124.52	23.16	42.40	16.20	33.00	107.72	34.04	190.16
blank average	51.08	129.96	20.80	30.92	16.46	26.88	108.80	29.04	193.66

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction									
SRM614-1	233.40	162.72	16.92	1568.13	423.78	188.88	155.28	667.56	939.07
SRM612-1	9135.33	13326.72	21.48	1579.17	793.82	18211.70	8606.81	62771.75	24974.52
SRM610-1	44157.09	45027.93	34.68	705.24	929.15	54102.35	17125.46	194092.26	79230.07
AP1-1	424.60	2307.69	8.48	244.32	68.58	195.36	180.72	99239.91	1033.75
AP2-1	611.12	8001.76	20.68	167.56	215.98	2828.38	1269.25	45655.86	2747.36
AP3-1	1650.93	3639.46	24.36	202.80	516.34	3876.38	4132.54	71903.61	8669.15
AP4-1	3538.10	8469.09	30.64	297.08	1096.51	8281.93	9589.89	100093.09	19284.13
MZ4-1	199.84	1156.41	6.84	159.48	4.66	53.12	22.40	68.08	112.46
MZ4-2	237.36	1335.13	4.20	213.08	20.34	50.96	33.00	72.48	157.86
MZ4-3	556.80	1073.29	2.96	261.52	9.98	87.60	40.56	126.16	147.38
MZ4-4	193.24	1506.33	10.16	154.80	8.82	34.08	31.64	106.52	158.46
MZ4-5	142.04	1560.41	-4.84	168.40	15.66	20.76	-6.08	60.60	91.62
MZ4-6	329.00	1501.57	-1.84	136.24	15.66	53.76	-13.92	26.20	126.22
MZ4-7	257.72	2535.49	4.08	138.04	18.18	86.60	50.84	53.56	123.34
MZ4-8	249.96	2343.01	7.16	149.36	10.74	48.76	31.48	19.96	112.46
MZ4-9	227.56	2347.09	1.16	154.20	16.62	46.76	17.28	55.44	131.90
MZ4-10	177.16	1374.73	1.96	106.56	18.66	9.84	41.12	51.96	118.50
MZ4-11	155.64	1868.17	6.48	135.72	2.50	7.28	30.72	4.04	108.46
MZ4-12	2227.69	2167.05	12.28	160.80	16.14	-8.96	41.16	6.96	136.38
SRM614-2	180.72	226.60	21.64	1985.61	589.10	197.00	119.08	738.60	977.27
SRM612-2	7355.16	10586.54	24.12	1247.09	510.38	13779.88	6602.84	48166.35	18856.53
SRM610-2	47555.03	49045.64	43.52	753.00	966.51	53448.66	19027.11	225638.91	83522.65
AP1-2	81.24	1664.25	7.08	115.80	28.66	5.08	10.88	39503.54	443.50
AP2-2	472.16	6276.48	11.68	135.68	129.38	1020.81	833.40	38831.18	2030.31
AP3-2	1630.21	3815.30	23.64	210.12	626.82	3694.86	4888.79	82406.98	9344.03
AP4-2	3494.70	7749.24	20.36	213.24	880.62	6293.44	7821.00	82870.70	16642.23
zero correction									
SRM614-1	233.40	162.72	16.92	1568.13	423.78	188.88	155.28	667.56	939.07
SRM612-1	9135.33	13326.72	21.48	1579.17	793.82	18211.70	8606.81	62771.75	24974.52
SRM610-1	44157.09	45027.93	34.68	705.24	929.15	54102.35	17125.46	194092.26	79230.07
AP1-1	424.60	2307.69	8.48	244.32	68.58	195.36	180.72	99239.91	1033.75
AP2-1	611.12	8001.76	20.68	167.56	215.98	2828.38	1269.25	45655.86	2747.36
AP3-1	1650.93	3639.46	24.36	202.80	516.34	3876.38	4132.54	71903.61	8669.15
AP4-1	3538.10	8469.09	30.64	297.08	1096.51	8281.93	9589.89	100093.09	19284.13
MZ4-1	199.84	1156.41	6.84	159.48	4.66	53.12	22.40	68.08	112.46
MZ4-2	237.36	1335.13	4.20	213.08	20.34	50.96	33.00	72.48	157.86
MZ4-3	556.80	1073.29	2.96	261.52	9.98	87.60	40.56	126.16	147.38
MZ4-4	193.24	1506.33	10.16	154.80	8.82	34.08	31.64	106.52	158.46
MZ4-5	142.04	1560.41	0.00	168.40	15.66	20.76	0.00	60.60	91.62
MZ4-6	329.00	1501.57	0.00	136.24	15.66	53.76	0.00	26.20	126.22
MZ4-7	257.72	2535.49	4.08	138.04	18.18	86.60	50.84	53.56	123.34
MZ4-8	249.96	2343.01	7.16	149.36	10.74	48.76	31.48	19.96	112.46
MZ4-9	227.56	2347.09	1.16	154.20	16.62	46.76	17.28	55.44	131.90
MZ4-10	177.16	1374.73	1.96	106.56	18.66	9.84	41.12	51.96	118.50
MZ4-11	155.64	1868.17	6.48	135.72	2.50	7.28	30.72	4.04	108.46
MZ4-12	2227.69	2167.05	12.28	160.80	16.14	0.00	41.16	6.96	136.38
SRM614-2	180.72	226.60	21.64	1985.61	589.10	197.00	119.08	738.60	977.27
SRM612-2	7355.16	10586.54	24.12	1247.09	510.38	13779.88	6602.84	48166.35	18856.53
SRM610-2	47555.03	49045.64	43.52	753.00	966.51	53448.66	19027.11	225638.91	83522.65
AP1-2	81.24	1664.25	7.08	115.80	28.66	5.08	10.88	39503.54	443.50
AP2-2	472.16	6276.48	11.68	135.68	129.38	1020.81	833.40	38831.18	2030.31
AP3-2	1630.21	3815.30	23.64	210.12	626.82	3694.86	4888.79	82406.98	9344.03
AP4-2	3494.70	7749.24	20.36	213.24	880.62	6293.44	7821.00	82870.70	16642.23
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-1	0.000293	0.000204	0.000021	0.001966	0.000531	0.000237	0.000195	0.000837	0.001177
SRM612-1	0.006574	0.009591	0.000015	0.001136	0.000571	0.013106	0.006194	0.045174	0.017973

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.101048	0.103041	0.000079	0.001614	0.002126	0.123807	0.039190	0.444157	0.181309
AP1-1	0.000052	0.000282	0.000001	0.000030	0.000008	0.000024	0.000022	0.012112	0.000126
AP2-1	0.000090	0.001183	0.000003	0.000025	0.000032	0.000418	0.000188	0.006750	0.000406
AP3-1	0.000255	0.000563	0.000004	0.000031	0.000080	0.000600	0.000639	0.011127	0.001342
AP4-1	0.000417	0.000997	0.000004	0.000035	0.000129	0.000975	0.001129	0.011787	0.002271
MZ4-1	0.000032	0.000183	0.000001	0.000025	0.000001	0.000008	0.000004	0.000011	0.000018
MZ4-2	0.000036	0.000203	0.000001	0.000032	0.000003	0.000008	0.000005	0.000011	0.000024
MZ4-3	0.000086	0.000165	0.000000	0.000040	0.000002	0.000013	0.000006	0.000019	0.000023
MZ4-4	0.000031	0.000239	0.000002	0.000025	0.000001	0.000005	0.000005	0.000017	0.000025
MZ4-5	0.000023	0.000253	0.000000	0.000027	0.000003	0.000003	0.000000	0.000010	0.000015
MZ4-6	0.000054	0.000244	0.000000	0.000022	0.000003	0.000009	0.000000	0.000004	0.000021
MZ4-7	0.000051	0.000505	0.000001	0.000027	0.000004	0.000017	0.000010	0.000011	0.000025
MZ4-8	0.000052	0.000487	0.000001	0.000031	0.000002	0.000010	0.000007	0.000004	0.000023
MZ4-9	0.000046	0.000473	0.000000	0.000031	0.000003	0.000009	0.000003	0.000011	0.000027
MZ4-10	0.000036	0.000283	0.000000	0.000022	0.000004	0.000002	0.000008	0.000011	0.000024
MZ4-11	0.000026	0.000314	0.000001	0.000023	0.000000	0.000001	0.000005	0.000001	0.000018
MZ4-12	0.000329	0.000320	0.000002	0.000024	0.000002	0.000000	0.000006	0.000001	0.000020
SRM614-2	0.000173	0.000217	0.000021	0.001897	0.000563	0.000188	0.000114	0.000706	0.000934
SRM612-2	0.007069	0.010175	0.000023	0.001199	0.000491	0.013244	0.006346	0.046295	0.018124
SRM610-2	0.106543	0.109883	0.000098	0.001687	0.002165	0.119747	0.042629	0.505525	0.187125
AP1-2	0.000014	0.000291	0.000001	0.000020	0.000005	0.000001	0.000002	0.006907	0.000078
AP2-2	0.000079	0.001053	0.000002	0.000023	0.000022	0.000171	0.000140	0.006514	0.000341
AP3-2	0.000254	0.000594	0.000004	0.000033	0.000098	0.000576	0.000762	0.012840	0.001456
AP4-2	0.000440	0.000976	0.000003	0.000027	0.000111	0.000793	0.000985	0.010441	0.002097
standardize signal averages AP									
AP1	0.000033	0.000286	0.000001	0.000025	0.000007	0.000012	0.000012	0.009510	0.000102
AP2	0.000085	0.001118	0.000003	0.000024	0.000027	0.000295	0.000164	0.006632	0.000373
AP3	0.000255	0.000579	0.000004	0.000032	0.000089	0.000588	0.000701	0.011984	0.001399
AP4	0.000428	0.000987	0.000003	0.000031	0.000120	0.000884	0.001057	0.011114	0.002184
linest from std sig ave									
	0.022297	0.026130	0.000000	0.000000	0.000000	0.012919	0.033996	0.007254	0.016952
standardize signal averages SRM									
srm614-2	0.000233	0.000210	0.000021	0.001931	0.000547	0.000212	0.000154	0.000771	0.001055
srm612-2	0.006822	0.009883	0.000019	0.001168	0.000531	0.013175	0.006270	0.045734	0.018048
srm610-2	0.103796	0.106462	0.000088	0.001650	0.002146	0.121777	0.040909	0.474841	0.184217
linest from std sig ave									
	0.049469	0.041302	0.000000	0.000000	0.000000	0.022882	0.073446	0.010840	0.025078
concentration data									
SRM614-1	0.56	0.46	0.00	0.00	0.00	0.26	0.57	0.52	1.71
SRM612-1	12.57	21.49	0.00	0.00	0.00	14.52	18.06	28.10	26.13
SRM610-1	193.23	230.91	0.00	0.00	0.00	137.17	114.26	276.32	263.59
AP1-1	0.46	2.94	0.00	0.00	0.00	0.12	0.30	35.05	0.85
AP2-1	0.80	12.33	0.00	0.00	0.00	2.15	2.54	19.53	2.75
AP3-1	2.27	5.87	0.00	0.00	0.00	3.09	8.67	32.20	9.07
AP4-1	3.71	10.40	0.00	0.00	0.00	5.03	15.32	34.11	15.36
MZ4-1	0.28	1.91	0.00	0.00	0.00	0.04	0.05	0.03	0.12
MZ4-2	0.32	2.12	0.00	0.00	0.00	0.04	0.07	0.03	0.16
MZ4-3	0.76	1.72	0.00	0.00	0.00	0.07	0.08	0.06	0.15
MZ4-4	0.27	2.49	0.00	0.00	0.00	0.03	0.07	0.05	0.17
MZ4-5	0.21	2.64	0.00	0.00	0.00	0.02	0.00	0.03	0.10
MZ4-6	0.48	2.55	0.00	0.00	0.00	0.05	0.00	0.01	0.14
MZ4-7	0.46	5.27	0.00	0.00	0.00	0.09	0.14	0.03	0.17
MZ4-8	0.46	5.08	0.00	0.00	0.00	0.05	0.09	0.01	0.16
MZ4-9	0.41	4.93	0.00	0.00	0.00	0.05	0.05	0.03	0.18
MZ4-10	0.32	2.95	0.00	0.00	0.00	0.01	0.11	0.03	0.17
MZ4-11	0.23	3.27	0.00	0.00	0.00	0.01	0.07	0.00	0.12
MZ4-12	2.93	3.34	0.00	0.00	0.00	0.00	0.08	0.00	0.14
SRM614-2	0.33	0.49	0.00	0.00	0.00	0.21	0.33	0.44	1.36
SRM612-2	13.52	22.80	0.00	0.00	0.00	14.67	18.50	28.80	26.35
SRM610-2	203.74	246.25	0.00	0.00	0.00	132.67	124.29	314.49	272.05
AP1-2	0.13	3.03	0.00	0.00	0.00	0.00	0.03	19.99	0.52
AP2-2	0.70	10.98	0.00	0.00	0.00	0.88	1.90	18.85	2.30
AP3-2	2.26	6.20	0.00	0.00	0.00	2.97	10.33	37.16	9.85
AP4-2	3.92	10.18	0.00	0.00	0.00	4.09	13.36	30.21	14.18
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-3	78.72	66.48	16.20	13.96	7.44	15.32	49.60	32.20	165.88
SRM614-3	405.36	471.44	69.60	4222.86	1244.53	609.60	323.68	1975.61	2120.29
SRM612-3	14982.04	16358.97	51.16	2345.29	1418.41	26910.23	12248.27	88550.26	33465.27
SRM610-3	92598.52	98561.91	87.84	1572.57	3979.10	133304.27	64960.73	614190.13	204626.55
AP1-3	484.56	3759.10	38.56	477.04	91.80	349.68	431.92	132115.42	1680.45
AP2-3	1533.13	9163.81	54.72	564.60	333.24	1963.53	2675.18	131601.91	6660.08
AP3-3	6067.39	12382.83	107.40	1061.65	2592.69	17211.78	28134.00	502003.09	43272.00
AP4-3	9823.90	19987.27	165.24	1208.41	4463.43	30272.01	37932.70	454089.69	74020.85
TGP3-1	1701.37	256.56	53.96	1654.65	61.56	587.84	171.72	412.64	536.76
TGP3-2	1285.29	221.12	36.48	1376.33	40.52	268.12	132.76	93.24	433.08
TGP3-3	1118.25	209.40	42.48	1189.61	41.40	413.52	142.80	175.52	397.32
TGP3-4	1450.97	276.76	58.80	1455.33	51.32	701.04	184.56	367.76	523.48
TGP3-5	1016.69	257.84	61.52	1346.41	56.64	441.96	140.08	234.24	401.60
TGP3-6	965.77	285.80	42.96	1219.09	50.04	358.12	155.96	413.40	388.08
TGP3-7	2657.05	340.92	33.40	1065.33	70.64	1883.17	297.12	1247.33	706.28
TGP3-8	1757.85	211.52	37.40	1045.93	54.32	643.32	163.96	182.12	377.00
TGP3-9	998.97	239.32	41.32	1054.81	34.16	125.32	130.84	256.60	377.00
TGP3-10	1513.33	352.32	41.56	991.57	39.84	538.52	187.32	705.52	563.92
TGP3-11	1253.81	312.24	41.68	1082.05	44.68	304.64	145.48	291.32	416.88
TGP3-12	944.33	279.76	33.12	1106.33	39.80	243.20	140.60	268.76	437.68
TGP3-13	3126.22	343.08	27.52	355.88	63.28	222.04	194.08	659.40	414.40
TGP3-14	2438.13	257.24	22.76	326.64	44.44	83.32	139.04	127.64	332.04
TGP3-15	4198.06	381.40	21.08	408.80	65.48	176.12	157.56	199.44	397.80
SRM614-4	339.56	423.48	44.32	2740.26	778.20	446.04	314.92	1358.49	1580.01
SRM612-4	14051.48	13605.12	35.20	1563.77	774.80	17515.26	8734.37	60528.62	24099.06
SRM610-4	87665.17	80323.93	86.24	1169.57	1760.85	83973.79	36561.16	428472.94	147776.83
AP1-4	229.64	2674.38	44.88	184.64	55.52	50.24	130.96	61341.79	876.92
AP2-4	1057.69	6722.84	30.52	191.92	223.76	1072.13	1548.97	76584.19	4076.86
AP3-4	3970.74	8322.37	79.08	460.24	1514.65	9564.49	15148.13	244906.22	23282.89
AP4-4	8207.33	14947.73	118.00	681.84	3110.34	21280.48	25378.70	280803.63	50261.92
blank-4	47.20	163.32	19.96	109.16	20.72	28.04	100.32	261.56	111.92
blank average	62.96	114.90	18.08	61.56	14.08	21.68	74.96	146.88	138.90
blank subtraction									
SRM614-3	342.40	356.54	51.52	4161.30	1230.45	587.92	248.72	1828.73	1981.39
SRM612-3	14919.08	16244.07	33.08	2283.73	1404.33	26888.55	12173.31	88403.38	33326.37
SRM610-3	92535.56	98447.01	69.76	1511.01	3965.02	133282.59	64885.77	614043.25	204487.65
AP1-3	421.60	3644.20	20.48	415.48	77.72	328.00	356.96	131968.54	1541.55
AP2-3	1470.17	9048.91	36.64	503.04	319.16	1941.85	2600.21	131455.03	6521.18
AP3-3	6004.43	12267.93	89.32	1000.09	2578.61	17190.10	28059.04	501856.21	43133.10
AP4-3	9760.94	19872.37	147.16	1146.85	4449.35	30250.33	37857.73	453942.81	73881.95
TGP3-1	1638.41	141.66	35.88	1593.09	47.48	566.16	96.76	265.76	397.86
TGP3-2	1222.33	106.22	18.40	1314.77	26.44	246.44	57.80	-53.64	294.18
TGP3-3	1055.29	94.50	24.40	1128.05	27.32	391.84	67.84	28.64	258.42
TGP3-4	1388.01	161.86	40.72	1393.77	37.24	679.36	109.60	220.88	384.58
TGP3-5	953.73	142.94	43.44	1284.85	42.56	420.28	65.12	87.36	262.70
TGP3-6	902.81	170.90	24.88	1157.53	35.96	336.44	81.00	266.52	249.18
TGP3-7	2594.09	226.02	15.32	1003.77	56.56	1861.49	222.16	1100.45	567.38
TGP3-8	1694.89	96.62	19.32	984.37	40.24	621.64	89.00	35.24	238.10
TGP3-9	936.01	124.42	23.24	993.25	20.08	103.64	55.88	109.72	238.10
TGP3-10	1450.37	237.42	23.48	930.01	25.76	516.84	112.36	558.64	425.02
TGP3-11	1190.85	197.34	23.60	1020.49	30.60	282.96	70.52	144.44	277.98
TGP3-12	881.36	164.86	15.04	1044.77	25.72	221.52	65.64	121.88	298.78
TGP3-13	3063.26	228.18	9.44	294.32	49.20	200.36	119.12	512.52	275.50
TGP3-14	2375.17	142.34	4.68	265.08	30.36	61.64	64.08	-19.24	193.14
TGP3-15	4135.10	266.50	3.00	347.24	51.40	154.44	82.60	52.56	258.90
SRM614-4	276.60	308.58	26.24	2678.70	764.12	424.36	239.96	1211.61	1441.11
SRM612-4	13988.52	13490.22	17.12	1502.21	760.72	17493.58	8659.41	60381.74	23960.15
SRM610-4	87602.21	80209.03	68.16	1108.01	1746.77	83952.11	36486.20	428326.06	147637.93
AP1-4	166.68	2559.47	26.80	123.08	41.44	28.56	56.00	61194.90	738.02
AP2-4	994.73	6607.94	12.44	130.36	209.68	1050.45	1474.01	76437.31	3937.96
AP3-4	3907.78	8207.47	61.00	398.68	1500.57	9542.81	15073.16	244759.34	23143.99
AP4-4	8144.37	14832.82	99.92	620.28	3096.26	21258.80	25303.74	280656.75	50123.02
zero correction									
SRM614-3	342.40	356.54	51.52	4161.30	1230.45	587.92	248.72	1828.73	1981.39
SRM612-3	14919.08	16244.07	33.08	2283.73	1404.33	26888.55	12173.31	88403.38	33326.37
SRM610-3	92535.56	98447.01	69.76	1511.01	3965.02	133282.59	64885.77	614043.25	204487.65
AP1-3	421.60	3644.20	20.48	415.48	77.72	328.00	356.96	131968.54	1541.55
AP2-3	1470.17	9048.91	36.64	503.04	319.16	1941.85	2600.21	131455.03	6521.18
AP3-3	6004.43	12267.93	89.32	1000.09	2578.61	17190.10	28059.04	501856.21	43133.10
AP4-3	9760.94	19872.37	147.16	1146.85	4449.35	30250.33	37857.73	453942.81	73881.95
TGP3-1	1638.41	141.66	35.88	1593.09	47.48	566.16	96.76	265.76	397.86
TGP3-2	1222.33	106.22	18.40	1314.77	26.44	246.44	57.80	0.00	294.18
TGP3-3	1055.29	94.50	24.40	1128.05	27.32	391.84	67.84	28.64	258.42

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	1388.01	161.86	40.72	1393.77	37.24	679.36	109.60	220.88	384.58
TGP3-5	953.73	142.94	43.44	1284.85	42.56	420.28	65.12	87.36	262.70
TGP3-6	902.81	170.90	24.88	1157.53	35.96	336.44	81.00	266.52	249.18
TGP3-7	2594.09	226.02	15.32	1003.77	56.56	1861.49	222.16	1100.45	567.38
TGP3-8	1694.89	96.62	19.32	984.37	40.24	621.64	89.00	35.24	238.10
TGP3-9	936.01	124.42	23.24	993.25	20.08	103.64	55.88	109.72	238.10
TGP3-10	1450.37	237.42	23.48	930.01	25.76	516.84	112.36	558.64	425.02
TGP3-11	1190.85	197.34	23.60	1020.49	30.60	282.96	70.52	144.44	277.98
TGP3-12	881.36	164.86	15.04	1044.77	25.72	221.52	65.64	121.88	298.78
TGP3-13	3063.26	228.18	9.44	294.32	49.20	200.36	119.12	512.52	275.50
TGP3-14	2375.17	142.34	4.68	265.08	30.36	61.64	64.08	0.00	193.14
TGP3-15	4135.10	266.50	3.00	347.24	51.40	154.44	82.60	52.56	258.90
SRM614-4	276.60	308.58	26.24	2678.70	764.12	424.36	239.96	1211.61	1441.11
SRM612-4	13988.52	13490.22	17.12	1502.21	760.72	17493.58	8659.41	60381.74	23960.15
SRM610-4	87602.21	80209.03	68.16	1108.01	1746.77	83952.11	36486.20	428326.06	147637.93
AP1-4	166.68	2559.47	26.80	123.08	41.44	28.56	56.00	61194.90	738.02
AP2-4	994.73	6607.94	12.44	130.36	209.68	1050.45	1474.01	76437.31	3937.96
AP3-4	3907.78	8207.47	61.00	398.68	1500.57	9542.81	15073.16	244759.34	23143.99
AP4-4	8144.37	14832.82	99.92	620.28	3096.26	21258.80	25303.74	280656.75	50123.02

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-3	0.000106	0.000110	0.000016	0.001287	0.000381	0.000182	0.000077	0.000566	0.000613
SRM612-3	0.004870	0.005302	0.000011	0.000745	0.000458	0.008777	0.003973	0.028856	0.010878
SRM610-3	0.068009	0.072354	0.000051	0.001111	0.002914	0.097957	0.047688	0.451294	0.150289
AP1-3	0.000023	0.000203	0.000001	0.000023	0.000004	0.000018	0.000020	0.007334	0.000086
AP2-3	0.000085	0.000523	0.000002	0.000029	0.000018	0.000112	0.000150	0.007603	0.000377
AP3-3	0.000270	0.000551	0.000004	0.000045	0.000116	0.000772	0.0001261	0.022548	0.001938
AP4-3	0.000497	0.001013	0.000007	0.000058	0.000227	0.001542	0.001929	0.023132	0.003765
TGP3-1	0.000064	0.000006	0.000001	0.000062	0.000002	0.000022	0.000004	0.000010	0.000016
TGP3-2	0.000053	0.000005	0.000001	0.000057	0.000001	0.000011	0.000002	0.000000	0.000013
TGP3-3	0.000050	0.000005	0.000001	0.000054	0.000001	0.000019	0.000003	0.000001	0.000012
TGP3-4	0.000054	0.000006	0.000002	0.000054	0.000001	0.000026	0.000004	0.000009	0.000015
TGP3-5	0.000039	0.000006	0.000002	0.000053	0.000002	0.000017	0.000003	0.000004	0.000011
TGP3-6	0.000039	0.000007	0.000001	0.000051	0.000002	0.000015	0.000004	0.000012	0.000011
TGP3-7	0.000121	0.000011	0.000001	0.000047	0.000003	0.000087	0.000010	0.000051	0.000026
TGP3-8	0.000080	0.000005	0.000001	0.000047	0.000002	0.000029	0.000004	0.000002	0.000011
TGP3-9	0.000039	0.000005	0.000001	0.000041	0.000001	0.000004	0.000002	0.000005	0.000010
TGP3-10	0.000073	0.000012	0.000001	0.000047	0.000001	0.000026	0.000006	0.000028	0.000021
TGP3-11	0.000057	0.000009	0.000001	0.000049	0.000001	0.000014	0.000003	0.000007	0.000013
TGP3-12	0.000041	0.000008	0.000001	0.000048	0.000001	0.000010	0.000003	0.000006	0.000014
TGP3-13	0.000272	0.000020	0.000001	0.000026	0.000004	0.000018	0.000011	0.000046	0.000024
TGP3-14	0.000207	0.000012	0.000000	0.000023	0.000003	0.000005	0.000006	0.000000	0.000017
TGP3-15	0.000280	0.000018	0.000000	0.000024	0.000003	0.000010	0.000006	0.000004	0.000018
SRM614-4	0.000141	0.000157	0.000013	0.001362	0.000388	0.000216	0.000122	0.000616	0.000733
SRM612-4	0.006462	0.006232	0.000008	0.000694	0.000351	0.008081	0.004000	0.027892	0.011068
SRM610-4	0.092700	0.084877	0.000072	0.001172	0.001848	0.088838	0.038610	0.453253	0.156230
AP1-4	0.000013	0.000201	0.000002	0.000010	0.000003	0.000002	0.000004	0.004804	0.000058
AP2-4	0.000075	0.000498	0.000001	0.000010	0.000016	0.000079	0.000111	0.005757	0.000297
AP3-4	0.000238	0.000500	0.000004	0.000024	0.000092	0.000582	0.000919	0.014925	0.001411
AP4-4	0.000529	0.000963	0.000006	0.000040	0.000201	0.001380	0.001643	0.018221	0.003254

standardize signal averages AP									
AP1	0.000018	0.000202	0.000002	0.000016	0.000004	0.000010	0.000012	0.006069	0.000072
AP2	0.000080	0.000511	0.000002	0.000019	0.000017	0.000096	0.000131	0.006680	0.000337
AP3	0.000254	0.000526	0.000004	0.000035	0.000104	0.000677	0.001090	0.018737	0.001675
AP4	0.000513	0.000988	0.000007	0.000049	0.000214	0.001461	0.001786	0.020677	0.003510

linest from std sig ave									
	0.019539	0.036070	0.000000	0.000000	0.000000	0.008810	0.020702	0.004535	0.011298

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srM614-2	0.000123	0.000134	0.000015	0.001324	0.000385	0.000199	0.000099	0.000591	0.000673
srM612-2	0.005666	0.005767	0.000009	0.000720	0.000405	0.008429	0.003987	0.028374	0.010973
srM610-2	0.080355	0.078615	0.000062	0.001142	0.002381	0.093397	0.043149	0.452273	0.153260

linest from std sig ave									
	0.063883	0.056001	0.000000	0.000000	0.000000	0.029891	0.070205	0.011404	0.030202

concentration data									
SRM614-3	0.18	0.34	0.00	0.00	0.00	0.14	0.14	0.22	0.59
SRM612-3	8.16	16.40	0.00	0.00	0.00	6.63	7.05	11.22	10.54
SRM610-3	113.97	223.82	0.00	0.00	0.00	74.01	84.67	175.54	145.62
AP1-3	0.18	2.91	0.00	0.00	0.00	0.06	0.16	13.27	0.39
AP2-3	0.66	7.53	0.00	0.00	0.00	0.39	1.24	13.76	1.70
AP3-3	2.10	7.93	0.00	0.00	0.00	2.71	10.41	40.80	8.73
AP4-3	3.88	14.57	0.00	0.00	0.00	5.42	15.93	41.85	16.97
TGP3-1	0.50	0.08	0.00	0.00	0.00	0.08	0.03	0.02	0.07
TGP3-2	0.41	0.07	0.00	0.00	0.00	0.04	0.02	0.00	0.06
TGP3-3	0.39	0.07	0.00	0.00	0.00	0.07	0.03	0.00	0.06
TGP3-4	0.42	0.09	0.00	0.00	0.00	0.09	0.04	0.02	0.07
TGP3-5	0.31	0.08	0.00	0.00	0.00	0.06	0.02	0.01	0.05
TGP3-6	0.31	0.11	0.00	0.00	0.00	0.05	0.03	0.02	0.05
TGP3-7	0.94	0.15	0.00	0.00	0.00	0.31	0.09	0.09	0.12
TGP3-8	0.63	0.07	0.00	0.00	0.00	0.10	0.03	0.00	0.05
TGP3-9	0.30	0.07	0.00	0.00	0.00	0.02	0.02	0.01	0.04
TGP3-10	0.57	0.17	0.00	0.00	0.00	0.09	0.05	0.05	0.10
TGP3-11	0.44	0.14	0.00	0.00	0.00	0.05	0.03	0.01	0.06
TGP3-12	0.32	0.11	0.00	0.00	0.00	0.04	0.03	0.01	0.06
TGP3-13	2.12	0.29	0.00	0.00	0.00	0.06	0.09	0.08	0.11
TGP3-14	1.61	0.18	0.00	0.00	0.00	0.02	0.05	0.00	0.08
TGP3-15	2.18	0.26	0.00	0.00	0.00	0.04	0.05	0.01	0.08
SRM614-4	0.24	0.49	0.00	0.00	0.00	0.16	0.22	0.24	0.71
SRM612-4	10.83	19.28	0.00	0.00	0.00	6.11	7.10	10.85	10.72
SRM610-4	155.34	262.56	0.00	0.00	0.00	67.12	68.55	176.30	151.38
AP1-4	0.10	2.89	0.00	0.00	0.00	0.01	0.04	8.69	0.26
AP2-4	0.58	7.16	0.00	0.00	0.00	0.28	0.92	10.42	1.34
AP3-4	1.86	7.20	0.00	0.00	0.00	2.05	7.59	27.00	6.36
AP4-4	4.12	13.86	0.00	0.00	0.00	4.85	13.57	32.97	14.67

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	94.40	84.68	7.76	13.64	9.60	15.60	75.52	106.68	203.08
SRM614-1	513.08	542.56	69.56	5553.99	1528.25	731.56	368.44	2410.81	2494.57
SRM612-1	16700.06	19086.99	59.64	2657.86	1514.13	32532.50	13927.20	105662.55	38962.90
SRM610-1	87807.38	89407.91	83.84	1481.13	3455.22	116757.05	47549.95	591701.38	193988.89
AP1-1	499.08	4963.87	51.92	681.68	60.88	183.92	300.52	207092.33	1790.85
AP2-1	1799.17	10108.26	64.60	679.20	483.64	2923.54	3326.14	191683.72	7511.28
AP3-1	7287.04	17213.22	146.88	2069.69	4300.94	37270.89	38733.14	859608.56	69257.99
AP4-1	9890.14	24526.54	177.64	1451.89	4638.51	38255.62	43629.89	541853.56	83257.99
TGP2-1	1447.05	309.24	59.96	1738.73	59.04	532.76	343.92	594.24	668.40
TGP2-2	1026.29	237.36	53.00	1573.05	52.04	192.32	238.88	209.04	1025.57
TGP2-3	1930.29	553.64	38.96	1384.77	60.80	162.52	272.68	219.24	841.52
TGP2-4	328.68	731.60	20.72	313.12	40.08	180.80	269.24	545.48	610.12
TGP2-5	230.40	813.80	17.92	277.28	27.68	67.24	130.32	85.68	607.60
TGP2-6	211.92	685.44	22.16	265.60	32.32	74.04	113.24	150.40	347.12
TGP2-7	338.88	673.60	26.12	244.92	37.20	259.84	201.08	412.36	570.28
TGP2-8	204.88	705.12	20.36	285.48	34.12	85.44	118.76	126.00	260.16
TGP2-9	243.80	674.60	18.20	273.96	32.72	93.24	133.68	119.52	338.20
TGP2-10	208.04	784.64	26.88	238.12	27.16	32.40	93.56	57.68	292.08
TGP2-11	283.64	768.04	33.92	345.96	25.24	55.80	130.44	56.60	326.44
TGP2-12	213.96	831.04	22.44	280.72	26.64	54.40	120.76	91.80	343.76
TGP2-13	436.00	386.28	28.36	327.80	22.16	87.92	145.64	351.64	472.24
TGP2-14	326.68	382.28	22.24	418.12	29.36	76.88	134.40	67.68	378.28
TGP2-15	467.32	347.80	32.32	518.24	30.84	64.72	148.12	62.28	428.20
TGP2-16	796.84	236.40	40.32	1052.85	41.48	130.96	321.36	145.08	490.00
TGP2-17	618.16	201.88	38.00	1062.81	33.40	99.28	150.64	101.48	436.20
TGP2-18	639.64	231.44	32.04	1008.29	35.40	76.32	150.64	83.76	463.96
SRM614-2	391.56	462.32	54.16	3018.50	900.97	495.36	257.92	1486.61	1639.05
SRM612-2	13765.56	13618.48	42.60	1588.25	767.96	19069.03	9133.25	63870.20	25025.54

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	80835.21	74540.26	71.36	1140.57	1859.85	87777.90	36963.29	422740.50	142128.41
AP1-2	277.56	3092.94	35.16	204.56	68.16	42.32	121.24	77803.80	939.57
AP2-2	1166.37	5996.47	38.92	312.44	284.32	1503.57	2054.81	106796.84	4606.07
AP3-2	6778.88	13768.60	121.56	1158.65	2943.70	18734.23	27434.12	578608.75	49028.23
AP4-2	7023.76	14155.12	102.04	573.24	2526.85	17576.94	23418.13	246959.88	42204.60
blank-2	57.08	141.68	16.08	87.92	14.88	15.28	68.20	28.56	96.88
blank average	75.74	113.18	11.92	50.78	12.24	15.44	71.86	67.62	149.98
blank subtraction									
SRM614-1	437.34	429.38	57.64	5503.21	1516.01	716.12	296.58	2343.19	2344.59
SRM612-1	16624.31	18973.81	47.72	2607.07	1501.89	32517.06	13855.34	105594.93	38812.92
SRM610-1	87731.63	89294.73	71.92	1430.35	3442.98	116741.61	47478.08	591633.76	193838.91
AP1-1	423.34	4850.69	40.00	630.90	48.64	168.48	228.66	207024.71	1640.87
AP2-1	1723.43	9995.08	52.68	628.42	471.40	2908.10	3254.28	191616.10	7361.30
AP3-1	7211.30	17100.04	134.96	2018.91	4288.70	37255.45	38661.28	859540.94	69108.01
AP4-1	9814.40	24413.36	165.72	1401.11	4626.27	38240.18	43558.03	541785.94	83108.01
TGP2-1	1371.31	196.06	48.04	1687.95	46.80	517.32	272.06	526.62	518.42
TGP2-2	950.55	124.18	41.08	1522.27	39.80	176.88	167.02	141.42	875.58
TGP2-3	1854.55	440.46	27.04	1333.99	48.56	147.08	200.82	151.62	691.54
TGP2-4	252.94	618.42	8.80	262.34	27.84	165.36	197.38	477.86	460.14
TGP2-5	154.66	700.62	6.00	226.50	15.44	51.80	58.46	18.06	457.62
TGP2-6	136.18	572.26	10.24	214.82	20.08	58.60	41.38	82.78	197.14
TGP2-7	263.14	560.42	14.20	194.14	24.96	244.40	129.22	344.74	420.30
TGP2-8	129.14	591.94	8.44	234.70	21.88	70.00	46.90	58.38	110.18
TGP2-9	168.06	561.42	6.28	223.18	20.48	77.80	61.82	51.90	188.22
TGP2-10	132.30	671.46	14.96	187.34	14.92	16.96	21.70	-9.94	142.10
TGP2-11	207.90	654.86	22.00	295.18	13.00	40.36	58.58	-11.02	176.46
TGP2-12	138.22	717.86	10.52	229.94	14.40	38.96	48.90	24.18	193.78
TGP2-13	360.26	273.10	16.44	277.02	9.92	72.48	73.78	284.02	322.26
TGP2-14	250.94	269.10	10.32	367.34	17.12	61.44	62.54	0.06	228.30
TGP2-15	391.58	234.62	20.40	467.46	18.60	49.28	76.26	-5.34	278.22
TGP2-16	721.10	123.22	28.40	1002.07	29.24	115.52	249.50	77.46	340.02
TGP2-17	542.42	88.70	26.08	1012.03	21.16	83.84	78.78	33.86	286.22
TGP2-18	563.90	118.26	20.12	957.51	23.16	60.88	78.78	16.14	313.98
SRM614-2	315.82	349.14	42.24	2967.72	888.73	479.92	186.06	1418.99	1489.07
SRM612-2	13689.82	13505.30	30.68	1537.47	755.72	19053.59	9061.39	63802.58	24875.56
SRM610-2	80759.47	74427.08	59.44	1089.79	1847.61	87762.46	36891.43	422672.88	141978.43
AP1-2	201.82	2979.76	23.24	153.78	55.92	26.88	49.38	77736.18	789.58
AP2-2	1090.63	5883.29	27.00	261.66	272.08	1488.13	1982.95	106729.22	4456.09
AP3-2	6703.14	13655.42	109.64	1107.87	2931.46	18718.78	27362.25	578541.13	48878.25
AP4-2	6948.02	14041.94	90.12	522.46	2514.61	17561.50	23346.27	246892.26	42054.62
zero correction									
SRM614-1	437.34	429.38	57.64	5503.21	1516.01	716.12	296.58	2343.19	2344.59
SRM612-1	16624.31	18973.81	47.72	2607.07	1501.89	32517.06	13855.34	105594.93	38812.92
SRM610-1	87731.63	89294.73	71.92	1430.35	3442.98	116741.61	47478.08	591633.76	193838.91
AP1-1	423.34	4850.69	40.00	630.90	48.64	168.48	228.66	207024.71	1640.87
AP2-1	1723.43	9995.08	52.68	628.42	471.40	2908.10	3254.28	191616.10	7361.30
AP3-1	7211.30	17100.04	134.96	2018.91	4288.70	37255.45	38661.28	859540.94	69108.01
AP4-1	9814.40	24413.36	165.72	1401.11	4626.27	38240.18	43558.03	541785.94	83108.01
TGP2-1	1371.31	196.06	48.04	1687.95	46.80	517.32	272.06	526.62	518.42
TGP2-2	950.55	124.18	41.08	1522.27	39.80	176.88	167.02	141.42	875.58
TGP2-3	1854.55	440.46	27.04	1333.99	48.56	147.08	200.82	151.62	691.54
TGP2-4	252.94	618.42	8.80	262.34	27.84	165.36	197.38	477.86	460.14
TGP2-5	154.66	700.62	6.00	226.50	15.44	51.80	58.46	18.06	457.62
TGP2-6	136.18	572.26	10.24	214.82	20.08	58.60	41.38	82.78	197.14
TGP2-7	263.14	560.42	14.20	194.14	24.96	244.40	129.22	344.74	420.30
TGP2-8	129.14	591.94	8.44	234.70	21.88	70.00	46.90	58.38	110.18
TGP2-9	168.06	561.42	6.28	223.18	20.48	77.80	61.82	51.90	188.22
TGP2-10	132.30	671.46	14.96	187.34	14.92	16.96	21.70	0.00	142.10
TGP2-11	207.90	654.86	22.00	295.18	13.00	40.36	58.58	0.00	176.46
TGP2-12	138.22	717.86	10.52	229.94	14.40	38.96	48.90	24.18	193.78
TGP2-13	360.26	273.10	16.44	277.02	9.92	72.48	73.78	284.02	322.26
TGP2-14	250.94	269.10	10.32	367.34	17.12	61.44	62.54	0.06	228.30
TGP2-15	391.58	234.62	20.40	467.46	18.60	49.28	76.26	0.00	278.22
TGP2-16	721.10	123.22	28.40	1002.07	29.24	115.52	249.50	77.46	340.02
TGP2-17	542.42	88.70	26.08	1012.03	21.16	83.84	78.78	33.86	286.22
TGP2-18	563.90	118.26	20.12	957.51	23.16	60.88	78.78	16.14	313.98
SRM614-2	315.82	349.14	42.24	2967.72	888.73	479.92	186.06	1418.99	1489.07
SRM612-2	13689.82	13505.30	30.68	1537.47	755.72	19053.59	9061.39	63802.58	24875.56
SRM610-2	80759.47	74427.08	59.44	1089.79	1847.61	87762.46	36891.43	422672.88	141978.43
AP1-2	201.82	2979.76	23.24	153.78	55.92	26.88	49.38	77736.18	789.58
AP2-2	1090.63	5883.29	27.00	261.66	272.08	1488.13	1982.95	106729.22	4456.09
AP3-2	6703.14	13655.42	109.64	1107.87	2931.46	18718.78	27362.25	578541.13	48878.25
AP4-2	6948.02	14041.94	90.12	522.46	2514.61	17561.50	23346.27	246892.26	42054.62
certified concentration									
SRM614	0.80	0.70							1.40

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-1	0.000112	0.000110	0.000015	0.001408	0.000388	0.000183	0.000076	0.000599	0.000600
SRM612-1	0.004917	0.005612	0.000014	0.000771	0.000444	0.009617	0.004098	0.031231	0.011479
SRM610-1	0.079092	0.080501	0.000065	0.001289	0.003104	0.105245	0.042803	0.533372	0.174750
AP1-1	0.000020	0.000226	0.000002	0.000029	0.000002	0.000008	0.000011	0.009646	0.000076
AP2-1	0.000105	0.000609	0.000003	0.000038	0.000029	0.000177	0.000198	0.011681	0.000449
AP3-1	0.000343	0.000813	0.000006	0.000096	0.000204	0.001772	0.001839	0.040880	0.003287
AP4-1	0.000496	0.001234	0.000008	0.000071	0.000234	0.001933	0.002202	0.027387	0.004201
TGP2-1	0.000054	0.000008	0.000002	0.000066	0.000002	0.000020	0.000011	0.000021	0.000020
TGP2-2	0.000040	0.000005	0.000002	0.000064	0.000002	0.000007	0.000007	0.000006	0.000037
TGP2-3	0.000077	0.000018	0.000001	0.000056	0.000002	0.000006	0.000008	0.000006	0.000029
TGP2-4	0.000023	0.000056	0.000001	0.000024	0.000003	0.000015	0.000018	0.000043	0.000042
TGP2-5	0.000013	0.000060	0.000001	0.000019	0.000001	0.000004	0.000005	0.000002	0.000039
TGP2-6	0.000014	0.000058	0.000001	0.000022	0.000002	0.000006	0.000004	0.000008	0.000020
TGP2-7	0.000029	0.000061	0.000002	0.000021	0.000003	0.000027	0.000014	0.000038	0.000046
TGP2-8	0.000013	0.000060	0.000001	0.000024	0.000002	0.000007	0.000005	0.000006	0.000011
TGP2-9	0.000017	0.000057	0.000001	0.000022	0.000002	0.000008	0.000006	0.000005	0.000019
TGP2-10	0.000010	0.000052	0.000001	0.000015	0.000001	0.000001	0.000002	0.000000	0.000011
TGP2-11	0.000015	0.000046	0.000002	0.000021	0.000001	0.000003	0.000004	0.000000	0.000013
TGP2-12	0.000011	0.000057	0.000001	0.000018	0.000001	0.000003	0.000004	0.000002	0.000015
TGP2-13	0.000030	0.000023	0.000001	0.000023	0.000001	0.000006	0.000006	0.000024	0.000027
TGP2-14	0.000019	0.000020	0.000001	0.000027	0.000001	0.000005	0.000005	0.000000	0.000017
TGP2-15	0.000025	0.000015	0.000001	0.000030	0.000001	0.000003	0.000005	0.000000	0.000018
TGP2-16	0.000033	0.000006	0.000001	0.000046	0.000001	0.000005	0.000012	0.000004	0.000016
TGP2-17	0.000025	0.000004	0.000001	0.000047	0.000001	0.000004	0.000004	0.000002	0.000013
TGP2-18	0.000026	0.000005	0.000001	0.000044	0.000001	0.000003	0.000004	0.000001	0.000014
SRM614-2	0.000142	0.000157	0.000019	0.001338	0.000401	0.000216	0.000084	0.000640	0.000671
SRM612-2	0.006449	0.006362	0.000014	0.000724	0.000356	0.008976	0.004269	0.030056	0.011718
SRM610-2	0.094440	0.087035	0.000070	0.001274	0.002161	0.102629	0.043141	0.494271	0.166029
AP1-2	0.000014	0.000200	0.000002	0.000010	0.000004	0.000002	0.000003	0.005224	0.000053
AP2-2	0.000092	0.000494	0.000002	0.000022	0.000023	0.000125	0.000167	0.008970	0.000375
AP3-2	0.000367	0.000748	0.000006	0.000061	0.000161	0.001025	0.001499	0.031693	0.002678
AP4-2	0.000465	0.000939	0.000006	0.000035	0.000168	0.001175	0.001562	0.016514	0.002813

standardize signal averages AP									
AP1	0.000017	0.000213	0.000002	0.000020	0.000003	0.000005	0.000007	0.007435	0.000065
AP2	0.000098	0.000552	0.000003	0.000030	0.000026	0.000151	0.000183	0.010326	0.000412
AP3	0.000355	0.000781	0.000006	0.000078	0.000182	0.001399	0.001669	0.036287	0.002982
AP4	0.000480	0.001087	0.000007	0.000053	0.000201	0.001554	0.001882	0.021951	0.003507

linest from std sig ave									
	0.018435	0.030817	0.000000	0.000000	0.000000	0.006753	0.016863	0.002893	0.009457

standardize signal averages SRM									
srm614-2	0.000127	0.000134	0.000017	0.001373	0.000394	0.000200	0.000080	0.000620	0.000636
srm612-2	0.005683	0.005987	0.000014	0.000748	0.000400	0.009296	0.004183	0.030643	0.011599
srm610-2	0.086766	0.083768	0.000067	0.001282	0.002632	0.103937	0.042972	0.513821	0.170390

linest from std sig ave									
	0.059179	0.052561	0.000000	0.000000	0.000000	0.026862	0.070466	0.010039	0.027170

concentration data									
SRM614-1	0.18	0.29	0.00	0.00	0.00	0.11	0.11	0.15	0.49
SRM612-1	7.77	14.83	0.00	0.00	0.00	5.57	5.93	7.75	9.31
SRM610-1	125.04	212.76	0.00	0.00	0.00	60.95	61.90	132.35	141.74
AP1-1	0.15	2.78	0.00	0.00	0.00	0.02	0.07	11.13	0.29
AP2-1	0.77	7.49	0.00	0.00	0.00	0.48	1.33	13.48	1.69
AP3-1	2.52	10.00	0.00	0.00	0.00	4.77	12.37	47.19	12.40
AP4-1	3.65	15.17	0.00	0.00	0.00	5.21	14.81	31.61	15.85
TGP2-1	0.39	0.09	0.00	0.00	0.00	0.05	0.07	0.02	0.08
TGP2-2	0.29	0.06	0.00	0.00	0.00	0.02	0.05	0.01	0.14
TGP2-3	0.57	0.23	0.00	0.00	0.00	0.02	0.06	0.01	0.11

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	0.17	0.69	0.00	0.00	0.00	0.04	0.12	0.05	0.16
TGP2-5	0.10	0.74	0.00	0.00	0.00	0.01	0.03	0.00	0.15
TGP2-6	0.10	0.71	0.00	0.00	0.00	0.02	0.03	0.01	0.08
TGP2-7	0.21	0.75	0.00	0.00	0.00	0.07	0.10	0.04	0.17
TGP2-8	0.10	0.74	0.00	0.00	0.00	0.02	0.03	0.01	0.04
TGP2-9	0.12	0.70	0.00	0.00	0.00	0.02	0.04	0.01	0.07
TGP2-10	0.08	0.65	0.00	0.00	0.00	0.00	0.01	0.00	0.04
TGP2-11	0.11	0.57	0.00	0.00	0.00	0.01	0.03	0.00	0.05
TGP2-12	0.08	0.70	0.00	0.00	0.00	0.01	0.03	0.00	0.06
TGP2-13	0.22	0.28	0.00	0.00	0.00	0.02	0.04	0.03	0.10
TGP2-14	0.14	0.25	0.00	0.00	0.00	0.01	0.03	0.00	0.06
TGP2-15	0.18	0.18	0.00	0.00	0.00	0.01	0.03	0.00	0.07
TGP2-16	0.24	0.07	0.00	0.00	0.00	0.01	0.08	0.00	0.06
TGP2-17	0.18	0.05	0.00	0.00	0.00	0.01	0.02	0.00	0.05
TGP2-18	0.19	0.07	0.00	0.00	0.00	0.01	0.02	0.00	0.05
SRM614-2	0.23	0.42	0.00	0.00	0.00	0.13	0.12	0.16	0.54
SRM612-2	10.20	16.81	0.00	0.00	0.00	5.20	6.17	7.46	9.50
SRM610-2	149.31	230.03	0.00	0.00	0.00	59.44	62.39	122.65	134.67
AP1-2	0.10	2.46	0.00	0.00	0.00	0.00	0.02	6.03	0.20
AP2-2	0.67	6.08	0.00	0.00	0.00	0.34	1.12	10.35	1.41
AP3-2	2.70	9.20	0.00	0.00	0.00	2.76	10.08	36.58	10.10
AP4-2	3.42	11.55	0.00	0.00	0.00	3.16	10.50	19.06	10.61

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-11	94.72	111.16	12.80	26.72	7.12	12.24	65.48	50.60	204.44
SRM614-11	612.56	581.00	67.28	5267.75	1498.85	796.96	408.60	2458.81	2784.98
SRM612-11	17162.86	19219.71	51.40	2524.25	1330.97	29942.61	13135.31	100933.25	39035.78
SRM610-11	115194.21	128717.84	138.88	1871.57	4006.98	179940.66	74442.09	825712.06	267141.03
AP1-11	641.96	4665.87	45.92	706.80	89.92	419.72	557.40	208036.14	2107.25
AP2-11	1938.77	13807.96	50.44	768.20	504.20	3361.86	3786.66	201252.05	7959.32
AP3-11	7328.96	16745.98	115.52	1425.17	3613.58	24284.46	39381.02	745806.13	58563.69
AP4-11	15962.53	44020.73	264.80	2281.09	8352.37	102489.09	88082.13	1171238.30	161495.55
GCK4-1	559.88	586.80	26.52	1102.97	60.16	313.28	173.16	935.45	506.32
GCK4-2	475.08	340.36	26.24	1048.57	39.56	165.00	131.76	455.40	413.88
GCK4-3	515.32	357.92	34.96	1082.97	49.00	271.52	145.24	274.64	426.84
GCK4-4	475.16	468.04	29.72	1437.73	38.28	218.44	186.16	869.52	475.60
GCK4-5	495.40	355.40	37.12	1366.97	52.48	139.40	119.40	306.76	487.56
GCK4-6	554.00	372.64	43.48	1318.41	57.92	93.68	115.88	177.24	388.68
GCK4-7	234.36	2665.73	25.00	340.48	28.60	144.80	144.16	660.56	332.36
GCK4-8	243.12	2691.38	18.96	304.52	20.48	75.68	88.60	93.52	227.20
GCK4-9	292.92	2791.66	29.16	486.60	39.92	126.80	95.56	235.56	271.12
GCK4-10	290.56	3064.06	24.44	266.20	41.20	181.68	170.84	618.12	383.56
GCK4-11	168.08	1722.85	20.12	244.16	16.80	59.48	116.24	187.84	226.24
GCK4-12	147.08	1788.53	14.36	227.24	23.80	134.08	92.08	195.56	263.08
GCK4-13	258.20	2386.69	29.00	309.92	30.24	136.16	151.28	692.28	380.92
GCK4-14	192.16	2337.33	17.32	326.60	29.64	49.16	78.64	100.44	252.80
GCK4-15	208.16	2312.65	14.32	370.76	33.92	74.24	113.72	178.16	251.56
GCK4-16	241.84	1163.81	26.76	262.84	31.80	35.52	75.44	121.32	209.04
GCK4-17	239.92	1591.25	13.20	269.24	29.40	29.80	76.32	125.68	245.08
GCK4-18	256.64	1396.93	29.84	283.28	24.12	34.44	89.36	31.00	239.60
SRM614-11	243.80	265.40	24.84	1465.29	453.24	270.24	168.48	756.44	1021.85
SRM612-11	9377.85	8788.97	29.52	1052.61	556.76	11932.47	6373.64	41303.55	16268.37
SRM610-11	61565.07	64174.88	59.12	906.13	1405.29	76404.59	30829.65	347459.28	119139.75
AP1-11	241.84	3000.54	17.44	215.76	48.76	82.40	217.28	76815.52	860.72
AP2-11	1179.93	6873.16	39.00	208.88	282.16	1150.93	1797.45	90002.87	4244.90
AP3-11	4109.14	8213.29	74.68	648.64	1666.37	12366.03	16044.29	275492.28	26084.19
AP4-11	8148.53	17818.94	131.32	916.25	3409.38	21722.56	34711.27	386255.34	61179.86
blank-11	97.40	106.16	14.88	10.24	11.60	25.00	95.92	34.40	109.36
blank average	96.06	108.66	13.84	18.48	9.36	18.62	80.70	42.50	156.90

blank subtraction									
SRM614-11	516.50	472.34	53.44	5249.27	1489.49	778.34	327.90	2416.31	2628.07
SRM612-11	17066.80	19111.05	37.56	2505.77	1321.61	29923.99	13054.61	100890.75	38878.88
SRM610-11	115098.15	128609.18	125.04	1853.09	3997.62	179922.04	74361.39	825669.56	266984.13
AP1-11	545.90	4557.21	32.08	688.32	80.56	401.10	476.70	207993.64	1950.35
AP2-11	1842.71	13699.30	36.60	749.72	494.84	3343.24	3705.96	201209.55	7802.42
AP3-11	7232.90	16637.31	101.68	1406.69	3604.22	24265.84	39300.32	745763.63	58406.79
AP4-11	15866.47	43912.07	250.96	2262.61	8343.01	102470.47	88001.43	1171195.80	161338.65

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	463.82	478.14	12.68	1084.49	50.80	294.66	92.46	892.94	349.42
GCK4-2	379.02	231.70	12.40	1030.09	30.20	146.38	51.06	412.90	256.98
GCK4-3	419.26	249.26	21.12	1064.49	39.64	252.90	64.54	232.14	269.94
GCK4-4	379.10	359.38	15.88	1419.25	28.92	199.82	105.46	827.02	318.70
GCK4-5	399.34	246.74	23.28	1348.49	43.12	120.78	38.70	264.26	330.66
GCK4-6	457.94	263.98	29.64	1299.93	48.56	75.06	35.18	134.74	231.78
GCK4-7	138.30	2557.07	11.16	322.00	19.24	126.18	63.46	618.06	175.46
GCK4-8	147.06	2582.71	5.12	286.04	11.12	57.06	7.90	51.02	70.30
GCK4-9	196.86	2683.00	15.32	468.12	30.56	108.18	14.86	193.06	114.22
GCK4-10	194.50	2955.40	10.60	247.72	31.84	163.06	90.14	575.62	226.66
GCK4-11	72.02	1614.19	6.28	225.68	7.44	40.86	35.54	145.34	69.34
GCK4-12	51.02	1679.87	0.52	208.76	14.44	115.46	11.38	153.06	106.18
GCK4-13	162.14	2278.03	15.16	291.44	20.88	117.54	70.58	649.78	224.02
GCK4-14	96.10	2228.67	3.48	308.12	20.28	30.54	-2.06	57.94	95.90
GCK4-15	112.10	2203.99	0.48	352.28	24.56	55.62	33.02	135.66	94.66
GCK4-16	145.78	1055.15	12.92	244.36	22.44	16.90	-5.26	78.82	52.14
GCK4-17	143.86	1482.59	-0.64	250.76	20.04	11.18	-4.38	83.18	88.18
GCK4-18	160.58	1288.27	16.00	264.80	14.76	15.82	8.66	-11.50	82.70
SRM614-11	147.74	156.74	11.00	1446.81	443.88	251.62	87.78	713.94	864.94
SRM612-11	9281.79	8680.31	15.68	1034.13	547.40	11913.85	6292.94	41261.05	16111.47
SRM610-11	61469.01	64066.22	45.28	887.65	1395.93	76385.97	30748.95	347416.78	118982.85
AP1-11	145.78	2891.88	3.60	197.28	39.40	63.78	136.58	76773.02	703.82
AP2-11	1083.87	6764.50	25.16	190.40	272.80	1132.31	1716.75	89960.37	4088.00
AP3-11	4013.08	8104.63	60.84	630.16	1657.01	12347.41	15963.59	275449.78	25927.29
AP4-11	8052.47	17710.28	117.48	897.77	3400.02	21703.94	34630.57	386212.84	61022.96

zero correction

SRM614-11	516.50	472.34	53.44	5249.27	1489.49	778.34	327.90	2416.31	2628.07
SRM612-11	17066.80	19111.05	37.56	2505.77	1321.61	29923.99	13054.61	100890.75	38878.88
SRM610-11	115098.15	128609.18	125.04	1853.09	3997.62	179922.04	74361.39	825669.56	266984.13
AP1-11	545.90	4557.21	32.08	688.32	80.56	401.10	476.70	207993.64	1950.35
AP2-11	1842.71	13699.30	36.60	749.72	494.84	3343.24	3705.96	201209.55	7802.42
AP3-11	7232.90	16637.31	101.68	1406.69	3604.22	24265.84	39300.32	745763.63	58406.79
AP4-11	15866.47	43912.07	250.96	2262.61	8343.01	102470.47	88001.43	1171195.80	161338.65
GCK4-1	463.82	478.14	12.68	1084.49	50.80	294.66	92.46	892.94	349.42
GCK4-2	379.02	231.70	12.40	1030.09	30.20	146.38	51.06	412.90	256.98
GCK4-3	419.26	249.26	21.12	1064.49	39.64	252.90	64.54	232.14	269.94
GCK4-4	379.10	359.38	15.88	1419.25	28.92	199.82	105.46	827.02	318.70
GCK4-5	399.34	246.74	23.28	1348.49	43.12	120.78	38.70	264.26	330.66
GCK4-6	457.94	263.98	29.64	1299.93	48.56	75.06	35.18	134.74	231.78
GCK4-7	138.30	2557.07	11.16	322.00	19.24	126.18	63.46	618.06	175.46
GCK4-8	147.06	2582.71	5.12	286.04	11.12	57.06	7.90	51.02	70.30
GCK4-9	196.86	2683.00	15.32	468.12	30.56	108.18	14.86	193.06	114.22
GCK4-10	194.50	2955.40	10.60	247.72	31.84	163.06	90.14	575.62	226.66
GCK4-11	72.02	1614.19	6.28	225.68	7.44	40.86	35.54	145.34	69.34
GCK4-12	51.02	1679.87	0.52	208.76	14.44	115.46	11.38	153.06	106.18
GCK4-13	162.14	2278.03	15.16	291.44	20.88	117.54	70.58	649.78	224.02
GCK4-14	96.10	2228.67	3.48	308.12	20.28	30.54	0.00	57.94	95.90
GCK4-15	112.10	2203.99	0.48	352.28	24.56	55.62	33.02	135.66	94.66
GCK4-16	145.78	1055.15	12.92	244.36	22.44	16.90	0.00	78.82	52.14
GCK4-17	143.86	1482.59	0.00	250.76	20.04	11.18	0.00	83.18	88.18
GCK4-18	160.58	1288.27	16.00	264.80	14.76	15.82	8.66	0.00	82.70
SRM614-11	147.74	156.74	11.00	1446.81	443.88	251.62	87.78	713.94	864.94
SRM612-11	9281.79	8680.31	15.68	1034.13	547.40	11913.85	6292.94	41261.05	16111.47
SRM610-11	61469.01	64066.22	45.28	887.65	1395.93	76385.97	30748.95	347416.78	118982.85
AP1-11	145.78	2891.88	3.60	197.28	39.40	63.78	136.58	76773.02	703.82
AP2-11	1083.87	6764.50	25.16	190.40	272.80	1132.31	1716.75	89960.37	4088.00
AP3-11	4013.08	8104.63	60.84	630.16	1657.01	12347.41	15963.59	275449.78	25927.29
AP4-11	8052.47	17710.28	117.48	897.77	3400.02	21703.94	34630.57	386212.84	61022.96

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal									
SRM614-11	0.000143	0.000130	0.000015	0.001448	0.000411	0.000215	0.000090	0.000667	0.000725
SRM612-11	0.005400	0.006047	0.000012	0.000793	0.000418	0.009468	0.004131	0.031922	0.012301
SRM610-11	0.070733	0.079037	0.000077	0.001139	0.002457	0.110571	0.045699	0.507414	0.164075
AP1-11	0.000027	0.000226	0.000002	0.000034	0.000004	0.000020	0.000024	0.010323	0.000097
AP2-11	0.000100	0.000741	0.000002	0.000041	0.000027	0.000181	0.000200	0.010883	0.000422
AP3-11	0.000336	0.000774	0.000005	0.000065	0.000168	0.001128	0.001827	0.034674	0.002716
AP4-11	0.000713	0.001974	0.000011	0.000102	0.000375	0.004606	0.003956	0.052648	0.007252
GCK4-1	0.000026	0.000027	0.000001	0.000060	0.000003	0.000016	0.000005	0.000050	0.000019
GCK4-2	0.000021	0.000013	0.000001	0.000057	0.000002	0.000008	0.000003	0.000023	0.000014
GCK4-3	0.000021	0.000013	0.000001	0.000054	0.000002	0.000013	0.000003	0.000012	0.000014
GCK4-4	0.000014	0.000013	0.000001	0.000052	0.000001	0.000007	0.000004	0.000030	0.000012
GCK4-5	0.000015	0.000009	0.000001	0.000050	0.000002	0.000004	0.000001	0.000010	0.000012
GCK4-6	0.000017	0.000010	0.000001	0.000048	0.000002	0.000003	0.000001	0.000005	0.000009
GCK4-7	0.000014	0.000268	0.000001	0.000034	0.000002	0.000013	0.000007	0.000065	0.000018
GCK4-8	0.000019	0.000332	0.000001	0.000037	0.000001	0.000007	0.000001	0.000007	0.000009
GCK4-9	0.000017	0.000236	0.000001	0.000041	0.000003	0.000009	0.000001	0.000017	0.000010
GCK4-10	0.000018	0.000275	0.000001	0.000023	0.000003	0.000015	0.000008	0.000054	0.000021
GCK4-11	0.000013	0.000296	0.000001	0.000041	0.000001	0.000008	0.000007	0.000027	0.000013
GCK4-12	0.000008	0.000278	0.000000	0.000035	0.000002	0.000019	0.000002	0.000025	0.000018
GCK4-13	0.000013	0.000177	0.000001	0.000023	0.000002	0.000009	0.000005	0.000051	0.000017
GCK4-14	0.000008	0.000174	0.000000	0.000024	0.000002	0.000002	0.000000	0.000005	0.000007
GCK4-15	0.000009	0.000174	0.000000	0.000028	0.000002	0.000004	0.000003	0.000011	0.000007
GCK4-16	0.000009	0.000064	0.000001	0.000015	0.000001	0.000001	0.000000	0.000005	0.000003
GCK4-17	0.000009	0.000091	0.000000	0.000015	0.000001	0.000001	0.000000	0.000005	0.000005
GCK4-18	0.000010	0.000082	0.000001	0.000017	0.000001	0.000001	0.000001	0.000000	0.000005
SRM614-11	0.000154	0.000164	0.000011	0.001510	0.000463	0.000263	0.000092	0.000745	0.000903
SRM612-11	0.007392	0.006913	0.000012	0.000824	0.000436	0.009489	0.005012	0.032862	0.012832
SRM610-11	0.099219	0.103411	0.000073	0.001433	0.002253	0.123296	0.049633	0.560774	0.192053
AP1-11	0.000012	0.000238	0.000000	0.000016	0.000003	0.000005	0.000011	0.006319	0.000058
AP2-11	0.000093	0.000578	0.000002	0.000016	0.000023	0.000097	0.000147	0.007685	0.000349
AP3-11	0.000302	0.000610	0.000005	0.000047	0.000125	0.000929	0.001201	0.020731	0.001951
AP4-11	0.000617	0.001356	0.000009	0.000069	0.000260	0.001662	0.002652	0.029578	0.004673
standardize signal averages AP									
AP1	0.000020	0.000232	0.000001	0.000025	0.000004	0.000013	0.000017	0.008321	0.000077
AP2	0.000096	0.000659	0.000002	0.000028	0.000025	0.000139	0.000174	0.009284	0.000386
AP3	0.000319	0.000692	0.000005	0.000056	0.000146	0.001029	0.001514	0.027702	0.002333
AP4	0.000665	0.001665	0.000010	0.000085	0.000318	0.003134	0.003304	0.041113	0.005963
linest from std sig ave									
	0.015174	0.022751	0.000000	0.000000	0.000000	0.004202	0.011872	0.002480	0.006790
standardize signal averages SRM									
srm614-2	0.000148	0.000147	0.000013	0.001479	0.000437	0.000239	0.000091	0.000706	0.000814
srm612-2	0.006396	0.006480	0.000012	0.000808	0.000427	0.009478	0.004571	0.032392	0.012567
srm610-2	0.084976	0.091224	0.000075	0.001286	0.002355	0.116934	0.047666	0.534094	0.178064
linest from std sig ave									
	0.060391	0.048266	0.000000	0.000000	0.000000	0.023892	0.063535	0.009658	0.025996
concentration data									
SRM614-11	0.19	0.25	0.00	0.00	0.00	0.08	0.09	0.14	0.42
SRM612-11	7.03	11.80	0.00	0.00	0.00	3.41	4.21	6.79	7.16
SRM610-11	92.05	154.22	0.00	0.00	0.00	39.85	46.53	107.93	95.55
AP1-11	0.16	2.05	0.00	0.00	0.00	0.03	0.11	10.21	0.26
AP2-11	0.60	6.73	0.00	0.00	0.00	0.30	0.95	10.77	1.14
AP3-11	2.04	7.02	0.00	0.00	0.00	1.89	8.65	34.31	7.36
AP4-11	4.32	17.92	0.00	0.00	0.00	7.72	18.74	52.09	19.65
GCK4-1	0.16	0.24	0.00	0.00	0.00	0.03	0.02	0.05	0.05
GCK4-2	0.13	0.12	0.00	0.00	0.00	0.01	0.01	0.02	0.04
GCK4-3	0.13	0.11	0.00	0.00	0.00	0.02	0.02	0.01	0.04
GCK4-4	0.08	0.12	0.00	0.00	0.00	0.01	0.02	0.03	0.03
GCK4-5	0.09	0.08	0.00	0.00	0.00	0.01	0.01	0.01	0.03
GCK4-6	0.10	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.02
GCK4-7	0.09	2.43	0.00	0.00	0.00	0.02	0.03	0.06	0.05
GCK4-8	0.11	3.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02
GCK4-9	0.10	2.14	0.00	0.00	0.00	0.02	0.01	0.02	0.03
GCK4-10	0.11	2.50	0.00	0.00	0.00	0.03	0.04	0.05	0.06
GCK4-11	0.08	2.69	0.00	0.00	0.00	0.01	0.03	0.03	0.03
GCK4-12	0.05	2.53	0.00	0.00	0.00	0.03	0.01	0.03	0.05
GCK4-13	0.08	1.61	0.00	0.00	0.00	0.02	0.03	0.05	0.05
GCK4-14	0.05	1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.02
GCK4-15	0.05	1.58	0.00	0.00	0.00	0.01	0.01	0.01	0.02
GCK4-16	0.05	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.01
GCK4-17	0.05	0.83	0.00	0.00	0.00	0.00	0.00	0.01	0.01
GCK4-18	0.06	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.01
SRM614-11	0.20	0.32	0.00	0.00	0.00	0.09	0.09	0.16	0.53

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	9.62	13.49	0.00	0.00	0.00	3.42	5.10	6.99	7.47
SRM610-11	129.12	201.78	0.00	0.00	0.00	44.43	50.53	119.28	111.85
AP1-11	0.07	2.16	0.00	0.00	0.00	0.01	0.05	6.25	0.16
AP2-11	0.56	5.24	0.00	0.00	0.00	0.16	0.69	7.60	0.95
AP3-11	1.83	5.54	0.00	0.00	0.00	1.56	5.69	20.51	5.29
AP4-11	3.73	12.31	0.00	0.00	0.00	2.79	12.56	29.27	12.66

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-9	95.60	84.76	10.96	23.20	12.88	12.84	95.36	137.68	252.28
SRM614-9	487.36	468.24	57.84	4619.07	1267.97	709.56	387.68	2182.53	2429.37
SRM612-9	17645.30	19528.03	58.32	2752.46	1657.61	35720.96	14113.12	111052.66	40817.11
SRM610-9	116705.34	135904.84	115.52	2425.57	5772.71	246800.42	77304.48	974951.63	308568.72
AP1-9	435.20	4946.55	66.84	546.80	88.36	191.16	274.24	176913.44	2208.53
AP2-9	1813.17	10460.62	65.48	566.52	450.76	2383.13	3273.74	183686.95	8034.00
AP3-9	7413.56	15710.57	156.36	1575.49	3166.66	17748.18	23545.05	532295.50	50747.73
AP4-9	10451.78	20939.40	195.80	1430.61	4122.54	39821.75	36042.97	443374.66	75364.98
GCK3-1	448.08	2082.13	44.04	693.56	39.36	102.80	162.84	172.68	4638.63
GCK3-2	1053.33	1202.01	70.76	1495.29	94.36	187.64	567.12	516.88	17997.54
GCK3-3	819.32	925.81	51.44	1507.25	85.80	477.68	616.92	435.16	21310.84
GCK3-4	223.16	1297.29	26.40	401.48	33.84	157.56	204.88	693.44	4188.18
GCK3-5	206.88	1404.69	24.64	352.20	35.92	105.40	121.80	168.40	2894.14
GCK3-6	247.12	1325.85	22.76	394.20	44.04	167.96	151.64	176.96	4283.10
GCK3-7	333.28	1544.73	36.48	441.60	47.60	276.16	260.04	761.64	6597.20
GCK3-8	282.28	1471.73	27.24	398.20	59.72	57.92	194.28	219.68	5456.51
GCK3-9	278.48	1596.21	21.68	368.80	50.28	62.72	194.48	195.84	4785.95
GCK3-10	273.00	830.12	29.24	332.80	38.52	171.12	195.88	690.20	3177.14
GCK3-11	235.32	874.36	33.48	402.04	44.48	69.96	147.84	144.32	2586.25
GCK3-12	197.88	795.32	22.96	334.60	28.92	67.72	126.12	160.80	2263.33
GCK3-13	236.00	705.04	25.64	326.72	29.56	267.92	215.28	1086.61	3239.94
GCK3-14	271.24	580.84	24.84	286.60	30.88	186.40	161.16	553.12	3287.10
GCK3-15	229.88	629.04	23.60	340.32	31.12	136.56	119.96	187.32	2002.93
GCK3-16	410.36	617.44	38.80	384.64	26.60	90.80	225.08	400.20	5853.15
GCK3-17	258.60	592.04	24.24	422.60	32.88	60.96	240.76	240.92	6971.20
GCK3-18	280.88	646.92	39.48	374.96	34.92	63.60	184.12	236.68	4244.74
SRM614-10	358.76	382.12	49.40	2710.86	816.52	436.84	285.40	1287.33	1670.65
SRM612-10	13798.56	13850.64	51.04	1689.85	863.44	20103.43	10100.98	67850.50	26055.83
SRM610-10	97497.11	95930.90	85.08	1458.45	2385.33	128779.80	47931.91	567443.56	185399.08
AP1-10	238.80	3712.98	40.12	271.92	49.60	47.36	154.72	96371.50	1138.73
AP2-10	989.41	5747.51	35.04	234.04	213.88	967.45	1589.41	74399.94	3731.98
AP3-10	5592.63	11554.87	99.56	802.48	2138.49	12064.47	17000.62	350359.25	34698.48
AP4-10	8181.57	15906.29	102.64	838.56	2958.34	27138.87	27058.59	306810.06	53597.58
blank-10	59.60	144.88	9.96	87.20	19.20	15.36	72.72	88.08	132.48
blank average	77.60	114.82	10.46	55.20	16.04	14.10	84.04	112.88	192.38

blank subtraction									
SRM614-9	409.76	353.42	47.38	4563.87	1251.93	695.46	303.64	2069.65	2236.99
SRM612-9	17567.70	19413.21	47.86	2697.26	1641.57	35706.86	14029.08	110939.78	40624.73
SRM610-9	116627.74	135790.02	105.06	2370.37	5756.67	246786.32	77220.44	974838.75	308376.34
AP1-9	357.60	4831.73	56.38	491.60	72.32	177.06	190.20	176800.56	2016.15
AP2-9	1735.57	10345.80	55.02	511.32	434.72	2369.03	3189.70	183574.07	7841.62
AP3-9	7335.96	15595.75	145.90	1520.29	3150.62	17734.08	23461.01	532182.62	50555.35
AP4-9	10374.18	20824.58	185.34	1375.41	4106.50	39807.65	35958.92	443261.78	75172.60
GCK3-1	370.48	1967.31	33.58	638.36	23.32	88.70	78.80	59.80	4446.25
GCK3-2	975.73	1087.19	60.30	1440.09	78.32	173.54	483.08	404.00	17805.16
GCK3-3	741.72	810.98	40.98	1452.05	69.76	463.58	532.88	322.28	21118.46
GCK3-4	145.56	1182.47	15.94	346.28	17.80	143.46	120.84	580.56	3995.80
GCK3-5	129.28	1289.87	14.18	297.00	19.88	91.30	37.76	55.52	2701.76
GCK3-6	169.52	1211.03	12.30	339.00	28.00	153.86	67.60	64.08	4090.72
GCK3-7	255.68	1429.91	26.02	386.40	31.56	262.06	176.00	648.76	6404.82
GCK3-8	204.68	1356.91	16.78	343.00	43.68	43.82	110.24	106.80	5264.13
GCK3-9	200.88	1481.39	11.22	313.60	34.24	48.62	110.44	82.96	4593.57
GCK3-10	195.40	715.30	18.78	277.60	22.48	157.02	111.84	577.32	2984.76
GCK3-11	157.72	759.54	23.02	346.84	28.44	55.86	63.80	31.44	2393.87
GCK3-12	120.28	680.50	12.50	279.40	12.88	53.62	42.08	47.92	2070.95
GCK3-13	158.40	590.22	15.18	271.52	13.52	253.82	131.24	973.73	3047.56
GCK3-14	193.64	466.02	14.38	231.40	14.84	172.30	77.12	440.24	3094.72
GCK3-15	152.28	514.22	13.14	285.12	15.08	122.46	35.92	74.44	1810.55
GCK3-16	332.76	502.62	28.34	329.44	10.56	76.70	141.04	287.32	5660.77

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	181.00	477.22	13.78	367.40	16.84	46.86	156.72	128.04	6778.82
GCK3-18	203.28	532.10	29.02	319.76	18.88	49.50	100.08	123.80	4052.36
SRM614-10	281.16	267.30	38.94	2655.65	800.48	422.74	201.36	1174.45	1478.27
SRM612-10	13720.96	13735.82	40.58	1634.65	847.40	20089.33	10016.94	67737.62	25863.44
SRM610-10	97419.51	95816.08	74.62	1403.25	2369.29	128765.70	47847.87	567330.68	185206.70
AP1-10	161.20	3598.16	29.66	216.72	33.56	33.26	70.68	96258.62	946.35
AP2-10	911.81	5632.69	24.58	178.84	197.84	953.35	1505.37	74287.06	3539.60
AP3-10	5515.03	11440.04	89.10	747.28	2122.45	12050.37	16916.57	350246.37	34506.10
AP4-10	8103.97	15791.47	92.18	783.36	2942.30	27124.77	26974.55	306697.18	53405.20

zero correction

SRM614-9	409.76	353.42	47.38	4563.87	1251.93	695.46	303.64	2069.65	2236.99
SRM612-9	17567.70	19413.21	47.86	2697.26	1641.57	35706.86	14029.08	110939.78	40624.73
SRM610-9	116627.74	135790.02	105.06	2370.37	5756.67	246786.32	77220.44	974838.75	308376.34
AP1-9	357.60	4831.73	56.38	491.60	72.32	177.06	190.20	176800.56	2016.15
AP2-9	1735.57	10345.80	55.02	511.32	434.72	2369.03	3189.70	183574.07	7841.62
AP3-9	7335.96	15595.75	145.90	1520.29	3150.62	17734.08	23461.01	532182.62	50555.35
AP4-9	10374.18	20824.58	185.34	1375.41	4106.50	39807.65	35958.92	443261.78	75172.60
GCK3-1	370.48	1967.31	33.58	638.36	23.32	88.70	78.80	59.80	4446.25
GCK3-2	975.73	1087.19	60.30	1440.09	78.32	173.54	483.08	404.00	17805.16
GCK3-3	741.72	810.98	40.98	1452.05	69.76	463.58	532.88	322.28	21118.46
GCK3-4	145.56	1182.47	15.94	346.28	17.80	143.46	120.84	580.56	3995.80
GCK3-5	129.28	1289.87	14.18	297.00	19.88	91.30	37.76	55.52	2701.76
GCK3-6	169.52	1211.03	12.30	339.00	28.00	153.86	67.60	64.08	4090.72
GCK3-7	255.68	1429.91	26.02	386.40	31.56	262.06	176.00	648.76	6404.82
GCK3-8	204.68	1356.91	16.78	343.00	43.68	43.82	110.24	106.80	5264.13
GCK3-9	200.88	1481.39	11.22	313.60	34.24	48.62	110.44	82.96	4593.57
GCK3-10	195.40	715.30	18.78	277.60	22.48	157.02	111.84	577.32	2984.76
GCK3-11	157.72	759.54	23.02	346.84	28.44	55.86	63.80	31.44	2393.87
GCK3-12	120.28	680.50	12.50	279.40	12.88	53.62	42.08	47.92	2070.95
GCK3-13	158.40	590.22	15.18	271.52	13.52	253.82	131.24	973.73	3047.56
GCK3-14	193.64	466.02	14.38	231.40	14.84	172.30	77.12	440.24	3094.72
GCK3-15	152.28	514.22	13.14	285.12	15.08	122.46	35.92	74.44	1810.55
GCK3-16	332.76	502.62	28.34	329.44	10.56	76.70	141.04	287.32	5660.77
GCK3-17	181.00	477.22	13.78	367.40	16.84	46.86	156.72	128.04	6778.82
GCK3-18	203.28	532.10	29.02	319.76	18.88	49.50	100.08	123.80	4052.36
SRM614-10	281.16	267.30	38.94	2655.65	800.48	422.74	201.36	1174.45	1478.27
SRM612-10	13720.96	13735.82	40.58	1634.65	847.40	20089.33	10016.94	67737.62	25863.44
SRM610-10	97419.51	95816.08	74.62	1403.25	2369.29	128765.70	47847.87	567330.68	185206.70
AP1-10	161.20	3598.16	29.66	216.72	33.56	33.26	70.68	96258.62	946.35
AP2-10	911.81	5632.69	24.58	178.84	197.84	953.35	1505.37	74287.06	3539.60
AP3-10	5515.03	11440.04	89.10	747.28	2122.45	12050.37	16916.57	350246.37	34506.10
AP4-10	8103.97	15791.47	92.18	783.36	2942.30	27124.77	26974.55	306697.18	53405.20

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-9	0.000120	0.000103	0.000014	0.001333	0.000366	0.000203	0.000089	0.000605	0.000653
SRM612-9	0.004726	0.005222	0.000013	0.000726	0.000442	0.009605	0.003774	0.029844	0.010928
SRM610-9	0.064798	0.075444	0.000058	0.001317	0.003198	0.137113	0.042903	0.541614	0.171332
AP1-9	0.000015	0.000205	0.000002	0.000021	0.000003	0.000007	0.000008	0.007484	0.000085
AP2-9	0.000088	0.000524	0.000003	0.000026	0.000022	0.000120	0.000161	0.009294	0.000397
AP3-9	0.000275	0.000584	0.000005	0.000057	0.000118	0.000664	0.000878	0.019921	0.001892
AP4-9	0.000465	0.000934	0.000008	0.000062	0.000184	0.001785	0.001612	0.019875	0.003371
GCK3-1	0.000017	0.000088	0.000001	0.000028	0.000001	0.000004	0.000004	0.000003	0.000198
GCK3-2	0.000039	0.000043	0.000002	0.000057	0.000003	0.000007	0.000019	0.000016	0.000706
GCK3-3	0.000032	0.000035	0.000002	0.000063	0.000003	0.000020	0.000023	0.000014	0.000920
GCK3-4	0.000016	0.000133	0.000002	0.000039	0.000002	0.000016	0.000014	0.000065	0.000449
GCK3-5	0.000014	0.000137	0.000002	0.000031	0.000002	0.000010	0.000004	0.000006	0.000286
GCK3-6	0.000018	0.000131	0.000001	0.000037	0.000003	0.000017	0.000007	0.000007	0.000442
GCK3-7	0.000016	0.000089	0.000002	0.000024	0.000002	0.000016	0.000011	0.000041	0.000401
GCK3-8	0.000013	0.000086	0.000001	0.000022	0.000003	0.000003	0.000007	0.000007	0.000334

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000013	0.000094	0.000001	0.000020	0.000002	0.000003	0.000007	0.000005	0.000293
GCK3-10	0.000015	0.000055	0.000001	0.000021	0.000002	0.000012	0.000009	0.000044	0.000229
GCK3-11	0.000012	0.000056	0.000002	0.000025	0.000002	0.000004	0.000005	0.000002	0.000175
GCK3-12	0.000009	0.000052	0.000001	0.000021	0.000001	0.000004	0.000003	0.000004	0.000159
GCK3-13	0.000011	0.000040	0.000001	0.000019	0.000001	0.000017	0.000009	0.000067	0.000208
GCK3-14	0.000013	0.000031	0.000001	0.000015	0.000001	0.000012	0.000005	0.000029	0.000207
GCK3-15	0.000010	0.000033	0.000001	0.000019	0.000001	0.000008	0.000002	0.000005	0.000118
GCK3-16	0.000018	0.000027	0.000002	0.000018	0.000001	0.000004	0.000008	0.000016	0.000308
GCK3-17	0.000010	0.000026	0.000001	0.000020	0.000001	0.000003	0.000009	0.000007	0.000369
GCK3-18	0.000010	0.000026	0.000001	0.000016	0.000001	0.000002	0.000005	0.000006	0.000199
SRM614-10	0.000148	0.000141	0.000021	0.001398	0.000421	0.000223	0.000106	0.000618	0.000778
SRM612-10	0.006464	0.006471	0.000019	0.000770	0.000399	0.009463	0.004719	0.031909	0.012183
SRM610-10	0.090198	0.088714	0.000069	0.001299	0.002194	0.119221	0.044301	0.525276	0.171478
AP1-10	0.000009	0.000211	0.000002	0.000013	0.000002	0.000002	0.000004	0.005645	0.000055
AP2-10	0.000075	0.000461	0.000002	0.000015	0.000016	0.000078	0.000123	0.006082	0.000290
AP3-10	0.000276	0.000573	0.000004	0.000037	0.000106	0.000604	0.000848	0.017550	0.001729
AP4-10	0.000476	0.000927	0.000005	0.000046	0.000173	0.001592	0.001583	0.018000	0.003134

standardize signal averages AP

AP1	0.000012	0.000208	0.000002	0.000017	0.000003	0.000005	0.000006	0.006564	0.000070
AP2	0.000081	0.000492	0.000002	0.000020	0.000019	0.000099	0.000142	0.007688	0.000343
AP3	0.000275	0.000579	0.000005	0.000047	0.000112	0.000634	0.000863	0.018736	0.001811
AP4	0.000470	0.000930	0.000007	0.000054	0.000178	0.001688	0.001598	0.018938	0.003252

linest from std sig ave

0.020471	0.037090	0.000000	0.000000	0.000000	0.007765	0.023864	0.004775	0.011848
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standardize signal averages SRM

srm614-2	0.000134	0.000122	0.000017	0.001366	0.000394	0.000213	0.000097	0.000611	0.000716
srm612-2	0.005595	0.005846	0.000016	0.000748	0.000420	0.009534	0.004246	0.030876	0.011556
srm610-2	0.077498	0.082079	0.000064	0.001308	0.002696	0.128167	0.043602	0.533445	0.171405

linest from std sig ave

0.066231	0.053643	0.000000	0.000000	0.000000	0.021807	0.069447	0.009670	0.027010
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concentration data

SRM614-9	0.21	0.33	0.00	0.00	0.00	0.14	0.18	0.25	0.66
SRM612-9	8.30	16.61	0.00	0.00	0.00	6.40	7.72	12.22	11.10
SRM610-9	113.76	239.98	0.00	0.00	0.00	91.31	87.81	221.79	174.09
AP1-9	0.12	3.03	0.00	0.00	0.00	0.02	0.08	14.26	0.40
AP2-9	0.72	7.75	0.00	0.00	0.00	0.37	1.54	17.70	1.88
AP3-9	2.24	8.64	0.00	0.00	0.00	2.06	8.36	37.95	8.94
AP4-9	3.80	13.82	0.00	0.00	0.00	5.53	15.35	37.86	15.93
GCK3-1	0.14	1.30	0.00	0.00	0.00	0.01	0.03	0.01	0.94
GCK3-2	0.32	0.64	0.00	0.00	0.00	0.02	0.18	0.03	3.34
GCK3-3	0.26	0.52	0.00	0.00	0.00	0.06	0.22	0.03	4.35
GCK3-4	0.13	1.97	0.00	0.00	0.00	0.05	0.13	0.12	2.12
GCK3-5	0.11	2.02	0.00	0.00	0.00	0.03	0.04	0.01	1.35
GCK3-6	0.15	1.94	0.00	0.00	0.00	0.05	0.07	0.01	2.09
GCK3-7	0.13	1.32	0.00	0.00	0.00	0.05	0.10	0.08	1.89
GCK3-8	0.11	1.27	0.00	0.00	0.00	0.01	0.07	0.01	1.58
GCK3-9	0.10	1.40	0.00	0.00	0.00	0.01	0.07	0.01	1.38
GCK3-10	0.12	0.81	0.00	0.00	0.00	0.04	0.08	0.08	1.08
GCK3-11	0.09	0.82	0.00	0.00	0.00	0.01	0.04	0.00	0.83
GCK3-12	0.08	0.77	0.00	0.00	0.00	0.01	0.03	0.01	0.75
GCK3-13	0.09	0.60	0.00	0.00	0.00	0.05	0.09	0.13	0.98
GCK3-14	0.11	0.46	0.00	0.00	0.00	0.04	0.05	0.06	0.98
GCK3-15	0.08	0.50	0.00	0.00	0.00	0.02	0.02	0.01	0.56
GCK3-16	0.15	0.40	0.00	0.00	0.00	0.01	0.07	0.03	1.46
GCK3-17	0.08	0.38	0.00	0.00	0.00	0.01	0.08	0.01	1.75
GCK3-18	0.08	0.39	0.00	0.00	0.00	0.01	0.05	0.01	0.94
SRM614-10	0.26	0.45	0.00	0.00	0.00	0.15	0.22	0.25	0.79
SRM612-10	11.35	20.58	0.00	0.00	0.00	6.30	9.66	13.07	12.38
SRM610-10	158.36	282.19	0.00	0.00	0.00	79.39	90.67	215.10	174.24
AP1-10	0.08	3.12	0.00	0.00	0.00	0.01	0.04	10.75	0.26
AP2-10	0.61	6.82	0.00	0.00	0.00	0.24	1.17	11.58	1.37
AP3-10	2.26	8.48	0.00	0.00	0.00	1.87	8.07	33.43	8.17
AP4-10	3.88	13.71	0.00	0.00	0.00	4.93	15.07	34.29	14.82

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-7	123.92	91.68	16.08	22.76	12.16	28.96	95.60	142.68	208.00
SRM614-7	519.00	523.40	63.44	3947.78	1127.17	542.48	309.96	1825.93	2084.33
SRM612-7	17220.10	16914.78	33.12	1929.85	863.04	21988.97	9978.70	75576.27	29905.29
SRM610-7	93551.56	96347.46	74.00	1391.01	1770.37	92860.81	37436.25	496528.03	176681.95
AP1-7	632.12	4385.86	33.32	382.52	94.44	189.96	297.16	191639.36	1695.49
AP2-7	1899.13	13870.92	45.72	373.48	398.48	2370.49	2931.86	153909.31	6530.88
AP3-7	6912.60	15036.65	109.48	886.60	2440.97	14861.60	20508.36	441659.72	42366.76
AP4-7	9491.21	20415.48	124.36	734.04	3258.18	30009.77	30513.01	367420.91	59849.70
GCK2-1	375.96	1627.01	17.08	259.60	25.00	124.76	295.16	210.48	2638.37
GCK2-2	236.48	1832.21	21.84	229.56	22.16	29.36	148.04	75.56	478.36
GCK2-3	387.64	2366.65	31.56	224.20	28.92	41.40	163.48	70.92	445.04
GCK2-4	319.48	6977.16	30.08	249.72	31.80	92.60	272.72	475.64	3661.98
GCK2-5	234.76	7906.76	23.48	237.16	22.96	30.16	118.72	40.00	591.16
GCK2-6	262.64	9320.65	22.04	240.76	30.60	43.44	161.16	101.64	938.69
GCK2-7	289.40	8111.57	22.68	200.64	35.88	101.96	286.60	565.68	1929.33
GCK2-8	209.64	9810.66	35.08	232.68	33.44	115.96	200.72	326.24	1274.17
GCK2-9	277.88	8893.37	26.16	260.04	25.04	40.56	163.92	78.00	774.32
GCK2-10	502.24	1662.85	26.88	658.48	49.12	165.20	255.24	197.64	1624.01
GCK2-11	462.92	1769.05	26.24	557.00	49.60	86.36	161.28	131.04	1047.01
GCK2-12	422.64	2098.41	27.52	586.40	38.72	54.36	184.84	121.80	714.96
GCK2-13	818.08	2428.25	26.48	530.84	38.68	205.52	222.00	176.32	2418.45
GCK2-14	663.44	3364.94	19.64	488.44	35.48	183.76	150.88	75.12	706.96
GCK2-15	551.08	2670.82	30.88	604.68	42.24	126.00	138.84	132.92	583.68
GCK2-16	713.88	4010.58	18.52	493.56	53.84	170.60	211.24	175.00	650.12
GCK2-17	525.28	5924.83	25.16	462.88	34.68	141.36	181.20	41.16	468.92
GCK2-18	344.44	7486.24	29.16	347.36	28.36	537.28	122.32	55.32	408.76
SRM614-8	335.64	334.80	49.44	2230.29	657.08	325.24	291.60	1049.65	1237.73
SRM612-8	12249.55	11704.47	45.68	1265.17	582.24	14053.44	6956.96	50015.44	19821.43
SRM610-8	79055.32	81720.38	85.52	1082.49	1415.85	74911.31	33583.19	413185.84	142391.88
AP1-8	340.28	3162.30	23.68	196.44	69.96	41.44	137.68	86586.88	901.73
AP2-8	1220.89	8155.73	42.00	246.20	250.20	1037.17	1877.01	86782.85	3794.82
AP3-8	5745.23	11451.70	89.68	654.72	1962.45	12419.43	16009.89	317419.59	32285.22
AP4-8	6421.28	11755.51	83.32	418.04	1749.57	15123.89	16226.13	167054.14	31047.25
blank-8	105.12	136.12	19.04	118.96	24.28	10.64	94.00	33.36	113.40
blank average	114.52	113.90	17.56	70.86	18.22	19.80	94.80	88.02	160.70
blank subtraction									
SRM614-7	404.48	409.50	45.88	3876.92	1108.95	522.68	215.16	1737.91	1923.63
SRM612-7	17105.58	16800.87	15.56	1858.99	844.82	21969.16	9883.90	75488.25	29744.59
SRM610-7	93437.04	96233.56	56.44	1320.15	1752.15	92841.00	37341.45	496440.01	176521.25
AP1-7	517.60	4271.96	15.76	311.66	76.22	170.16	202.36	191551.34	1534.79
AP2-7	1784.61	13757.02	28.16	302.62	380.26	2350.69	2837.06	153821.29	6370.18
AP3-7	6798.08	14922.74	91.92	815.74	2422.75	14841.80	20413.55	441571.70	42206.06
AP4-7	9376.69	20301.57	106.80	663.18	3239.96	29989.97	30418.21	367332.89	59688.99
GCK2-1	261.44	1513.11	-0.48	188.74	6.78	104.96	200.36	122.46	2477.67
GCK2-2	121.96	1718.31	4.28	158.70	3.94	9.56	53.24	-12.46	317.66
GCK2-3	273.12	2252.75	14.00	153.34	10.70	21.60	68.68	-17.10	284.34
GCK2-4	204.96	6863.26	12.52	178.86	13.58	72.80	177.92	387.62	3501.28
GCK2-5	120.24	7792.86	5.92	166.30	4.74	10.36	23.92	-48.02	430.46
GCK2-6	148.12	9206.75	4.48	169.90	12.38	23.64	66.36	13.62	777.98
GCK2-7	174.88	7997.67	5.12	129.78	17.66	82.16	191.80	477.66	1768.63
GCK2-8	95.12	9696.75	17.52	161.82	15.22	96.16	105.92	238.22	1113.47
GCK2-9	163.36	8779.47	8.60	189.18	6.82	20.76	69.12	-10.02	613.62
GCK2-10	387.72	1548.95	9.32	587.62	30.90	145.40	160.44	109.62	1463.31
GCK2-11	348.40	1655.15	8.68	486.14	31.38	66.56	66.48	43.02	886.31
GCK2-12	308.12	1984.51	9.96	515.54	20.50	34.56	90.04	33.78	554.26
GCK2-13	703.56	2314.35	8.92	459.98	20.46	185.72	127.20	88.30	2257.75
GCK2-14	548.92	3251.04	2.08	417.58	17.26	163.96	56.08	-12.90	546.26
GCK2-15	436.56	2556.91	13.32	533.82	24.02	106.20	44.04	44.90	422.98
GCK2-16	599.36	3896.68	0.96	422.70	35.62	150.80	116.44	86.98	489.42
GCK2-17	410.76	5810.93	7.60	392.02	16.46	121.56	86.40	-46.86	308.22
GCK2-18	229.92	7372.34	11.60	276.50	10.14	517.48	27.52	-32.70	248.06
SRM614-8	221.12	220.90	31.88	2159.43	638.86	305.44	196.80	961.63	1077.03
SRM612-8	12135.03	11590.57	28.12	1194.31	564.02	14033.64	6862.16	49927.42	19660.73
SRM610-8	78940.80	81606.47	67.96	1011.63	1397.63	74891.50	33488.39	413097.82	142231.18
AP1-8	225.76	3048.40	6.12	125.58	51.74	21.64	42.88	86498.86	741.02
AP2-8	1106.37	8041.82	24.44	175.34	231.98	1017.37	1782.21	86694.83	3634.12
AP3-8	5630.71	11337.80	72.12	583.86	1944.23	12399.63	15915.09	317331.57	32124.52
AP4-8	6306.76	11641.61	65.76	347.18	1731.35	15104.08	16131.33	166966.12	30886.55
zero correction									
SRM614-7	404.48	409.50	45.88	3876.92	1108.95	522.68	215.16	1737.91	1923.63
SRM612-7	17105.58	16800.87	15.56	1858.99	844.82	21969.16	9883.90	75488.25	29744.59
SRM610-7	93437.04	96233.56	56.44	1320.15	1752.15	92841.00	37341.45	496440.01	176521.25
AP1-7	517.60	4271.96	15.76	311.66	76.22	170.16	202.36	191551.34	1534.79
AP2-7	1784.61	13757.02	28.16	302.62	380.26	2350.69	2837.06	153821.29	6370.18

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	6798.08	14922.74	91.92	815.74	2422.75	14841.80	20413.55	441571.70	42206.06
AP4-7	9376.69	20301.57	106.80	663.18	3239.96	29989.97	30418.21	367332.89	59688.99
GCK2-1	261.44	1513.11	0.00	188.74	6.78	104.96	200.36	122.46	2477.67
GCK2-2	121.96	1718.31	4.28	158.70	3.94	9.56	53.24	0.00	317.66
GCK2-3	273.12	2252.75	14.00	153.34	10.70	21.60	68.68	0.00	284.34
GCK2-4	204.96	6863.26	12.52	178.86	13.58	72.80	177.92	387.62	3501.28
GCK2-5	120.24	7792.86	5.92	166.30	4.74	10.36	23.92	0.00	430.46
GCK2-6	148.12	9206.75	4.48	169.90	12.38	23.64	66.36	13.62	777.98
GCK2-7	174.88	7997.67	5.12	129.78	17.66	82.16	191.80	477.66	1768.63
GCK2-8	95.12	9696.75	17.52	161.82	15.22	96.16	105.92	238.22	1113.47
GCK2-9	163.36	8779.47	8.60	189.18	6.82	20.76	69.12	0.00	613.62
GCK2-10	387.72	1548.95	9.32	587.62	30.90	145.40	160.44	109.62	1463.31
GCK2-11	348.40	1655.15	8.68	486.14	31.38	66.56	66.48	43.02	886.31
GCK2-12	308.12	1984.51	9.96	515.54	20.50	34.56	90.04	33.78	554.26
GCK2-13	703.56	2314.35	8.92	459.98	20.46	185.72	127.20	88.30	2257.75
GCK2-14	548.92	3251.04	2.08	417.58	17.26	163.96	56.08	0.00	546.26
GCK2-15	436.56	2556.91	13.32	533.82	24.02	106.20	44.04	44.90	422.98
GCK2-16	599.36	3896.68	0.96	422.70	35.62	150.80	116.44	86.98	489.42
GCK2-17	410.76	5810.93	7.60	392.02	16.46	121.56	86.40	0.00	308.22
GCK2-18	229.92	7372.34	11.60	276.50	10.14	517.48	27.52	0.00	248.06
SRM614-8	221.12	220.90	31.88	2159.43	638.86	305.44	196.80	961.63	1077.03
SRM612-8	12135.03	11590.57	28.12	1194.31	564.02	14033.64	6862.16	49927.42	19660.73
SRM610-8	78940.80	81606.47	67.96	1011.63	1397.63	74891.50	33488.39	413097.82	142231.18
AP1-8	225.76	3048.40	6.12	125.58	51.74	21.64	42.88	86498.86	741.02
AP2-8	1106.37	8041.82	24.44	175.34	231.98	1017.37	1782.21	86694.83	3634.12
AP3-8	5630.71	11337.80	72.12	583.86	1944.23	12399.63	15915.09	317331.57	32124.52
AP4-8	6306.76	11641.61	65.76	347.18	1731.35	15104.08	16131.33	166966.12	30886.55

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-7	0.000162	0.000164	0.000018	0.001555	0.000445	0.000210	0.000086	0.000697	0.000771
SRM612-7	0.007196	0.007068	0.000007	0.000782	0.000355	0.009242	0.004158	0.031757	0.012513
SRM610-7	0.096814	0.099712	0.000058	0.001368	0.001815	0.096196	0.038691	0.514382	0.182901
AP1-7	0.000028	0.000232	0.000001	0.000017	0.000004	0.000009	0.000011	0.010409	0.000083
AP2-7	0.000119	0.000919	0.000002	0.000020	0.000025	0.000157	0.000189	0.010273	0.000425
AP3-7	0.000334	0.000733	0.000005	0.000040	0.000119	0.000729	0.001003	0.021687	0.002073
AP4-7	0.000547	0.001184	0.000006	0.000039	0.000189	0.001748	0.001773	0.021414	0.003480
GCK2-1	0.000046	0.000268	0.000000	0.000033	0.000001	0.000019	0.000035	0.000022	0.000438
GCK2-2	0.000024	0.000334	0.000001	0.000031	0.000001	0.000002	0.000010	0.000000	0.000062
GCK2-3	0.000054	0.000443	0.000003	0.000030	0.000002	0.000004	0.000014	0.000000	0.000056
GCK2-4	0.000035	0.001183	0.000002	0.000031	0.000002	0.000013	0.000031	0.000067	0.000603
GCK2-5	0.000020	0.001282	0.000001	0.000027	0.000001	0.000002	0.000004	0.000000	0.000071
GCK2-6	0.000021	0.001334	0.000001	0.000025	0.000002	0.000003	0.000010	0.000002	0.000113
GCK2-7	0.000028	0.001300	0.000001	0.000021	0.000003	0.000013	0.000031	0.000078	0.000287
GCK2-8	0.000014	0.001407	0.000003	0.000023	0.000002	0.000014	0.000015	0.000035	0.000162
GCK2-9	0.000025	0.001358	0.000001	0.000029	0.000001	0.000003	0.000011	0.000000	0.000095
GCK2-10	0.000028	0.000114	0.000001	0.000043	0.000002	0.000011	0.000012	0.000008	0.000108
GCK2-11	0.000026	0.000126	0.000001	0.000037	0.000002	0.000005	0.000005	0.000003	0.000067
GCK2-12	0.000024	0.000153	0.000001	0.000040	0.000002	0.000003	0.000007	0.000003	0.000043
GCK2-13	0.000052	0.000172	0.000001	0.000034	0.000002	0.000014	0.000009	0.000007	0.000167
GCK2-14	0.000044	0.000258	0.000000	0.000033	0.000001	0.000013	0.000004	0.000000	0.000043
GCK2-15	0.000032	0.000187	0.000001	0.000039	0.000002	0.000008	0.000003	0.000003	0.000031
GCK2-16	0.000053	0.000347	0.000000	0.000038	0.000003	0.000013	0.000010	0.000008	0.000044
GCK2-17	0.000038	0.000536	0.000001	0.000036	0.000002	0.000011	0.000008	0.000000	0.000028
GCK2-18	0.000027	0.000865	0.000001	0.000032	0.000001	0.000061	0.000003	0.000000	0.000029
SRM614-8	0.000163	0.000163	0.000024	0.001593	0.000471	0.000225	0.000145	0.000710	0.000795
SRM612-8	0.008078	0.007716	0.000019	0.000795	0.000375	0.009342	0.004568	0.033238	0.013088
SRM610-8	0.111307	0.115065	0.000096	0.001426	0.001971	0.105597	0.047219	0.582469	0.200546
AP1-8	0.000017	0.000232	0.000000	0.000010	0.000004	0.000002	0.000003	0.006591	0.000056
AP2-8	0.000100	0.000730	0.000002	0.000016	0.000021	0.000092	0.000162	0.007865	0.000330
AP3-8	0.000342	0.000688	0.000004	0.000035	0.000118	0.000753	0.000966	0.019260	0.001950

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.000510	0.000941	0.000005	0.000028	0.000140	0.001221	0.001304	0.013496	0.002497
standardize signal averages AP									
AP1	0.000023	0.000232	0.000001	0.000013	0.000004	0.000005	0.000007	0.008500	0.000070
AP2	0.000110	0.000824	0.000002	0.000018	0.000023	0.000125	0.000176	0.009069	0.000378
AP3	0.000338	0.000711	0.000004	0.000038	0.000118	0.000741	0.000984	0.020473	0.002011
AP4	0.000528	0.001062	0.000006	0.000033	0.000164	0.001485	0.001539	0.017455	0.002988
linest from std sig ave									
	0.017690	0.028988	0.000000	0.000000	0.000000	0.008579	0.023689	0.004706	0.012232
standardize signal averages SRM									
srM614-2	0.000163	0.000164	0.000021	0.001574	0.000458	0.000217	0.000116	0.000703	0.000783
srM612-2	0.007637	0.007392	0.000013	0.000789	0.000365	0.009292	0.004363	0.032497	0.012801
srM610-2	0.104060	0.107388	0.000077	0.001397	0.001893	0.100897	0.042955	0.548426	0.191724
linest from std sig ave									
	0.049321	0.041004	0.000000	0.000000	0.000000	0.027665	0.070467	0.009406	0.024148
concentration data									
SRM614-7	0.25	0.41	0.00	0.00	0.00	0.15	0.18	0.28	0.81
SRM612-7	10.92	17.57	0.00	0.00	0.00	6.80	8.45	12.82	13.13
SRM610-7	146.88	247.90	0.00	0.00	0.00	70.78	78.61	207.61	191.87
AP1-7	0.20	2.68	0.00	0.00	0.00	0.03	0.10	19.54	0.41
AP2-7	0.84	10.63	0.00	0.00	0.00	0.54	1.79	19.29	2.08
AP3-7	2.36	8.48	0.00	0.00	0.00	2.49	9.47	40.71	10.11
AP4-7	3.86	13.69	0.00	0.00	0.00	5.98	16.76	40.20	16.98
GCK2-1	0.33	3.10	0.00	0.00	0.00	0.06	0.33	0.04	2.14
GCK2-2	0.17	3.86	0.00	0.00	0.00	0.01	0.10	0.00	0.30
GCK2-3	0.38	5.13	0.00	0.00	0.00	0.01	0.13	0.00	0.27
GCK2-4	0.25	13.68	0.00	0.00	0.00	0.04	0.29	0.13	2.94
GCK2-5	0.14	14.82	0.00	0.00	0.00	0.01	0.04	0.00	0.35
GCK2-6	0.15	15.43	0.00	0.00	0.00	0.01	0.09	0.00	0.55
GCK2-7	0.20	15.03	0.00	0.00	0.00	0.05	0.29	0.15	1.40
GCK2-8	0.10	16.27	0.00	0.00	0.00	0.05	0.15	0.06	0.79
GCK2-9	0.18	15.70	0.00	0.00	0.00	0.01	0.10	0.00	0.46
GCK2-10	0.20	1.32	0.00	0.00	0.00	0.04	0.11	0.02	0.52
GCK2-11	0.19	1.45	0.00	0.00	0.00	0.02	0.05	0.01	0.33
GCK2-12	0.17	1.77	0.00	0.00	0.00	0.01	0.07	0.00	0.21
GCK2-13	0.37	1.98	0.00	0.00	0.00	0.05	0.09	0.01	0.82
GCK2-14	0.31	2.98	0.00	0.00	0.00	0.04	0.04	0.00	0.21
GCK2-15	0.23	2.16	0.00	0.00	0.00	0.03	0.03	0.01	0.15
GCK2-16	0.38	4.01	0.00	0.00	0.00	0.05	0.10	0.01	0.21
GCK2-17	0.27	6.20	0.00	0.00	0.00	0.04	0.08	0.00	0.14
GCK2-18	0.19	10.00	0.00	0.00	0.00	0.21	0.03	0.00	0.14
SRM614-8	0.25	0.41	0.00	0.00	0.00	0.17	0.30	0.29	0.83
SRM612-8	12.26	19.18	0.00	0.00	0.00	6.87	9.28	13.41	13.73
SRM610-8	168.87	286.07	0.00	0.00	0.00	77.69	95.93	235.09	210.38
AP1-8	0.12	2.69	0.00	0.00	0.00	0.01	0.03	12.37	0.28
AP2-8	0.71	8.44	0.00	0.00	0.00	0.32	1.53	14.77	1.61
AP3-8	2.41	7.96	0.00	0.00	0.00	2.58	9.13	36.16	9.51
AP4-8	3.60	10.88	0.00	0.00	0.00	4.18	12.32	25.34	12.18
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-5	59.60	126.68	13.88	25.08	29.64	40.00	258.12	636.84	373.36
SRM614-5	568.20	614.84	68.88	3748.82	1028.05	675.28	389.56	2058.89	2365.37
SRM612-5	16756.37	16791.65	49.36	1941.65	889.65	21615.80	10257.86	71801.13	29616.49
SRM610-5	104656.71	111787.27	111.28	1466.81	1792.01	123239.13	43289.72	567464.25	195546.58
AP1-5	696.64	4573.31	48.88	428.52	111.72	213.12	422.32	173452.66	1627.09
AP2-5	1819.49	13620.24	47.56	438.64	402.00	2656.05	3048.62	153330.55	6317.80
AP3-5	10368.66	22537.09	185.16	1454.37	4976.63	50205.44	44927.45	1019150.90	81518.94
AP4-5	15343.93	40818.43	189.28	1511.93	6732.44	62614.23	68206.18	914621.44	130834.41
GCK1-1	563.52	1335.89	26.48	680.20	55.92	127.44	195.60	920.97	500.28
GCK1-2	624.96	1231.45	40.12	744.40	58.28	88.32	184.44	484.68	393.48
GCK1-3	457.04	1383.37	42.28	576.56	47.64	97.88	119.52	601.52	361.16
GCK1-4	856.76	665.72	29.20	814.52	75.32	153.56	244.72	735.44	581.48
GCK1-5	599.60	431.08	29.36	849.80	59.04	93.32	190.08	425.48	415.40
GCK1-6	582.00	865.56	30.16	500.36	46.44	65.20	155.60	216.56	340.64

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	387.68	1008.29	30.44	300.44	41.32	309.08	199.00	1223.57	518.20
GCK1-8	199.08	926.61	36.44	283.80	34.72	50.00	109.60	206.32	244.52
GCK1-9	209.16	879.20	19.20	279.56	35.56	58.56	130.40	308.76	301.84
GCK1-10	583.64	352.04	31.16	872.40	62.80	101.68	169.16	473.88	393.20
GCK1-11	383.40	276.60	33.12	682.48	45.72	59.44	115.80	218.36	313.80
GCK1-12	441.36	272.44	24.04	696.68	42.08	71.84	133.16	113.76	323.60
GCK1-13	367.52	1400.89	31.24	289.24	27.84	113.84	131.68	466.32	362.20
GCK1-14	291.24	1369.25	22.40	266.16	28.04	80.04	134.96	237.52	283.36
GCK1-15	226.08	1385.69	27.08	251.44	33.04	52.88	107.44	141.56	263.24
GCK1-16	443.12	840.72	28.12	256.32	34.96	142.48	209.12	924.49	378.96
GCK1-17	516.88	910.57	19.68	257.16	32.12	84.76	142.24	101.52	263.44
GCK1-18	450.72	780.32	17.04	243.40	31.52	107.52	128.04	182.00	295.68
SRM614-6	353.44	368.36	37.56	2175.73	591.00	250.36	219.68	1001.29	1204.29
SRM612-6	11950.95	11139.10	38.80	1245.49	528.80	12433.43	6270.28	45462.18	18480.58
SRM610-6	83312.43	80782.89	66.72	1083.05	1245.65	69707.20	28975.20	390305.16	136474.53
AP1-6	305.96	3172.10	25.52	173.36	55.76	46.60	179.36	67873.59	876.20
AP2-6	1283.53	7359.36	28.84	213.76	216.04	935.61	1658.49	79103.25	3743.66
AP3-6	6222.27	13292.24	104.16	782.80	2430.57	19754.51	21380.52	452483.47	41550.59
AP4-6	7060.72	14366.08	110.08	598.36	2482.41	23651.37	23403.13	260153.94	44917.53
blank-6	68.72	155.52	23.68	113.28	23.24	21.16	91.28	140.00	116.36
blank average	64.16	141.10	18.78	69.18	26.44	30.58	174.70	388.42	244.86

blank subtraction									
SRM614-5	504.04	473.74	50.10	3679.64	1001.61	644.70	214.86	1670.47	2120.51
SRM612-5	16692.21	16650.55	30.58	1872.47	863.20	21585.22	10083.16	71412.70	29371.62
SRM610-5	104592.55	111646.17	92.50	1397.63	1765.57	123208.55	43115.02	567075.83	195301.72
AP1-5	632.48	4432.20	30.10	359.34	85.28	182.54	247.62	173064.24	1382.23
AP2-5	1755.33	13479.14	28.78	369.46	375.56	2625.47	2873.92	152942.13	6072.93
AP3-5	10304.50	22395.99	166.38	1385.19	4950.19	50174.86	44752.75	1018762.48	81274.08
AP4-5	15279.77	40677.33	170.50	1442.75	6706.00	62583.65	68031.48	914233.02	130589.55
GCK1-1	499.36	1194.79	7.70	611.02	29.48	96.86	20.90	532.54	255.42
GCK1-2	560.80	1090.35	21.34	675.22	31.84	57.74	9.74	96.26	148.62
GCK1-3	392.88	1242.27	23.50	507.38	21.20	67.30	-55.18	213.10	116.30
GCK1-4	792.60	524.62	10.42	745.34	48.88	122.98	70.02	347.02	336.62
GCK1-5	535.44	289.98	10.58	780.62	32.60	62.74	15.38	37.06	170.54
GCK1-6	517.84	724.46	11.38	431.18	20.00	34.62	-19.10	-171.86	95.78
GCK1-7	323.52	867.18	11.66	231.26	14.88	278.50	24.30	835.14	273.34
GCK1-8	134.92	785.50	17.66	214.62	8.28	19.42	-65.10	-182.10	-0.34
GCK1-9	145.00	738.10	0.42	210.38	9.12	27.98	-44.30	-79.66	56.98
GCK1-10	519.48	210.94	12.38	803.22	36.36	71.10	-5.54	85.46	148.34
GCK1-11	319.24	135.50	14.34	613.30	19.28	28.86	-58.90	-170.06	68.94
GCK1-12	377.20	131.34	5.26	627.50	15.64	41.26	-41.54	-274.66	78.74
GCK1-13	303.36	1259.79	12.46	220.06	1.40	83.26	-43.02	77.90	117.34
GCK1-14	227.08	1228.15	3.62	196.98	1.60	49.46	-39.74	-150.90	38.50
GCK1-15	161.92	1244.59	8.30	182.26	6.60	22.30	-67.26	-246.86	18.38
GCK1-16	378.96	699.62	9.34	187.14	8.52	111.90	34.42	536.06	134.10
GCK1-17	452.72	769.46	0.90	187.98	5.68	54.18	-32.46	-286.90	18.58
GCK1-18	386.56	639.22	-1.74	174.22	5.08	76.94	-46.66	-206.42	50.82
SRM614-6	289.28	227.26	18.78	2106.55	564.56	219.78	44.98	612.86	959.43
SRM612-6	11886.79	10998.00	20.02	1176.31	502.36	12402.85	6095.57	45073.75	18235.72
SRM610-6	83248.27	80641.79	47.94	1013.87	1219.21	69676.61	28800.50	389916.74	136229.67
AP1-6	241.80	3031.00	6.74	104.18	29.32	16.02	4.66	67485.16	631.34
AP2-6	1219.37	7218.26	10.06	144.58	189.60	905.03	1483.79	78714.83	3498.80
AP3-6	6158.11	13151.13	85.38	713.62	2404.13	19723.93	21205.82	452095.05	41305.73
AP4-6	6996.56	14224.98	91.30	529.18	2455.97	23620.79	23228.43	259765.52	44672.67

zero correction									
SRM614-5	504.04	473.74	50.10	3679.64	1001.61	644.70	214.86	1670.47	2120.51
SRM612-5	16692.21	16650.55	30.58	1872.47	863.20	21585.22	10083.16	71412.70	29371.62
SRM610-5	104592.55	111646.17	92.50	1397.63	1765.57	123208.55	43115.02	567075.83	195301.72
AP1-5	632.48	4432.20	30.10	359.34	85.28	182.54	247.62	173064.24	1382.23
AP2-5	1755.33	13479.14	28.78	369.46	375.56	2625.47	2873.92	152942.13	6072.93
AP3-5	10304.50	22395.99	166.38	1385.19	4950.19	50174.86	44752.75	1018762.48	81274.08
AP4-5	15279.77	40677.33	170.50	1442.75	6706.00	62583.65	68031.48	914233.02	130589.55
GCK1-1	499.36	1194.79	7.70	611.02	29.48	96.86	20.90	532.54	255.42
GCK1-2	560.80	1090.35	21.34	675.22	31.84	57.74	9.74	96.26	148.62
GCK1-3	392.88	1242.27	23.50	507.38	21.20	67.30	0.00	213.10	116.30
GCK1-4	792.60	524.62	10.42	745.34	48.88	122.98	70.02	347.02	336.62
GCK1-5	535.44	289.98	10.58	780.62	32.60	62.74	15.38	37.06	170.54
GCK1-6	517.84	724.46	11.38	431.18	20.00	34.62	0.00	0.00	95.78
GCK1-7	323.52	867.18	11.66	231.26	14.88	278.50	24.30	835.14	273.34
GCK1-8	134.92	785.50	17.66	214.62	8.28	19.42	0.00	0.00	0.00
GCK1-9	145.00	738.10	0.42	210.38	9.12	27.98	0.00	0.00	56.98
GCK1-10	519.48	210.94	12.38	803.22	36.36	71.10	0.00	85.46	148.34
GCK1-11	319.24	135.50	14.34	613.30	19.28	28.86	0.00	0.00	68.94
GCK1-12	377.20	131.34	5.26	627.50	15.64	41.26	0.00	0.00	78.74
GCK1-13	303.36	1259.79	12.46	220.06	1.40	83.26	0.00	77.90	117.34
GCK1-14	227.08	1228.15	3.62	196.98	1.60	49.46	0.00	0.00	38.50

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	161.92	1244.59	8.30	182.26	6.60	22.30	0.00	0.00	18.38
GCK1-16	378.96	699.62	9.34	187.14	8.52	111.90	34.42	536.06	134.10
GCK1-17	452.72	769.46	0.90	187.98	5.68	54.18	0.00	0.00	18.58
GCK1-18	386.56	639.22	0.00	174.22	5.08	76.94	0.00	0.00	50.82
SRM614-6	289.28	227.26	18.78	2106.55	564.56	219.78	44.98	612.86	959.43
SRM612-6	11886.79	10998.00	20.02	1176.31	502.36	12402.85	6095.57	45073.75	18235.72
SRM610-6	83248.27	80641.79	47.94	1013.87	1219.21	69676.61	28800.50	389916.74	136229.67
AP1-6	241.80	3031.00	6.74	104.18	29.32	16.02	4.66	67485.16	631.34
AP2-6	1219.37	7218.26	10.06	144.58	189.60	905.03	1483.79	78714.83	3498.80
AP3-6	6158.11	13151.13	85.38	713.62	2404.13	19723.93	21205.82	452095.05	41305.73
AP4-6	6996.56	14224.98	91.30	529.18	2455.97	23620.79	23228.43	259765.52	44672.67

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-5	0.000204	0.000192	0.000020	0.001493	0.000406	0.000262	0.000087	0.000678	0.000860
SRM612-5	0.007485	0.007467	0.000014	0.000840	0.000387	0.009679	0.004522	0.032024	0.013171
SRM610-5	0.097252	0.103811	0.000086	0.001300	0.001642	0.114562	0.040089	0.527278	0.181595
AP1-5	0.000037	0.000257	0.000002	0.000021	0.000005	0.000011	0.000014	0.010029	0.000080
AP2-5	0.000124	0.000951	0.000002	0.000026	0.000027	0.000185	0.000203	0.010793	0.000429
AP3-5	0.000508	0.001104	0.000008	0.000068	0.000244	0.002473	0.002206	0.050210	0.004006
AP4-5	0.000834	0.002219	0.000009	0.000079	0.000366	0.003414	0.003712	0.049877	0.007125
GCK1-1	0.000028	0.000067	0.000000	0.000034	0.000002	0.000005	0.000001	0.000030	0.000014
GCK1-2	0.000028	0.000055	0.000001	0.000034	0.000002	0.000003	0.000000	0.000005	0.000007
GCK1-3	0.000026	0.000083	0.000002	0.000034	0.000001	0.000004	0.000000	0.000014	0.000008
GCK1-4	0.000042	0.000028	0.000001	0.000040	0.000003	0.000007	0.000004	0.000019	0.000018
GCK1-5	0.000028	0.000015	0.000001	0.000041	0.000002	0.000003	0.000001	0.000002	0.000009
GCK1-6	0.000033	0.000046	0.000001	0.000027	0.000001	0.000002	0.000000	0.000000	0.000006
GCK1-7	0.000039	0.000104	0.000001	0.000028	0.000002	0.000034	0.000003	0.000101	0.000033
GCK1-8	0.000017	0.000098	0.000002	0.000027	0.000001	0.000002	0.000000	0.000000	0.000000
GCK1-9	0.000017	0.000089	0.000000	0.000025	0.000001	0.000003	0.000000	0.000000	0.000007
GCK1-10	0.000027	0.000011	0.000001	0.000041	0.000002	0.000004	0.000000	0.000004	0.000008
GCK1-11	0.000020	0.000008	0.000001	0.000038	0.000001	0.000002	0.000000	0.000000	0.000004
GCK1-12	0.000023	0.000008	0.000000	0.000038	0.000001	0.000002	0.000000	0.000000	0.000005
GCK1-13	0.000027	0.000113	0.000001	0.000020	0.000000	0.000007	0.000000	0.000007	0.000011
GCK1-14	0.000020	0.000108	0.000000	0.000017	0.000000	0.000004	0.000000	0.000000	0.000003
GCK1-15	0.000015	0.000117	0.000001	0.000017	0.000001	0.000002	0.000000	0.000000	0.000002
GCK1-16	0.000047	0.000086	0.000001	0.000023	0.000001	0.000014	0.000004	0.000066	0.000016
GCK1-17	0.000048	0.000081	0.000000	0.000020	0.000001	0.000006	0.000000	0.000000	0.000002
GCK1-18	0.000049	0.000081	0.000000	0.000022	0.000001	0.000010	0.000000	0.000000	0.000006
SRM614-6	0.000215	0.000169	0.000014	0.001562	0.000419	0.000163	0.000033	0.000454	0.000711
SRM612-6	0.008376	0.007749	0.000014	0.000829	0.000354	0.008739	0.004295	0.031760	0.012849
SRM610-6	0.113433	0.109881	0.000065	0.001381	0.001661	0.094940	0.039243	0.531293	0.185624
AP1-6	0.000020	0.000254	0.000001	0.000009	0.000002	0.000001	0.000000	0.005658	0.000053
AP2-6	0.000119	0.000705	0.000001	0.000014	0.000019	0.000088	0.000145	0.007688	0.000342
AP3-6	0.000403	0.000862	0.000006	0.000047	0.000158	0.001292	0.001389	0.029619	0.002706
AP4-6	0.000633	0.001286	0.000008	0.000048	0.000222	0.002136	0.002101	0.023491	0.004040

standardize signal averages AP									
AP1	0.000028	0.000255	0.000001	0.000015	0.000004	0.000006	0.000007	0.007843	0.000067
AP2	0.000121	0.000828	0.000002	0.000020	0.000023	0.000137	0.000174	0.009241	0.000385
AP3	0.000456	0.000983	0.000007	0.000058	0.000201	0.001883	0.001797	0.039915	0.003356
AP4	0.000733	0.001753	0.000009	0.000063	0.000294	0.002775	0.002906	0.036684	0.005582

linest from std sig ave									
	0.012915	0.020433	0.000000	0.000000	0.000000	0.004263	0.012668	0.002275	0.006768

standardize signal averages SRM									
srM614-2	0.000209	0.000180	0.000017	0.001527	0.000412	0.000212	0.000060	0.000566	0.000786
srM612-2	0.007930	0.007608	0.000014	0.000834	0.000371	0.009209	0.004408	0.031892	0.013010
srM610-2	0.105342	0.106846	0.000076	0.001341	0.001651	0.104751	0.039666	0.529285	0.183610

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.048715	0.041209	0.000000	0.000000	0.000000	0.026656	0.076235	0.009746	0.025211
concentration data									
SRM614-5	0.23	0.34	0.00	0.00	0.00	0.10	0.09	0.13	0.50
SRM612-5	8.29	13.08	0.00	0.00	0.00	3.54	4.91	6.25	7.64
SRM610-5	107.72	181.92	0.00	0.00	0.00	41.89	43.56	102.86	105.40
AP1-5	0.19	2.09	0.00	0.00	0.00	0.02	0.07	9.10	0.22
AP2-5	0.64	7.75	0.00	0.00	0.00	0.32	1.02	9.79	1.16
AP3-5	2.62	9.00	0.00	0.00	0.00	4.21	11.15	45.56	10.81
AP4-5	4.30	18.09	0.00	0.00	0.00	5.81	18.76	45.26	19.24
GCK1-1	0.14	0.54	0.00	0.00	0.00	0.01	0.01	0.03	0.04
GCK1-2	0.15	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.02
GCK1-3	0.13	0.67	0.00	0.00	0.00	0.01	0.00	0.01	0.02
GCK1-4	0.22	0.23	0.00	0.00	0.00	0.01	0.02	0.02	0.05
GCK1-5	0.15	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.02
GCK1-6	0.17	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.02
GCK1-7	0.20	0.85	0.00	0.00	0.00	0.06	0.01	0.09	0.09
GCK1-8	0.09	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK1-9	0.09	0.72	0.00	0.00	0.00	0.01	0.00	0.00	0.02
GCK1-10	0.14	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.02
GCK1-11	0.10	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.01
GCK1-12	0.12	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01
GCK1-13	0.14	0.92	0.00	0.00	0.00	0.01	0.00	0.01	0.03
GCK1-14	0.10	0.88	0.00	0.00	0.00	0.01	0.00	0.00	0.01
GCK1-15	0.08	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK1-16	0.24	0.70	0.00	0.00	0.00	0.02	0.02	0.06	0.04
GCK1-17	0.25	0.66	0.00	0.00	0.00	0.01	0.00	0.00	0.01
GCK1-18	0.25	0.66	0.00	0.00	0.00	0.02	0.00	0.00	0.02
SRM614-6	0.24	0.30	0.00	0.00	0.00	0.06	0.04	0.09	0.41
SRM612-6	9.28	13.58	0.00	0.00	0.00	3.20	4.67	6.20	7.46
SRM610-6	125.64	192.56	0.00	0.00	0.00	34.71	42.64	103.64	107.74
AP1-6	0.10	2.07	0.00	0.00	0.00	0.00	0.00	5.13	0.14
AP2-6	0.61	5.75	0.00	0.00	0.00	0.15	0.73	6.98	0.92
AP3-6	2.08	7.02	0.00	0.00	0.00	2.20	7.02	26.88	7.31
AP4-6	3.26	10.49	0.00	0.00	0.00	3.63	10.62	21.32	10.91
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	111.16	133.08	18.28	27.84	31.48	29.00	203.04	35.88	155.68
SRM614-1	782.44	611.08	66.60	3931.22	1084.17	573.28	480.44	2016.97	2571.25
SRM612-1	17443.98	16384.01	49.36	1912.21	948.09	19319.27	11339.30	68678.55	28789.88
SRM610-1	107799.61	106946.00	89.88	1514.57	1695.73	95489.34	33387.75	404933.19	171093.36
AP1-1	778.88	4534.19	34.84	487.72	146.92	263.00	832.52	217406.58	2051.17
AP2-1	2220.09	17791.42	53.28	484.76	519.28	3609.14	3929.30	199493.80	7612.12
AP3-1	11400.70	22337.21	203.04	1384.13	5854.15	60273.14	56144.16	1156421.00	91918.84
AP4-1	14081.68	36084.65	172.28	1150.49	5385.75	53958.98	59254.41	708795.50	102965.26
V2-1	252.72	1656.85	24.64	288.48	28.64	77.32	133.28	419.20	331.52
V2-2	181.84	1466.69	19.96	262.44	28.80	42.76	112.44	292.76	318.04
V2-3	168.68	1413.53	21.60	246.68	26.84	51.96	106.20	117.60	304.64
V2-4	476.48	3629.06	27.96	289.92	49.44	156.80	203.44	1238.09	560.40
V2-5	306.56	3033.78	30.80	349.28	43.32	66.52	154.36	220.88	323.28
V2-6	309.72	2798.30	19.80	361.80	44.36	89.76	154.20	487.60	382.88
V2-7	344.00	1849.85	44.00	292.60	46.32	188.64	260.36	1267.01	707.00
V2-8	212.68	1808.37	28.16	298.08	28.92	68.20	155.28	314.68	398.12
V2-9	216.28	1860.69	26.52	306.28	37.76	87.28	152.60	378.36	682.12
V2-10	338.12	2225.53	27.24	293.48	31.12	232.36	209.64	806.84	483.56
V2-11	200.04	2097.13	25.04	311.84	23.72	81.28	127.36	190.72	369.76
V2-12	174.96	2039.77	27.36	256.52	31.32	107.76	137.96	329.96	428.08
V2-13	766.00	728.44	38.68	799.16	59.16	131.04	186.40	399.88	485.20
V2-14	679.72	802.76	51.64	837.80	71.56	67.40	131.96	150.92	403.52
V2-15	776.40	857.28	36.16	868.08	61.88	84.28	141.96	276.56	486.76
SRM614-2	393.08	427.52	61.72	2594.33	701.36	315.48	244.84	1254.29	1483.61
SRM612-2	13676.60	13566.68	52.80	1571.05	691.72	15127.73	8359.69	57494.72	23088.09
SRM610-2	92488.52	96173.78	80.08	1349.57	1430.81	86079.60	29998.73	459470.88	160749.42
AP1-2	270.44	3063.90	36.28	220.96	83.72	128.28	886.97	90381.87	1121.61
AP2-2	1320.81	10210.86	44.20	265.12	237.80	1625.41	1921.17	93393.33	4319.90
AP3-2	4852.35	9151.33	88.36	552.48	1910.89	15819.85	16064.49	294054.84	29402.17
AP4-2	8900.69	19148.07	106.76	599.28	3033.14	36543.57	31127.57	336839.94	55650.51

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	66.16	160.60	23.60	117.52	22.72	13.92	96.40	68.12	145.64
blank average	88.66	146.84	20.94	72.68	27.10	21.46	149.72	52.00	150.66
blank subtraction									
SRM614-1	693.78	464.24	45.66	3858.54	1057.07	551.82	330.72	1964.97	2420.59
SRM612-1	17355.32	16237.17	28.42	1839.53	920.99	19297.81	11189.58	68626.55	28639.22
SRM610-1	107710.95	106799.16	68.94	1441.89	1668.63	95467.88	33238.03	404881.19	170942.70
AP1-1	690.22	4387.34	13.90	415.04	119.82	241.54	682.80	217354.58	1900.51
AP2-1	2131.43	17644.58	32.34	412.08	492.18	3587.68	3779.58	199441.80	7461.46
AP3-1	11312.04	22190.36	182.10	1311.45	5827.05	60251.68	55994.44	1156369.00	91768.18
AP4-1	13993.02	35937.80	151.34	1077.81	5358.65	53937.52	59104.69	708743.50	102814.60
V2-1	164.06	1510.01	3.70	215.80	1.54	55.86	-16.44	367.20	180.86
V2-2	93.18	1319.85	-0.98	189.76	1.70	21.30	-37.28	240.76	167.38
V2-3	80.02	1266.69	0.66	174.00	-0.26	30.50	-43.52	65.60	153.98
V2-4	387.82	3482.22	7.02	217.24	22.34	135.34	53.72	1186.09	409.74
V2-5	217.90	2886.94	9.86	276.60	16.22	45.06	4.64	168.88	172.62
V2-6	221.06	2651.46	-1.14	289.12	17.26	68.30	4.48	435.60	232.22
V2-7	255.34	1703.01	23.06	219.92	19.22	167.18	110.64	1215.01	556.34
V2-8	124.02	1661.53	7.22	225.40	1.82	46.74	5.56	262.68	247.46
V2-9	127.62	1713.85	5.58	233.60	10.66	65.82	2.88	326.36	531.46
V2-10	249.46	2078.69	6.30	220.80	4.02	210.90	59.92	754.84	332.90
V2-11	111.38	1950.29	4.10	239.16	-3.38	59.82	-22.36	138.72	219.10
V2-12	86.30	1892.93	6.42	183.84	4.22	86.30	-11.76	277.96	277.42
V2-13	677.34	581.60	17.74	726.48	32.06	109.58	36.68	347.88	334.54
V2-14	591.06	655.92	30.70	765.12	44.46	45.94	-17.76	98.92	252.86
V2-15	687.74	710.44	15.22	795.40	34.78	62.82	-7.76	224.56	336.10
SRM614-2	304.42	280.68	40.78	2521.65	674.26	294.02	95.12	1202.29	1332.95
SRM612-2	13587.94	13419.84	31.86	1498.37	664.62	15106.27	8209.97	57442.72	22937.43
SRM610-2	92399.86	96026.94	59.14	1276.89	1403.71	86058.14	29849.01	459418.88	160598.76
AP1-2	181.78	2917.06	15.34	148.28	56.62	106.82	737.24	90329.87	970.95
AP2-2	1232.15	10064.02	23.26	192.44	210.70	1603.95	1771.45	93341.33	4169.24
AP3-2	4763.69	9004.49	67.42	479.80	1883.79	15798.39	15914.77	294002.84	29251.51
AP4-2	8812.03	19001.23	85.82	526.60	3006.04	36522.11	30977.85	336787.94	55499.85
zero correction									
SRM614-1	693.78	464.24	45.66	3858.54	1057.07	551.82	330.72	1964.97	2420.59
SRM612-1	17355.32	16237.17	28.42	1839.53	920.99	19297.81	11189.58	68626.55	28639.22
SRM610-1	107710.95	106799.16	68.94	1441.89	1668.63	95467.88	33238.03	404881.19	170942.70
AP1-1	690.22	4387.34	13.90	415.04	119.82	241.54	682.80	217354.58	1900.51
AP2-1	2131.43	17644.58	32.34	412.08	492.18	3587.68	3779.58	199441.80	7461.46
AP3-1	11312.04	22190.36	182.10	1311.45	5827.05	60251.68	55994.44	1156369.00	91768.18
AP4-1	13993.02	35937.80	151.34	1077.81	5358.65	53937.52	59104.69	708743.50	102814.60
V2-1	164.06	1510.01	3.70	215.80	1.54	55.86	0.00	367.20	180.86
V2-2	93.18	1319.85	0.00	189.76	1.70	21.30	0.00	240.76	167.38
V2-3	80.02	1266.69	0.66	174.00	0.00	30.50	0.00	65.60	153.98
V2-4	387.82	3482.22	7.02	217.24	22.34	135.34	53.72	1186.09	409.74
V2-5	217.90	2886.94	9.86	276.60	16.22	45.06	4.64	168.88	172.62
V2-6	221.06	2651.46	0.00	289.12	17.26	68.30	4.48	435.60	232.22
V2-7	255.34	1703.01	23.06	219.92	19.22	167.18	110.64	1215.01	556.34
V2-8	124.02	1661.53	7.22	225.40	1.82	46.74	5.56	262.68	247.46
V2-9	127.62	1713.85	5.58	233.60	10.66	65.82	2.88	326.36	531.46
V2-10	249.46	2078.69	6.30	220.80	4.02	210.90	59.92	754.84	332.90
V2-11	111.38	1950.29	4.10	239.16	0.00	59.82	0.00	138.72	219.10
V2-12	86.30	1892.93	6.42	183.84	4.22	86.30	0.00	277.96	277.42
V2-13	677.34	581.60	17.74	726.48	32.06	109.58	36.68	347.88	334.54
V2-14	591.06	655.92	30.70	765.12	44.46	45.94	0.00	98.92	252.86
V2-15	687.74	710.44	15.22	795.40	34.78	62.82	0.00	224.56	336.10
SRM614-2	304.42	280.68	40.78	2521.65	674.26	294.02	95.12	1202.29	1332.95
SRM612-2	13587.94	13419.84	31.86	1498.37	664.62	15106.27	8209.97	57442.72	22937.43
SRM610-2	92399.86	96026.94	59.14	1276.89	1403.71	86058.14	29849.01	459418.88	160598.76
AP1-2	181.78	2917.06	15.34	148.28	56.62	106.82	737.24	90329.87	970.95
AP2-2	1232.15	10064.02	23.26	192.44	210.70	1603.95	1771.45	93341.33	4169.24
AP3-2	4763.69	9004.49	67.42	479.80	1883.79	15798.39	15914.77	294002.84	29251.51
AP4-2	8812.03	19001.23	85.82	526.60	3006.04	36522.11	30977.85	336787.94	55499.85
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-1	0.000277	0.000185	0.000018	0.001539	0.000422	0.000220	0.000132	0.000784	0.000965
SRM612-1	0.007765	0.007265	0.000013	0.000823	0.000412	0.008635	0.005007	0.030706	0.012814
SRM610-1	0.103098	0.102226	0.000066	0.001380	0.001597	0.091380	0.031815	0.387542	0.163622
AP1-1	0.000041	0.000258	0.000001	0.000024	0.000007	0.000014	0.000040	0.012775	0.000112
AP2-1	0.000124	0.001022	0.000002	0.000024	0.000029	0.000208	0.000219	0.011557	0.000432
AP3-1	0.000538	0.001056	0.000009	0.000062	0.000277	0.002868	0.002665	0.055042	0.004368
AP4-1	0.000697	0.001790	0.000008	0.000054	0.000267	0.002687	0.002944	0.035305	0.005122
V2-1	0.000018	0.000167	0.000000	0.000024	0.000000	0.000006	0.000000	0.000041	0.000020
V2-2	0.000012	0.000166	0.000000	0.000024	0.000000	0.000003	0.000000	0.000030	0.000021
V2-3	0.000012	0.000192	0.000000	0.000026	0.000000	0.000005	0.000000	0.000010	0.000023
V2-4	0.000046	0.000416	0.000001	0.000026	0.000003	0.000016	0.000006	0.000142	0.000049
V2-5	0.000024	0.000320	0.000001	0.000031	0.000002	0.000005	0.000001	0.000019	0.000019
V2-6	0.000025	0.000295	0.000000	0.000032	0.000002	0.000008	0.000000	0.000049	0.000026
V2-7	0.000041	0.000276	0.000004	0.000036	0.000003	0.000027	0.000018	0.000197	0.000090
V2-8	0.000021	0.000278	0.000001	0.000038	0.000000	0.000008	0.000001	0.000044	0.000041
V2-9	0.000024	0.000324	0.000001	0.000044	0.000002	0.000012	0.000001	0.000062	0.000100
V2-10	0.000049	0.000407	0.000001	0.000043	0.000001	0.000041	0.000012	0.000148	0.000065
V2-11	0.000024	0.000420	0.000001	0.000051	0.000000	0.000013	0.000000	0.000030	0.000047
V2-12	0.000019	0.000423	0.000001	0.000041	0.000001	0.000019	0.000000	0.000062	0.000062
V2-13	0.000038	0.000033	0.000001	0.000041	0.000002	0.000006	0.000002	0.000019	0.000019
V2-14	0.000032	0.000036	0.000002	0.000042	0.000002	0.000003	0.000000	0.000005	0.000014
V2-15	0.000035	0.000036	0.000001	0.000040	0.000002	0.000003	0.000000	0.000011	0.000017
SRM614-2	0.000201	0.000186	0.000027	0.001667	0.000446	0.000194	0.000063	0.000795	0.000881
SRM612-2	0.007917	0.007819	0.000019	0.000873	0.000387	0.008802	0.004783	0.033469	0.013364
SRM610-2	0.103268	0.107322	0.000066	0.001427	0.001569	0.096180	0.033360	0.513456	0.179488
AP1-2	0.000015	0.000239	0.000001	0.000012	0.000005	0.000009	0.000060	0.007386	0.000079
AP2-2	0.000099	0.000807	0.000002	0.000015	0.000017	0.000129	0.000142	0.007483	0.000334
AP3-2	0.000369	0.000698	0.000005	0.000037	0.000146	0.001225	0.001234	0.022790	0.002267
AP4-2	0.000594	0.001281	0.000006	0.000035	0.000203	0.002462	0.002088	0.022701	0.003741
standardize signal averages AP									
AP1	0.000028	0.000248	0.000001	0.000018	0.000006	0.000011	0.000050	0.010080	0.000096
AP2	0.000111	0.000915	0.000002	0.000020	0.000023	0.000168	0.000181	0.009520	0.000383
AP3	0.000454	0.000877	0.000007	0.000050	0.000212	0.002046	0.001949	0.038916	0.003318
AP4	0.000646	0.001535	0.000007	0.000045	0.000235	0.002574	0.002516	0.029003	0.004431
linest from std sig ave									
	0.014041	0.022294	0.000000	0.000000	0.000000	0.004328	0.013473	0.002567	0.007926
standardize signal averages SRM									
srm614-2	0.000239	0.000185	0.000023	0.001603	0.000434	0.000207	0.000097	0.000789	0.000923
srm612-2	0.007841	0.007542	0.000016	0.000848	0.000400	0.008718	0.004895	0.032087	0.013089
srm610-2	0.103183	0.104774	0.000066	0.001404	0.001583	0.093780	0.032587	0.450499	0.171555
linest from std sig ave									
	0.049732	0.042022	0.000000	0.000000	0.000000	0.029762	0.092256	0.011446	0.026975
concentration data									
SRM614-1	0.33	0.35	0.00	0.00	0.00	0.08	0.15	0.17	0.66
SRM612-1	9.35	13.89	0.00	0.00	0.00	3.20	5.79	6.76	8.71
SRM610-1	124.15	195.46	0.00	0.00	0.00	33.91	36.76	85.33	111.22
AP1-1	0.23	2.29	0.00	0.00	0.00	0.02	0.22	13.08	0.35
AP2-1	0.69	9.09	0.00	0.00	0.00	0.36	1.18	11.84	1.37
AP3-1	3.02	9.39	0.00	0.00	0.00	4.95	14.33	56.37	13.81
AP4-1	3.90	15.92	0.00	0.00	0.00	4.64	15.82	36.16	16.19
V2-1	0.10	1.49	0.00	0.00	0.00	0.01	0.00	0.04	0.06
V2-2	0.07	1.47	0.00	0.00	0.00	0.00	0.00	0.03	0.07
V2-3	0.07	1.71	0.00	0.00	0.00	0.01	0.00	0.01	0.07
V2-4	0.26	3.70	0.00	0.00	0.00	0.03	0.03	0.15	0.15
V2-5	0.14	2.85	0.00	0.00	0.00	0.01	0.00	0.02	0.06
V2-6	0.14	2.63	0.00	0.00	0.00	0.01	0.00	0.05	0.08
V2-7	0.23	2.46	0.00	0.00	0.00	0.05	0.10	0.20	0.29
V2-8	0.12	2.47	0.00	0.00	0.00	0.01	0.00	0.05	0.13
V2-9	0.14	2.88	0.00	0.00	0.00	0.02	0.00	0.06	0.32
V2-10	0.27	3.62	0.00	0.00	0.00	0.07	0.06	0.15	0.21
V2-11	0.13	3.73	0.00	0.00	0.00	0.02	0.00	0.03	0.15
V2-12	0.11	3.77	0.00	0.00	0.00	0.03	0.00	0.06	0.20
V2-13	0.21	0.29	0.00	0.00	0.00	0.01	0.01	0.02	0.06
V2-14	0.18	0.32	0.00	0.00	0.00	0.00	0.00	0.01	0.04
V2-15	0.19	0.32	0.00	0.00	0.00	0.01	0.00	0.01	0.05
SRM614-2	0.24	0.35	0.00	0.00	0.00	0.07	0.07	0.18	0.60
SRM612-2	9.53	14.95	0.00	0.00	0.00	3.27	5.53	7.37	9.08

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	124.36	205.20	0.00	0.00	0.00	35.70	38.55	113.05	122.00
AP1-2	0.08	2.12	0.00	0.00	0.00	0.02	0.32	7.56	0.25
AP2-2	0.55	7.18	0.00	0.00	0.00	0.22	0.76	7.66	1.06
AP3-2	2.07	6.21	0.00	0.00	0.00	2.11	6.63	23.34	7.17
AP4-2	3.33	11.39	0.00	0.00	0.00	4.25	11.22	23.25	11.83

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-23	76.48	93.96	12.92	17.36	11.24	8.44	54.76	32.64	123.44
SRM614-23	298.84	301.76	32.08	2686.22	742.68	386.88	241.00	1267.33	1434.25
SRM612-23	9450.89	9592.65	34.92	1369.09	837.48	16089.57	7142.00	51606.49	19703.67
SRM610-23	52389.38	47998.11	49.56	868.16	2298.37	66906.70	25502.90	285457.41	100928.41
AP1-23	243.44	1751.49	25.88	200.80	29.28	73.88	111.36	53855.98	835.92
AP2-23	1379.61	9932.34	50.72	591.40	409.96	2002.25	2796.30	152483.78	5760.35
AP3-23	3516.62	7775.00	88.40	863.20	1753.85	11150.22	13884.72	272962.63	25883.15
AP4-23	5464.43	9970.02	76.84	601.36	1912.65	23688.69	17025.14	184478.11	33013.83
34HP45-494-1	7319.80	1345.01	38.28	590.32	127.00	1983.85	296.40	121.52	2555.73
34HP45-494-2	3748.30	1235.21	32.00	606.76	73.12	1557.85	232.04	56.88	1733.17
34HP45-494-3	5038.11	1228.65	33.12	595.72	76.08	1850.17	235.40	106.68	1680.33
34HP45-494-4	17179.18	322.08	50.56	232.88	189.84	2153.21	247.04	172.28	981.97
34HP45-494-5	4294.82	487.48	65.64	198.64	56.20	687.20	209.44	88.52	514.84
34HP45-494-6	4093.54	347.80	66.12	219.52	57.96	698.00	170.60	53.96	580.40
34HP45-494-7	10286.38	570.16	46.64	272.92	107.76	1974.81	160.68	77.88	548.20
34HP45-494-8	10648.26	415.56	41.12	158.56	120.52	3245.82	185.76	107.84	759.00
34HP45-494-9	8364.01	480.44	38.20	183.88	89.36	2855.70	192.96	99.76	661.96
34HP45-494-10	26261.19	1165.37	77.64	441.76	233.44	2694.70	528.60	139.96	848.04
34HP45-494-11	24978.94	1377.25	70.72	522.08	227.92	1129.21	521.88	59.68	757.44
34HP45-494-12	27034.87	800.60	69.88	637.88	238.36	1881.49	593.32	88.20	756.92
34HP45-494-13	11920.71	1648.29	64.96	265.56	113.44	2074.25	337.52	188.24	504.32
34HP45-494-14	12384.35	1718.17	62.40	324.68	136.84	1145.41	320.44	73.12	508.24
34HP45-494-15	9182.29	1855.09	56.04	259.92	90.12	197.28	278.20	71.56	434.24
34HP45-494-16	4083.46	556.16	72.72	297.12	58.40	655.36	220.68	83.36	361.04
34HP45-494-17	4634.27	594.64	51.72	275.44	59.68	466.36	251.04	53.36	443.12
34HP45-494-18	3576.90	680.32	53.16	330.76	44.16	496.16	176.72	67.00	372.52
SRM614-24	298.64	318.92	40.92	1939.53	548.52	279.28	204.92	872.08	1085.85
SRM612-24	9488.05	8726.89	47.96	1101.85	513.80	11579.43	5474.31	38920.74	15631.41
SRM610-24	59462.93	51735.81	66.40	794.08	1251.73	59542.02	25533.06	279266.00	95721.82
AP1-24	156.44	1794.01	44.68	150.44	26.20	25.20	105.36	35940.04	613.40
AP2-24	1022.05	6465.08	38.88	319.44	253.44	1432.57	1966.29	98560.16	4058.02
AP3-24	3446.06	7011.52	81.80	646.16	1454.81	8657.85	12491.75	230141.17	22562.49
AP4-24	5368.43	9537.61	71.12	412.52	1520.89	9596.97	13524.44	141585.16	26945.75
blank-24	72.56	95.24	22.00	137.52	13.88	13.48	78.52	24.20	74.88
blank average	74.52	94.60	17.46	77.44	12.56	10.96	66.64	28.42	99.16

blank subtraction									
SRM614-23	224.32	207.16	14.62	2608.77	730.12	375.92	174.36	1238.91	1335.09
SRM612-23	9376.37	9498.05	17.46	1291.65	824.92	16078.61	7075.36	51578.07	19604.51
SRM610-23	52314.85	47903.51	32.10	790.72	2285.81	66895.73	25436.26	285428.99	100829.25
AP1-23	168.92	1656.89	8.42	123.36	16.72	62.92	44.72	53827.56	736.76
AP2-23	1305.09	9837.74	33.26	513.96	397.40	1991.29	2729.66	152455.36	5661.19
AP3-23	3442.10	7680.40	70.94	785.76	1741.29	11139.26	13818.08	272934.21	25783.98
AP4-23	5389.91	9875.42	59.38	523.92	1900.09	23677.73	16958.50	184449.69	32914.67
34HP45-494-1	7245.28	1250.41	20.82	512.88	114.44	1972.89	229.76	93.10	2456.57
34HP45-494-2	3673.78	1140.61	14.54	529.32	60.56	1546.89	165.40	28.46	1634.01
34HP45-494-3	4963.59	1134.05	15.66	518.28	63.52	1839.21	168.76	78.26	1581.17
34HP45-494-4	17104.66	227.48	33.10	155.44	177.28	2142.25	180.40	143.86	882.80
34HP45-494-5	4220.30	392.88	48.18	121.20	43.64	676.24	142.80	60.10	415.68
34HP45-494-6	4019.02	253.20	48.66	142.08	45.40	687.04	103.96	25.54	481.24
34HP45-494-7	10211.86	475.56	29.18	195.48	95.20	1963.85	94.04	49.46	449.04
34HP45-494-8	10573.74	320.96	23.66	81.12	107.96	3234.86	119.12	79.42	659.84
34HP45-494-9	8289.49	385.84	20.74	106.44	76.80	2844.74	126.32	71.34	562.80
34HP45-494-10	26186.67	1070.77	60.18	364.32	220.88	2683.74	461.96	111.54	748.88
34HP45-494-11	24904.42	1282.65	53.26	444.64	215.36	1118.25	455.24	31.26	658.28
34HP45-494-12	26960.35	706.00	52.42	560.44	225.80	1870.53	526.68	59.78	657.76
34HP45-494-13	11846.19	1553.69	47.50	188.12	100.88	2063.29	270.88	159.82	405.16
34HP45-494-14	12309.83	1623.57	44.94	247.24	124.28	1134.45	253.80	44.70	409.08
34HP45-494-15	9107.77	1760.49	38.58	182.48	77.56	186.32	211.56	43.14	335.08
34HP45-494-16	4008.94	461.56	55.26	219.68	45.84	644.40	154.04	54.94	261.88
34HP45-494-17	4559.75	500.04	34.26	198.00	47.12	455.40	184.40	24.94	343.96

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	3502.38	585.72	35.70	253.32	31.60	485.20	110.08	38.58	273.36
SRM614-24	224.12	224.32	23.46	1862.09	535.96	268.32	138.28	843.66	986.69
SRM612-24	9413.53	8632.29	30.50	1024.41	501.24	11568.47	5407.67	38892.32	15532.25
SRM610-24	59388.41	51641.21	48.94	716.64	1239.17	59531.06	25466.42	279237.58	95622.66
AP1-24	81.92	1699.41	27.22	73.00	13.64	14.24	38.72	35911.62	514.24
AP2-24	947.53	6370.48	21.42	242.00	240.88	1421.61	1899.65	98531.74	3958.86
AP3-24	3371.54	6916.92	64.34	568.72	1442.25	8646.89	12425.11	230112.75	22463.33
AP4-24	5293.91	9443.01	53.66	335.08	1508.33	9586.01	13457.80	141556.74	26846.59

zero correction									
SRM614-23	224.32	207.16	14.62	2608.77	730.12	375.92	174.36	1238.91	1335.09
SRM612-23	9376.37	9498.05	17.46	1291.65	824.92	16078.61	7075.36	51578.07	19604.51
SRM610-23	52314.85	47903.51	32.10	790.72	2285.81	66895.73	25436.26	285428.99	100829.25
AP1-23	168.92	1656.89	8.42	123.36	16.72	62.92	44.72	53827.56	736.76
AP2-23	1305.09	9837.74	33.26	513.96	397.40	1991.29	2729.66	152455.36	5661.19
AP3-23	3442.10	7680.40	70.94	785.76	1741.29	11139.26	13818.08	272934.21	25783.98
AP4-23	5389.91	9875.42	59.38	523.92	1900.09	23677.73	16958.50	184449.69	32914.67
34HP45-494-1	7245.28	1250.41	20.82	512.88	114.44	1972.89	229.76	93.10	2456.57
34HP45-494-2	3673.78	1140.61	14.54	529.32	60.56	1546.89	165.40	28.46	1634.01
34HP45-494-3	4963.59	1134.05	15.66	518.28	63.52	1839.21	168.76	78.26	1581.17
34HP45-494-4	17104.66	227.48	33.10	155.44	177.28	2142.25	180.40	143.86	882.80
34HP45-494-5	4220.30	392.88	48.18	121.20	43.64	676.24	142.80	60.10	415.68
34HP45-494-6	4019.02	253.20	48.66	142.08	45.40	687.04	103.96	25.54	481.24
34HP45-494-7	10211.86	475.56	29.18	195.48	95.20	1963.85	94.04	49.46	449.04
34HP45-494-8	10573.74	320.96	23.66	81.12	107.96	3234.86	119.12	79.42	659.84
34HP45-494-9	8289.49	385.84	20.74	106.44	76.80	2844.74	126.32	71.34	562.80
34HP45-494-10	26186.67	1070.77	60.18	364.32	220.88	2683.74	461.96	111.54	748.88
34HP45-494-11	24904.42	1282.65	53.26	444.64	215.36	1118.25	455.24	31.26	658.28
34HP45-494-12	26960.35	706.00	52.42	560.44	225.80	1870.53	526.68	59.78	657.76
34HP45-494-13	11846.19	1553.69	47.50	188.12	100.88	2063.29	270.88	159.82	405.16
34HP45-494-14	12309.83	1623.57	44.94	247.24	124.28	1134.45	253.80	44.70	409.08
34HP45-494-15	9107.77	1760.49	38.58	182.48	77.56	186.32	211.56	43.14	335.08
34HP45-494-16	4008.94	461.56	55.26	219.68	45.84	644.40	154.04	54.94	261.88
34HP45-494-17	4559.75	500.04	34.26	198.00	47.12	455.40	184.40	24.94	343.96
34HP45-494-18	3502.38	585.72	35.70	253.32	31.60	485.20	110.08	38.58	273.36
SRM614-24	224.12	224.32	23.46	1862.09	535.96	268.32	138.28	843.66	986.69
SRM612-24	9413.53	8632.29	30.50	1024.41	501.24	11568.47	5407.67	38892.32	15532.25
SRM610-24	59388.41	51641.21	48.94	716.64	1239.17	59531.06	25466.42	279237.58	95622.66
AP1-24	81.92	1699.41	27.22	73.00	13.64	14.24	38.72	35911.62	514.24
AP2-24	947.53	6370.48	21.42	242.00	240.88	1421.61	1899.65	98531.74	3958.86
AP3-24	3371.54	6916.92	64.34	568.72	1442.25	8646.89	12425.11	230112.75	22463.33
AP4-24	5293.91	9443.01	53.66	335.08	1508.33	9586.01	13457.80	141556.74	26846.59

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-23	0.000108	0.000100	0.000007	0.001255	0.000351	0.000181	0.000084	0.000596	0.000642
SRM612-23	0.004816	0.004879	0.000009	0.000663	0.000424	0.008259	0.003634	0.026493	0.010070
SRM610-23	0.072190	0.066103	0.000044	0.001091	0.003154	0.092310	0.035100	0.393867	0.139135
AP1-23	0.000017	0.000164	0.000001	0.000012	0.000002	0.000006	0.000004	0.005330	0.000073
AP2-23	0.000096	0.000725	0.000002	0.000038	0.000029	0.000147	0.000201	0.011239	0.000417
AP3-23	0.000228	0.000510	0.000005	0.000052	0.000116	0.000739	0.000917	0.018110	0.001711
AP4-23	0.000360	0.000660	0.000004	0.000035	0.000127	0.001584	0.001134	0.012336	0.002201
34HP45-494-1	0.000477	0.000082	0.000001	0.000034	0.000008	0.000130	0.000015	0.000006	0.000162
34HP45-494-2	0.000277	0.000086	0.000001	0.000040	0.000005	0.000116	0.000012	0.000002	0.000123
34HP45-494-3	0.000396	0.000090	0.000001	0.000041	0.000005	0.000147	0.000013	0.000006	0.000126
34HP45-494-4	0.001217	0.000016	0.000002	0.000011	0.000013	0.000152	0.000013	0.000010	0.000063
34HP45-494-5	0.000300	0.000028	0.000003	0.000009	0.000003	0.000048	0.000010	0.000004	0.000030
34HP45-494-6	0.000322	0.000020	0.000004	0.000011	0.000004	0.000055	0.000008	0.000002	0.000038
34HP45-494-7	0.000903	0.000042	0.000003	0.000017	0.000008	0.000174	0.000008	0.000004	0.000040
34HP45-494-8	0.001038	0.000032	0.000002	0.000008	0.000011	0.000318	0.000012	0.000008	0.000065
34HP45-494-9	0.000846	0.000039	0.000002	0.000011	0.000008	0.000290	0.000013	0.000007	0.000057

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.002072	0.000085	0.000005	0.000029	0.000017	0.000212	0.000037	0.000009	0.000059
34HP45-494-11	0.001823	0.000094	0.000004	0.000033	0.000016	0.000082	0.000033	0.000002	0.000048
34HP45-494-12	0.001941	0.000051	0.000004	0.000040	0.000016	0.000135	0.000038	0.000004	0.000047
34HP45-494-13	0.000963	0.000126	0.000004	0.000015	0.000008	0.000168	0.000022	0.000013	0.000033
34HP45-494-14	0.000952	0.000126	0.000003	0.000019	0.000010	0.000088	0.000020	0.000003	0.000032
34HP45-494-15	0.000681	0.000132	0.000003	0.000014	0.000006	0.000014	0.000016	0.000003	0.000025
34HP45-494-16	0.000362	0.000042	0.000005	0.000020	0.000004	0.000058	0.000014	0.000005	0.000024
34HP45-494-17	0.000378	0.000041	0.000003	0.000016	0.000004	0.000038	0.000015	0.000002	0.000029
34HP45-494-18	0.000262	0.000044	0.000003	0.000019	0.000002	0.000036	0.000008	0.000003	0.000020
SRM614-24	0.000168	0.000168	0.000018	0.001397	0.000402	0.000201	0.000104	0.000633	0.000740
SRM612-24	0.007264	0.006662	0.000024	0.000791	0.000387	0.008927	0.004173	0.030013	0.011986
SRM610-24	0.112999	0.098258	0.000093	0.001364	0.002358	0.113270	0.048455	0.531309	0.181942
AP1-24	0.000009	0.000196	0.000003	0.000008	0.000002	0.000002	0.000004	0.004131	0.000059
AP2-24	0.000082	0.000552	0.000002	0.000021	0.000021	0.000123	0.000165	0.008532	0.000343
AP3-24	0.000260	0.000533	0.000005	0.000044	0.000111	0.000666	0.000957	0.017731	0.001731
AP4-24	0.000412	0.000735	0.000004	0.000026	0.000117	0.000746	0.001047	0.011011	0.002088

standardize signal averages AP

AP1	0.000013	0.000180	0.000002	0.000010	0.000002	0.000004	0.000004	0.004731	0.000066
AP2	0.000089	0.000638	0.000002	0.000029	0.000025	0.000135	0.000183	0.009886	0.000380
AP3	0.000244	0.000521	0.000005	0.000048	0.000113	0.000703	0.000937	0.017920	0.001721
AP4	0.000386	0.000698	0.000004	0.000031	0.000122	0.001165	0.001091	0.011674	0.002145

linest from std sig ave

	0.024210	0.040358	0.000000	0.000000	0.000000	0.010508	0.029517	0.005691	0.015866
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standardize signal averages SRM

srM614-2	0.000138	0.000134	0.000012	0.001326	0.000377	0.000191	0.000094	0.000614	0.000691
srM612-2	0.006040	0.005770	0.000016	0.000727	0.000405	0.008593	0.003904	0.028253	0.011028
srM610-2	0.092594	0.082180	0.000069	0.001227	0.002756	0.102790	0.041778	0.462588	0.160539

linest from std sig ave

	0.055454	0.053579	0.000000	0.000000	0.000000	0.027174	0.072503	0.011150	0.028837
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concentration data

SRM614-23	0.22	0.34	0.00	0.00	0.00	0.16	0.21	0.29	0.87
SRM612-23	10.00	16.89	0.00	0.00	0.00	7.44	9.20	12.93	13.70
SRM610-23	149.89	228.80	0.00	0.00	0.00	83.19	88.85	192.22	189.33
AP1-23	0.16	2.64	0.00	0.00	0.00	0.03	0.05	12.10	0.46
AP2-23	0.93	11.68	0.00	0.00	0.00	0.62	2.37	25.51	2.64
AP3-23	2.21	8.20	0.00	0.00	0.00	3.10	10.80	41.11	10.83
AP4-23	3.48	10.63	0.00	0.00	0.00	6.64	13.36	28.00	13.93
34HP45-494-1	4.61	1.33	0.00	0.00	0.00	0.54	0.18	0.01	1.02
34HP45-494-2	2.67	1.38	0.00	0.00	0.00	0.49	0.15	0.00	0.78
34HP45-494-3	3.82	1.46	0.00	0.00	0.00	0.61	0.16	0.01	0.80
34HP45-494-4	11.75	0.26	0.00	0.00	0.00	0.64	0.15	0.02	0.40
34HP45-494-5	2.90	0.45	0.00	0.00	0.00	0.20	0.12	0.01	0.19
34HP45-494-6	3.11	0.33	0.00	0.00	0.00	0.23	0.10	0.00	0.24
34HP45-494-7	8.72	0.68	0.00	0.00	0.00	0.73	0.10	0.01	0.25
34HP45-494-8	10.02	0.51	0.00	0.00	0.00	1.33	0.14	0.02	0.41
34HP45-494-9	8.17	0.63	0.00	0.00	0.00	1.22	0.15	0.02	0.36
34HP45-494-10	20.02	1.36	0.00	0.00	0.00	0.89	0.43	0.02	0.38
34HP45-494-11	17.60	1.51	0.00	0.00	0.00	0.34	0.39	0.01	0.30
34HP45-494-12	18.75	0.82	0.00	0.00	0.00	0.56	0.45	0.01	0.30
34HP45-494-13	9.30	2.03	0.00	0.00	0.00	0.70	0.26	0.03	0.21
34HP45-494-14	9.20	2.02	0.00	0.00	0.00	0.37	0.23	0.01	0.20
34HP45-494-15	6.58	2.12	0.00	0.00	0.00	0.06	0.19	0.01	0.16
34HP45-494-16	3.50	0.67	0.00	0.00	0.00	0.24	0.16	0.01	0.15
34HP45-494-17	3.65	0.67	0.00	0.00	0.00	0.16	0.18	0.00	0.18
34HP45-494-18	2.53	0.71	0.00	0.00	0.00	0.15	0.10	0.01	0.13
SRM614-24	0.35	0.58	0.00	0.00	0.00	0.18	0.26	0.31	1.01
SRM612-24	15.08	23.06	0.00	0.00	0.00	8.05	10.56	14.65	16.31
SRM610-24	234.62	340.09	0.00	0.00	0.00	102.08	122.66	259.30	247.58
AP1-24	0.09	3.15	0.00	0.00	0.00	0.01	0.05	9.38	0.37
AP2-24	0.79	8.88	0.00	0.00	0.00	0.52	1.94	19.37	2.17
AP3-24	2.51	8.58	0.00	0.00	0.00	2.79	11.27	40.25	10.96
AP4-24	3.98	11.83	0.00	0.00	0.00	3.13	12.33	25.00	13.22

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Zr Mo Ru Rh Pd Ag Cd In Sn

Appendix A. Raw trace element datasheets from laser ablation.

raw data									
blank-21	71.40	86.04	19.20	21.76	9.88	15.16	44.28	164.24	132.92
SRM614-21	242.32	237.64	29.96	1586.65	453.60	266.16	183.24	762.92	941.49
SRM612-21	8197.49	9298.65	42.20	1418.81	905.25	16332.45	7420.84	54763.31	19657.71
SRM610-21	61097.06	63574.00	77.08	1148.21	3578.54	110016.50	44822.49	449471.22	139467.19
AP1-21	349.52	2170.93	39.88	332.76	81.04	311.28	241.00	68987.35	1091.85
AP2-21	1137.13	7849.28	57.60	446.16	315.84	1841.69	2113.29	104811.11	4604.11
AP3-21	932.97	6231.48	44.04	380.40	226.52	1001.57	1597.53	78869.09	3843.46
AP4-21	7621.12	18060.06	137.56	1267.61	3648.70	22964.05	30590.77	393259.38	62356.43
34HP45-671-1	4782.99	2203.61	75.92	666.32	129.72	633.08	257.28	321.08	554.04
34HP45-671-2	4231.50	2301.25	42.12	637.44	109.88	259.60	305.72	203.04	450.00
34HP45-671-3	2968.70	1681.37	49.00	729.76	75.04	159.68	194.68	114.08	597.80
34HP45-671-4	4945.43	1847.57	60.52	1384.89	114.48	368.48	309.16	303.64	897.13
34HP45-671-5	3842.94	1647.25	45.32	1059.21	85.52	162.20	207.72	142.40	383.16
34HP45-671-6	3292.34	1521.93	34.40	668.16	85.72	210.08	182.24	261.28	531.44
34HP45-671-7	4246.90	4160.06	50.24	1144.89	104.40	792.12	336.48	499.40	957.17
34HP45-671-8	4518.27	3773.26	47.32	956.17	89.52	247.32	180.52	207.48	295.52
34HP45-671-9	3747.58	3079.22	48.68	842.08	74.16	139.96	194.04	167.68	454.12
34HP45-671-10	1591923.10	4408.74	69.40	773.16	10042.62	2514.21	318.04	521.08	1174.33
34HP45-671-11	7108.68	3028.46	43.72	518.08	101.84	158.84	182.48	372.00	475.08
34HP45-671-12	5418.43	3176.86	42.24	567.88	87.36	149.88	174.52	86.00	438.28
34HP45-671-13	922.41	1265.41	35.24	352.64	36.92	203.56	168.92	555.88	390.64
34HP45-671-14	598.92	973.29	27.36	277.88	21.20	125.28	103.32	218.56	236.40
34HP45-671-15	450.48	936.65	23.72	291.68	28.64	174.92	96.72	134.80	171.92
34HP45-671-16	659.92	1121.81	22.56	287.80	40.04	188.88	108.12	317.04	277.80
34HP45-671-17	580.64	1361.25	28.40	279.64	30.68	114.52	87.28	111.40	174.44
34HP45-671-18	663.92	1423.29	34.00	274.20	26.60	152.88	102.36	189.00	225.08
SRM614-22	249.52	279.68	40.64	1490.53	436.36	239.52	186.68	746.32	927.25
SRM612-22	8536.49	7906.36	34.16	1047.49	488.64	10326.50	5386.11	37451.09	14655.88
SRM610-22	69056.15	62475.19	62.00	1004.25	1859.37	79740.73	36449.04	374993.16	122359.49
AP1-22	200.92	2626.53	33.56	206.28	37.00	37.80	139.00	51942.97	717.96
AP2-22	840.24	5393.67	28.92	249.44	203.84	732.24	1299.61	56001.23	3013.42
AP3-22	3773.82	7275.88	66.32	678.64	1601.45	10874.30	14450.32	264731.22	23942.14
AP4-22	5373.95	10945.54	84.52	546.64	2249.49	18304.98	17500.18	190912.11	33131.39
blank-22	62.00	126.60	13.76	124.68	20.00	15.80	76.28	48.64	92.32
blank average	66.70	106.32	16.48	73.22	14.94	15.48	60.28	106.44	112.62

blank subtraction									
SRM614-21	175.62	131.32	13.48	1513.43	438.66	250.68	122.96	656.48	828.86
SRM612-21	8130.79	9192.33	25.72	1345.59	890.31	16316.97	7360.56	54656.87	19545.09
SRM610-21	61030.36	63467.68	60.60	1074.99	3563.60	110001.02	44762.21	449364.78	139354.57
AP1-21	282.82	2064.61	23.40	259.54	66.10	295.80	180.72	68880.91	979.23
AP2-21	1070.43	7742.96	41.12	372.94	300.90	1826.21	2053.01	104704.67	4491.49
AP3-21	866.26	6125.15	27.56	307.18	211.58	986.09	1537.25	78762.65	3730.84
AP4-21	7554.42	17953.74	121.08	1194.39	3633.76	22948.57	30530.49	393152.94	62243.81
34HP45-671-1	4716.29	2097.29	59.44	593.10	114.78	617.60	197.00	214.64	441.42
34HP45-671-2	4164.80	2194.93	25.64	564.22	94.94	244.12	245.44	96.60	337.38
34HP45-671-3	2902.00	1575.05	32.52	656.54	60.10	144.20	134.40	7.64	485.18
34HP45-671-4	4878.73	1741.25	44.04	1311.67	99.54	353.00	248.88	197.20	784.50
34HP45-671-5	3776.24	1540.93	28.84	985.99	70.58	146.72	147.44	35.96	270.54
34HP45-671-6	3225.64	1415.61	17.92	594.94	70.78	194.60	121.96	154.84	418.82
34HP45-671-7	4180.20	4053.74	33.76	1071.67	89.46	776.64	276.20	392.96	844.54
34HP45-671-8	4451.57	3666.94	30.84	882.94	74.58	231.84	120.24	101.04	182.90
34HP45-671-9	3680.88	2972.90	32.20	768.86	59.22	124.48	133.76	61.24	341.50
34HP45-671-10	1591856.40	4302.42	52.92	699.94	10027.68	2498.73	257.76	414.64	1061.71
34HP45-671-11	7041.98	2922.14	27.24	444.86	86.90	143.36	122.20	265.56	362.46
34HP45-671-12	5351.73	3070.54	25.76	494.66	72.42	134.40	114.24	-20.44	325.66
34HP45-671-13	855.70	1159.09	18.76	279.42	21.98	188.08	108.64	449.44	278.02
34HP45-671-14	532.22	866.96	10.88	204.66	6.26	109.80	43.04	112.12	123.78
34HP45-671-15	383.78	830.32	7.24	218.46	13.70	159.44	36.44	28.36	59.30
34HP45-671-16	593.22	1015.49	6.08	214.58	25.10	173.40	47.84	210.60	165.18
34HP45-671-17	513.94	1254.93	11.92	206.42	15.74	99.04	27.00	4.96	61.82
34HP45-671-18	597.22	1316.97	17.52	200.98	11.66	137.40	42.08	82.56	112.46
SRM614-22	182.82	173.36	24.16	1417.31	421.42	224.04	126.40	639.88	814.62
SRM612-22	8469.79	7800.04	17.68	974.27	473.70	10311.02	5325.83	37344.65	14543.26
SRM610-22	68989.45	62368.87	45.52	931.03	1844.43	79725.25	36388.76	374886.72	122246.87
AP1-22	134.22	2520.21	17.08	133.06	22.06	22.32	78.72	51836.53	605.34
AP2-22	773.54	5287.35	12.44	176.22	188.90	716.76	1239.33	55894.79	2900.80
AP3-22	3707.12	7169.56	49.84	605.42	1586.51	10858.82	14390.04	264624.78	23829.51
AP4-22	5307.25	10839.22	68.04	473.42	2234.55	18289.50	17439.90	190805.67	33018.77

zero correction									
SRM614-21	175.62	131.32	13.48	1513.43	438.66	250.68	122.96	656.48	828.86
SRM612-21	8130.79	9192.33	25.72	1345.59	890.31	16316.97	7360.56	54656.87	19545.09
SRM610-21	61030.36	63467.68	60.60	1074.99	3563.60	110001.02	44762.21	449364.78	139354.57
AP1-21	282.82	2064.61	23.40	259.54	66.10	295.80	180.72	68880.91	979.23
AP2-21	1070.43	7742.96	41.12	372.94	300.90	1826.21	2053.01	104704.67	4491.49
AP3-21	866.26	6125.15	27.56	307.18	211.58	986.09	1537.25	78762.65	3730.84

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	7554.42	17953.74	121.08	1194.39	3633.76	22948.57	30530.49	393152.94	62243.81
34HP45-671-1	4716.29	2097.29	59.44	593.10	114.78	617.60	197.00	214.64	441.42
34HP45-671-2	4164.80	2194.93	25.64	564.22	94.94	244.12	245.44	96.60	337.38
34HP45-671-3	2902.00	1575.05	32.52	656.54	60.10	144.20	134.40	7.64	485.18
34HP45-671-4	4878.73	1741.25	44.04	1311.67	99.54	353.00	248.88	197.20	784.50
34HP45-671-5	3776.24	1540.93	28.84	985.99	70.58	146.72	147.44	35.96	270.54
34HP45-671-6	3225.64	1415.61	17.92	594.94	70.78	194.60	121.96	154.84	418.82
34HP45-671-7	4180.20	4053.74	33.76	1071.67	89.46	776.64	276.20	392.96	844.54
34HP45-671-8	4451.57	3666.94	30.84	882.94	74.58	231.84	120.24	101.04	182.90
34HP45-671-9	3680.88	2972.90	32.20	768.86	59.22	124.48	133.76	61.24	341.50
34HP45-671-10	1591856.40	4302.42	52.92	699.94	10027.68	2498.73	257.76	414.64	1061.71
34HP45-671-11	7041.98	2922.14	27.24	444.86	86.90	143.36	122.20	265.56	362.46
34HP45-671-12	5351.73	3070.54	25.76	494.66	72.42	134.40	114.24	0.00	325.66
34HP45-671-13	855.70	1159.09	18.76	279.42	21.98	188.08	108.64	449.44	278.02
34HP45-671-14	532.22	866.96	10.88	204.66	6.26	109.80	43.04	112.12	123.78
34HP45-671-15	383.78	830.32	7.24	218.46	13.70	159.44	36.44	28.36	59.30
34HP45-671-16	593.22	1015.49	6.08	214.58	25.10	173.40	47.84	210.60	165.18
34HP45-671-17	513.94	1254.93	11.92	206.42	15.74	99.04	27.00	4.96	61.82
34HP45-671-18	597.22	1316.97	17.52	200.98	11.66	137.40	42.08	82.56	112.46
SRM614-22	182.82	173.36	24.16	1417.31	421.42	224.04	126.40	639.88	814.62
SRM612-22	8469.79	7800.04	17.68	974.27	473.70	10311.02	5325.83	37344.65	14543.26
SRM610-22	68989.45	62368.87	45.52	931.03	1844.43	79725.25	36388.76	374886.72	122246.87
AP1-22	134.22	2520.21	17.08	133.06	22.06	22.32	78.72	51836.53	605.34
AP2-22	773.54	5287.35	12.44	176.22	188.90	716.76	1239.33	55894.79	2900.80
AP3-22	3707.12	7169.56	49.84	605.42	1586.51	10858.82	14390.04	264624.78	23829.51
AP4-22	5307.25	10839.22	68.04	473.42	2234.55	18289.50	17439.90	190805.67	33018.77

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-21	0.000131	0.000098	0.000010	0.001128	0.000327	0.000187	0.000092	0.000489	0.000618
SRM612-21	0.004121	0.004658	0.000013	0.000682	0.000451	0.008269	0.003730	0.027699	0.009905
SRM610-21	0.059434	0.061807	0.000059	0.001047	0.003470	0.107123	0.043591	0.437609	0.135709
AP1-21	0.000027	0.000199	0.000002	0.000025	0.000006	0.000028	0.000017	0.006628	0.000094
AP2-21	0.000081	0.000587	0.000003	0.000028	0.000023	0.000138	0.000156	0.007936	0.000340
AP3-21	0.000071	0.000501	0.000002	0.000025	0.000017	0.000081	0.000126	0.006446	0.000305
AP4-21	0.000444	0.001056	0.000007	0.000070	0.000214	0.001349	0.001795	0.023117	0.003660
34HP45-671-1	0.000245	0.000109	0.000003	0.000031	0.000006	0.000032	0.000010	0.000011	0.000023
34HP45-671-2	0.000238	0.000125	0.000001	0.000032	0.000005	0.000014	0.000014	0.000006	0.000019
34HP45-671-3	0.000174	0.000095	0.000002	0.000039	0.000004	0.000009	0.000008	0.000000	0.000029
34HP45-671-4	0.000264	0.000094	0.000002	0.000071	0.000005	0.000019	0.000013	0.000011	0.000042
34HP45-671-5	0.000227	0.000092	0.000002	0.000059	0.000004	0.000009	0.000009	0.000002	0.000016
34HP45-671-6	0.000229	0.000100	0.000001	0.000042	0.000005	0.000014	0.000009	0.000011	0.000030
34HP45-671-7	0.000228	0.000221	0.000002	0.000058	0.000005	0.000042	0.000015	0.000021	0.000046
34HP45-671-8	0.000252	0.000208	0.000002	0.000050	0.000004	0.000013	0.000007	0.000006	0.000010
34HP45-671-9	0.000203	0.000164	0.000002	0.000042	0.000003	0.000007	0.000007	0.000003	0.000019
34HP45-671-10	0.104081	0.000281	0.000003	0.000046	0.000656	0.000163	0.000017	0.000027	0.000069
34HP45-671-11	0.000488	0.000203	0.000002	0.000031	0.000006	0.000010	0.000008	0.000018	0.000025
34HP45-671-12	0.000383	0.000220	0.000002	0.000035	0.000005	0.000010	0.000008	0.000000	0.000023
34HP45-671-13	0.000133	0.000181	0.000003	0.000044	0.000003	0.000029	0.000017	0.000070	0.000043
34HP45-671-14	0.000101	0.000165	0.000002	0.000039	0.000001	0.000021	0.000008	0.000021	0.000024
34HP45-671-15	0.000076	0.000164	0.000001	0.000043	0.000003	0.000031	0.000007	0.000006	0.000012
34HP45-671-16	0.000124	0.000212	0.000001	0.000045	0.000005	0.000036	0.000010	0.000044	0.000035
34HP45-671-17	0.000086	0.000210	0.000002	0.000035	0.000003	0.000017	0.000005	0.000001	0.000010
34HP45-671-18	0.000094	0.000208	0.000003	0.000032	0.000002	0.000022	0.000007	0.000013	0.000018
SRM614-22	0.000177	0.000168	0.000023	0.001373	0.000408	0.000217	0.000122	0.000620	0.000789
SRM612-22	0.007021	0.006466	0.000015	0.000808	0.000393	0.008547	0.004415	0.030957	0.012056
SRM610-22	0.102689	0.092835	0.000068	0.001386	0.002745	0.118669	0.054164	0.558011	0.181962
AP1-22	0.000014	0.000255	0.000002	0.000013	0.000002	0.000002	0.000008	0.005245	0.000061
AP2-22	0.000075	0.000513	0.000001	0.000017	0.000018	0.000069	0.000120	0.005419	0.000281
AP3-22	0.000282	0.000546	0.000004	0.000046	0.000121	0.000827	0.001096	0.020158	0.001815
AP4-22	0.000405	0.000826	0.000005	0.000036	0.000170	0.001394	0.001330	0.014548	0.002518

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP									
AP1	0.000020	0.000227	0.000002	0.000019	0.000004	0.000015	0.000013	0.005936	0.000078
AP2	0.000078	0.000550	0.000002	0.000023	0.000021	0.000104	0.000138	0.006677	0.000311
AP3	0.000177	0.000524	0.000003	0.000036	0.000069	0.000454	0.000611	0.013302	0.001060
AP4	0.000424	0.000941	0.000006	0.000053	0.000192	0.001372	0.001562	0.018833	0.003089
linest from std sig ave									
	0.024179	0.036651	0.000000	0.000000	0.000000	0.009604	0.025571	0.005468	0.013223
standardize signal averages SRM									
srM614-2	0.000154	0.000133	0.000017	0.001251	0.000368	0.000202	0.000107	0.000555	0.000704
srM612-2	0.005571	0.005562	0.000014	0.000745	0.000422	0.008408	0.004073	0.029328	0.010980
srM610-2	0.081061	0.077321	0.000063	0.001216	0.003108	0.112896	0.048878	0.497810	0.158835
linest from std sig ave									
	0.063333	0.056942	0.000000	0.000000	0.000000	0.024757	0.062014	0.010362	0.029145
concentration data									
SRM614-21	0.27	0.31	0.00	0.00	0.00	0.15	0.20	0.23	0.70
SRM612-21	8.54	14.64	0.00	0.00	0.00	6.81	8.18	12.99	11.23
SRM610-21	123.25	194.28	0.00	0.00	0.00	88.23	95.60	205.23	153.90
AP1-21	0.26	2.90	0.00	0.00	0.00	0.11	0.18	14.46	0.50
AP2-21	0.78	8.58	0.00	0.00	0.00	0.53	1.59	17.31	1.80
AP3-21	0.68	7.33	0.00	0.00	0.00	0.31	1.28	14.06	1.61
AP4-21	4.28	15.44	0.00	0.00	0.00	5.17	18.31	50.43	19.31
34HP45-671-1	2.37	1.59	0.00	0.00	0.00	0.12	0.10	0.02	0.12
34HP45-671-2	2.30	1.83	0.00	0.00	0.00	0.05	0.14	0.01	0.10
34HP45-671-3	1.68	1.38	0.00	0.00	0.00	0.03	0.08	0.00	0.15
34HP45-671-4	2.54	1.38	0.00	0.00	0.00	0.07	0.14	0.02	0.22
34HP45-671-5	2.19	1.35	0.00	0.00	0.00	0.03	0.09	0.00	0.09
34HP45-671-6	2.21	1.47	0.00	0.00	0.00	0.05	0.09	0.02	0.16
34HP45-671-7	2.20	3.23	0.00	0.00	0.00	0.16	0.15	0.05	0.24
34HP45-671-8	2.43	3.04	0.00	0.00	0.00	0.05	0.07	0.01	0.05
34HP45-671-9	1.96	2.40	0.00	0.00	0.00	0.03	0.08	0.01	0.10
34HP45-671-10	1003.97	4.11	0.00	0.00	0.00	0.63	0.17	0.06	0.37
34HP45-671-11	4.71	2.96	0.00	0.00	0.00	0.04	0.09	0.04	0.13
34HP45-671-12	3.69	3.21	0.00	0.00	0.00	0.04	0.08	0.00	0.12
34HP45-671-13	1.29	2.64	0.00	0.00	0.00	0.11	0.17	0.15	0.23
34HP45-671-14	0.98	2.41	0.00	0.00	0.00	0.08	0.08	0.05	0.12
34HP45-671-15	0.73	2.39	0.00	0.00	0.00	0.12	0.07	0.01	0.06
34HP45-671-16	1.20	3.11	0.00	0.00	0.00	0.14	0.10	0.10	0.18
34HP45-671-17	0.83	3.08	0.00	0.00	0.00	0.06	0.05	0.00	0.05
34HP45-671-18	0.91	3.05	0.00	0.00	0.00	0.08	0.07	0.03	0.09
SRM614-22	0.37	0.53	0.00	0.00	0.00	0.18	0.27	0.29	0.89
SRM612-22	14.56	20.32	0.00	0.00	0.00	7.04	9.68	14.52	13.67
SRM610-22	212.95	291.81	0.00	0.00	0.00	97.74	118.78	261.69	206.35
AP1-22	0.13	3.73	0.00	0.00	0.00	0.01	0.08	11.44	0.32
AP2-22	0.72	7.50	0.00	0.00	0.00	0.27	1.23	11.82	1.48
AP3-22	2.72	7.99	0.00	0.00	0.00	3.17	11.18	43.98	9.58
AP4-22	3.90	12.08	0.00	0.00	0.00	5.34	13.56	31.74	13.28
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-19	44.64	98.16	6.36	13.40	9.72	23.72	45.44	10.76	110.00
SRM614-19	377.68	370.32	36.76	3031.98	837.48	495.44	300.64	1407.81	1808.21
SRM612-19	9535.25	9190.57	27.20	1357.73	937.01	19005.95	8717.93	54922.55	20859.20
SRM610-19	64311.28	60945.15	72.88	1085.65	3062.22	99592.24	34723.88	375675.53	127192.84
AP1-19	216.68	1916.13	22.24	247.44	45.24	42.52	128.36	91206.59	912.81
AP2-19	4097.86	11615.31	62.16	692.32	577.76	7222.44	3622.70	185948.84	7575.16
AP3-19	8053.65	14472.32	167.92	1799.53	4198.82	28003.28	41162.39	856480.38	64065.88
AP4-19	10714.22	28169.32	200.56	1935.93	5596.91	41921.60	51073.01	697766.19	97290.83
34HP60-102-1	1258.09	387.76	36.68	560.16	41.76	100.64	131.88	169.96	1174.45
34HP60-102-2	460.64	302.88	30.96	532.40	46.60	85.20	75.00	73.60	504.40
34HP60-102-3	311.36	241.08	22.20	408.60	19.48	71.28	77.68	81.48	363.84
34HP60-102-4	148.40	991.41	18.48	263.08	26.60	36.68	90.24	101.80	203.48
34HP60-102-5	700.44	1232.97	27.84	397.68	32.32	119.32	95.44	97.96	241.92
34HP60-102-6	2247.89	1246.45	40.04	894.97	47.32	123.12	89.88	111.44	410.12
34HP60-102-7	392.04	1030.61	15.96	231.36	27.24	58.76	85.00	217.84	254.28

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	1860.93	1064.65	31.40	407.36	52.12	157.84	144.36	62.48	317.80
34HP60-102-9	2523.49	1126.21	24.20	405.28	66.20	196.20	217.48	89.76	299.64
34HP60-102-10	5582.39	920.53	53.84	510.92	119.12	123.72	455.92	138.40	250.60
34HP60-102-11	4336.66	1051.89	34.24	435.40	90.68	94.40	305.16	63.40	271.04
34HP60-102-12	6326.04	647.72	43.56	445.28	124.80	121.68	492.04	65.92	268.28
34HP60-102-13	4639.71	484.28	45.24	494.00	128.56	212.76	728.20	199.68	237.36
34HP60-102-14	4132.34	706.36	48.76	468.04	93.76	134.36	621.96	177.40	267.52
34HP60-102-15	3424.26	715.72	51.44	413.40	88.36	131.40	595.96	45.84	243.24
34HP60-102-16	1481.45	1007.53	43.16	433.84	36.92	151.00	207.00	211.68	250.92
34HP60-102-17	1423.81	1093.53	30.44	426.96	41.68	90.92	136.72	27.24	214.92
34HP60-102-18	405.36	1613.93	23.60	337.76	30.56	76.68	122.80	65.32	221.76
SRM614-20	314.20	312.20	37.24	1990.85	577.40	245.88	204.52	913.89	1227.21
SRM612-20	9311.37	8934.81	34.80	1215.33	624.84	12143.23	6168.79	42840.60	16865.06
SRM610-20	69978.80	64483.36	81.36	1034.21	1953.61	85604.72	35851.56	385519.41	127433.44
AP1-20	170.88	1828.13	38.80	158.96	40.44	29.84	87.32	50816.97	827.48
AP2-20	986.49	6393.84	57.84	232.32	211.08	931.45	1609.57	71680.96	3376.54
AP3-20	3658.70	7742.20	78.44	688.96	1784.77	11238.70	16942.38	295128.78	26466.19
AP4-20	7014.00	15959.41	124.24	864.40	2947.38	24783.34	26550.35	329782.44	51898.69
blank-20	67.56	143.28	14.12	99.32	19.96	27.84	81.36	75.24	103.56
blank average	56.10	120.72	10.24	56.36	14.84	25.78	63.40	43.00	106.78
blank subtraction									
SRM614-19	321.58	249.60	26.52	2975.62	822.64	469.66	237.24	1364.81	1701.43
SRM612-19	9479.15	9069.85	16.96	1301.37	922.17	18980.17	8654.53	54879.55	20752.42
SRM610-19	64255.18	60824.42	62.64	1029.29	3047.38	99566.46	34660.47	375632.53	127086.06
AP1-19	160.58	1795.41	12.00	191.08	30.40	16.74	64.96	91163.59	806.02
AP2-19	4041.76	11494.59	51.92	635.96	562.92	7196.66	3559.30	185905.84	7468.38
AP3-19	7997.54	14351.60	157.68	1743.17	4183.98	27977.50	41098.99	856437.38	63959.10
AP4-19	10658.12	28048.60	190.32	1879.57	5582.07	41895.82	51009.61	697723.19	97184.05
34HP60-102-1	1201.99	267.04	26.44	503.80	26.92	74.86	68.48	126.96	1067.67
34HP60-102-2	404.54	182.16	20.72	476.04	31.76	59.42	11.60	30.60	397.62
34HP60-102-3	255.26	120.36	11.96	352.24	4.64	45.50	14.28	38.48	257.06
34HP60-102-4	92.30	870.68	8.24	206.72	11.76	10.90	26.84	58.80	96.70
34HP60-102-5	644.34	1112.25	17.60	341.32	17.48	93.54	32.04	54.96	135.14
34HP60-102-6	2191.79	1125.73	29.80	838.60	32.48	97.34	26.48	68.44	303.34
34HP60-102-7	335.94	909.89	5.72	175.00	12.40	32.98	21.60	174.84	147.50
34HP60-102-8	1804.83	943.93	21.16	351.00	37.28	132.06	80.96	19.48	211.02
34HP60-102-9	2467.39	1005.49	13.96	348.92	51.36	170.42	154.08	46.76	192.86
34HP60-102-10	5526.29	799.80	43.60	454.56	104.28	97.94	392.52	95.40	143.82
34HP60-102-11	4280.56	931.17	24.00	379.04	75.84	68.62	241.76	20.40	164.26
34HP60-102-12	6269.94	527.00	33.32	388.92	109.96	95.90	428.64	22.92	161.50
34HP60-102-13	4583.61	363.56	35.00	437.64	113.72	186.98	664.80	156.68	130.58
34HP60-102-14	4076.24	585.64	38.52	411.68	78.92	108.58	558.56	134.40	160.74
34HP60-102-15	3368.16	595.00	41.20	357.04	73.52	105.62	532.56	2.84	136.46
34HP60-102-16	1425.35	886.80	32.92	377.48	22.08	125.22	143.60	168.68	144.14
34HP60-102-17	1367.71	972.81	20.20	370.60	26.84	65.14	73.32	-15.76	108.14
34HP60-102-18	349.26	1493.21	13.36	281.40	15.72	50.90	59.40	22.32	114.98
SRM614-20	258.10	191.48	27.00	1934.49	562.56	220.10	141.12	870.88	1120.43
SRM612-20	9255.27	8814.09	24.56	1158.97	610.00	12117.45	6105.39	42797.60	16758.27
SRM610-20	69922.70	64362.64	71.12	977.85	1938.77	85578.94	35788.16	385476.41	127326.66
AP1-20	114.78	1707.41	28.56	102.60	25.60	4.06	23.92	50773.96	720.70
AP2-20	930.39	6273.12	47.60	175.96	196.24	905.67	1546.17	71637.96	3269.76
AP3-20	3602.60	7621.48	68.20	632.60	1769.93	11212.92	16878.97	295085.78	26359.41
AP4-20	6957.90	15838.69	114.00	808.04	2932.54	24757.56	26486.95	329739.44	51791.91
zero correction									
SRM614-19	321.58	249.60	26.52	2975.62	822.64	469.66	237.24	1364.81	1701.43
SRM612-19	9479.15	9069.85	16.96	1301.37	922.17	18980.17	8654.53	54879.55	20752.42
SRM610-19	64255.18	60824.42	62.64	1029.29	3047.38	99566.46	34660.47	375632.53	127086.06
AP1-19	160.58	1795.41	12.00	191.08	30.40	16.74	64.96	91163.59	806.02
AP2-19	4041.76	11494.59	51.92	635.96	562.92	7196.66	3559.30	185905.84	7468.38
AP3-19	7997.54	14351.60	157.68	1743.17	4183.98	27977.50	41098.99	856437.38	63959.10
AP4-19	10658.12	28048.60	190.32	1879.57	5582.07	41895.82	51009.61	697723.19	97184.05
34HP60-102-1	1201.99	267.04	26.44	503.80	26.92	74.86	68.48	126.96	1067.67
34HP60-102-2	404.54	182.16	20.72	476.04	31.76	59.42	11.60	30.60	397.62
34HP60-102-3	255.26	120.36	11.96	352.24	4.64	45.50	14.28	38.48	257.06
34HP60-102-4	92.30	870.68	8.24	206.72	11.76	10.90	26.84	58.80	96.70
34HP60-102-5	644.34	1112.25	17.60	341.32	17.48	93.54	32.04	54.96	135.14
34HP60-102-6	2191.79	1125.73	29.80	838.60	32.48	97.34	26.48	68.44	303.34
34HP60-102-7	335.94	909.89	5.72	175.00	12.40	32.98	21.60	174.84	147.50
34HP60-102-8	1804.83	943.93	21.16	351.00	37.28	132.06	80.96	19.48	211.02
34HP60-102-9	2467.39	1005.49	13.96	348.92	51.36	170.42	154.08	46.76	192.86
34HP60-102-10	5526.29	799.80	43.60	454.56	104.28	97.94	392.52	95.40	143.82
34HP60-102-11	4280.56	931.17	24.00	379.04	75.84	68.62	241.76	20.40	164.26
34HP60-102-12	6269.94	527.00	33.32	388.92	109.96	95.90	428.64	22.92	161.50
34HP60-102-13	4583.61	363.56	35.00	437.64	113.72	186.98	664.80	156.68	130.58
34HP60-102-14	4076.24	585.64	38.52	411.68	78.92	108.58	558.56	134.40	160.74
34HP60-102-15	3368.16	595.00	41.20	357.04	73.52	105.62	532.56	2.84	136.46

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	1425.35	886.80	32.92	377.48	22.08	125.22	143.60	168.68	144.14
34HP60-102-17	1367.71	972.81	20.20	370.60	26.84	65.14	73.32	0.00	108.14
34HP60-102-18	349.26	1493.21	13.36	281.40	15.72	50.90	59.40	22.32	114.98
SRM614-20	258.10	191.48	27.00	1934.49	562.56	220.10	141.12	870.88	1120.43
SRM612-20	9255.27	8814.09	24.56	1158.97	610.00	12117.45	6105.39	42797.60	16758.27
SRM610-20	69922.70	64362.64	71.12	977.85	1938.77	85578.94	35788.16	385476.41	127326.66
AP1-20	114.78	1707.41	28.56	102.60	25.60	4.06	23.92	50773.96	720.70
AP2-20	930.39	6273.12	47.60	175.96	196.24	905.67	1546.17	71637.96	3269.76
AP3-20	3602.60	7621.48	68.20	632.60	1769.93	11212.92	16878.97	295085.78	26359.41
AP4-20	6957.90	15838.69	114.00	808.04	2932.54	24757.56	26486.95	329739.44	51791.91

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-19	0.000136	0.000105	0.000011	0.001256	0.000347	0.000198	0.000100	0.000576	0.000718
SRM612-19	0.005035	0.004818	0.000009	0.000691	0.000490	0.010082	0.004597	0.029153	0.011024
SRM610-19	0.066846	0.063277	0.000065	0.001071	0.003170	0.103581	0.036058	0.390778	0.132210
AP1-19	0.000014	0.000155	0.000001	0.000016	0.000003	0.000001	0.000006	0.007870	0.000070
AP2-19	0.000249	0.000708	0.000003	0.000039	0.000035	0.000443	0.000219	0.011451	0.000460
AP3-19	0.000386	0.000693	0.000008	0.000084	0.000202	0.001351	0.001985	0.041371	0.003090
AP4-19	0.000520	0.001369	0.000009	0.000092	0.000272	0.002045	0.002490	0.034058	0.004744
34HP60-102-1	0.000100	0.000022	0.000002	0.000042	0.000002	0.000006	0.000006	0.000011	0.000089
34HP60-102-2	0.000050	0.000023	0.000003	0.000059	0.000004	0.000007	0.000001	0.000004	0.000050
34HP60-102-3	0.000044	0.000021	0.000002	0.000061	0.000001	0.000008	0.000002	0.000007	0.000045
34HP60-102-4	0.000024	0.000229	0.000002	0.000054	0.000003	0.000003	0.000007	0.000015	0.000025
34HP60-102-5	0.000115	0.000198	0.000003	0.000061	0.000003	0.000017	0.000006	0.000010	0.000024
34HP60-102-6	0.000186	0.000095	0.000003	0.000071	0.000003	0.000008	0.000002	0.000006	0.000026
34HP60-102-7	0.000080	0.000218	0.000001	0.000042	0.000003	0.000008	0.000005	0.000042	0.000035
34HP60-102-8	0.000312	0.000163	0.000004	0.000061	0.000006	0.000023	0.000014	0.000003	0.000036
34HP60-102-9	0.000371	0.000151	0.000002	0.000052	0.000008	0.000026	0.000023	0.000007	0.000029
34HP60-102-10	0.000477	0.000069	0.000004	0.000039	0.000009	0.000008	0.000034	0.000008	0.000012
34HP60-102-11	0.000404	0.000088	0.000002	0.000036	0.000007	0.000006	0.000023	0.000002	0.000016
34HP60-102-12	0.000547	0.000046	0.000003	0.000034	0.000010	0.000008	0.000037	0.000002	0.000014
34HP60-102-13	0.000364	0.000029	0.000003	0.000035	0.000009	0.000015	0.000053	0.000012	0.000010
34HP60-102-14	0.000318	0.000046	0.000003	0.000032	0.000006	0.000008	0.000044	0.000010	0.000013
34HP60-102-15	0.000283	0.000050	0.000003	0.000030	0.000006	0.000009	0.000045	0.000000	0.000011
34HP60-102-16	0.000171	0.000106	0.000004	0.000045	0.000003	0.000015	0.000017	0.000020	0.000017
34HP60-102-17	0.000156	0.000111	0.000002	0.000042	0.000003	0.000007	0.000008	0.000000	0.000012
34HP60-102-18	0.000053	0.000225	0.000002	0.000042	0.000002	0.000008	0.000009	0.000003	0.000017
SRM614-20	0.000179	0.000133	0.000019	0.001341	0.000390	0.000153	0.000098	0.000604	0.000777
SRM612-20	0.006206	0.005910	0.000016	0.000777	0.000409	0.008125	0.004094	0.028696	0.011237
SRM610-20	0.088599	0.081554	0.000090	0.001239	0.002457	0.108438	0.045347	0.488439	0.161336
AP1-20	0.000011	0.000167	0.000003	0.000010	0.000003	0.000000	0.000002	0.004972	0.000071
AP2-20	0.000086	0.000577	0.000004	0.000016	0.000018	0.000083	0.000142	0.006587	0.000301
AP3-20	0.000257	0.000544	0.000005	0.000045	0.000126	0.000800	0.001204	0.021054	0.001881
AP4-20	0.000445	0.001013	0.000007	0.000052	0.000188	0.001584	0.001695	0.021096	0.003314

standardize signal averages AP									
AP1	0.000013	0.000161	0.000002	0.000013	0.000003	0.000001	0.000004	0.006421	0.000070
AP2	0.000167	0.000642	0.000004	0.000028	0.000026	0.000263	0.000181	0.009019	0.000380
AP3	0.000322	0.000619	0.000006	0.000065	0.000164	0.001076	0.001595	0.031212	0.002485
AP4	0.000483	0.001191	0.000008	0.000072	0.000230	0.001815	0.002092	0.027577	0.004029

linest from std sig ave									
	0.018551	0.029737	0.000000	0.000000	0.000000	0.006759	0.016327	0.002990	0.009320

standardize signal averages SRM									
srm614-2	0.000157	0.000119	0.000015	0.001298	0.000369	0.000175	0.000099	0.000590	0.000747
srm612-2	0.005621	0.005364	0.000013	0.000734	0.000449	0.009104	0.004346	0.028924	0.011130
srm610-2	0.077723	0.072416	0.000078	0.001155	0.002813	0.106009	0.040703	0.439609	0.146773

linest from std sig ave									
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Appendix A. Raw trace element datasheets from laser ablation.

	0.066039	0.060794	0.000000	0.000000	0.000000	0.026344	0.074328	0.011732	0.031530
concentration data									
SRM614-19	0.22	0.27	0.00	0.00	0.00	0.11	0.14	0.15	0.57
SRM612-19	8.01	12.29	0.00	0.00	0.00	5.84	6.44	7.48	8.81
SRM610-19	106.35	161.38	0.00	0.00	0.00	60.04	50.49	100.22	105.68
AP1-19	0.10	1.84	0.00	0.00	0.00	0.00	0.04	9.39	0.26
AP2-19	1.84	8.40	0.00	0.00	0.00	1.20	1.43	13.66	1.71
AP3-19	2.86	8.22	0.00	0.00	0.00	3.64	12.93	49.35	11.49
AP4-19	3.85	16.24	0.00	0.00	0.00	5.51	16.22	40.63	17.64
34HP60-102-1	0.74	0.26	0.00	0.00	0.00	0.02	0.04	0.01	0.33
34HP60-102-2	0.37	0.27	0.00	0.00	0.00	0.02	0.01	0.00	0.18
34HP60-102-3	0.33	0.25	0.00	0.00	0.00	0.02	0.02	0.01	0.17
34HP60-102-4	0.18	2.71	0.00	0.00	0.00	0.01	0.05	0.02	0.09
34HP60-102-5	0.85	2.35	0.00	0.00	0.00	0.04	0.04	0.01	0.09
34HP60-102-6	1.38	1.13	0.00	0.00	0.00	0.02	0.01	0.01	0.10
34HP60-102-7	0.59	2.58	0.00	0.00	0.00	0.02	0.03	0.05	0.13
34HP60-102-8	2.31	1.94	0.00	0.00	0.00	0.06	0.09	0.00	0.14
34HP60-102-9	2.75	1.79	0.00	0.00	0.00	0.07	0.15	0.01	0.11
34HP60-102-10	3.53	0.82	0.00	0.00	0.00	0.02	0.22	0.01	0.05
34HP60-102-11	2.99	1.04	0.00	0.00	0.00	0.02	0.15	0.00	0.06
34HP60-102-12	4.05	0.55	0.00	0.00	0.00	0.02	0.24	0.00	0.05
34HP60-102-13	2.69	0.34	0.00	0.00	0.00	0.04	0.34	0.01	0.04
34HP60-102-14	2.35	0.54	0.00	0.00	0.00	0.02	0.28	0.01	0.05
34HP60-102-15	2.09	0.59	0.00	0.00	0.00	0.02	0.29	0.00	0.04
34HP60-102-16	1.26	1.26	0.00	0.00	0.00	0.04	0.11	0.02	0.06
34HP60-102-17	1.15	1.31	0.00	0.00	0.00	0.02	0.05	0.00	0.05
34HP60-102-18	0.39	2.67	0.00	0.00	0.00	0.02	0.06	0.00	0.06
SRM614-20	0.28	0.34	0.00	0.00	0.00	0.09	0.14	0.15	0.62
SRM612-20	9.87	15.07	0.00	0.00	0.00	4.71	5.73	7.36	8.98
SRM610-20	140.96	207.99	0.00	0.00	0.00	62.86	63.50	125.27	128.96
AP1-20	0.08	1.98	0.00	0.00	0.00	0.00	0.02	5.93	0.26
AP2-20	0.63	6.84	0.00	0.00	0.00	0.22	0.93	7.86	1.12
AP3-20	1.90	6.45	0.00	0.00	0.00	2.16	7.84	25.12	6.99
AP4-20	3.29	12.02	0.00	0.00	0.00	4.27	11.04	25.17	12.32
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-17	57.16	72.52	9.20	17.68	6.28	9.76	61.12	107.24	181.40
SRM614-17	269.08	293.80	43.84	2548.09	665.80	424.88	212.04	1532.73	1434.85
SRM612-17	7024.36	7794.76	48.00	1326.53	1018.77	14991.52	6629.16	45241.54	17585.18
SRM610-17	58908.53	68328.42	89.72	1302.77	5521.87	129812.05	58698.77	564107.38	154922.27
AP1-17	1058.57	2833.22	46.52	955.49	107.00	204.64	461.92	178358.05	1705.17
AP2-17	3703.30	9599.13	56.80	872.92	570.96	4398.50	3246.42	159148.78	6465.48
AP3-17	5365.19	8796.85	124.60	1170.81	2252.97	14915.20	21626.68	419320.84	34315.63
AP4-17	10495.78	26023.71	207.12	2061.01	4875.55	41525.15	43917.69	603643.63	84098.95
34HP60-24-1	452.12	1742.97	26.92	304.20	26.96	197.52	113.52	251.36	291.12
34HP60-24-2	475.32	1737.37	23.12	321.92	21.32	52.04	75.24	64.44	354.12
34HP60-24-3	618.16	1988.13	25.76	337.56	23.56	75.32	71.20	90.28	274.08
34HP60-24-4	2432.65	1290.01	35.12	356.32	78.20	97.32	193.96	92.72	389.00
34HP60-24-5	6010.07	863.20	55.40	593.04	148.12	129.84	428.60	165.28	613.56
34HP60-24-6	6494.80	879.92	47.16	534.64	162.88	163.12	480.28	51.24	611.88
34HP60-24-7	4205.74	918.53	56.88	480.60	97.56	93.08	218.80	162.48	352.56
34HP60-24-8	3688.10	949.41	39.68	586.08	87.24	99.52	244.72	188.12	438.84
34HP60-24-9	5684.31	663.60	42.72	708.52	131.44	106.12	266.92	53.96	459.04
34HP60-24-10	9337.73	490.08	49.04	494.80	176.92	109.88	395.64	100.48	324.00
34HP60-24-11	10021.62	462.16	49.48	476.56	145.76	118.96	412.76	30.84	303.08
34HP60-24-12	12548.35	517.68	54.16	502.84	196.52	124.44	354.52	71.76	329.72
SRM614-18	250.68	261.24	38.00	1847.97	567.04	256.72	209.48	887.57	1043.09
SRM612-18	9420.13	9514.93	42.56	1257.17	571.96	12262.35	6368.28	45355.30	17661.30
SRM610-18	73549.94	65521.17	78.88	1018.85	2214.25	86386.16	40253.87	403857.13	127262.44
AP1-18	301.96	2392.73	26.72	266.28	54.28	54.08	203.64	80711.97	910.93
AP2-18	1147.33	7475.36	29.76	266.72	313.52	1335.29	1994.97	88436.18	4035.98
AP3-18	3922.90	7558.76	85.24	543.36	1660.41	10185.42	15768.13	280502.03	25002.26
AP4-18	7864.32	18804.35	123.76	976.33	3217.90	20589.92	29160.68	361127.16	57492.60
blank-18	74.32	112.16	27.20	125.48	14.92	22.56	79.68	30.08	99.44
blank average	65.74	92.34	18.20	71.58	10.60	16.16	70.40	68.66	140.42
blank subtraction									

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	203.34	201.46	25.64	2476.51	655.20	408.72	141.64	1464.07	1294.43
SRM612-17	6958.62	7702.42	29.80	1254.95	1008.17	14975.36	6558.76	45172.87	17444.76
SRM610-17	58842.79	68236.08	71.52	1231.19	5511.27	129795.89	58628.37	564038.72	154781.85
AP1-17	992.83	2740.88	28.32	883.90	96.40	188.48	391.52	178289.39	1564.75
AP2-17	3637.56	9506.79	38.60	801.34	560.36	4382.34	3176.02	159080.12	6325.06
AP3-17	5299.45	8704.51	106.40	1099.23	2242.37	14899.04	21556.28	419252.18	34175.21
AP4-17	10430.04	25931.37	188.92	1989.43	4864.95	41508.99	43847.29	603574.97	83958.53
34HP60-24-1	386.38	1650.63	8.72	232.62	16.36	181.36	43.12	182.70	150.70
34HP60-24-2	409.58	1645.03	4.92	250.34	10.72	35.88	4.84	-4.22	213.70
34HP60-24-3	552.42	1895.79	7.56	265.98	12.96	59.16	0.80	21.62	133.66
34HP60-24-4	2366.91	1197.67	16.92	284.74	67.60	81.16	123.56	24.06	248.58
34HP60-24-5	5944.33	770.86	37.20	521.46	137.52	113.68	358.20	96.62	473.14
34HP60-24-6	6429.06	787.58	28.96	463.06	152.28	146.96	409.88	-17.42	471.46
34HP60-24-7	4140.00	826.18	38.68	409.02	86.96	76.92	148.40	93.82	212.14
34HP60-24-8	3622.36	857.06	21.48	514.50	76.64	83.36	174.32	119.46	298.42
34HP60-24-9	5618.57	571.26	24.52	636.94	120.84	89.96	196.52	-14.70	318.62
34HP60-24-10	9271.99	397.74	30.84	423.22	166.32	93.72	325.24	31.82	183.58
34HP60-24-11	9955.88	369.82	31.28	404.98	135.16	102.80	342.36	-37.82	162.66
34HP60-24-12	12482.61	425.34	35.96	431.26	185.92	108.28	284.12	3.10	189.30
SRM614-18	184.94	168.90	19.80	1776.39	556.44	240.56	139.08	818.90	902.67
SRM612-18	9354.39	9422.59	24.36	1185.59	561.36	12246.19	6297.88	45286.64	17520.88
SRM610-18	73484.20	65428.83	60.68	947.27	2203.65	86370.00	40183.47	403788.47	127122.02
AP1-18	236.22	2300.39	8.52	194.70	43.68	37.92	133.24	80643.31	770.50
AP2-18	1081.59	7383.02	11.56	195.14	302.92	1319.13	1924.57	88367.52	3895.56
AP3-18	3857.16	7466.42	67.04	471.78	1649.81	10169.26	15697.73	280433.37	24861.84
AP4-18	7798.58	18712.01	105.56	904.75	3207.30	20573.76	29090.28	361058.50	57352.18

zero correction

SRM614-17	203.34	201.46	25.64	2476.51	655.20	408.72	141.64	1464.07	1294.43
SRM612-17	6958.62	7702.42	29.80	1254.95	1008.17	14975.36	6558.76	45172.87	17444.76
SRM610-17	58842.79	68236.08	71.52	1231.19	5511.27	129795.89	58628.37	564038.72	154781.85
AP1-17	992.83	2740.88	28.32	883.90	96.40	188.48	391.52	178289.39	1564.75
AP2-17	3637.56	9506.79	38.60	801.34	560.36	4382.34	3176.02	159080.12	6325.06
AP3-17	5299.45	8704.51	106.40	1099.23	2242.37	14899.04	21556.28	419252.18	34175.21
AP4-17	10430.04	25931.37	188.92	1989.43	4864.95	41508.99	43847.29	603574.97	83958.53
34HP60-24-1	386.38	1650.63	8.72	232.62	16.36	181.36	43.12	182.70	150.70
34HP60-24-2	409.58	1645.03	4.92	250.34	10.72	35.88	4.84	0.00	213.70
34HP60-24-3	552.42	1895.79	7.56	265.98	12.96	59.16	0.80	21.62	133.66
34HP60-24-4	2366.91	1197.67	16.92	284.74	67.60	81.16	123.56	24.06	248.58
34HP60-24-5	5944.33	770.86	37.20	521.46	137.52	113.68	358.20	96.62	473.14
34HP60-24-6	6429.06	787.58	28.96	463.06	152.28	146.96	409.88	0.00	471.46
34HP60-24-7	4140.00	826.18	38.68	409.02	86.96	76.92	148.40	93.82	212.14
34HP60-24-8	3622.36	857.06	21.48	514.50	76.64	83.36	174.32	119.46	298.42
34HP60-24-9	5618.57	571.26	24.52	636.94	120.84	89.96	196.52	0.00	318.62
34HP60-24-10	9271.99	397.74	30.84	423.22	166.32	93.72	325.24	31.82	183.58
34HP60-24-11	9955.88	369.82	31.28	404.98	135.16	102.80	342.36	0.00	162.66
34HP60-24-12	12482.61	425.34	35.96	431.26	185.92	108.28	284.12	3.10	189.30
SRM614-18	184.94	168.90	19.80	1776.39	556.44	240.56	139.08	818.90	902.67
SRM612-18	9354.39	9422.59	24.36	1185.59	561.36	12246.19	6297.88	45286.64	17520.88
SRM610-18	73484.20	65428.83	60.68	947.27	2203.65	86370.00	40183.47	403788.47	127122.02
AP1-18	236.22	2300.39	8.52	194.70	43.68	37.92	133.24	80643.31	770.50
AP2-18	1081.59	7383.02	11.56	195.14	302.92	1319.13	1924.57	88367.52	3895.56
AP3-18	3857.16	7466.42	67.04	471.78	1649.81	10169.26	15697.73	280433.37	24861.84
AP4-18	7798.58	18712.01	105.56	904.75	3207.30	20573.76	29090.28	361058.50	57352.18

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-17	0.000095	0.000094	0.000012	0.001151	0.000305	0.000190	0.000066	0.000681	0.000602
SRM612-17	0.003553	0.003932	0.000015	0.000641	0.000515	0.007645	0.003348	0.023062	0.008906
SRM610-17	0.045583	0.052860	0.000055	0.000954	0.004269	0.100548	0.045417	0.436938	0.119903
AP1-17	0.000062	0.000172	0.000002	0.000055	0.000006	0.000012	0.000025	0.011178	0.000098

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000237	0.000619	0.000003	0.000052	0.000037	0.000286	0.000207	0.010365	0.000412
AP3-17	0.000319	0.000524	0.000006	0.000066	0.000135	0.000898	0.001299	0.025258	0.002059
AP4-17	0.000511	0.001270	0.000009	0.000097	0.000238	0.002033	0.002148	0.029566	0.004113
34HP60-24-1	0.000081	0.000344	0.000002	0.000048	0.000003	0.000038	0.000009	0.000038	0.000031
34HP60-24-2	0.000079	0.000317	0.000001	0.000048	0.000002	0.000007	0.000001	0.000000	0.000041
34HP60-24-3	0.000098	0.000337	0.000001	0.000047	0.000002	0.000011	0.000000	0.000004	0.000024
34HP60-24-4	0.000290	0.000147	0.000002	0.000035	0.000008	0.000010	0.000015	0.000003	0.000030
34HP60-24-5	0.000527	0.000068	0.000003	0.000046	0.000012	0.000010	0.000032	0.000009	0.000042
34HP60-24-6	0.000554	0.000068	0.000002	0.000040	0.000013	0.000013	0.000035	0.000000	0.000041
34HP60-24-7	0.000425	0.000085	0.000004	0.000042	0.000009	0.000008	0.000015	0.000010	0.000022
34HP60-24-8	0.000356	0.000084	0.000002	0.000050	0.000008	0.000008	0.000017	0.000012	0.000029
34HP60-24-9	0.000496	0.000050	0.000002	0.000056	0.000011	0.000008	0.000017	0.000000	0.000028
34HP60-24-10	0.000872	0.000037	0.000003	0.000040	0.000016	0.000009	0.000031	0.000003	0.000017
34HP60-24-11	0.000847	0.000031	0.000003	0.000034	0.000012	0.000009	0.000029	0.000000	0.000014
34HP60-24-12	0.000967	0.000033	0.000003	0.000033	0.000014	0.000008	0.000022	0.000000	0.000015
SRM614-18	0.000151	0.000138	0.000016	0.001447	0.000453	0.000196	0.000113	0.000667	0.000735
SRM612-18	0.006173	0.006218	0.000016	0.000782	0.000370	0.008081	0.004156	0.029884	0.011562
SRM610-18	0.090431	0.080518	0.000075	0.001166	0.002712	0.106289	0.049451	0.496909	0.156439
AP1-18	0.000021	0.000203	0.000001	0.000017	0.000004	0.000003	0.000012	0.007126	0.000068
AP2-18	0.000085	0.000583	0.000001	0.000015	0.000024	0.000104	0.000152	0.006983	0.000308
AP3-18	0.000277	0.000536	0.000005	0.000034	0.000118	0.000729	0.001126	0.020114	0.001783
AP4-18	0.000481	0.001153	0.000007	0.000056	0.000198	0.001268	0.001793	0.022257	0.003535

standardize signal averages AP

AP1	0.000042	0.000188	0.000001	0.000036	0.000005	0.000008	0.000018	0.009152	0.000083
AP2	0.000161	0.000601	0.000002	0.000034	0.000030	0.000195	0.000180	0.008674	0.000360
AP3	0.000298	0.000530	0.000006	0.000050	0.000127	0.000813	0.001212	0.022686	0.001921
AP4	0.000496	0.001212	0.000008	0.000077	0.000218	0.001651	0.001971	0.025911	0.003824

linest from std sig ave

	0.018714	0.030241	0.000000	0.000000	0.000000	0.007719	0.018723	0.003690	0.010283
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standardize signal averages SRM

srM614-2	0.000123	0.000116	0.000014	0.001299	0.000379	0.000193	0.000090	0.000674	0.000669
srM612-2	0.004863	0.005075	0.000016	0.000712	0.000443	0.007863	0.003752	0.026473	0.010234
srM610-2	0.068007	0.066689	0.000065	0.001060	0.003491	0.103418	0.047434	0.466924	0.138171

linest from std sig ave

	0.075478	0.066008	0.000000	0.000000	0.000000	0.027023	0.063916	0.011048	0.033496
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concentration data

SRM614-17	0.15	0.24	0.00	0.00	0.00	0.13	0.11	0.22	0.53
SRM612-17	5.70	10.20	0.00	0.00	0.00	5.06	5.38	7.30	7.85
SRM610-17	73.16	137.10	0.00	0.00	0.00	66.56	72.93	138.26	105.74
AP1-17	0.46	2.07	0.00	0.00	0.00	0.04	0.18	16.45	0.40
AP2-17	1.77	7.47	0.00	0.00	0.00	0.88	1.55	15.26	1.69
AP3-17	2.38	6.33	0.00	0.00	0.00	2.76	9.70	37.18	8.45
AP4-17	3.81	15.32	0.00	0.00	0.00	6.26	16.04	43.52	16.87
34HP60-24-1	0.60	4.15	0.00	0.00	0.00	0.12	0.07	0.06	0.13
34HP60-24-2	0.59	3.82	0.00	0.00	0.00	0.02	0.01	0.00	0.17
34HP60-24-3	0.73	4.06	0.00	0.00	0.00	0.03	0.00	0.01	0.10
34HP60-24-4	2.17	1.77	0.00	0.00	0.00	0.03	0.11	0.00	0.13
34HP60-24-5	3.94	0.82	0.00	0.00	0.00	0.03	0.24	0.01	0.17
34HP60-24-6	4.13	0.82	0.00	0.00	0.00	0.04	0.26	0.00	0.17
34HP60-24-7	3.17	1.02	0.00	0.00	0.00	0.02	0.11	0.01	0.09
34HP60-24-8	2.65	1.01	0.00	0.00	0.00	0.03	0.13	0.02	0.12
34HP60-24-9	3.70	0.61	0.00	0.00	0.00	0.02	0.13	0.00	0.12
34HP60-24-10	6.51	0.45	0.00	0.00	0.00	0.03	0.23	0.00	0.07
34HP60-24-11	6.32	0.38	0.00	0.00	0.00	0.03	0.22	0.00	0.06
34HP60-24-12	7.22	0.40	0.00	0.00	0.00	0.03	0.16	0.00	0.06
SRM614-18	0.24	0.36	0.00	0.00	0.00	0.13	0.18	0.21	0.65
SRM612-18	9.91	16.13	0.00	0.00	0.00	5.35	6.67	9.46	10.20
SRM610-18	145.14	208.83	0.00	0.00	0.00	70.36	79.40	157.24	137.96
AP1-18	0.16	2.45	0.00	0.00	0.00	0.01	0.09	10.49	0.28
AP2-18	0.64	7.04	0.00	0.00	0.00	0.32	1.14	10.28	1.26
AP3-18	2.07	6.46	0.00	0.00	0.00	2.25	8.41	29.61	7.32
AP4-18	3.59	13.92	0.00	0.00	0.00	3.91	13.39	32.76	14.50

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Zr Mo Ru Rh Pd Ag Cd In Sn

Appendix A. Raw trace element datasheets from laser ablation.

raw data									
blank-15	67.24	81.88	20.64	14.20	6.48	9.32	52.40	66.00	121.60
SRM614-15	415.80	375.00	43.48	3677.38	1066.33	587.72	284.88	1684.77	1766.61
SRM612-15	12871.79	14804.88	48.40	2264.97	1394.93	35257.96	12879.47	91438.48	33635.11
SRM610-15	102207.21	129541.25	136.32	2050.41	6793.48	271686.63	113139.32	1024894.30	293570.41
AP1-15	258.68	2041.33	33.44	324.80	39.28	61.88	119.08	80548.81	944.25
AP2-15	955.65	5004.51	48.88	354.84	286.72	1480.25	1673.21	94247.57	4697.91
AP3-15	4744.83	9502.73	134.28	931.93	2396.33	13320.16	16842.46	342330.28	32073.62
AP4-15	7032.08	11461.55	122.60	696.28	2481.05	18493.50	22834.97	236017.69	41698.84
34BV166-1	131.32	1331.37	16.76	225.48	17.88	29.80	96.96	63.84	165.16
34BV166-2	133.48	1584.61	19.84	213.44	13.84	35.24	73.12	141.32	180.88
34BV166-3	130.36	1783.25	22.68	175.20	13.68	24.80	68.88	38.76	151.56
34BV166-4	105.32	2278.45	25.48	164.04	18.40	28.84	68.96	55.68	163.12
34BV166-5	104.04	2636.93	21.64	227.88	21.04	39.40	78.64	168.28	178.36
34BV166-6	133.72	3879.10	21.64	180.60	18.12	28.60	81.68	45.64	184.84
SRM614-16	333.72	361.56	30.68	2317.53	645.32	345.04	242.52	1074.85	1362.09
SRM612-16	13738.08	13337.80	51.08	1794.89	841.72	19057.63	9115.09	66120.38	25306.34
SRM610-16	95069.38	83482.99	93.56	1219.53	2701.70	113208.52	49834.72	528029.50	167678.50
AP1-16	190.96	1924.09	24.88	162.40	32.32	42.20	136.64	54435.95	808.32
AP2-16	928.93	4704.91	37.12	203.84	180.20	998.05	1291.29	60283.70	3519.06
AP3-16	4088.50	8051.21	95.24	623.20	1852.41	8983.17	11725.67	224906.95	22631.73
AP4-16	5661.23	9286.81	60.12	401.20	1551.53	11266.62	13639.24	137947.86	27752.92
blank-16	76.28	104.04	5.04	55.80	14.96	15.72	64.52	42.44	109.68
blank average	71.76	92.96	12.84	35.00	10.72	12.52	58.46	54.22	115.64
blank subtraction									
SRM614-15	344.04	282.04	30.64	3642.38	1055.61	575.20	226.42	1630.55	1650.97
SRM612-15	12800.03	14711.92	35.56	2229.97	1384.21	35245.44	12821.01	91384.26	33519.47
SRM610-15	102135.45	129448.29	123.48	2015.41	6782.76	271674.11	113080.86	1024840.08	293454.77
AP1-15	186.92	1948.37	20.60	289.80	28.56	49.36	60.62	80494.59	828.60
AP2-15	883.88	4911.55	36.04	319.84	276.00	1467.73	1614.75	94193.35	4582.27
AP3-15	4673.07	9409.77	121.44	896.93	2385.61	13307.63	16783.99	342276.06	31957.98
AP4-15	6960.32	11368.58	109.76	661.28	2470.33	18480.98	22776.51	235963.47	41583.20
34BV166-1	59.56	1238.41	3.92	190.48	7.16	17.28	38.50	9.62	49.52
34BV166-2	61.72	1491.65	7.00	178.44	3.12	22.72	14.66	87.10	65.24
34BV166-3	58.60	1690.29	9.84	140.20	2.96	12.28	10.42	-15.46	35.92
34BV166-4	33.56	2185.49	12.64	129.04	7.68	16.32	10.50	1.46	47.48
34BV166-5	32.28	2543.97	8.80	192.88	10.32	26.88	20.18	114.06	62.72
34BV166-6	61.96	3786.14	8.80	145.60	7.40	16.08	23.22	-8.58	69.20
SRM614-16	261.96	268.60	17.84	2282.53	634.60	332.52	184.06	1020.63	1246.45
SRM612-16	13666.32	13244.83	38.24	1759.89	831.00	19045.11	9056.63	66066.15	25190.70
SRM610-16	94997.61	83390.03	80.72	1184.53	2690.98	113196.00	49776.26	527975.28	167562.86
AP1-16	119.20	1831.13	12.04	127.40	21.60	29.68	78.18	54381.72	692.68
AP2-16	857.16	4611.95	24.28	168.84	169.48	985.53	1232.83	60229.48	3403.42
AP3-16	4016.74	7958.25	82.40	588.20	1841.69	8970.65	11667.21	224852.73	22516.09
AP4-16	5589.47	9193.85	47.28	366.20	1540.81	11254.10	13580.78	137893.64	27637.28
zero correction									
SRM614-15	344.04	282.04	30.64	3642.38	1055.61	575.20	226.42	1630.55	1650.97
SRM612-15	12800.03	14711.92	35.56	2229.97	1384.21	35245.44	12821.01	91384.26	33519.47
SRM610-15	102135.45	129448.29	123.48	2015.41	6782.76	271674.11	113080.86	1024840.08	293454.77
AP1-15	186.92	1948.37	20.60	289.80	28.56	49.36	60.62	80494.59	828.60
AP2-15	883.88	4911.55	36.04	319.84	276.00	1467.73	1614.75	94193.35	4582.27
AP3-15	4673.07	9409.77	121.44	896.93	2385.61	13307.63	16783.99	342276.06	31957.98
AP4-15	6960.32	11368.58	109.76	661.28	2470.33	18480.98	22776.51	235963.47	41583.20
34BV166-1	59.56	1238.41	3.92	190.48	7.16	17.28	38.50	9.62	49.52
34BV166-2	61.72	1491.65	7.00	178.44	3.12	22.72	14.66	87.10	65.24
34BV166-3	58.60	1690.29	9.84	140.20	2.96	12.28	10.42	0.00	35.92
34BV166-4	33.56	2185.49	12.64	129.04	7.68	16.32	10.50	1.46	47.48
34BV166-5	32.28	2543.97	8.80	192.88	10.32	26.88	20.18	114.06	62.72
34BV166-6	61.96	3786.14	8.80	145.60	7.40	16.08	23.22	0.00	69.20
SRM614-16	261.96	268.60	17.84	2282.53	634.60	332.52	184.06	1020.63	1246.45
SRM612-16	13666.32	13244.83	38.24	1759.89	831.00	19045.11	9056.63	66066.15	25190.70
SRM610-16	94997.61	83390.03	80.72	1184.53	2690.98	113196.00	49776.26	527975.28	167562.86
AP1-16	119.20	1831.13	12.04	127.40	21.60	29.68	78.18	54381.72	692.68
AP2-16	857.16	4611.95	24.28	168.84	169.48	985.53	1232.83	60229.48	3403.42
AP3-16	4016.74	7958.25	82.40	588.20	1841.69	8970.65	11667.21	224852.73	22516.09
AP4-16	5589.47	9193.85	47.28	366.20	1540.81	11254.10	13580.78	137893.64	27637.28
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-15	0.000121	0.000099	0.000011	0.001279	0.000371	0.000202	0.000080	0.000573	0.000580
SRM612-15	0.004195	0.004822	0.000012	0.000731	0.000454	0.011551	0.004202	0.029949	0.010985
SRM610-15	0.054860	0.069530	0.000066	0.001083	0.003643	0.145924	0.060739	0.550470	0.157623
AP1-15	0.000014	0.000145	0.000002	0.000022	0.000002	0.000004	0.000005	0.005997	0.000062
AP2-15	0.000062	0.000347	0.000003	0.000023	0.000019	0.000104	0.000114	0.006646	0.000323
AP3-15	0.000250	0.000504	0.000007	0.000048	0.000128	0.000713	0.000899	0.018327	0.001711
AP4-15	0.000410	0.000670	0.000006	0.000039	0.000146	0.001089	0.001342	0.013903	0.002450
34BV166-1	0.000014	0.000298	0.000001	0.000046	0.000002	0.000004	0.000009	0.000002	0.000012
34BV166-2	0.000017	0.000421	0.000002	0.000050	0.000001	0.000006	0.000004	0.000025	0.000018
34BV166-3	0.000018	0.000520	0.000003	0.000043	0.000001	0.000004	0.000003	0.000000	0.000011
34BV166-4	0.000012	0.000751	0.000004	0.000044	0.000003	0.000006	0.000004	0.000001	0.000016
34BV166-5	0.000010	0.000827	0.000003	0.000063	0.000003	0.000009	0.000007	0.000037	0.000020
34BV166-6	0.000015	0.000892	0.000002	0.000034	0.000002	0.000004	0.000005	0.000000	0.000016
SRM614-16	0.000152	0.000156	0.000010	0.001326	0.000369	0.000193	0.000107	0.000593	0.000724
SRM612-16	0.005900	0.005718	0.000017	0.000760	0.000359	0.008223	0.003910	0.028523	0.010876
SRM610-16	0.085223	0.074810	0.000072	0.001063	0.002414	0.101549	0.044655	0.473652	0.150322
AP1-16	0.000010	0.000153	0.000001	0.000011	0.000002	0.000002	0.000007	0.004539	0.000058
AP2-16	0.000072	0.000385	0.000002	0.000014	0.000014	0.000082	0.000103	0.005027	0.000284
AP3-16	0.000246	0.000488	0.000005	0.000036	0.000113	0.000550	0.000716	0.013798	0.001382
AP4-16	0.000385	0.000633	0.000003	0.000025	0.000106	0.000775	0.000935	0.009492	0.001902
standardize signal averages AP									
AP1	0.000012	0.000149	0.000001	0.000016	0.000002	0.000003	0.000006	0.005268	0.000060
AP2	0.000067	0.000366	0.000002	0.000018	0.000017	0.000093	0.000108	0.005836	0.000304
AP3	0.000248	0.000496	0.000006	0.000042	0.000120	0.000632	0.000807	0.016062	0.001546
AP4	0.000397	0.000651	0.000005	0.000032	0.000126	0.000932	0.001138	0.011697	0.002176
linest from std sig ave									
	0.023779	0.049700	0.000000	0.000000	0.000000	0.012706	0.030903	0.006344	0.016470
standardize signal averages SRM									
srM614-2	0.000136	0.000128	0.000011	0.001302	0.000370	0.000198	0.000093	0.000583	0.000652
srM612-2	0.005048	0.005270	0.000014	0.000745	0.000406	0.009887	0.004056	0.029236	0.010931
srM610-2	0.070042	0.072170	0.000069	0.001073	0.003029	0.123736	0.052697	0.512061	0.153973
linest from std sig ave									
	0.073283	0.061004	0.000000	0.000000	0.000000	0.022580	0.057538	0.010074	0.030064
concentration data									
SRM614-15	0.25	0.42	0.00	0.00	0.00	0.22	0.21	0.31	0.82
SRM612-15	8.56	20.55	0.00	0.00	0.00	12.59	11.14	16.29	15.52
SRM610-15	111.88	296.37	0.00	0.00	0.00	159.02	160.98	299.48	222.65
AP1-15	0.13	2.88	0.00	0.00	0.00	0.02	0.06	15.18	0.41
AP2-15	0.59	6.87	0.00	0.00	0.00	0.52	1.40	16.82	2.12
AP3-15	2.37	9.99	0.00	0.00	0.00	3.61	11.08	46.38	11.24
AP4-15	3.89	13.28	0.00	0.00	0.00	5.52	16.54	35.18	16.10
34BV166-1	0.14	5.90	0.00	0.00	0.00	0.02	0.11	0.01	0.08
34BV166-2	0.17	8.34	0.00	0.00	0.00	0.03	0.05	0.06	0.12
34BV166-3	0.17	10.32	0.00	0.00	0.00	0.02	0.04	0.00	0.07
34BV166-4	0.11	14.88	0.00	0.00	0.00	0.03	0.04	0.00	0.11
34BV166-5	0.10	16.40	0.00	0.00	0.00	0.04	0.08	0.09	0.13
34BV166-6	0.14	17.70	0.00	0.00	0.00	0.02	0.07	0.00	0.11
SRM614-16	0.31	0.66	0.00	0.00	0.00	0.21	0.28	0.32	1.02
SRM612-16	12.03	24.37	0.00	0.00	0.00	8.96	10.36	15.52	15.36
SRM610-16	173.80	318.87	0.00	0.00	0.00	110.66	118.35	257.69	212.34
AP1-16	0.09	3.03	0.00	0.00	0.00	0.01	0.08	11.49	0.38
AP2-16	0.68	7.63	0.00	0.00	0.00	0.42	1.27	12.72	1.87
AP3-16	2.34	9.68	0.00	0.00	0.00	2.79	8.83	34.92	9.08
AP4-16	3.65	12.55	0.00	0.00	0.00	3.93	11.52	24.02	12.50
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-13	95.00	86.84	5.68	16.04	6.88	10.68	40.84	21.44	132.04
SRM614-13	386.44	398.72	48.68	3971.54	1080.09	1024.57	291.44	1729.65	1866.77
SRM612-13	13398.36	14691.96	41.72	2080.37	1250.17	25825.31	10490.38	80023.29	29833.73
SRM610-13	84434.71	88079.82	87.20	1425.05	4131.46	145848.94	60048.22	664091.94	200819.56
AP1-13	341.80	2789.38	38.12	375.92	65.28	194.00	209.88	90402.15	1168.21
AP2-13	1201.33	6464.28	37.44	483.32	303.84	1652.45	2313.09	115677.41	5640.11
AP3-13	4281.78	7977.17	81.12	769.72	1670.33	13145.07	14287.44	284263.16	27855.08
AP4-13	6361.36	11400.31	101.28	674.88	2322.09	18786.23	19233.63	218813.31	38815.46
W3-1	211.00	136.24	20.64	223.96	18.24	912.93	91.40	155.56	491.32
W3-2	212.48	138.24	23.76	218.56	26.80	150.56	71.28	140.16	292.04
W3-3	237.24	135.36	10.52	242.56	26.20	106.48	89.76	151.16	254.56
W3-4	232.56	114.80	19.60	216.04	19.96	383.12	84.56	215.08	375.48
W3-5	265.88	148.88	24.60	254.36	19.56	167.00	74.16	41.64	334.36
W3-6	406.12	107.52	29.36	259.04	36.68	598.76	92.12	62.16	307.12
W3-7	268.36	124.12	22.64	242.12	28.48	670.28	94.56	116.64	1020.61
W3-8	229.64	138.56	22.00	275.04	23.20	261.92	90.44	62.88	441.24
W3-9	177.84	149.56	18.88	252.60	29.48	113.76	73.76	74.24	317.24
W3-10	447.28	167.32	22.88	244.20	32.36	466.56	118.28	357.56	402.80
W3-11	423.52	155.88	18.76	285.64	42.68	311.84	113.64	41.28	328.24
W3-12	234.52	142.16	28.00	288.56	17.68	505.04	92.08	61.84	274.28
SRM614-14	414.88	458.08	46.24	3349.70	944.17	510.08	325.88	1493.05	1749.73
SRM612-14	15062.52	16009.93	48.88	1949.25	1025.97	25404.66	11726.87	80392.49	30627.21
SRM610-14	84067.99	78594.00	87.28	1171.57	2359.81	111854.15	47862.19	501387.44	160404.78
AP1-14	211.96	2295.69	26.92	198.84	38.52	35.44	128.84	52483.77	826.40
AP2-14	981.01	5359.47	34.88	250.88	190.20	1016.05	1454.93	63960.64	3624.98
AP3-14	3941.34	7363.80	72.04	525.48	1386.09	10937.30	12439.51	231621.55	22873.45
AP4-14	5721.39	9899.86	69.72	462.92	1740.81	12006.59	15681.33	161348.95	30307.41
blank-14	86.20	119.00	15.04	81.04	16.32	11.84	92.84	47.52	102.92
blank average	90.60	102.92	10.36	48.54	11.60	11.26	66.84	34.48	117.48
blank subtraction									
SRM614-13	295.84	295.80	38.32	3923.00	1068.49	1013.31	224.60	1695.17	1749.29
SRM612-13	13307.75	14589.04	31.36	2031.83	1238.57	25814.04	10423.54	79988.81	29716.25
SRM610-13	84344.11	87976.90	76.84	1376.51	4119.86	145837.68	59981.38	664057.46	200702.08
AP1-13	251.20	2686.46	27.76	327.38	53.68	182.74	143.04	90367.67	1050.73
AP2-13	1110.73	6361.36	27.08	434.78	292.24	1641.19	2246.25	115642.93	5522.63
AP3-13	4191.18	7874.24	70.76	721.18	1658.73	13133.81	14220.60	284228.68	27737.60
AP4-13	6270.76	11297.38	90.92	626.34	2310.49	18774.96	19166.79	218778.83	38697.98
W3-1	120.40	33.32	10.28	175.42	6.64	901.67	24.56	121.08	373.84
W3-2	121.88	35.32	13.40	170.02	15.20	139.30	4.44	105.68	174.56
W3-3	146.64	32.44	0.16	194.02	14.60	95.22	22.92	116.68	137.08
W3-4	141.96	11.88	9.24	167.50	8.36	371.86	17.72	180.60	258.00
W3-5	175.28	45.96	14.24	205.82	7.96	155.74	7.32	7.16	216.88
W3-6	315.52	4.60	19.00	210.50	25.08	587.50	25.28	27.68	189.64
W3-7	177.76	21.20	12.28	193.58	16.88	659.02	27.72	82.16	903.13
W3-8	139.04	35.64	11.64	226.50	11.60	250.66	23.60	28.40	323.76
W3-9	87.24	46.64	8.52	204.06	17.88	102.50	6.92	39.76	199.76
W3-10	356.68	64.40	12.52	195.66	20.76	455.30	51.44	323.08	285.32
W3-11	332.92	52.96	8.40	237.10	31.08	300.58	46.80	6.80	210.76
W3-12	143.92	39.24	17.64	240.02	6.08	493.78	25.24	27.36	156.80
SRM614-14	324.28	355.16	35.88	3301.16	932.57	498.82	259.04	1458.57	1632.25
SRM612-14	14971.92	15907.01	38.52	1900.71	1014.37	25393.40	11660.03	80358.01	30509.73
SRM610-14	83977.39	78491.08	76.92	1123.03	2348.21	111842.89	47795.35	501352.96	160287.30
AP1-14	121.36	2192.77	16.56	150.30	26.92	24.18	62.00	52449.29	708.92
AP2-14	890.41	5256.55	24.52	202.34	178.60	1004.79	1388.09	63926.16	3507.50
AP3-14	3850.74	7260.88	61.68	476.94	1374.49	10926.04	12372.67	231587.07	22755.97
AP4-14	5630.79	9796.93	59.36	414.38	1729.21	11995.33	15614.49	161314.47	30189.93
zero correction									
SRM614-13	295.84	295.80	38.32	3923.00	1068.49	1013.31	224.60	1695.17	1749.29
SRM612-13	13307.75	14589.04	31.36	2031.83	1238.57	25814.04	10423.54	79988.81	29716.25
SRM610-13	84344.11	87976.90	76.84	1376.51	4119.86	145837.68	59981.38	664057.46	200702.08
AP1-13	251.20	2686.46	27.76	327.38	53.68	182.74	143.04	90367.67	1050.73
AP2-13	1110.73	6361.36	27.08	434.78	292.24	1641.19	2246.25	115642.93	5522.63
AP3-13	4191.18	7874.24	70.76	721.18	1658.73	13133.81	14220.60	284228.68	27737.60
AP4-13	6270.76	11297.38	90.92	626.34	2310.49	18774.96	19166.79	218778.83	38697.98
W3-1	120.40	33.32	10.28	175.42	6.64	901.67	24.56	121.08	373.84
W3-2	121.88	35.32	13.40	170.02	15.20	139.30	4.44	105.68	174.56
W3-3	146.64	32.44	0.16	194.02	14.60	95.22	22.92	116.68	137.08
W3-4	141.96	11.88	9.24	167.50	8.36	371.86	17.72	180.60	258.00
W3-5	175.28	45.96	14.24	205.82	7.96	155.74	7.32	7.16	216.88
W3-6	315.52	4.60	19.00	210.50	25.08	587.50	25.28	27.68	189.64
W3-7	177.76	21.20	12.28	193.58	16.88	659.02	27.72	82.16	903.13
W3-8	139.04	35.64	11.64	226.50	11.60	250.66	23.60	28.40	323.76
W3-9	87.24	46.64	8.52	204.06	17.88	102.50	6.92	39.76	199.76

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	356.68	64.40	12.52	195.66	20.76	455.30	51.44	323.08	285.32
W3-11	332.92	52.96	8.40	237.10	31.08	300.58	46.80	6.80	210.76
W3-12	143.92	39.24	17.64	240.02	6.08	493.78	25.24	27.36	156.80
SRM614-14	324.28	355.16	35.88	3301.16	932.57	498.82	259.04	1458.57	1632.25
SRM612-14	14971.92	15907.01	38.52	1900.71	1014.37	25393.40	11660.03	80358.01	30509.73
SRM610-14	83977.39	78491.08	76.92	1123.03	2348.21	111842.89	47795.35	501352.96	160287.30
AP1-14	121.36	2192.77	16.56	150.30	26.92	24.18	62.00	52449.29	708.92
AP2-14	890.41	5256.55	24.52	202.34	178.60	1004.79	1388.09	63926.16	3507.50
AP3-14	3850.74	7260.88	61.68	476.94	1374.49	10926.04	12372.67	231587.07	22755.97
AP4-14	5630.79	9796.93	59.36	414.38	1729.21	11995.33	15614.49	161314.47	30189.93

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-13	0.000102	0.000101	0.000013	0.001346	0.000367	0.000348	0.000077	0.000582	0.000600
SRM612-13	0.004569	0.005009	0.000011	0.000698	0.000425	0.008864	0.003579	0.027465	0.010203
SRM610-13	0.071261	0.074331	0.000065	0.001163	0.003481	0.123216	0.050677	0.561054	0.169571
AP1-13	0.000016	0.000172	0.000002	0.000021	0.000003	0.000012	0.000009	0.005779	0.000067
AP2-13	0.000068	0.000388	0.000002	0.000027	0.000018	0.000100	0.000137	0.007062	0.000337
AP3-13	0.000242	0.000455	0.000004	0.000042	0.000096	0.000759	0.000822	0.016433	0.001604
AP4-13	0.000359	0.000646	0.000005	0.000036	0.000132	0.001074	0.001096	0.012512	0.002213
W3-1	0.000020	0.000006	0.000002	0.000029	0.000001	0.000150	0.000004	0.000020	0.000062
W3-2	0.000019	0.000005	0.000002	0.000026	0.000002	0.000022	0.000001	0.000016	0.000027
W3-3	0.000023	0.000005	0.000000	0.000031	0.000002	0.000015	0.000004	0.000019	0.000022
W3-4	0.000025	0.000002	0.000002	0.000029	0.000001	0.000064	0.000003	0.000031	0.000045
W3-5	0.000028	0.000007	0.000002	0.000033	0.000001	0.000025	0.000001	0.000001	0.000034
W3-6	0.000049	0.000001	0.000003	0.000033	0.000004	0.000092	0.000004	0.000004	0.000030
W3-7	0.000034	0.000004	0.000002	0.000037	0.000003	0.000125	0.000005	0.000016	0.000172
W3-8	0.000023	0.000006	0.000002	0.000038	0.000002	0.000042	0.000004	0.000005	0.000054
W3-9	0.000014	0.000007	0.000001	0.000033	0.000003	0.000016	0.000001	0.000006	0.000032
W3-10	0.000041	0.000007	0.000001	0.000022	0.000002	0.000052	0.000006	0.000037	0.000033
W3-11	0.000038	0.000006	0.000001	0.000027	0.000004	0.000034	0.000005	0.000001	0.000024
W3-12	0.000016	0.000004	0.000002	0.000027	0.000001	0.000055	0.000003	0.000003	0.000018
SRM614-14	0.000137	0.000150	0.000015	0.001399	0.000395	0.000211	0.000110	0.000618	0.000692
SRM612-14	0.005969	0.006342	0.000015	0.000758	0.000404	0.010124	0.004649	0.032038	0.012164
SRM610-14	0.089984	0.084105	0.000082	0.001203	0.002516	0.119842	0.051214	0.537210	0.171751
AP1-14	0.000009	0.000171	0.000001	0.000012	0.000002	0.000002	0.000005	0.004090	0.000055
AP2-14	0.000067	0.000393	0.000002	0.000015	0.000013	0.000075	0.000104	0.004776	0.000262
AP3-14	0.000265	0.000499	0.000004	0.000033	0.000094	0.000751	0.000850	0.015911	0.001563
AP4-14	0.000383	0.000667	0.000004	0.000028	0.000118	0.000816	0.001062	0.010975	0.002054

standardize signal averages AP									
AP1	0.000013	0.000171	0.000002	0.000016	0.000003	0.000007	0.000007	0.004934	0.000061
AP2	0.000067	0.000391	0.000002	0.000021	0.000016	0.000088	0.000120	0.005919	0.000300
AP3	0.000253	0.000477	0.000004	0.000037	0.000095	0.000755	0.000836	0.016172	0.001584
AP4	0.000371	0.000656	0.000005	0.000032	0.000125	0.000945	0.001079	0.011744	0.002134

linest from std sig ave									
	0.024689	0.049423	0.000000	0.000000	0.000000	0.011765	0.031426	0.006299	0.016520

standardize signal averages SRM									
srm614-2	0.000119	0.000126	0.000014	0.001372	0.000381	0.000280	0.000093	0.000600	0.000646
srm612-2	0.005269	0.005676	0.000013	0.000728	0.000415	0.009494	0.004114	0.029752	0.011184
srm610-2	0.080622	0.079218	0.000074	0.001183	0.002998	0.121529	0.050946	0.549132	0.170661

linest from std sig ave									
	0.063689	0.055580	0.000000	0.000000	0.000000	0.022993	0.059505	0.009394	0.027130

concentration data									
SRM614-13	0.21	0.43	0.00	0.00	0.00	0.35	0.21	0.31	0.85
SRM612-13	9.68	21.23	0.00	0.00	0.00	8.94	9.65	14.84	14.46
SRM610-13	150.89	315.07	0.00	0.00	0.00	124.33	136.58	303.10	240.25

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.16	3.39	0.00	0.00	0.00	0.05	0.11	14.52	0.44
AP2-13	0.67	7.66	0.00	0.00	0.00	0.47	1.72	17.75	2.22
AP3-13	2.39	8.98	0.00	0.00	0.00	3.56	10.31	41.29	10.57
AP4-13	3.53	12.74	0.00	0.00	0.00	5.04	13.74	31.44	14.59
W3-1	0.20	0.11	0.00	0.00	0.00	0.70	0.05	0.05	0.41
W3-2	0.19	0.11	0.00	0.00	0.00	0.10	0.01	0.04	0.18
W3-3	0.23	0.10	0.00	0.00	0.00	0.07	0.05	0.05	0.14
W3-4	0.24	0.04	0.00	0.00	0.00	0.30	0.04	0.08	0.29
W3-5	0.27	0.14	0.00	0.00	0.00	0.12	0.01	0.00	0.23
W3-6	0.48	0.01	0.00	0.00	0.00	0.43	0.05	0.01	0.19
W3-7	0.33	0.08	0.00	0.00	0.00	0.59	0.07	0.04	1.13
W3-8	0.23	0.12	0.00	0.00	0.00	0.20	0.05	0.01	0.36
W3-9	0.14	0.15	0.00	0.00	0.00	0.08	0.01	0.02	0.21
W3-10	0.40	0.15	0.00	0.00	0.00	0.24	0.07	0.09	0.21
W3-11	0.37	0.12	0.00	0.00	0.00	0.16	0.07	0.00	0.16
W3-12	0.16	0.09	0.00	0.00	0.00	0.26	0.04	0.01	0.12
SRM614-14	0.29	0.64	0.00	0.00	0.00	0.21	0.30	0.33	0.98
SRM612-14	12.64	26.88	0.00	0.00	0.00	10.22	12.53	17.31	17.23
SRM610-14	190.53	356.50	0.00	0.00	0.00	120.92	138.03	290.21	243.34
AP1-14	0.09	3.37	0.00	0.00	0.00	0.01	0.06	10.28	0.36
AP2-14	0.66	7.74	0.00	0.00	0.00	0.35	1.30	12.00	1.73
AP3-14	2.61	9.84	0.00	0.00	0.00	3.52	10.66	39.98	10.30
AP4-14	3.77	13.14	0.00	0.00	0.00	3.83	13.32	27.58	13.54

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-11	127.88	110.32	19.68	17.92	17.36	62.56	82.20	599.52	244.56
SRM614-11	574.00	565.56	71.64	5091.87	1423.69	688.12	372.44	2169.33	2443.89
SRM612-11	16938.34	16078.25	50.32	2185.53	1104.81	23971.90	10548.38	84516.20	32485.42
SRM610-11	104277.79	95892.90	96.16	1469.37	2966.86	127712.88	49477.36	610713.13	199517.72
AP1-11	473.28	3394.06	39.12	544.52	81.16	226.84	317.96	172955.89	1507.41
AP2-11	1627.69	8247.53	44.88	539.44	375.88	1791.17	2763.18	156500.08	6923.24
AP3-11	6350.84	12489.63	139.56	1230.49	3537.82	21500.00	28475.00	604420.06	49563.28
AP4-11	6800.96	11400.47	110.88	582.00	2305.29	23032.21	21021.28	238624.75	40401.47
W1-1	599.20	265.84	26.28	669.96	23.72	83.32	88.08	154.24	264.24
W1-2	371.16	208.20	25.08	511.56	21.76	56.84	91.16	90.56	208.52
W1-3	506.96	230.84	14.16	473.12	19.60	65.08	90.24	63.44	203.00
W1-4	1394.41	193.76	34.12	935.89	43.36	151.28	185.48	512.32	420.96
W1-5	761.44	173.76	27.92	789.20	28.04	63.76	120.12	147.40	264.92
W1-6	467.04	142.40	23.88	733.44	29.04	121.96	91.28	136.88	245.40
W1-7	1148.73	216.52	37.16	842.44	52.44	230.96	220.76	633.96	495.68
W1-8	615.88	181.80	25.40	699.76	52.56	310.04	114.64	113.16	311.20
W1-9	717.20	159.08	26.88	791.36	36.40	172.56	121.48	166.32	385.12
W1-10	657.44	224.68	40.60	823.88	38.32	164.44	175.04	418.60	445.00
W1-11	504.04	170.08	25.72	854.12	51.96	235.96	116.20	140.36	361.24
W1-12	503.48	180.96	30.60	733.76	43.40	106.16	141.04	87.84	316.80
W1-13	828.44	199.48	22.12	835.48	22.56	127.76	116.92	275.84	334.40
W1-14	720.72	171.04	21.80	885.25	26.68	127.28	86.44	82.56	284.76
W1-15	638.00	173.48	33.44	866.00	26.68	101.68	131.68	66.64	309.84
W1-16	808.84	182.88	26.20	610.32	33.36	123.24	110.32	351.92	318.88
W1-17	536.28	150.76	24.76	638.24	23.68	73.72	77.60	82.92	216.72
W1-18	584.88	226.80	22.92	615.92	23.56	56.08	86.08	140.84	221.68
SRM614-12	433.08	476.92	45.92	3448.22	956.57	492.40	303.32	1533.61	1801.61
SRM612-12	15025.69	14267.36	34.72	1671.05	802.36	18881.23	9104.09	65484.89	25356.62
SRM610-12	96986.95	85016.24	82.16	1208.45	1915.17	100435.41	42537.08	488106.75	159632.45
AP1-12	294.48	2630.33	30.40	197.88	53.12	61.60	155.20	77378.48	821.48
AP2-12	1068.17	5504.55	41.04	226.04	253.44	1311.61	1634.81	75699.31	3918.82
AP3-12	3917.06	7162.88	62.56	487.56	1470.81	8920.21	14106.76	259266.02	23706.85
AP4-12	6327.52	11746.63	93.80	509.28	2004.89	16005.53	19414.95	212558.92	37705.41
blank-12	82.04	137.80	16.20	98.96	20.56	21.08	85.16	125.08	109.36
blank average	104.96	124.06	17.94	58.44	18.96	41.82	83.68	362.30	176.96

blank subtraction									
SRM614-11	469.04	441.50	53.70	5033.43	1404.73	646.30	288.76	1807.03	2266.93
SRM612-11	16833.38	15954.19	32.38	2127.09	1085.85	23930.07	10464.70	84153.89	32308.46
SRM610-11	104172.83	95768.84	78.22	1410.93	2947.90	127671.06	49393.68	610350.83	199340.76
AP1-11	368.32	3270.00	21.18	486.08	62.20	185.02	234.28	172593.59	1330.45
AP2-11	1522.73	8123.47	26.94	481.00	356.92	1749.35	2679.50	156137.78	6746.28
AP3-11	6245.88	12365.57	121.62	1172.05	3518.86	21458.18	28391.32	604057.76	49386.32

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	6696.00	11276.40	92.94	523.56	2286.33	22990.39	20937.60	238262.45	40224.51
W1-1	494.24	141.78	8.34	611.52	4.76	41.50	4.40	-208.06	87.28
W1-2	266.20	84.14	7.14	453.12	2.80	15.02	7.48	-271.74	31.56
W1-3	402.00	106.78	-3.78	414.68	0.64	23.26	6.56	-298.86	26.04
W1-4	1289.45	69.70	16.18	877.44	24.40	109.46	101.80	150.02	244.00
W1-5	656.48	49.70	9.98	730.76	9.08	21.94	36.44	-214.90	87.96
W1-6	362.08	18.34	5.94	675.00	10.08	80.14	7.60	-225.42	68.44
W1-7	1043.77	92.46	19.22	784.00	33.48	189.14	137.08	271.66	318.72
W1-8	510.92	57.74	7.46	641.32	33.60	268.22	30.96	-249.96	134.24
W1-9	612.24	35.02	8.94	732.92	17.44	130.74	37.80	-195.98	208.16
W1-10	552.48	100.62	22.66	765.44	19.36	122.62	91.36	56.30	268.04
W1-11	399.08	46.02	7.78	795.68	33.00	194.14	32.52	-221.94	184.28
W1-12	398.52	56.90	12.66	675.32	24.44	64.34	57.36	-274.46	139.84
W1-13	723.48	75.42	4.18	777.04	3.60	85.94	33.24	-86.46	157.44
W1-14	615.76	46.98	3.86	826.80	7.72	85.46	2.76	-279.74	107.80
W1-15	533.04	49.42	15.50	807.56	7.72	59.86	48.00	-295.66	132.88
W1-16	703.88	58.82	8.26	551.88	14.40	81.42	26.64	-10.38	141.92
W1-17	431.32	26.70	6.82	579.80	4.72	31.90	-6.08	-279.38	39.76
W1-18	479.92	102.74	4.98	557.48	4.60	14.26	2.40	-221.46	44.72
SRM614-12	328.12	352.86	27.98	3389.78	937.61	450.58	219.64	1171.31	1624.65
SRM612-12	14920.72	14143.30	16.78	1612.61	783.40	18839.41	9020.41	65122.59	25179.66
SRM610-12	96881.98	84892.18	64.22	1150.01	1896.21	100393.59	42453.40	487744.45	159455.49
AP1-12	189.52	2506.27	12.46	139.44	34.16	19.78	71.52	77016.17	644.52
AP2-12	963.21	5380.49	23.10	167.60	234.48	1269.79	1551.13	75337.00	3741.86
AP3-12	3812.10	7038.82	44.62	429.12	1451.85	8878.39	14023.08	258903.72	23529.89
AP4-12	6222.56	11622.57	75.86	450.84	1985.93	15963.71	19331.27	212196.62	37528.45

zero correction

SRM614-11	469.04	441.50	53.70	5033.43	1404.73	646.30	288.76	1807.03	2266.93
SRM612-11	16833.38	15954.19	32.38	2127.09	1085.85	23930.07	10464.70	84153.89	32308.46
SRM610-11	104172.83	95768.84	78.22	1410.93	2947.90	127671.06	49393.68	610350.83	199340.76
AP1-11	368.32	3270.00	21.18	486.08	62.20	185.02	234.28	172593.59	1330.45
AP2-11	1522.73	8123.47	26.94	481.00	356.92	1749.35	2679.50	156137.78	6746.28
AP3-11	6245.88	12365.57	121.62	1172.05	3518.86	21458.18	28391.32	604057.76	49386.32
AP4-11	6696.00	11276.40	92.94	523.56	2286.33	22990.39	20937.60	238262.45	40224.51
W1-1	494.24	141.78	8.34	611.52	4.76	41.50	4.40	0.00	87.28
W1-2	266.20	84.14	7.14	453.12	2.80	15.02	7.48	0.00	31.56
W1-3	402.00	106.78	0.00	414.68	0.64	23.26	6.56	0.00	26.04
W1-4	1289.45	69.70	16.18	877.44	24.40	109.46	101.80	150.02	244.00
W1-5	656.48	49.70	9.98	730.76	9.08	21.94	36.44	0.00	87.96
W1-6	362.08	18.34	5.94	675.00	10.08	80.14	7.60	0.00	68.44
W1-7	1043.77	92.46	19.22	784.00	33.48	189.14	137.08	271.66	318.72
W1-8	510.92	57.74	7.46	641.32	33.60	268.22	30.96	0.00	134.24
W1-9	612.24	35.02	8.94	732.92	17.44	130.74	37.80	0.00	208.16
W1-10	552.48	100.62	22.66	765.44	19.36	122.62	91.36	56.30	268.04
W1-11	399.08	46.02	7.78	795.68	33.00	194.14	32.52	0.00	184.28
W1-12	398.52	56.90	12.66	675.32	24.44	64.34	57.36	0.00	139.84
W1-13	723.48	75.42	4.18	777.04	3.60	85.94	33.24	0.00	157.44
W1-14	615.76	46.98	3.86	826.80	7.72	85.46	2.76	0.00	107.80
W1-15	533.04	49.42	15.50	807.56	7.72	59.86	48.00	0.00	132.88
W1-16	703.88	58.82	8.26	551.88	14.40	81.42	26.64	0.00	141.92
W1-17	431.32	26.70	6.82	579.80	4.72	31.90	0.00	0.00	39.76
W1-18	479.92	102.74	4.98	557.48	4.60	14.26	2.40	0.00	44.72
SRM614-12	328.12	352.86	27.98	3389.78	937.61	450.58	219.64	1171.31	1624.65
SRM612-12	14920.72	14143.30	16.78	1612.61	783.40	18839.41	9020.41	65122.59	25179.66
SRM610-12	96881.98	84892.18	64.22	1150.01	1896.21	100393.59	42453.40	487744.45	159455.49
AP1-12	189.52	2506.27	12.46	139.44	34.16	19.78	71.52	77016.17	644.52
AP2-12	963.21	5380.49	23.10	167.60	234.48	1269.79	1551.13	75337.00	3741.86
AP3-12	3812.10	7038.82	44.62	429.12	1451.85	8878.39	14023.08	258903.72	23529.89
AP4-12	6222.56	11622.57	75.86	450.84	1985.93	15963.71	19331.27	212196.62	37528.45

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal									
SRM614-11	0.000134	0.000126	0.000015	0.001441	0.000402	0.000185	0.000083	0.000517	0.000649
SRM612-11	0.005485	0.005198	0.000011	0.000693	0.000354	0.007797	0.003410	0.027419	0.010527
SRM610-11	0.078371	0.072049	0.000059	0.001061	0.002218	0.096050	0.037160	0.459180	0.149968
AP1-11	0.000020	0.000178	0.000001	0.000026	0.000003	0.000010	0.000013	0.009397	0.000072
AP2-11	0.000087	0.000462	0.000002	0.000027	0.000020	0.000100	0.000152	0.008886	0.000384
AP3-11	0.000338	0.000669	0.000007	0.000063	0.000191	0.001162	0.001537	0.032705	0.002674
AP4-11	0.000413	0.000695	0.000006	0.000032	0.000141	0.001416	0.001290	0.014680	0.002478
W1-1	0.000038	0.000011	0.000001	0.000047	0.000000	0.000003	0.000000	0.000000	0.000007
W1-2	0.000026	0.000008	0.000001	0.000044	0.000000	0.000001	0.000001	0.000000	0.000003
W1-3	0.000047	0.000013	0.000000	0.000049	0.000000	0.000003	0.000001	0.000000	0.000003
W1-4	0.000071	0.000004	0.000001	0.000048	0.000001	0.000006	0.000006	0.000008	0.000013
W1-5	0.000040	0.000003	0.000001	0.000044	0.000001	0.000001	0.000002	0.000000	0.000005
W1-6	0.000021	0.000001	0.000000	0.000040	0.000001	0.000005	0.000000	0.000000	0.000004
W1-7	0.000056	0.000005	0.000001	0.000042	0.000002	0.000010	0.000007	0.000015	0.000017
W1-8	0.000030	0.000003	0.000000	0.000037	0.000002	0.000016	0.000002	0.000000	0.000008
W1-9	0.000035	0.000002	0.000001	0.000042	0.000001	0.000007	0.000002	0.000000	0.000012
W1-10	0.000027	0.000005	0.000001	0.000037	0.000001	0.000006	0.000004	0.000003	0.000013
W1-11	0.000019	0.000002	0.000000	0.000038	0.000002	0.000009	0.000002	0.000000	0.000009
W1-12	0.000021	0.000003	0.000001	0.000035	0.000001	0.000003	0.000003	0.000000	0.000007
W1-13	0.000039	0.000004	0.000000	0.000041	0.000000	0.000005	0.000002	0.000000	0.000008
W1-14	0.000032	0.000002	0.000000	0.000042	0.000000	0.000004	0.000000	0.000000	0.000006
W1-15	0.000028	0.000003	0.000001	0.000043	0.000000	0.000003	0.000003	0.000000	0.000007
W1-16	0.000051	0.000004	0.000001	0.000040	0.000001	0.000006	0.000002	0.000000	0.000010
W1-17	0.000031	0.000002	0.000000	0.000042	0.000000	0.000002	0.000000	0.000000	0.000003
W1-18	0.000036	0.000008	0.000000	0.000041	0.000000	0.000001	0.000000	0.000000	0.000003
SRM614-12	0.000142	0.000153	0.000012	0.001472	0.000407	0.000196	0.000095	0.000509	0.000705
SRM612-12	0.006772	0.006419	0.000008	0.000732	0.000356	0.008551	0.004094	0.029558	0.011428
SRM610-12	0.098665	0.086454	0.000065	0.001171	0.001931	0.102241	0.043235	0.496719	0.162389
AP1-12	0.000015	0.000192	0.000001	0.000011	0.000003	0.000002	0.000005	0.005897	0.000049
AP2-12	0.000079	0.000440	0.000002	0.000014	0.000019	0.000104	0.000127	0.006167	0.000306
AP3-12	0.000292	0.000539	0.000003	0.000033	0.000111	0.000680	0.001074	0.019830	0.001802
AP4-12	0.000456	0.000852	0.000006	0.000033	0.000146	0.001170	0.001417	0.015552	0.002750
standardize signal averages AP									
AP1	0.000017	0.000185	0.000001	0.000019	0.000003	0.000006	0.000009	0.007647	0.000061
AP2	0.000083	0.000451	0.000002	0.000021	0.000020	0.000102	0.000140	0.007526	0.000345
AP3	0.000315	0.000604	0.000005	0.000048	0.000151	0.000921	0.001306	0.026268	0.002238
AP4	0.000434	0.000773	0.000006	0.000033	0.000143	0.001293	0.001353	0.015116	0.002614
linest from std sig ave									
	0.020579	0.041223	0.000000	0.000000	0.000000	0.009003	0.022336	0.004078	0.012643
standardize signal averages SRM									
srm614-2	0.000138	0.000140	0.000014	0.001456	0.000405	0.000190	0.000089	0.000513	0.000677
srm612-2	0.006128	0.005809	0.000009	0.000712	0.000355	0.008174	0.003752	0.028488	0.010978
srm610-2	0.088518	0.079252	0.000062	0.001116	0.002074	0.099145	0.040197	0.477950	0.156179
linest from std sig ave									
	0.057996	0.055552	0.000000	0.000000	0.000000	0.028176	0.075354	0.010792	0.029640
concentration data									
SRM614-11	0.24	0.45	0.00	0.00	0.00	0.14	0.16	0.18	0.70
SRM612-11	9.68	18.38	0.00	0.00	0.00	6.02	6.53	9.59	11.41
SRM610-11	138.32	254.72	0.00	0.00	0.00	74.16	71.18	160.61	162.61
AP1-11	0.16	2.93	0.00	0.00	0.00	0.04	0.11	15.29	0.37
AP2-11	0.71	7.60	0.00	0.00	0.00	0.36	1.36	14.46	1.94
AP3-11	2.78	11.01	0.00	0.00	0.00	4.17	13.70	53.21	13.49
AP4-11	3.39	11.43	0.00	0.00	0.00	5.09	11.49	23.88	12.50
W1-1	0.31	0.18	0.00	0.00	0.00	0.01	0.00	0.00	0.03
W1-2	0.21	0.13	0.00	0.00	0.00	0.01	0.01	0.00	0.02
W1-3	0.39	0.21	0.00	0.00	0.00	0.01	0.01	0.00	0.02
W1-4	0.58	0.06	0.00	0.00	0.00	0.02	0.05	0.01	0.07
W1-5	0.32	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.03
W1-6	0.18	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.02
W1-7	0.46	0.08	0.00	0.00	0.00	0.04	0.07	0.02	0.09
W1-8	0.24	0.06	0.00	0.00	0.00	0.06	0.02	0.00	0.04
W1-9	0.29	0.03	0.00	0.00	0.00	0.03	0.02	0.00	0.06
W1-10	0.22	0.08	0.00	0.00	0.00	0.02	0.04	0.00	0.07
W1-11	0.16	0.04	0.00	0.00	0.00	0.03	0.01	0.00	0.04
W1-12	0.17	0.05	0.00	0.00	0.00	0.01	0.03	0.00	0.04
W1-13	0.32	0.07	0.00	0.00	0.00	0.02	0.02	0.00	0.04
W1-14	0.26	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.03
W1-15	0.23	0.04	0.00	0.00	0.00	0.01	0.02	0.00	0.04
W1-16	0.42	0.07	0.00	0.00	0.00	0.02	0.02	0.00	0.05
W1-17	0.26	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.01
W1-18	0.29	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.02

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.25	0.54	0.00	0.00	0.00	0.15	0.18	0.18	0.76
SRM612-12	11.95	22.69	0.00	0.00	0.00	6.60	7.84	10.34	12.39
SRM610-12	174.14	305.65	0.00	0.00	0.00	78.94	82.82	173.74	176.08
AP1-12	0.12	3.16	0.00	0.00	0.00	0.01	0.05	9.59	0.25
AP2-12	0.65	7.24	0.00	0.00	0.00	0.37	1.13	10.03	1.54
AP3-12	2.40	8.87	0.00	0.00	0.00	2.44	9.57	32.26	9.09
AP4-12	3.74	14.01	0.00	0.00	0.00	4.20	12.62	25.30	13.87

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-9	113.84	71.56	11.48	19.84	6.72	18.28	88.24	9.96	174.00
SRM614-9	508.92	412.60	57.80	3514.02	1013.73	577.92	296.32	1858.73	1863.89
SRM612-9	16833.90	16450.73	51.88	2309.93	1216.73	25435.34	10889.30	89741.10	33594.47
SRM610-9	107534.52	90058.02	99.00	1485.49	3214.34	110404.22	40857.79	560740.81	186278.77
AP1-9	505.76	3714.82	49.68	400.00	88.56	253.92	266.48	165018.77	1535.53
AP2-9	1700.97	8871.41	66.88	523.60	417.72	5879.39	3229.70	185083.03	7607.64
AP3-9	5464.35	10866.02	95.76	817.48	2211.69	18460.06	19403.63	410277.72	37156.65
AP4-9	8289.05	14777.12	129.76	702.80	3021.54	19109.27	25440.26	303732.91	51831.81
T2-1	949.09	154.56	28.16	1212.01	37.36	563.96	131.24	265.64	411.24
T2-2	508.68	162.04	35.16	960.85	37.88	151.12	109.36	256.88	321.68
T2-3	1101.37	149.80	47.80	747.12	31.20	88.76	92.52	110.00	260.52
T2-4	1680.25	207.76	40.56	1020.53	56.68	111.84	123.48	157.68	288.12
T2-5	399.84	216.04	14.76	926.61	42.24	56.52	103.40	196.12	237.96
T2-6	281.88	192.52	28.04	728.40	29.24	45.76	95.88	43.40	252.92
T2-7	1011.21	232.68	30.92	578.08	42.36	103.84	89.08	275.16	322.52
T2-8	1163.97	208.52	25.76	640.96	39.32	125.08	87.76	52.96	255.40
T2-9	423.60	250.88	20.64	520.80	26.28	76.72	85.84	98.32	312.32
T2-10	2246.45	191.24	14.40	195.04	31.60	217.52	92.88	240.64	276.00
T2-11	1916.53	200.96	18.52	233.12	27.40	208.60	117.32	197.56	261.44
T2-12	468.84	160.24	21.20	219.16	26.64	81.60	78.92	92.52	231.40
T2-13	2110.41	229.84	24.36	271.04	38.24	342.96	213.36	487.48	421.92
T2-14	1705.53	207.04	27.96	318.00	37.16	232.80	122.80	155.08	288.84
T2-15	1355.85	213.36	24.24	312.88	40.40	163.64	119.00	109.72	238.44
T2-16	1424.37	264.24	14.40	297.24	32.04	405.96	207.68	652.04	399.76
T2-17	838.96	187.68	23.80	369.36	24.60	163.92	110.20	232.16	308.84
T2-18	910.53	203.88	16.24	372.36	47.20	108.84	128.44	129.04	283.96
SRM614-10	364.00	385.56	38.20	2460.01	742.04	387.12	246.24	1136.09	1452.57
SRM612-10	14550.16	13944.48	42.88	1649.17	810.84	19319.59	8824.85	64154.52	25185.06
SRM610-10	99671.44	85997.88	63.00	1255.89	1912.97	100313.01	39722.54	503094.88	163609.33
AP1-10	241.24	3030.38	24.60	211.12	64.80	34.08	150.40	80383.21	938.13
AP2-10	1251.93	6485.92	32.56	262.80	233.64	1150.89	1985.77	96827.70	4771.43
AP3-10	4409.82	8491.21	67.80	515.32	1449.97	12662.51	13080.67	250378.30	25014.62
AP4-10	6422.80	11710.39	78.28	486.52	2118.01	16052.21	19888.35	214783.22	37550.37
blank-10	77.04	128.56	20.24	73.76	10.56	29.32	67.72	193.92	129.92
blank average	95.44	100.06	15.86	46.80	8.64	23.80	77.98	101.94	151.96

blank subtraction									
SRM614-9	413.48	312.54	41.94	3467.22	1005.09	554.12	218.34	1756.79	1711.93
SRM612-9	16738.45	16350.67	36.02	2263.13	1208.09	25411.54	10811.32	89639.16	33442.51
SRM610-9	107439.08	89957.96	83.14	1438.69	3205.70	110380.42	40779.81	560638.87	186126.81
AP1-9	410.32	3614.76	33.82	353.20	79.92	230.12	188.50	164916.83	1383.57
AP2-9	1605.53	8771.35	51.02	476.80	409.08	5855.59	3151.72	184981.09	7455.68
AP3-9	5368.91	10765.96	79.90	770.68	2203.05	18436.26	19325.65	410175.78	37004.69
AP4-9	8193.61	14677.06	113.90	656.00	3012.90	19085.47	25362.28	303630.97	51679.85
T2-1	853.64	54.50	12.30	1165.21	28.72	540.16	53.26	163.70	259.28
T2-2	413.24	61.98	19.30	914.05	29.24	127.32	31.38	154.94	169.72
T2-3	1005.93	49.74	31.94	700.32	22.56	64.96	14.54	8.06	108.56
T2-4	1584.81	107.70	24.70	973.73	48.04	88.04	45.50	55.74	136.16
T2-5	304.40	115.98	-1.10	879.81	33.60	32.72	25.42	94.18	86.00
T2-6	186.44	92.46	12.18	681.60	20.60	21.96	17.90	-58.54	100.96
T2-7	915.77	132.62	15.06	531.28	33.72	80.04	11.10	173.22	170.56
T2-8	1068.53	108.46	9.90	594.16	30.68	101.28	9.78	-48.98	103.44
T2-9	328.16	150.82	4.78	474.00	17.64	52.92	7.86	-3.62	160.36
T2-10	2151.01	91.18	-1.46	148.24	22.96	193.72	14.90	138.70	124.04
T2-11	1821.09	100.90	2.66	186.32	18.76	184.80	39.34	95.62	109.48
T2-12	373.40	60.18	5.34	172.36	18.00	57.80	0.94	-9.42	79.44
T2-13	2014.97	129.78	8.50	224.24	29.60	319.16	135.38	385.54	269.96
T2-14	1610.09	106.98	12.10	271.20	28.52	209.00	44.82	53.14	136.88
T2-15	1260.41	113.30	8.38	266.08	31.76	139.84	41.02	7.78	86.48

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	1328.93	164.18	-1.46	250.44	23.40	382.16	129.70	550.10	247.80
T2-17	743.52	87.62	7.94	322.56	15.96	140.12	32.22	130.22	156.88
T2-18	815.08	103.82	0.38	325.56	38.56	85.04	50.46	27.10	132.00
SRM614-10	268.56	285.50	22.34	2413.21	733.40	363.32	168.26	1034.15	1300.61
SRM612-10	14454.72	13844.42	27.02	1602.37	802.20	19295.79	8746.87	64052.58	25033.10
SRM610-10	99576.00	85897.82	47.14	1209.09	1904.33	100289.21	39644.56	502992.94	163457.37
AP1-10	145.80	2930.32	8.74	164.32	56.16	10.28	72.42	80281.27	786.16
AP2-10	1156.49	6385.86	16.70	216.00	225.00	1127.09	1907.79	96725.76	4619.47
AP3-10	4314.38	8391.15	51.94	468.52	1441.33	12638.71	13002.69	250276.36	24862.66
AP4-10	6327.36	11610.33	62.42	439.72	2109.37	16028.41	19810.37	214681.28	37398.41

zero correction

SRM614-9	413.48	312.54	41.94	3467.22	1005.09	554.12	218.34	1756.79	1711.93
SRM612-9	16738.45	16350.67	36.02	2263.13	1208.09	25411.54	10811.32	89639.16	33442.51
SRM610-9	107439.08	89957.96	83.14	1438.69	3205.70	110380.42	40779.81	560638.87	186126.81
AP1-9	410.32	3614.76	33.82	353.20	79.92	230.12	188.50	164916.83	1383.57
AP2-9	1605.53	8771.35	51.02	476.80	409.08	5855.59	3151.72	184981.09	7455.68
AP3-9	5368.91	10765.96	79.90	770.68	2203.05	18436.26	19325.65	410175.78	37004.69
AP4-9	8193.61	14677.06	113.90	656.00	3012.90	19085.47	25362.28	303630.97	51679.85
T2-1	853.64	54.50	12.30	1165.21	28.72	540.16	53.26	163.70	259.28
T2-2	413.24	61.98	19.30	914.05	29.24	127.32	31.38	154.94	169.72
T2-3	1005.93	49.74	31.94	700.32	22.56	64.96	14.54	8.06	108.56
T2-4	1584.81	107.70	24.70	973.73	48.04	88.04	45.50	55.74	136.16
T2-5	304.40	115.98	0.00	879.81	33.60	32.72	25.42	94.18	86.00
T2-6	186.44	92.46	12.18	681.60	20.60	21.96	17.90	0.00	100.96
T2-7	915.77	132.62	15.06	531.28	33.72	80.04	11.10	173.22	170.56
T2-8	1068.53	108.46	9.90	594.16	30.68	101.28	9.78	0.00	103.44
T2-9	328.16	150.82	4.78	474.00	17.64	52.92	7.86	0.00	160.36
T2-10	2151.01	91.18	0.00	148.24	22.96	193.72	14.90	138.70	124.04
T2-11	1821.09	100.90	2.66	186.32	18.76	184.80	39.34	95.62	109.48
T2-12	373.40	60.18	5.34	172.36	18.00	57.80	0.94	0.00	79.44
T2-13	2014.97	129.78	8.50	224.24	29.60	319.16	135.38	385.54	269.96
T2-14	1610.09	106.98	12.10	271.20	28.52	209.00	44.82	53.14	136.88
T2-15	1260.41	113.30	8.38	266.08	31.76	139.84	41.02	7.78	86.48
T2-16	1328.93	164.18	0.00	250.44	23.40	382.16	129.70	550.10	247.80
T2-17	743.52	87.62	7.94	322.56	15.96	140.12	32.22	130.22	156.88
T2-18	815.08	103.82	0.38	325.56	38.56	85.04	50.46	27.10	132.00
SRM614-10	268.56	285.50	22.34	2413.21	733.40	363.32	168.26	1034.15	1300.61
SRM612-10	14454.72	13844.42	27.02	1602.37	802.20	19295.79	8746.87	64052.58	25033.10
SRM610-10	99576.00	85897.82	47.14	1209.09	1904.33	100289.21	39644.56	502992.94	163457.37
AP1-10	145.80	2930.32	8.74	164.32	56.16	10.28	72.42	80281.27	786.16
AP2-10	1156.49	6385.86	16.70	216.00	225.00	1127.09	1907.79	96725.76	4619.47
AP3-10	4314.38	8391.15	51.94	468.52	1441.33	12638.71	13002.69	250276.36	24862.66
AP4-10	6327.36	11610.33	62.42	439.72	2109.37	16028.41	19810.37	214681.28	37398.41

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-9	0.000154	0.000116	0.000016	0.001291	0.000374	0.000206	0.000081	0.000654	0.000638
SRM612-9	0.005532	0.005404	0.000012	0.000748	0.000399	0.008399	0.003573	0.029626	0.011053
SRM610-9	0.080921	0.067754	0.000063	0.001084	0.002414	0.083136	0.030714	0.422260	0.140186
AP1-9	0.000022	0.000197	0.000002	0.000019	0.000004	0.000013	0.000010	0.008998	0.000075
AP2-9	0.000086	0.000472	0.000003	0.000026	0.000022	0.000315	0.000170	0.009957	0.000401
AP3-9	0.000291	0.000584	0.000004	0.000042	0.000119	0.000999	0.001048	0.022233	0.002006
AP4-9	0.000442	0.000791	0.000006	0.000035	0.000162	0.001029	0.001367	0.016369	0.002786
T2-1	0.000039	0.000002	0.000001	0.000053	0.000001	0.000024	0.000002	0.000007	0.000012
T2-2	0.000021	0.000003	0.000001	0.000047	0.000002	0.000007	0.000002	0.000008	0.000009
T2-3	0.000062	0.000003	0.000002	0.000043	0.000001	0.000004	0.000001	0.000000	0.000007
T2-4	0.000089	0.000006	0.000001	0.000055	0.000003	0.000005	0.000003	0.000003	0.000008
T2-5	0.000019	0.000007	0.000000	0.000055	0.000002	0.000002	0.000002	0.000006	0.000005
T2-6	0.000013	0.000007	0.000001	0.000048	0.000001	0.000002	0.000001	0.000000	0.000007
T2-7	0.000056	0.000008	0.000001	0.000032	0.000002	0.000005	0.000001	0.000011	0.000010

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000063	0.000006	0.000001	0.000035	0.000002	0.000006	0.000001	0.000000	0.000006
T2-9	0.000020	0.000009	0.000000	0.000029	0.000001	0.000003	0.000000	0.000000	0.000010
T2-10	0.000286	0.000012	0.000000	0.000020	0.000003	0.000026	0.000002	0.000018	0.000016
T2-11	0.000212	0.000012	0.000000	0.000022	0.000002	0.000022	0.000005	0.000011	0.000013
T2-12	0.000041	0.000007	0.000001	0.000019	0.000002	0.000006	0.000000	0.000000	0.000009
T2-13	0.000203	0.000013	0.000001	0.000023	0.000003	0.000032	0.000014	0.000039	0.000027
T2-14	0.000150	0.000010	0.000001	0.000025	0.000003	0.000019	0.000004	0.000005	0.000013
T2-15	0.000110	0.000010	0.000001	0.000023	0.000003	0.000012	0.000004	0.000001	0.000008
T2-16	0.000093	0.000012	0.000000	0.000018	0.000002	0.000027	0.000009	0.000039	0.000017
T2-17	0.000047	0.000006	0.000001	0.000021	0.000001	0.000009	0.000002	0.000008	0.000010
T2-18	0.000048	0.000006	0.000000	0.000019	0.000002	0.000005	0.000003	0.000002	0.000008
SRM614-10	0.000144	0.000153	0.000012	0.001293	0.000393	0.000195	0.000090	0.000554	0.000697
SRM612-10	0.006799	0.006512	0.000013	0.000754	0.000377	0.009076	0.004114	0.030129	0.011775
SRM610-10	0.096490	0.083235	0.000046	0.001172	0.001845	0.097181	0.038416	0.487402	0.158391
AP1-10	0.000011	0.000212	0.000001	0.000012	0.000004	0.000001	0.000005	0.005820	0.000057
AP2-10	0.000081	0.000448	0.000001	0.000015	0.000016	0.000079	0.000134	0.006782	0.000324
AP3-10	0.000309	0.000601	0.000004	0.000034	0.000103	0.000905	0.000931	0.017915	0.001780
AP4-10	0.000449	0.000825	0.000004	0.000031	0.000150	0.001139	0.001407	0.015250	0.002657
standardize signal averages AP									
AP1	0.000016	0.000205	0.000001	0.000016	0.000004	0.000007	0.000008	0.007409	0.000066
AP2	0.000084	0.000460	0.000002	0.000020	0.000019	0.000197	0.000152	0.008369	0.000363
AP3	0.000300	0.000592	0.000004	0.000038	0.000111	0.000952	0.000989	0.020074	0.001893
AP4	0.000446	0.000808	0.000005	0.000033	0.000156	0.001084	0.001387	0.015809	0.002721
linest from std sig ave									
	0.020651	0.040406	0.000000	0.000000	0.000000	0.009759	0.025303	0.004948	0.013277
standardize signal averages SRM									
srm614-2	0.000149	0.000135	0.000014	0.001292	0.000384	0.000201	0.000086	0.000604	0.000667
srm612-2	0.006166	0.005958	0.000012	0.000751	0.000388	0.008737	0.003844	0.029877	0.011414
srm610-2	0.088705	0.075495	0.000054	0.001128	0.002130	0.090158	0.034565	0.454831	0.149289
linest from std sig ave									
	0.057873	0.058300	0.000000	0.000000	0.000000	0.030945	0.087485	0.011339	0.030998
concentration data									
SRM614-9	0.27	0.40	0.00	0.00	0.00	0.17	0.18	0.28	0.73
SRM612-9	9.80	18.73	0.00	0.00	0.00	7.03	7.75	12.57	12.59
SRM610-9	143.32	234.79	0.00	0.00	0.00	69.58	66.65	179.17	159.63
AP1-9	0.18	3.18	0.00	0.00	0.00	0.05	0.10	17.76	0.40
AP2-9	0.71	7.61	0.00	0.00	0.00	1.23	1.71	19.65	2.13
AP3-9	2.40	9.41	0.00	0.00	0.00	3.89	10.57	43.88	10.62
AP4-9	3.64	12.75	0.00	0.00	0.00	4.01	13.80	32.31	14.76
T2-1	0.32	0.04	0.00	0.00	0.00	0.10	0.02	0.01	0.06
T2-2	0.18	0.05	0.00	0.00	0.00	0.03	0.02	0.02	0.05
T2-3	0.51	0.05	0.00	0.00	0.00	0.02	0.01	0.00	0.04
T2-4	0.74	0.10	0.00	0.00	0.00	0.02	0.03	0.01	0.04
T2-5	0.16	0.12	0.00	0.00	0.00	0.01	0.02	0.01	0.03
T2-6	0.11	0.11	0.00	0.00	0.00	0.01	0.01	0.00	0.04
T2-7	0.46	0.13	0.00	0.00	0.00	0.02	0.01	0.02	0.06
T2-8	0.52	0.10	0.00	0.00	0.00	0.02	0.01	0.00	0.03
T2-9	0.17	0.15	0.00	0.00	0.00	0.01	0.00	0.00	0.05
T2-10	2.35	0.20	0.00	0.00	0.00	0.10	0.02	0.04	0.09
T2-11	1.75	0.19	0.00	0.00	0.00	0.08	0.05	0.02	0.07
T2-12	0.33	0.11	0.00	0.00	0.00	0.02	0.00	0.00	0.05
T2-13	1.67	0.21	0.00	0.00	0.00	0.13	0.14	0.08	0.14
T2-14	1.24	0.16	0.00	0.00	0.00	0.08	0.04	0.01	0.07
T2-15	0.91	0.16	0.00	0.00	0.00	0.05	0.04	0.00	0.04
T2-16	0.77	0.19	0.00	0.00	0.00	0.10	0.09	0.08	0.09
T2-17	0.39	0.09	0.00	0.00	0.00	0.03	0.02	0.02	0.05
T2-18	0.39	0.10	0.00	0.00	0.00	0.02	0.03	0.00	0.04
SRM614-10	0.25	0.53	0.00	0.00	0.00	0.16	0.20	0.24	0.79
SRM612-10	12.04	22.57	0.00	0.00	0.00	7.60	8.93	12.78	13.41
SRM610-10	170.89	288.44	0.00	0.00	0.00	81.34	83.36	206.81	180.36
AP1-10	0.09	3.42	0.00	0.00	0.00	0.00	0.05	11.49	0.30
AP2-10	0.67	7.22	0.00	0.00	0.00	0.31	1.35	13.39	1.72
AP3-10	2.54	9.68	0.00	0.00	0.00	3.52	9.40	35.36	9.43
AP4-10	3.70	13.29	0.00	0.00	0.00	4.43	14.20	30.10	14.07
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-1	44.92	80.60	5.96	11.08	8.24	13.16	39.44	49.56	135.00
SRM614-1	252.00	329.72	62.56	3850.34	1060.49	540.80	250.60	1660.93	1798.21
SRM612-1	7559.00	10008.46	83.04	1867.77	1571.97	22769.05	9760.93	72859.45	24490.54
SRM610-1	52342.50	55109.71	129.96	1379.61	7053.84	117166.82	40381.79	506199.41	142157.05
AP1-1	213.92	1428.97	59.12	573.56	75.64	125.24	149.64	95830.46	901.81
AP2-1	969.61	7824.68	130.24	1087.85	439.84	2450.21	2518.53	147166.63	5342.79
AP3-1	5769.87	14192.96	357.92	3788.98	5030.67	36398.89	41082.95	1035111.30	66358.38
AP4-1	4303.46	7910.20	178.28	1038.25	2212.97	16381.81	17329.18	192744.28	31946.06
41LU1-REDO-1	313.24	5399.71	126.08	435.64	28.08	103.44	72.16	251.96	413.76
41LU1-REDO-2	370.16	6586.64	118.76	504.24	32.64	59.84	80.84	85.36	303.64
41LU1-REDO-3	377.96	7962.04	120.76	491.00	21.20	56.52	85.76	74.36	283.80
41LU1-REDO-4	318.60	6550.68	96.04	332.68	33.20	100.36	74.88	225.52	303.00
41LU1-REDO-5	371.56	7670.08	116.24	496.12	28.60	112.36	91.56	79.92	282.00
41LU1-REDO-6	265.80	6728.20	93.44	422.20	21.64	52.84	77.20	103.24	232.52
41LU1-REDO-7	260.52	5845.39	60.84	323.16	20.44	88.08	95.24	230.16	381.52
41LU1-REDO-8	208.28	6356.40	71.32	331.96	23.28	113.92	78.88	101.84	312.12
41LU1-REDO-9	341.40	5975.11	61.60	340.28	33.08	115.28	56.08	97.88	321.72
41LU1-REDO-10	325.08	5207.03	68.52	314.68	30.16	112.20	98.16	202.28	318.16
41LU1-REDO-11	288.04	5193.79	80.68	458.36	24.48	90.76	93.24	30.44	308.00
41LU1-REDO-12	280.92	4695.59	49.48	413.76	19.28	82.44	90.12	30.64	244.76
41LU1-REDO-13	317.88	5067.35	60.60	316.28	23.96	70.84	83.32	153.76	273.92
41LU1-REDO-14	259.12	5661.19	67.64	348.76	26.32	58.32	79.88	67.00	232.48
41LU1-REDO-15	214.00	6843.12	84.16	346.52	23.84	49.84	58.84	31.20	202.68
SRM614-2	326.72	410.36	46.88	3706.42	1062.09	521.48	292.88	1579.81	1850.49
SRM612-2	10978.58	12322.95	53.48	1885.93	1300.13	21463.72	9879.70	72768.05	26505.95
SRM610-2	76826.91	72325.77	94.72	1443.97	4993.71	122003.57	50231.00	554766.19	165766.22
AP1-2	175.00	1583.89	30.68	336.56	79.24	28.84	108.76	72921.17	646.88
AP2-2	994.65	6930.60	54.00	618.28	311.16	1593.09	2055.93	109422.81	4482.43
AP3-2	4642.47	11136.22	221.80	1773.13	4894.87	18675.59	25725.78	521089.91	41617.36
AP4-2	4646.07	8187.13	122.40	708.72	1865.97	12980.99	15028.93	163692.41	29359.93
blank-2	30.40	92.20	12.24	65.20	14.32	14.56	53.56	17.96	102.68
blank average	37.66	86.40	9.10	38.14	11.28	13.86	46.50	33.76	118.84
blank subtraction									
SRM614-1	214.34	243.32	53.46	3812.20	1049.21	526.94	204.10	1627.17	1679.37
SRM612-1	7521.34	9922.06	73.94	1829.63	1560.69	22755.19	9714.43	72825.69	24371.70
SRM610-1	52304.84	55023.31	120.86	1341.47	7042.56	117152.96	40335.29	506165.65	142038.21
AP1-1	176.26	1342.57	50.02	535.42	64.36	111.38	103.14	95796.70	782.96
AP2-1	931.95	7738.28	121.14	1049.71	428.56	2436.35	2472.03	147132.87	5223.95
AP3-1	5732.21	14106.56	348.82	3750.84	5019.39	36385.03	41036.45	1035077.54	66239.53
AP4-1	4265.80	7823.80	169.18	1000.11	2201.69	16367.95	17282.68	192710.52	31827.22
41LU1-REDO-1	275.58	5313.31	116.98	397.50	16.80	89.58	25.66	218.20	294.92
41LU1-REDO-2	332.50	6500.24	109.66	466.10	21.36	45.98	34.34	51.60	184.80
41LU1-REDO-3	340.30	7875.64	111.66	452.86	9.92	42.66	39.26	40.60	164.96
41LU1-REDO-4	280.94	6464.28	86.94	294.54	21.92	86.50	28.38	191.76	184.16
41LU1-REDO-5	333.90	7583.68	107.14	457.98	17.32	98.50	45.06	46.16	163.16
41LU1-REDO-6	228.14	6641.80	84.34	384.06	10.36	38.98	30.70	69.48	113.68
41LU1-REDO-7	222.86	5758.99	51.74	285.02	9.16	74.22	48.74	196.40	262.68
41LU1-REDO-8	170.62	6270.00	62.22	293.82	12.00	100.06	32.38	68.08	193.28
41LU1-REDO-9	303.74	5888.71	52.50	302.14	21.80	101.42	9.58	64.12	202.88
41LU1-REDO-10	287.42	5120.63	59.42	276.54	18.88	98.34	51.66	168.52	199.32
41LU1-REDO-11	250.38	5107.39	71.58	420.22	13.20	76.90	46.74	-3.32	189.16
41LU1-REDO-12	243.26	4609.19	40.38	375.62	8.00	68.58	43.62	-3.12	125.92
41LU1-REDO-13	280.22	4980.95	51.50	278.14	12.68	56.98	36.82	120.00	155.08
41LU1-REDO-14	221.46	5574.79	58.54	310.62	15.04	44.46	33.38	33.24	113.64
41LU1-REDO-15	176.34	6756.72	75.06	308.38	12.56	35.98	12.34	-2.56	83.84
SRM614-2	289.06	323.96	37.78	3668.28	1050.81	507.62	246.38	1546.05	1731.65
SRM612-2	10940.92	12236.55	44.38	1847.79	1288.85	21449.86	9833.20	72734.29	26387.11
SRM610-2	76789.25	72239.37	85.62	1405.83	4982.43	121989.71	50184.50	554732.43	165646.38
AP1-2	137.34	1497.49	21.58	298.42	67.96	14.98	62.26	72887.41	528.04
AP2-2	956.99	6844.20	44.90	580.14	299.88	1579.23	2009.43	109389.05	4363.58
AP3-2	4604.81	11049.82	212.70	1734.99	4883.59	18661.73	25679.28	521056.15	41498.51
AP4-2	4608.41	8100.73	113.30	670.58	1854.69	12967.13	14982.42	163658.65	29241.09
zero correction									
SRM614-1	214.34	243.32	53.46	3812.20	1049.21	526.94	204.10	1627.17	1679.37
SRM612-1	7521.34	9922.06	73.94	1829.63	1560.69	22755.19	9714.43	72825.69	24371.70
SRM610-1	52304.84	55023.31	120.86	1341.47	7042.56	117152.96	40335.29	506165.65	142038.21
AP1-1	176.26	1342.57	50.02	535.42	64.36	111.38	103.14	95796.70	782.96
AP2-1	931.95	7738.28	121.14	1049.71	428.56	2436.35	2472.03	147132.87	5223.95
AP3-1	5732.21	14106.56	348.82	3750.84	5019.39	36385.03	41036.45	1035077.54	66239.53
AP4-1	4265.80	7823.80	169.18	1000.11	2201.69	16367.95	17282.68	192710.52	31827.22
41LU1-REDO-1	275.58	5313.31	116.98	397.50	16.80	89.58	25.66	218.20	294.92
41LU1-REDO-2	332.50	6500.24	109.66	466.10	21.36	45.98	34.34	51.60	184.80
41LU1-REDO-3	340.30	7875.64	111.66	452.86	9.92	42.66	39.26	40.60	164.96

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	280.94	6464.28	86.94	294.54	21.92	86.50	28.38	191.76	184.16
41LU1-REDO-5	333.90	7583.68	107.14	457.98	17.32	98.50	45.06	46.16	163.16
41LU1-REDO-6	228.14	6641.80	84.34	384.06	10.36	38.98	30.70	69.48	113.68
41LU1-REDO-7	222.86	5758.99	51.74	285.02	9.16	74.22	48.74	196.40	262.68
41LU1REDO-8	170.62	6270.00	62.22	293.82	12.00	100.06	32.38	68.08	193.28
41LU1-REDO-9	303.74	5888.71	52.50	302.14	21.80	101.42	9.58	64.12	202.88
41LU1REDO-10	287.42	5120.63	59.42	276.54	18.88	98.34	51.66	168.52	199.32
41LU1-REDO-11	250.38	5107.39	71.58	420.22	13.20	76.90	46.74	0.00	189.16
41LU1REDO-12	243.26	4609.19	40.38	375.62	8.00	68.58	43.62	0.00	125.92
41LU1-REDO-13	280.22	4980.95	51.50	278.14	12.68	56.98	36.82	120.00	155.08
41LU1-REDO-14	221.46	5574.79	58.54	310.62	15.04	44.46	33.38	33.24	113.64
41LU1-REDO-15	176.34	6756.72	75.06	308.38	12.56	35.98	12.34	0.00	83.84
SRM614-2	289.06	323.96	37.78	3668.28	1050.81	507.62	246.38	1546.05	1731.65
SRM612-2	10940.92	12236.55	44.38	1847.79	1288.85	21449.86	9833.20	72734.29	26387.11
SRM610-2	76789.25	72239.37	85.62	1405.83	4982.43	121989.71	50184.50	554732.43	165646.38
AP1-2	137.34	1497.49	21.58	298.42	67.96	14.98	62.26	72887.41	528.04
AP2-2	956.99	6844.20	44.90	580.14	299.88	1579.23	2009.43	109389.05	4363.58
AP3-2	4604.81	11049.82	212.70	1734.99	4883.59	18661.73	25679.28	521056.15	41498.51
AP4-2	4608.41	8100.73	113.30	670.58	1854.69	12967.13	14982.42	163658.65	29241.09

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-1	0.000067	0.000076	0.000017	0.001187	0.000327	0.000164	0.000064	0.000507	0.000523
SRM612-1	0.002535	0.003345	0.000025	0.000617	0.000526	0.007671	0.003275	0.024550	0.008216
SRM610-1	0.036381	0.038272	0.000084	0.000933	0.004899	0.081487	0.028056	0.352071	0.098797
AP1-1	0.000019	0.000148	0.000005	0.000059	0.000007	0.000012	0.000011	0.010525	0.000086
AP2-1	0.000061	0.000509	0.000008	0.000069	0.000028	0.000160	0.000163	0.009675	0.000344
AP3-1	0.000261	0.000643	0.000016	0.000171	0.000229	0.001660	0.001872	0.047213	0.003021
AP4-1	0.000285	0.000523	0.000011	0.000067	0.000147	0.001095	0.001156	0.012889	0.002129
41LU1-REDO-1	0.000049	0.000947	0.000021	0.000071	0.000003	0.000016	0.000005	0.000039	0.000053
41LU1-REDO-2	0.000049	0.000957	0.000016	0.000069	0.000003	0.000007	0.000005	0.000008	0.000027
41LU1-REDO-3	0.000043	0.000989	0.000014	0.000057	0.000001	0.000005	0.000005	0.000005	0.000021
41LU1-REDO-4	0.000057	0.001309	0.000018	0.000060	0.000004	0.000018	0.000006	0.000039	0.000037
41LU1-REDO-5	0.000057	0.001287	0.000018	0.000078	0.000003	0.000017	0.000008	0.000008	0.000028
41LU1-REDO-6	0.000043	0.001238	0.000016	0.000072	0.000002	0.000007	0.000006	0.000013	0.000021
41LU1-REDO-7	0.000055	0.001410	0.000013	0.000070	0.000002	0.000018	0.000012	0.000048	0.000064
41LU1REDO-8	0.000039	0.001431	0.000014	0.000067	0.000003	0.000023	0.000007	0.000016	0.000044
41LU1-REDO-9	0.000072	0.001390	0.000012	0.000071	0.000005	0.000024	0.000002	0.000015	0.000048
41LU1REDO-10	0.000061	0.001081	0.000013	0.000058	0.000004	0.000021	0.000011	0.000036	0.000042
41LU1-REDO-11	0.000054	0.001108	0.000016	0.000091	0.000003	0.000017	0.000010	0.000000	0.000041
41LU1REDO-12	0.000058	0.001094	0.000010	0.000089	0.000002	0.000016	0.000010	0.000000	0.000030
41LU1-REDO-13	0.000065	0.001157	0.000012	0.000065	0.000003	0.000013	0.000009	0.000028	0.000036
41LU1-REDO-14	0.000046	0.001162	0.000012	0.000065	0.000003	0.000009	0.000007	0.000007	0.000024
41LU1-REDO-15	0.000029	0.001125	0.000013	0.000051	0.000002	0.000006	0.000002	0.000000	0.000014
SRM614-2	0.000100	0.000112	0.000013	0.001263	0.000362	0.000175	0.000085	0.000532	0.000596
SRM612-2	0.003870	0.004329	0.000016	0.000654	0.000456	0.007588	0.003478	0.025729	0.009334
SRM610-2	0.056847	0.053479	0.000063	0.001041	0.003689	0.090310	0.037152	0.410671	0.122629
AP1-2	0.000014	0.000150	0.000002	0.000030	0.000007	0.000001	0.000006	0.007291	0.000053
AP2-2	0.000060	0.000430	0.000003	0.000036	0.000019	0.000099	0.000126	0.006865	0.000274
AP3-2	0.000212	0.000510	0.000010	0.000080	0.000225	0.000861	0.001184	0.024032	0.001914
AP4-2	0.000281	0.000495	0.000007	0.000041	0.000113	0.000792	0.000915	0.009993	0.001786

standardize signal averages AP									
AP1	0.000017	0.000149	0.000004	0.000044	0.000007	0.000007	0.000009	0.008908	0.000069
AP2	0.000061	0.000469	0.000005	0.000053	0.000024	0.000130	0.000144	0.008270	0.000309
AP3	0.000237	0.000577	0.000013	0.000126	0.000227	0.001260	0.001528	0.035623	0.002468
AP4	0.000283	0.000509	0.000009	0.000054	0.000130	0.000943	0.001035	0.011441	0.001957

linest from std sig ave									
	0.029477	0.048018	0.000000	0.000000	0.000000	0.008510	0.021083	0.003089	0.013124

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srn614-2	0.000083	0.000094	0.000015	0.001225	0.000344	0.000169	0.000074	0.000520	0.000560
srn612-2	0.003203	0.003837	0.000020	0.000635	0.000491	0.007629	0.003377	0.025139	0.008775
srn610-2	0.046614	0.045876	0.000074	0.000987	0.004294	0.085898	0.032604	0.381371	0.110713

linest from std sig ave									
	0.110134	0.095913	0.000000	0.000000	0.000000	0.032504	0.092822	0.013523	0.041792

concentration data									
SRM614-1	0.17	0.31	0.00	0.00	0.00	0.12	0.11	0.13	0.59
SRM612-1	6.41	13.77	0.00	0.00	0.00	5.60	5.92	6.50	9.25
SRM610-1	91.97	157.61	0.00	0.00	0.00	59.47	50.73	93.26	111.20
AP1-1	0.23	2.83	0.00	0.00	0.00	0.04	0.10	12.97	0.45
AP2-1	0.72	9.75	0.00	0.00	0.00	0.54	1.37	11.92	1.80
AP3-1	3.07	12.33	0.00	0.00	0.00	5.63	15.74	58.18	15.82
AP4-1	3.36	10.02	0.00	0.00	0.00	3.72	9.72	15.88	11.15
41LU1-REDO-1	0.58	18.14	0.00	0.00	0.00	0.05	0.04	0.05	0.28
41LU1-REDO-2	0.58	18.32	0.00	0.00	0.00	0.02	0.04	0.01	0.14
41LU1-REDO-3	0.50	18.95	0.00	0.00	0.00	0.02	0.04	0.01	0.11
41LU1-REDO-4	0.67	25.08	0.00	0.00	0.00	0.06	0.05	0.05	0.20
41LU1-REDO-5	0.67	24.65	0.00	0.00	0.00	0.06	0.06	0.01	0.14
41LU1-REDO-6	0.50	23.72	0.00	0.00	0.00	0.02	0.05	0.02	0.11
41LU1-REDO-7	0.64	27.01	0.00	0.00	0.00	0.06	0.10	0.06	0.34
41LU1REDO-8	0.46	27.41	0.00	0.00	0.00	0.08	0.06	0.02	0.23
41LU1-REDO-9	0.84	26.63	0.00	0.00	0.00	0.08	0.02	0.02	0.25
41LU1REDO-10	0.71	20.71	0.00	0.00	0.00	0.07	0.09	0.04	0.22
41LU1-REDO-11	0.64	21.23	0.00	0.00	0.00	0.06	0.09	0.00	0.21
41LU1REDO-12	0.68	20.95	0.00	0.00	0.00	0.06	0.09	0.00	0.16
41LU1-REDO-13	0.77	22.15	0.00	0.00	0.00	0.04	0.07	0.03	0.19
41LU1-REDO-14	0.54	22.27	0.00	0.00	0.00	0.03	0.06	0.01	0.12
41LU1-REDO-15	0.35	21.56	0.00	0.00	0.00	0.02	0.02	0.00	0.07
SRM614-2	0.25	0.46	0.00	0.00	0.00	0.13	0.15	0.14	0.67
SRM612-2	9.78	17.83	0.00	0.00	0.00	5.54	6.29	6.82	10.51
SRM610-2	143.71	220.23	0.00	0.00	0.00	65.91	67.18	108.79	138.03
AP1-2	0.16	2.87	0.00	0.00	0.00	0.01	0.05	8.98	0.28
AP2-2	0.71	8.23	0.00	0.00	0.00	0.34	1.06	8.46	1.43
AP3-2	2.50	9.76	0.00	0.00	0.00	2.92	9.96	29.61	10.02
AP4-2	3.31	9.48	0.00	0.00	0.00	2.69	7.69	12.31	9.35

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-17	49.64	75.48	13.04	7.52	6.04	32.48	59.04	171.28	126.44
SRM614-17	168.00	212.00	49.40	2291.37	675.40	328.84	179.12	1033.21	1105.73
SRM612-17	6545.52	9997.78	50.04	1827.77	1307.21	21463.68	7334.68	72578.45	24380.06
SRM610-17	52746.62	53601.26	95.84	1206.73	6028.23	113390.96	38442.73	475769.56	135756.77
AP1-17	199.16	2349.65	51.32	657.52	75.32	156.56	144.16	70862.12	909.69
AP2-17	781.04	7627.80	78.20	758.88	299.16	1714.37	1621.45	80127.17	3365.38
AP3-17	2150.45	4621.79	103.84	985.85	1469.01	9716.21	11059.02	201953.63	17462.78
AP4-17	2840.10	5480.15	145.52	705.00	2714.94	9169.61	10123.26	107421.20	18998.63
41LU1-1	422.80	8820.61	104.76	467.16	39.00	55.12	112.88	94.52	200.96
41LU1-2	696.36	7726.68	115.48	398.24	59.72	130.72	111.68	116.84	205.24
41LU1-3	312.96	6063.07	73.76	350.20	15.08	34.24	75.00	51.48	158.20
41LU1-4	728.88	7251.16	126.00	429.28	53.28	182.44	127.80	114.84	185.08
41LU1-5	428.60	6005.19	87.08	292.96	40.84	90.64	89.80	21.32	147.96
41LU1-6	462.80	5490.03	89.52	343.20	36.48	95.68	98.88	34.88	193.32
41LU1-7	6709.36	8755.65	841.56	1633.61	441.08	2127.25	489.84	75.40	794.00
41LU1-8	2327.69	12330.55	350.08	880.96	136.68	651.84	212.40	98.52	234.80
41LU1-9	2464.49	11868.91	332.52	914.53	154.00	773.52	253.80	120.96	306.80
41LU1-10	4284.66	12163.67	520.72	1479.77	305.00	1767.17	428.00	302.44	489.84
41LU1-11	10571.22	9698.45	803.92	1878.45	665.60	3699.94	694.36	130.00	926.05
41LU1-12	8706.01	11212.38	725.92	1763.57	537.92	2926.42	569.32	84.24	795.44
SRM614-18	227.32	338.32	71.00	2513.05	703.36	377.28	219.76	1158.93	1219.01
SRM612-18	9141.73	13080.19	57.04	2085.13	1028.41	23144.25	9249.25	76219.99	28543.80
SRM610-18	88451.41	81078.38	103.00	1587.53	4193.54	135926.25	53124.86	609108.88	184240.64
AP1-18	238.32	2393.21	54.64	490.84	86.72	113.20	72777.93	910.81	
AP2-18	856.68	7853.92	66.88	525.56	252.92	966.37	1503.25	73250.73	3454.30
AP3-18	2807.50	5660.67	87.68	700.56	1394.69	9974.78	12331.23	217389.53	19801.51
AP4-18	3454.06	5591.95	67.28	479.28	1117.49	6120.55	8033.33	79709.21	17092.70
blank-18	44.96	114.24	55.76	373.20	23.52	35.92	56.76	42.28	67.52

Appendix A. Raw trace element datasheets from laser ablation.

blank average	47.30	94.86	34.40	190.36	14.78	34.20	57.90	106.78	96.98
blank subtraction									
SRM614-17	120.70	117.14	15.00	2101.01	660.62	294.64	121.22	926.43	1008.75
SRM612-17	6498.22	9902.92	15.64	1637.41	1292.43	21429.48	7276.78	72471.66	24283.08
SRM610-17	52699.32	53506.40	61.44	1016.37	6013.45	113356.76	38384.83	475662.78	135659.79
AP1-17	151.86	2254.79	16.92	467.16	60.54	122.36	86.26	70755.34	812.70
AP2-17	733.74	7532.94	43.80	568.52	284.38	1680.17	1563.55	80020.39	3268.40
AP3-17	2103.15	4526.93	69.44	795.48	1454.23	9682.01	11001.12	201846.85	17365.80
AP4-17	2792.80	5385.29	111.12	514.64	2700.16	9135.41	10065.36	107314.42	18901.65
41LU1-1	375.50	8725.75	70.36	276.80	24.22	20.92	54.98	-12.26	103.98
41LU1-2	649.06	7631.82	81.08	207.88	44.94	96.52	53.78	10.06	108.26
41LU1-3	265.66	5968.21	39.36	159.84	0.30	0.04	17.10	-55.30	61.22
41LU1-4	681.58	7156.30	91.60	238.92	38.50	148.24	69.90	8.06	88.10
41LU1-5	381.30	5910.33	52.68	102.60	26.06	56.44	31.90	-85.46	50.98
41LU1-6	415.50	5395.17	55.12	152.84	21.70	61.48	40.98	-71.90	96.34
41LU1-7	6662.06	8660.79	807.16	1443.25	426.30	2093.05	431.94	-31.38	697.02
41LU1-8	2280.39	12235.69	315.68	690.60	121.90	617.64	154.50	-8.26	137.82
41LU1-9	2417.19	11774.05	298.12	724.16	139.22	739.32	195.90	14.18	209.82
41LU1-10	4237.36	12068.81	486.32	1289.41	290.22	1732.97	370.10	195.66	392.86
41LU1-11	10523.92	9603.59	769.52	1688.09	650.82	3665.74	636.46	23.22	829.06
41LU1-12	8658.71	11117.52	691.52	1573.21	523.14	2892.22	511.42	-22.54	698.46
SRM614-18	180.02	243.46	36.60	2322.69	688.58	343.08	161.86	1052.15	1122.03
SRM612-18	9094.43	12985.33	22.64	1894.77	1013.63	23110.05	9191.35	76113.21	28446.82
SRM610-18	88404.11	80983.51	68.60	1397.17	4178.76	135892.05	53066.96	609002.10	184143.66
AP1-18	191.02	2298.35	20.24	300.48	71.94	19.52	55.30	72671.15	813.82
AP2-18	809.38	7759.06	32.48	335.20	238.14	932.17	1445.35	73143.95	3357.32
AP3-18	2760.20	5565.81	53.28	510.20	1379.91	9940.58	12273.33	217282.75	19704.53
AP4-18	3406.76	5497.09	32.88	288.92	1102.71	6086.35	7975.42	79602.43	16995.71
zero correction									
SRM614-17	120.70	117.14	15.00	2101.01	660.62	294.64	121.22	926.43	1008.75
SRM612-17	6498.22	9902.92	15.64	1637.41	1292.43	21429.48	7276.78	72471.66	24283.08
SRM610-17	52699.32	53506.40	61.44	1016.37	6013.45	113356.76	38384.83	475662.78	135659.79
AP1-17	151.86	2254.79	16.92	467.16	60.54	122.36	86.26	70755.34	812.70
AP2-17	733.74	7532.94	43.80	568.52	284.38	1680.17	1563.55	80020.39	3268.40
AP3-17	2103.15	4526.93	69.44	795.48	1454.23	9682.01	11001.12	201846.85	17365.80
AP4-17	2792.80	5385.29	111.12	514.64	2700.16	9135.41	10065.36	107314.42	18901.65
41LU1-1	375.50	8725.75	70.36	276.80	24.22	20.92	54.98	0.00	103.98
41LU1-2	649.06	7631.82	81.08	207.88	44.94	96.52	53.78	10.06	108.26
41LU1-3	265.66	5968.21	39.36	159.84	0.30	0.04	17.10	0.00	61.22
41LU1-4	681.58	7156.30	91.60	238.92	38.50	148.24	69.90	8.06	88.10
41LU1-5	381.30	5910.33	52.68	102.60	26.06	56.44	31.90	0.00	50.98
41LU1-6	415.50	5395.17	55.12	152.84	21.70	61.48	40.98	0.00	96.34
41LU1-7	6662.06	8660.79	807.16	1443.25	426.30	2093.05	431.94	0.00	697.02
41LU1-8	2280.39	12235.69	315.68	690.60	121.90	617.64	154.50	0.00	137.82
41LU1-9	2417.19	11774.05	298.12	724.16	139.22	739.32	195.90	14.18	209.82
41LU1-10	4237.36	12068.81	486.32	1289.41	290.22	1732.97	370.10	195.66	392.86
41LU1-11	10523.92	9603.59	769.52	1688.09	650.82	3665.74	636.46	23.22	829.06
41LU1-12	8658.71	11117.52	691.52	1573.21	523.14	2892.22	511.42	0.00	698.46
SRM614-18	180.02	243.46	36.60	2322.69	688.58	343.08	161.86	1052.15	1122.03
SRM612-18	9094.43	12985.33	22.64	1894.77	1013.63	23110.05	9191.35	76113.21	28446.82
SRM610-18	88404.11	80983.51	68.60	1397.17	4178.76	135892.05	53066.96	609002.10	184143.66
AP1-18	191.02	2298.35	20.24	300.48	71.94	19.52	55.30	72671.15	813.82
AP2-18	809.38	7759.06	32.48	335.20	238.14	932.17	1445.35	73143.95	3357.32
AP3-18	2760.20	5565.81	53.28	510.20	1379.91	9940.58	12273.33	217282.75	19704.53
AP4-18	3406.76	5497.09	32.88	288.92	1102.71	6086.35	7975.42	79602.43	16995.71
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-17	0.000064	0.000062	0.000008	0.001111	0.000349	0.000156	0.000064	0.000490	0.000533

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.002683	0.004089	0.000006	0.000676	0.000534	0.008848	0.003004	0.029922	0.010026
SRM610-17	0.044620	0.045303	0.000052	0.000861	0.005092	0.095978	0.032500	0.402740	0.114862
AP1-17	0.000011	0.000169	0.000001	0.000035	0.000005	0.000009	0.000006	0.005318	0.000061
AP2-17	0.000058	0.000599	0.000003	0.000045	0.000023	0.000134	0.000124	0.006359	0.000260
AP3-17	0.000182	0.000392	0.000006	0.000069	0.000126	0.000838	0.000952	0.017466	0.001503
AP4-17	0.000257	0.000495	0.000010	0.000047	0.000248	0.000840	0.000926	0.009868	0.001738
41LU1-1	0.000056	0.001309	0.000011	0.000042	0.000004	0.000003	0.000008	0.000000	0.000016
41LU1-2	0.000102	0.001197	0.000013	0.000033	0.000007	0.000015	0.000008	0.000002	0.000017
41LU1-3	0.000050	0.001113	0.000007	0.000030	0.000000	0.000000	0.000003	0.000000	0.000011
41LU1-4	0.000124	0.001297	0.000017	0.000043	0.000007	0.000027	0.000013	0.000001	0.000016
41LU1-5	0.000089	0.001372	0.000012	0.000024	0.000006	0.000013	0.000007	0.000000	0.000012
41LU1-6	0.000106	0.001371	0.000014	0.000039	0.000006	0.000016	0.000010	0.000000	0.000024
41LU1-7	0.000455	0.000591	0.000055	0.000099	0.000029	0.000143	0.000029	0.000000	0.000048
41LU1-8	0.000219	0.001175	0.000030	0.000066	0.000012	0.000059	0.000015	0.000000	0.000013
41LU1-9	0.000231	0.001126	0.000029	0.000069	0.000013	0.000071	0.000019	0.000001	0.000020
41LU1-10	0.000289	0.000823	0.000033	0.000088	0.000020	0.000118	0.000025	0.000013	0.000027
41LU1-11	0.000523	0.000477	0.000038	0.000084	0.000032	0.000182	0.000032	0.000001	0.000041
41LU1-12	0.000457	0.000587	0.000036	0.000083	0.000028	0.000153	0.000027	0.000000	0.000037
SRM614-18	0.000106	0.000143	0.000022	0.001366	0.000405	0.000202	0.000095	0.000619	0.000660
SRM612-18	0.004119	0.005881	0.000010	0.000858	0.000459	0.010466	0.004163	0.034471	0.012883
SRM610-18	0.067078	0.061448	0.000052	0.001060	0.003171	0.103110	0.040265	0.462091	0.139722
AP1-18	0.000013	0.000154	0.000001	0.000020	0.000005	0.000001	0.000004	0.004866	0.000054
AP2-18	0.000059	0.000568	0.000002	0.000025	0.000017	0.000068	0.000106	0.005358	0.000246
AP3-18	0.000207	0.000417	0.000004	0.000038	0.000103	0.000744	0.000918	0.016261	0.001475
AP4-18	0.000275	0.000444	0.000003	0.000023	0.000089	0.000492	0.000645	0.006437	0.001374
standardize signal averages AP									
AP1	0.000012	0.000162	0.000001	0.000028	0.000005	0.000005	0.000005	0.005092	0.000058
AP2	0.000059	0.000583	0.000003	0.000035	0.000020	0.000101	0.000115	0.005858	0.000253
AP3	0.000194	0.000404	0.000005	0.000054	0.000115	0.000791	0.000935	0.016863	0.001489
AP4	0.000266	0.000470	0.000006	0.000035	0.000169	0.000666	0.000785	0.008152	0.001556
linest from std sig ave									
	0.033389	0.049299	0.000000	0.000000	0.000000	0.013203	0.033292	0.006507	0.019975
standardize signal averages SRM									
srm614-2	0.000085	0.000103	0.000015	0.001239	0.000377	0.000179	0.000080	0.000554	0.000597
srm612-2	0.003401	0.004985	0.000008	0.000767	0.000496	0.009657	0.003584	0.032197	0.011455
srm610-2	0.055849	0.053376	0.000052	0.000960	0.004131	0.099544	0.036383	0.432415	0.127292
linest from std sig ave									
	0.091958	0.082376	0.000000	0.000000	0.000000	0.028027	0.083219	0.011922	0.036320
concentration data									
SRM614-17	0.18	0.26	0.00	0.00	0.00	0.18	0.18	0.27	0.91
SRM612-17	7.68	17.29	0.00	0.00	0.00	10.02	8.58	16.70	17.18
SRM610-17	127.77	191.54	0.00	0.00	0.00	108.68	92.79	224.77	196.77
AP1-17	0.15	3.33	0.00	0.00	0.00	0.05	0.09	13.81	0.49
AP2-17	0.78	11.77	0.00	0.00	0.00	0.70	1.65	16.51	2.07
AP3-17	2.42	7.70	0.00	0.00	0.00	4.41	12.64	45.34	11.97
AP4-17	3.42	9.74	0.00	0.00	0.00	4.42	12.29	25.62	13.85
41LU1-1	0.75	25.75	0.00	0.00	0.00	0.02	0.11	0.00	0.12
41LU1-2	1.36	23.55	0.00	0.00	0.00	0.08	0.11	0.00	0.14
41LU1-3	0.66	21.88	0.00	0.00	0.00	0.00	0.04	0.00	0.09
41LU1-4	1.65	25.50	0.00	0.00	0.00	0.14	0.17	0.00	0.13
41LU1-5	1.18	26.98	0.00	0.00	0.00	0.07	0.10	0.00	0.09
41LU1-6	1.41	26.95	0.00	0.00	0.00	0.08	0.14	0.00	0.20
41LU1-7	6.06	11.63	0.00	0.00	0.00	0.75	0.39	0.00	0.38
41LU1-8	2.92	23.11	0.00	0.00	0.00	0.31	0.20	0.00	0.11
41LU1-9	3.08	22.15	0.00	0.00	0.00	0.37	0.25	0.00	0.16
41LU1-10	3.85	16.18	0.00	0.00	0.00	0.62	0.33	0.03	0.21
41LU1-11	6.97	9.39	0.00	0.00	0.00	0.96	0.42	0.00	0.33
41LU1-12	6.08	11.54	0.00	0.00	0.00	0.80	0.36	0.00	0.29
SRM614-18	0.30	0.61	0.00	0.00	0.00	0.23	0.27	0.35	1.13
SRM612-18	11.79	24.86	0.00	0.00	0.00	11.85	11.89	19.24	22.07
SRM610-18	192.08	259.80	0.00	0.00	0.00	116.76	114.97	257.89	239.36
AP1-18	0.17	3.03	0.00	0.00	0.00	0.01	0.05	12.63	0.43
AP2-18	0.79	11.18	0.00	0.00	0.00	0.36	1.41	13.91	1.96
AP3-18	2.75	8.19	0.00	0.00	0.00	3.92	12.20	42.21	11.75
AP4-18	3.67	8.74	0.00	0.00	0.00	2.59	8.56	16.71	10.95
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	3.94	13.11			4.79	14.95	30.42	14.97	
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-19	147.44	100.64	14.04	24.68	12.08	30.36	89.28	278.48	202.00
SRM614-19	415.64	346.44	41.08	2481.69	712.92	377.56	239.12	1227.57	1300.09
SRM612-19	10309.54	11187.54	34.72	1479.49	720.72	18795.59	8045.69	58775.09	22316.69
SRM610-19	75066.23	72790.53	71.16	1186.21	1934.97	104308.11	37566.09	447824.81	149469.56
AP1-19	314.92	2130.17	36.08	192.68	62.20	68.28	116.08	60452.66	767.72
AP2-19	1090.17	6457.64	33.20	235.72	244.88	962.93	1530.89	76390.15	3918.46
AP3-19	3147.46	5791.79	42.16	336.40	875.60	6089.75	7787.72	133510.72	14710.04
AP4-19	4301.70	5985.91	57.00	302.88	969.45	5046.83	8078.17	78542.52	17476.82
THEO-1	1110.01	3158.90	22.84	173.24	35.72	66.20	139.36	76.72	867.20
THEO-2	1861.13	3825.98	25.60	235.28	42.68	106.16	134.40	69.84	758.32
THEO-2	1344.49	5279.91	35.96	214.48	50.56	80.48	116.32	60.32	388.44
THEO-3	2361.57	2767.34	45.68	258.76	46.80	280.72	185.60	123.04	3932.74
THEO-4	4942.55	2208.49	41.56	343.44	59.60	215.52	179.12	81.88	3328.70
THEO-5	1646.29	4747.91	49.88	340.88	52.84	179.64	156.12	45.96	1285.69
THEO-6	5172.11	683.48	49.44	267.00	74.44	240.12	293.60	130.80	7902.80
THEO-7	4148.62	1135.17	62.96	325.60	68.36	198.12	252.08	71.68	2911.22
THEO-8	1150.81	747.92	47.64	238.60	42.68	135.92	137.72	45.08	269.04
THEO-9	2206.45	433.80	56.72	341.56	78.04	210.56	222.60	42.28	589.80
THEO-10	1282.21	452.08	63.80	319.84	43.76	240.96	195.80	43.16	266.52
THEO-11	2529.73	1039.21	61.16	390.44	67.36	750.52	173.92	58.12	1181.69
THEO-12	3911.38	847.44	50.40	315.84	73.36	589.24	215.52	57.12	2054.65
THEO-13	1772.57	423.08	86.56	383.76	66.52	225.16	235.84	86.00	303.08
THEO-14	2301.49	420.32	76.60	351.48	58.56	165.68	409.24	151.08	8106.17
THEO-15	2783.22	442.96	123.52	411.36	108.16	319.16	410.80	113.24	4190.94
THEO-16	3659.14	419.84	68.28	327.40	57.32	185.76	440.28	170.04	13233.79
THEO-17	3756.18	426.84	70.16	433.24	79.00	254.64	601.08	328.60	24576.94
THEO-18	2413.49	446.48	83.60	416.08	59.80	207.96	240.84	101.68	2117.21
SRM614-20	312.40	300.44	66.88	2168.85	572.96	296.88	220.76	1012.73	1106.77
SRM612-20	9034.85	9272.93	53.12	1122.09	523.08	12812.27	6477.76	43619.45	17203.54
SRM610-20	71305.77	64436.04	72.08	954.97	1609.81	78433.92	34542.04	385578.13	124710.46
AP1-20	232.80	1929.25	43.44	184.20	54.68	31.64	113.24	41812.43	612.56
AP2-20	723.08	4128.82	40.40	227.96	138.04	508.84	1016.77	46319.98	2402.29
AP3-20	3174.58	6216.56	61.36	459.92	1112.93	7377.76	9913.90	173090.45	17922.54
AP4-20	3755.54	4979.47	45.00	258.80	698.36	3326.34	6121.31	56488.56	13583.76
blank-20	95.76	120.68	42.28	200.64	21.80	12.60	92.04	30.28	113.88
blank average	121.60	110.66	28.16	112.66	16.94	21.48	90.66	154.38	157.94
blank subtraction									
SRM614-19	294.04	235.78	12.92	2369.03	695.98	356.08	148.46	1073.19	1142.15
SRM612-19	10187.94	11076.88	6.56	1366.83	703.78	18774.11	7955.02	58620.71	22158.75
SRM610-19	74944.63	72679.87	43.00	1073.55	1918.03	104286.63	37475.43	447670.43	149311.62
AP1-19	193.32	2019.51	7.92	80.02	45.26	46.80	25.42	60298.28	609.78
AP2-19	968.57	6346.98	5.04	123.06	227.94	941.45	1440.23	76235.77	3760.52
AP3-19	3025.86	5681.13	14.00	223.74	858.66	6068.27	7697.06	133356.34	14552.10
AP4-19	4180.10	5875.25	28.84	190.22	952.51	5025.35	7987.50	78388.14	17318.88
THEO-1	988.41	3048.24	-5.32	60.58	18.78	44.72	48.70	-77.66	709.26
THEO-2	1739.53	3715.32	-2.56	122.62	25.74	84.68	43.74	-84.54	600.38
THEO-2	1222.89	5169.25	7.80	101.82	33.62	59.00	25.66	-94.06	230.50
THEO-3	2239.97	2656.67	17.52	146.10	29.86	259.24	94.94	-31.34	3774.80
THEO-4	4820.95	2097.83	13.40	230.78	42.66	194.04	88.46	-72.50	3170.76
THEO-5	1524.69	4637.25	21.72	228.22	35.90	158.16	65.46	-108.42	1127.75
THEO-6	5050.51	572.82	21.28	154.34	57.50	218.64	202.94	-23.58	7744.86
THEO-7	4027.02	1024.51	34.80	212.94	51.42	176.64	161.42	-82.70	2753.28
THEO-8	1029.21	637.26	19.48	125.94	25.74	114.44	47.06	-109.30	111.10
THEO-9	2084.85	323.14	28.56	228.90	61.10	189.08	131.94	-112.10	431.86
THEO-10	1160.61	341.42	35.64	207.18	26.82	219.48	105.14	-111.22	108.58
THEO-11	2408.13	928.55	33.00	277.78	50.42	729.04	83.26	-96.26	1023.75
THEO-12	3789.78	736.78	22.24	203.18	56.42	567.76	124.86	-97.26	1896.71
THEO-13	1650.97	312.42	58.40	271.10	49.58	203.68	145.18	-68.38	145.14
THEO-14	2179.89	309.66	48.44	238.82	41.62	144.20	318.58	-3.30	7948.22
THEO-15	2661.61	332.30	95.36	298.70	91.22	297.68	320.14	-41.14	4033.00
THEO-16	3537.54	309.18	40.12	214.74	40.38	164.28	349.62	15.66	13075.85
THEO-17	3634.58	316.18	42.00	320.58	62.06	233.16	510.42	174.22	24419.00
THEO-18	2291.89	335.82	55.44	303.42	42.86	186.48	150.18	-52.70	1959.27
SRM614-20	190.80	189.78	38.72	2056.19	556.02	275.40	130.10	858.34	948.83
SRM612-20	8913.25	9162.27	24.96	1009.43	506.14	12790.79	6387.10	43465.06	17045.60
SRM610-20	71184.17	64325.38	43.92	842.30	1592.87	78412.44	34451.37	385423.75	124552.52
AP1-20	111.20	1818.59	15.28	71.54	37.74	10.16	22.58	41658.05	454.62
AP2-20	601.48	4018.16	12.24	115.30	121.10	487.36	926.11	46165.60	2244.35
AP3-20	3052.98	6105.89	33.20	347.26	1095.99	7356.28	9823.24	172936.07	17764.60
AP4-20	3633.94	4868.81	16.84	146.14	681.42	3304.86	6030.65	56334.18	13425.82
zero correction									
SRM614-19	294.04	235.78	12.92	2369.03	695.98	356.08	148.46	1073.19	1142.15

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	10187.94	11076.88	6.56	1366.83	703.78	18774.11	7955.02	58620.71	22158.75
SRM610-19	74944.63	72679.87	43.00	1073.55	1918.03	104286.63	37475.43	447670.43	149311.62
AP1-19	193.32	2019.51	7.92	80.02	45.26	46.80	25.42	60298.28	609.78
AP2-19	968.57	6346.98	5.04	123.06	227.94	941.45	1440.23	76235.77	3760.52
AP3-19	3025.86	5681.13	14.00	223.74	858.66	6068.27	7697.06	133356.34	14552.10
AP4-19	4180.10	5875.25	28.84	190.22	952.51	5025.35	7987.50	78388.14	17318.88
THEO-1	988.41	3048.24	0.00	60.58	18.78	44.72	48.70	0.00	709.26
THEO-2	1739.53	3715.32	0.00	122.62	25.74	84.68	43.74	0.00	600.38
THEO-2	1222.89	5169.25	7.80	101.82	33.62	59.00	25.66	0.00	230.50
THEO-3	2239.97	2656.67	17.52	146.10	29.86	259.24	94.94	0.00	3774.80
THEO-4	4820.95	2097.83	13.40	230.78	42.66	194.04	88.46	0.00	3170.76
THEO-5	1524.69	4637.25	21.72	228.22	35.90	158.16	65.46	0.00	1127.75
THEO-6	5050.51	572.82	21.28	154.34	57.50	218.64	202.94	0.00	7744.86
THEO-7	4027.02	1024.51	34.80	212.94	51.42	176.64	161.42	0.00	2753.28
THEO-8	1029.21	637.26	19.48	125.94	25.74	114.44	47.06	0.00	111.10
THEO-9	2084.85	323.14	28.56	228.90	61.10	189.08	131.94	0.00	431.86
THEO-10	1160.61	341.42	35.64	207.18	26.82	219.48	105.14	0.00	108.58
THEO-11	2408.13	928.55	33.00	277.78	50.42	729.04	83.26	0.00	1023.75
THEO-12	3789.78	736.78	22.24	203.18	56.42	567.76	124.86	0.00	1896.71
THEO-13	1650.97	312.42	58.40	271.10	49.58	203.68	145.18	0.00	145.14
THEO-14	2179.89	309.66	48.44	238.82	41.62	144.20	318.58	0.00	7948.22
THEO-15	2661.61	332.30	95.36	298.70	91.22	297.68	320.14	0.00	4033.00
THEO-16	3537.54	309.18	40.12	214.74	40.38	164.28	349.62	15.66	13075.85
THEO-17	3634.58	316.18	42.00	320.58	62.06	233.16	510.42	174.22	24419.00
THEO-18	2291.89	335.82	55.44	303.42	42.86	186.48	150.18	0.00	1959.27
SRM614-20	190.80	189.78	38.72	2056.19	556.02	275.40	130.10	858.34	948.83
SRM612-20	8913.25	9162.27	24.96	1009.43	506.14	12790.79	6387.10	43465.06	17045.60
SRM610-20	71184.17	64325.38	43.92	842.30	1592.87	78412.44	34451.37	385423.75	124552.52
AP1-20	111.20	1818.59	15.28	71.54	37.74	10.16	22.58	41658.05	454.62
AP2-20	601.48	4018.16	12.24	115.30	121.10	487.36	926.11	46165.60	2244.35
AP3-20	3052.98	6105.89	33.20	347.26	1095.99	7356.28	9823.24	172936.07	17764.60
AP4-20	3633.94	4868.81	16.84	146.14	681.42	3304.86	6030.65	56334.18	13425.82

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-19	0.000164	0.000131	0.000007	0.001319	0.000387	0.000198	0.000083	0.000597	0.000636
SRM612-19	0.005679	0.006174	0.000004	0.000762	0.000392	0.010464	0.004434	0.032674	0.012351
SRM610-19	0.081101	0.078650	0.000047	0.001162	0.002076	0.112853	0.040554	0.484444	0.161577
AP1-19	0.000015	0.000159	0.000001	0.000006	0.000004	0.000004	0.000002	0.004758	0.000048
AP2-19	0.000101	0.000661	0.000001	0.000013	0.000024	0.000098	0.000150	0.007943	0.000392
AP3-19	0.000226	0.000425	0.000001	0.000017	0.000064	0.000454	0.000576	0.009971	0.001088
AP4-19	0.000324	0.000455	0.000002	0.000015	0.000074	0.000389	0.000619	0.006075	0.001342
THEO-1	0.000216	0.000666	0.000000	0.000013	0.000004	0.000010	0.000011	0.000000	0.000155
THEO-2	0.000274	0.000586	0.000000	0.000019	0.000004	0.000013	0.000007	0.000000	0.000095
THEO-2	0.000162	0.000683	0.000001	0.000013	0.000004	0.000008	0.000003	0.000000	0.000030
THEO-3	0.000395	0.000469	0.000003	0.000026	0.000005	0.000046	0.000017	0.000000	0.000666
THEO-4	0.000779	0.000339	0.000002	0.000037	0.000007	0.000031	0.000014	0.000000	0.000513
THEO-5	0.000196	0.000596	0.000003	0.000029	0.000005	0.000020	0.000008	0.000000	0.000145
THEO-6	0.000977	0.000111	0.000004	0.000030	0.000011	0.000042	0.000039	0.000000	0.001498
THEO-7	0.000616	0.000157	0.000005	0.000033	0.000008	0.000027	0.000025	0.000000	0.000421
THEO-8	0.000188	0.000117	0.000004	0.000023	0.000005	0.000021	0.000009	0.000000	0.000020
THEO-9	0.000324	0.000050	0.000004	0.000036	0.000009	0.000029	0.000020	0.000000	0.000067
THEO-10	0.000165	0.000049	0.000005	0.000029	0.000004	0.000031	0.000015	0.000000	0.000015
THEO-11	0.000363	0.000140	0.000005	0.000042	0.000008	0.000110	0.000013	0.000000	0.000154
THEO-12	0.000713	0.000139	0.000004	0.000038	0.000011	0.000107	0.000023	0.000000	0.000357
THEO-13	0.000275	0.000052	0.000010	0.000045	0.000008	0.000034	0.000024	0.000000	0.000024
THEO-14	0.000391	0.000056	0.000009	0.000043	0.000007	0.000026	0.000057	0.000000	0.001427
THEO-15	0.000462	0.000058	0.000017	0.000052	0.000016	0.000052	0.000056	0.000000	0.000700
THEO-16	0.000660	0.000058	0.000007	0.000040	0.000008	0.000031	0.000065	0.000003	0.002439
THEO-17	0.000520	0.000045	0.000006	0.000046	0.000009	0.000033	0.000073	0.000025	0.003496
THEO-18	0.000337	0.000049	0.000008	0.000045	0.000006	0.000027	0.000022	0.000000	0.000288

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000127	0.000126	0.000026	0.001370	0.000370	0.000183	0.000087	0.000572	0.000632
SRM612-20	0.006483	0.006664	0.000018	0.000734	0.000368	0.009303	0.004646	0.031613	0.012398
SRM610-20	0.092276	0.083385	0.000057	0.001092	0.002065	0.101646	0.044659	0.499625	0.161458
AP1-20	0.000010	0.000169	0.000001	0.000007	0.000004	0.000001	0.000002	0.003880	0.000042
AP2-20	0.000077	0.000517	0.000002	0.000015	0.000016	0.000063	0.000119	0.005945	0.000289
AP3-20	0.000244	0.000488	0.000003	0.000028	0.000088	0.000588	0.000785	0.013828	0.001420
AP4-20	0.000337	0.000451	0.000002	0.000014	0.000063	0.000306	0.000559	0.005218	0.001244

standardize signal averages AP

AP1	0.000013	0.000164	0.000001	0.000006	0.000004	0.000002	0.000002	0.004319	0.000045
AP2	0.000089	0.000589	0.000001	0.000014	0.000020	0.000080	0.000135	0.006944	0.000340
AP3	0.000235	0.000457	0.000002	0.000022	0.000076	0.000521	0.000680	0.011900	0.001254
AP4	0.000330	0.000453	0.000002	0.000014	0.000068	0.000348	0.000589	0.005646	0.001293

linest from std sig ave

0.026966	0.047948	0.000000	0.000000	0.000000	0.020861	0.045214	0.008881	0.023650
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standardize signal averages SRM

srM614-2	0.000145	0.000129	0.000016	0.001344	0.000379	0.000191	0.000085	0.000585	0.000634
srM612-2	0.006081	0.006419	0.000011	0.000748	0.000380	0.009884	0.004540	0.032144	0.012374
srM610-2	0.086688	0.081018	0.000052	0.001127	0.002070	0.107250	0.042607	0.492035	0.161517

linest from std sig ave

0.059217	0.054325	0.000000	0.000000	0.000000	0.026026	0.071009	0.010482	0.028651
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concentration data

SRM614-19	0.38	0.54	0.00	0.00	0.00	0.35	0.32	0.45	1.29
SRM612-19	13.13	25.39	0.00	0.00	0.00	18.72	17.19	24.89	25.05
SRM610-19	187.56	323.42	0.00	0.00	0.00	201.91	157.26	368.99	327.73
AP1-19	0.16	3.05	0.00	0.00	0.00	0.03	0.04	16.86	0.45
AP2-19	1.09	12.65	0.00	0.00	0.00	0.82	2.71	28.14	3.70
AP3-19	2.43	8.13	0.00	0.00	0.00	3.78	10.38	35.33	10.27
AP4-19	3.48	8.71	0.00	0.00	0.00	3.24	11.17	21.52	12.66
THEO-1	2.32	12.74	0.00	0.00	0.00	0.08	0.19	0.00	1.46
THEO-2	2.95	11.21	0.00	0.00	0.00	0.11	0.12	0.00	0.89
THEO-2	1.74	13.07	0.00	0.00	0.00	0.06	0.06	0.00	0.29
THEO-3	4.25	8.97	0.00	0.00	0.00	0.38	0.30	0.00	6.28
THEO-4	8.38	6.49	0.00	0.00	0.00	0.26	0.26	0.00	4.84
THEO-5	2.11	11.39	0.00	0.00	0.00	0.17	0.15	0.00	1.37
THEO-6	10.51	2.12	0.00	0.00	0.00	0.35	0.71	0.00	14.13
THEO-7	6.62	3.00	0.00	0.00	0.00	0.22	0.45	0.00	3.97
THEO-8	2.03	2.23	0.00	0.00	0.00	0.17	0.16	0.00	0.19
THEO-9	3.48	0.96	0.00	0.00	0.00	0.24	0.37	0.00	0.63
THEO-10	1.77	0.93	0.00	0.00	0.00	0.26	0.27	0.00	0.15
THEO-11	3.90	2.68	0.00	0.00	0.00	0.91	0.23	0.00	1.46
THEO-12	7.67	2.65	0.00	0.00	0.00	0.89	0.42	0.00	3.37
THEO-13	2.96	1.00	0.00	0.00	0.00	0.28	0.44	0.00	0.23
THEO-14	4.21	1.06	0.00	0.00	0.00	0.22	1.03	0.00	13.46
THEO-15	4.97	1.10	0.00	0.00	0.00	0.43	1.00	0.00	6.60
THEO-16	7.10	1.10	0.00	0.00	0.00	0.26	1.18	0.01	23.01
THEO-17	5.60	0.87	0.00	0.00	0.00	0.28	1.32	0.09	32.99
THEO-18	3.63	0.94	0.00	0.00	0.00	0.23	0.40	0.00	2.72
SRM614-20	0.29	0.52	0.00	0.00	0.00	0.33	0.34	0.44	1.28
SRM612-20	14.99	27.40	0.00	0.00	0.00	16.64	18.01	24.08	25.15
SRM610-20	213.41	342.89	0.00	0.00	0.00	181.86	173.18	380.56	327.49
AP1-20	0.11	3.24	0.00	0.00	0.00	0.01	0.04	13.75	0.40
AP2-20	0.83	9.90	0.00	0.00	0.00	0.52	2.15	21.06	2.73
AP3-20	2.63	9.34	0.00	0.00	0.00	4.90	14.17	48.99	13.40
AP4-20	3.62	8.63	0.00	0.00	0.00	2.55	10.08	18.49	11.73

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn	
blank-15		58.04	79.92	6.80	11.76	9.80	14.68	50.52	35.12	96.56
SRM614-15		228.76	223.92	32.92	1717.57	488.08	279.56	188.20	901.01	1068.09
SRM612-15		6913.76	8235.05	24.12	1196.69	726.36	15864.13	7568.28	47566.71	18131.66
SRM610-15		57467.44	58612.09	65.52	1074.93	2571.85	83643.47	35598.60	423505.50	133037.91
AP1-15		233.92	2173.85	31.32	325.68	72.08	96.76	144.84	77039.44	934.21
AP2-15		999.57	6799.56	35.88	361.36	263.80	2249.69	1585.41	83090.66	4004.26
AP3-15		3945.50	8502.85	109.08	862.72	1733.69	9205.17	14346.56	288256.63	28110.44

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	4721.75	7999.21	82.92	432.52	1416.29	9355.17	12059.03	120938.36	25201.18
LA3324-2-1	168.80	461.80	14.24	274.68	22.20	55.84	72.16	47.24	206.64
LA3324-2-2	177.32	553.08	19.32	282.28	14.32	35.08	67.52	59.24	232.88
LA3324-2-3	224.32	665.24	22.96	351.60	21.28	43.24	78.08	55.76	360.40
LA3324-2-4	204.48	3189.86	20.68	298.96	15.88	52.08	73.60	126.56	294.56
LA3324-2-5	202.60	3069.30	18.56	263.60	17.68	33.48	59.04	26.72	155.80
LA3324-2-6	231.00	3163.50	26.32	277.76	26.60	34.80	73.60	52.92	170.24
LA3324-2-7	299.64	1937.57	36.52	269.44	16.76	69.44	110.84	105.56	354.60
LA3324-2-8	227.20	2033.73	23.84	331.96	28.56	44.92	135.12	68.12	483.76
LA3324-2-9	259.12	2260.05	21.80	345.80	21.80	58.24	129.60	37.12	479.56
LA3324-2-10	288.68	2179.89	39.32	282.36	23.56	144.20	133.72	55.80	1087.33
LA3324-2-11	342.12	2645.77	25.52	249.20	24.52	71.32	105.68	33.64	302.68
LA3324-2-12	871.12	2837.70	64.88	397.96	49.32	247.16	146.72	90.80	325.24
SRM614-16	253.08	319.24	42.32	1735.01	517.40	281.12	235.24	917.13	1083.17
SRM612-16	8814.65	8837.93	44.12	1082.93	607.00	12212.95	6560.68	42345.60	17187.50
SRM610-16	73116.38	66326.61	85.76	1058.21	1846.61	84175.80	39219.90	427776.41	135773.36
AP1-16	201.04	2216.01	22.88	210.12	54.04	27.16	114.80	60024.42	737.72
AP2-16	884.13	5955.67	44.76	267.64	215.68	2159.45	1343.97	63115.59	3267.86
AP3-16	4152.94	8387.53	121.32	628.20	2562.29	10479.34	13354.48	266355.13	25681.58
AP4-16	4885.79	8293.73	56.28	359.12	1275.97	8335.61	10774.74	107552.13	22698.45
blank-16	70.28	99.16	30.40	99.96	14.44	15.80	73.12	39.48	96.68
blank average	64.16	89.54	18.60	55.86	12.12	15.24	61.82	37.30	96.62

blank subtraction									
SRM614-15	164.60	134.38	14.32	1661.71	475.96	264.32	126.38	863.70	971.47
SRM612-15	6849.60	8145.51	5.52	1140.83	714.24	15848.89	7506.46	47529.41	18035.04
SRM610-15	57403.28	58522.55	46.92	1019.07	2559.73	83628.23	35536.78	423468.20	132941.29
AP1-15	169.76	2084.31	12.72	269.82	59.96	81.52	83.02	77002.14	837.58
AP2-15	935.41	6710.02	17.28	305.50	251.68	2234.45	1523.59	83053.36	3907.64
AP3-15	3881.34	8413.31	90.48	806.86	1721.57	9189.93	14284.74	288219.33	28013.82
AP4-15	4657.59	7909.66	64.32	376.66	1404.17	9339.93	11997.21	120901.06	25104.56
LA3324-2-1	104.64	372.26	-4.36	218.82	10.08	40.60	10.34	9.94	110.02
LA3324-2-2	113.16	463.54	0.72	226.42	2.20	19.84	5.70	21.94	136.26
LA3324-2-3	160.16	575.70	4.36	295.74	9.16	28.00	16.26	18.46	263.78
LA3324-2-4	140.32	3100.32	2.08	243.10	3.76	36.84	11.78	89.26	197.94
LA3324-2-5	138.44	2979.76	-0.04	207.74	5.56	18.24	-2.78	-10.58	59.18
LA3324-2-6	166.84	3073.96	7.72	221.90	14.48	19.56	11.78	15.62	73.62
LA3324-2-7	235.48	1848.03	17.92	213.58	4.64	54.20	49.02	68.26	257.98
LA3324-2-8	163.04	1944.19	5.24	276.10	16.44	29.68	73.30	30.82	387.14
LA3324-2-9	194.96	2170.51	3.20	289.94	9.68	43.00	67.78	-0.18	382.94
LA3324-2-10	224.52	2090.35	20.72	226.50	11.44	128.96	71.90	18.50	990.71
LA3324-2-11	277.96	2556.23	6.92	193.34	12.40	56.08	43.86	-3.66	206.06
LA3324-2-12	806.96	2748.16	46.28	342.10	37.20	231.92	84.90	53.50	228.62
SRM614-16	188.92	229.70	23.72	1679.15	505.28	265.88	173.42	879.82	986.55
SRM612-16	8750.49	8748.39	25.52	1027.07	594.88	12197.71	6498.86	42308.30	17090.88
SRM610-16	73052.21	66237.07	67.16	1002.35	1834.49	84160.56	39158.08	427739.11	135676.74
AP1-16	136.88	2126.47	4.28	154.26	41.92	11.92	52.98	59987.12	641.10
AP2-16	819.96	5866.13	26.16	211.78	203.56	2144.21	1282.15	63078.29	3171.24
AP3-16	4088.78	8297.99	102.72	572.34	2550.17	10464.10	13292.66	266317.83	25584.96
AP4-16	4821.63	8204.19	37.68	303.26	1263.85	8320.37	10712.92	107514.83	22601.83

zero correction									
SRM614-15	164.60	134.38	14.32	1661.71	475.96	264.32	126.38	863.70	971.47
SRM612-15	6849.60	8145.51	5.52	1140.83	714.24	15848.89	7506.46	47529.41	18035.04
SRM610-15	57403.28	58522.55	46.92	1019.07	2559.73	83628.23	35536.78	423468.20	132941.29
AP1-15	169.76	2084.31	12.72	269.82	59.96	81.52	83.02	77002.14	837.58
AP2-15	935.41	6710.02	17.28	305.50	251.68	2234.45	1523.59	83053.36	3907.64
AP3-15	3881.34	8413.31	90.48	806.86	1721.57	9189.93	14284.74	288219.33	28013.82
AP4-15	4657.59	7909.66	64.32	376.66	1404.17	9339.93	11997.21	120901.06	25104.56
LA3324-2-1	104.64	372.26	0.00	218.82	10.08	40.60	10.34	9.94	110.02
LA3324-2-2	113.16	463.54	0.72	226.42	2.20	19.84	5.70	21.94	136.26
LA3324-2-3	160.16	575.70	4.36	295.74	9.16	28.00	16.26	18.46	263.78
LA3324-2-4	140.32	3100.32	2.08	243.10	3.76	36.84	11.78	89.26	197.94
LA3324-2-5	138.44	2979.76	0.00	207.74	5.56	18.24	0.00	0.00	59.18
LA3324-2-6	166.84	3073.96	7.72	221.90	14.48	19.56	11.78	15.62	73.62
LA3324-2-7	235.48	1848.03	17.92	213.58	4.64	54.20	49.02	68.26	257.98
LA3324-2-8	163.04	1944.19	5.24	276.10	16.44	29.68	73.30	30.82	387.14
LA3324-2-9	194.96	2170.51	3.20	289.94	9.68	43.00	67.78	0.00	382.94
LA3324-2-10	224.52	2090.35	20.72	226.50	11.44	128.96	71.90	18.50	990.71
LA3324-2-11	277.96	2556.23	6.92	193.34	12.40	56.08	43.86	0.00	206.06
LA3324-2-12	806.96	2748.16	46.28	342.10	37.20	231.92	84.90	53.50	228.62
SRM614-16	188.92	229.70	23.72	1679.15	505.28	265.88	173.42	879.82	986.55
SRM612-16	8750.49	8748.39	25.52	1027.07	594.88	12197.71	6498.86	42308.30	17090.88
SRM610-16	73052.21	66237.07	67.16	1002.35	1834.49	84160.56	39158.08	427739.11	135676.74
AP1-16	136.88	2126.47	4.28	154.26	41.92	11.92	52.98	59987.12	641.10
AP2-16	819.96	5866.13	26.16	211.78	203.56	2144.21	1282.15	63078.29	3171.24
AP3-16	4088.78	8297.99	102.72	572.34	2550.17	10464.10	13292.66	266317.83	25584.96
AP4-16	4821.63	8204.19	37.68	303.26	1263.85	8320.37	10712.92	107514.83	22601.83

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-15	0.000121	0.000099	0.000011	0.001221	0.000350	0.000194	0.000093	0.000635	0.000714
SRM612-15	0.004777	0.005681	0.000004	0.000796	0.000498	0.011054	0.005235	0.033149	0.012578
SRM610-15	0.073955	0.075397	0.000060	0.001313	0.003298	0.107741	0.045783	0.545568	0.171273
AP1-15	0.000015	0.000181	0.000001	0.000023	0.000005	0.000007	0.000007	0.006679	0.000073
AP2-15	0.000076	0.000545	0.000001	0.000025	0.000020	0.000181	0.000124	0.006745	0.000317
AP3-15	0.000233	0.000504	0.000005	0.000048	0.000103	0.000551	0.000856	0.017273	0.001679
AP4-15	0.000309	0.000524	0.000004	0.000025	0.000093	0.000619	0.000795	0.008016	0.001664
LA3324-2-1	0.000027	0.000097	0.000000	0.000057	0.000003	0.000011	0.000003	0.000003	0.000029
LA3324-2-2	0.000024	0.000099	0.000000	0.000049	0.000000	0.000004	0.000001	0.000005	0.000029
LA3324-2-3	0.000030	0.000109	0.000001	0.000056	0.000002	0.000005	0.000003	0.000004	0.000050
LA3324-2-4	0.000020	0.000438	0.000000	0.000034	0.000001	0.000005	0.000002	0.000013	0.000028
LA3324-2-5	0.000019	0.000411	0.000000	0.000029	0.000001	0.000003	0.000000	0.000000	0.000008
LA3324-2-6	0.000023	0.000426	0.000001	0.000031	0.000002	0.000003	0.000002	0.000002	0.000010
LA3324-2-7	0.000049	0.000386	0.000004	0.000045	0.000001	0.000011	0.000010	0.000014	0.000054
LA3324-2-8	0.000030	0.000363	0.000001	0.000052	0.000003	0.000006	0.000014	0.000006	0.000072
LA3324-2-9	0.000036	0.000396	0.000001	0.000053	0.000002	0.000008	0.000012	0.000000	0.000070
LA3324-2-10	0.000041	0.000380	0.000004	0.000041	0.000002	0.000023	0.000013	0.000003	0.000180
LA3324-2-11	0.000041	0.000377	0.000001	0.000029	0.000002	0.000008	0.000006	0.000000	0.000030
LA3324-2-12	0.000083	0.000283	0.000005	0.000035	0.000004	0.000024	0.000009	0.000006	0.000024
SRM614-16	0.000140	0.000170	0.000018	0.001243	0.000374	0.000197	0.000128	0.000651	0.000730
SRM612-16	0.006188	0.006186	0.000018	0.000726	0.000421	0.008625	0.004596	0.029917	0.012085
SRM610-16	0.088191	0.079964	0.000081	0.001210	0.002215	0.101602	0.047273	0.516383	0.163794
AP1-16	0.000013	0.000197	0.000000	0.000014	0.000004	0.000001	0.000005	0.005554	0.000059
AP2-16	0.000071	0.000508	0.000002	0.000018	0.000018	0.000186	0.000111	0.005463	0.000275
AP3-16	0.000258	0.000523	0.000006	0.000036	0.000161	0.000659	0.000838	0.016784	0.001612
AP4-16	0.000332	0.000565	0.000003	0.000021	0.000087	0.000573	0.000738	0.007404	0.001556
standardize signal averages AP									
AP1	0.000014	0.000189	0.000001	0.000019	0.000005	0.000004	0.000006	0.006116	0.000066
AP2	0.000073	0.000527	0.000002	0.000022	0.000019	0.000184	0.000117	0.006104	0.000296
AP3	0.000245	0.000514	0.000006	0.000042	0.000132	0.000605	0.000847	0.017029	0.001646
AP4	0.000320	0.000545	0.000003	0.000023	0.000090	0.000596	0.000767	0.007710	0.001610
linest from std sig ave									
	0.027153	0.047301	0.000000	0.000000	0.000000	0.016081	0.036038	0.006475	0.018523
standardize signal averages SRM									
srm614-2	0.000130	0.000134	0.000014	0.001232	0.000362	0.000196	0.000111	0.000643	0.000722
srm612-2	0.005482	0.005934	0.000011	0.000761	0.000459	0.009839	0.004915	0.031533	0.012332
srm610-2	0.081073	0.077680	0.000071	0.001261	0.002756	0.104671	0.046528	0.530976	0.167533
linest from std sig ave									
	0.063328	0.056667	0.000000	0.000000	0.000000	0.026662	0.065030	0.009715	0.027626
concentration data									
SRM614-15	0.28	0.40	0.00	0.00	0.00	0.27	0.29	0.35	1.13
SRM612-15	11.12	23.05	0.00	0.00	0.00	15.24	16.18	18.41	19.98
SRM610-15	172.22	305.86	0.00	0.00	0.00	148.59	141.50	302.95	272.09
AP1-15	0.16	3.41	0.00	0.00	0.00	0.05	0.10	17.25	0.54
AP2-15	0.82	10.28	0.00	0.00	0.00	1.16	1.78	17.42	2.35
AP3-15	2.52	9.51	0.00	0.00	0.00	3.53	12.31	44.62	12.41
AP4-15	3.35	9.90	0.00	0.00	0.00	3.97	11.44	20.71	12.30
LA3324-2-1	0.30	1.83	0.00	0.00	0.00	0.07	0.04	0.01	0.21
LA3324-2-2	0.26	1.88	0.00	0.00	0.00	0.03	0.02	0.01	0.22
LA3324-2-3	0.33	2.06	0.00	0.00	0.00	0.03	0.04	0.01	0.37
LA3324-2-4	0.21	8.26	0.00	0.00	0.00	0.03	0.02	0.03	0.21
LA3324-2-5	0.21	7.76	0.00	0.00	0.00	0.02	0.00	0.00	0.06
LA3324-2-6	0.25	8.04	0.00	0.00	0.00	0.02	0.02	0.01	0.08

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	0.53	7.28	0.00	0.00	0.00	0.07	0.15	0.04	0.40
LA3324-2-8	0.33	6.85	0.00	0.00	0.00	0.04	0.20	0.01	0.53
LA3324-2-9	0.39	7.47	0.00	0.00	0.00	0.05	0.18	0.00	0.52
LA3324-2-10	0.44	7.18	0.00	0.00	0.00	0.15	0.19	0.01	1.33
LA3324-2-11	0.44	7.11	0.00	0.00	0.00	0.05	0.09	0.00	0.22
LA3324-2-12	0.90	5.34	0.00	0.00	0.00	0.15	0.13	0.01	0.17
SRM614-16	0.33	0.69	0.00	0.00	0.00	0.27	0.40	0.36	1.16
SRM612-16	14.41	25.10	0.00	0.00	0.00	11.90	14.20	16.61	19.20
SRM610-16	205.38	324.39	0.00	0.00	0.00	140.12	146.11	286.75	260.21
AP1-16	0.14	3.71	0.00	0.00	0.00	0.01	0.07	14.34	0.44
AP2-16	0.77	9.59	0.00	0.00	0.00	1.19	1.60	14.11	2.03
AP3-16	2.79	9.87	0.00	0.00	0.00	4.23	12.04	43.35	11.92
AP4-16	3.60	10.66	0.00	0.00	0.00	3.68	10.61	19.12	11.50

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-13		77.40	90.76	14.96	13.08	4.48	7.80	58.04	127.28
SRM614-13		343.04	275.00	39.96	2494.41	705.28	411.08	204.12	1186.89
SRM612-13		9550.57	9759.09	54.36	1331.57	747.52	15769.09	7088.84	53085.34
SRM610-13		74569.10	69194.71	72.88	1200.05	2561.33	105633.99	39869.75	464078.56
AP1-13		324.56	2711.02	33.72	320.32	46.16	108.00	165.92	112748.31
AP2-13		1013.85	4574.59	40.28	295.52	208.16	880.96	1393.45	72419.45
AP3-13		3822.70	7686.68	73.84	479.84	1202.97	7446.80	9681.33	184297.88
AP4-13		6037.47	11252.82	103.40	513.72	2086.65	19372.03	19388.19	210457.02
LA3324-1-1		866.24	2372.17	31.20	272.28	39.32	122.84	166.08	195.12
LA3324-1-2		462.92	1823.33	27.32	258.12	21.52	76.84	124.92	40.00
LA3324-1-3		381.92	1610.33	20.12	224.08	29.12	59.00	120.80	156.40
LA3324-1-4		1901.45	1698.65	41.08	529.84	76.92	327.52	353.64	224.64
LA3324-1-5		1330.57	1108.49	59.84	434.00	58.76	222.04	215.40	52.68
LA3324-1-6		1543.41	1449.01	52.68	490.16	79.56	244.00	279.60	70.04
LA3324-1-7		1523.05	1831.89	68.44	580.24	47.32	230.76	279.20	54.32
LA3324-1-8		2010.21	1408.97	55.28	627.96	73.84	344.20	299.28	44.72
LA3324-1-9		2559.89	873.08	68.28	686.08	73.84	373.32	375.72	83.76
LA3324-1-10		1058.65	1055.21	39.44	287.08	27.72	60.60	107.56	54.20
LA3324-1-11		392.52	1035.13	35.92	327.68	28.96	56.68	93.88	31.00
LA3324-1-12		507.00	1097.29	43.96	274.48	27.48	89.32	79.24	44.32
LA3324-1-13		1005.57	666.56	58.76	325.24	30.04	68.44	104.60	63.80
LA3324-1-14		759.44	738.40	55.44	314.16	25.08	99.44	112.64	34.80
LA3324-1-15		759.36	674.16	33.16	310.72	26.20	48.40	111.88	51.04
LA3324-1-16		617.84	487.08	33.16	307.24	27.20	27.48	97.48	69.52
LA3324-1-17		746.88	461.72	29.96	307.60	28.52	45.00	97.48	26.60
LA3324-1-18		659.52	446.88	36.40	324.44	27.20	36.28	77.88	67.04
SRM614-14		275.12	309.56	52.52	1878.53	502.44	290.44	196.68	843.28
SRM612-14		9227.65	9099.93	36.80	1109.13	519.44	12551.67	6216.88	43392.16
SRM610-14		80073.25	69991.12	77.84	1052.85	1773.25	84848.64	37934.17	417165.88
AP1-14		228.96	2270.01	27.04	252.84	35.96	41.36	126.40	71438.04
AP2-14		792.00	3350.26	38.80	203.76	127.64	585.96	1004.93	48675.23
AP3-14		3468.10	6642.92	70.00	378.72	1030.53	5483.79	8410.01	151492.50
AP4-14		4598.35	7600.20	72.64	307.68	1213.13	10913.14	10458.22	102978.86
blank-14		86.40	130.44	38.60	161.08	10.76	13.60	86.08	26.68
blank average		81.90	110.60	26.78	87.08	7.62	10.70	72.06	18.76

blank subtraction									
SRM614-13		261.14	164.40	13.18	2407.33	697.66	400.38	132.06	1168.13
SRM612-13		9468.67	9648.49	27.58	1244.49	739.90	15758.39	7016.78	53066.58
SRM610-13		74487.20	69084.11	46.10	1112.97	2553.71	105623.29	39797.69	464059.80
AP1-13		242.66	2600.41	6.94	233.24	38.54	97.30	93.86	112729.55
AP2-13		931.95	4463.99	13.50	208.44	200.54	870.26	1321.39	72400.68
AP3-13		3740.80	7576.08	47.06	392.76	1195.35	7436.10	9609.27	184279.12
AP4-13		5955.57	11142.22	76.62	426.64	2079.03	19361.33	19316.13	210438.26
LA3324-1-1		784.34	2261.57	4.42	185.20	31.70	112.14	94.02	176.36
LA3324-1-2		381.02	1712.73	0.54	171.04	13.90	66.14	52.86	21.24
LA3324-1-3		300.02	1499.73	-6.66	137.00	21.50	48.30	48.74	137.64
LA3324-1-4		1819.55	1588.05	14.30	442.76	69.30	316.82	281.58	205.88
LA3324-1-5		1248.67	997.89	33.06	346.92	51.14	211.34	143.34	33.92
LA3324-1-6		1461.51	1338.41	25.90	403.08	71.94	233.30	207.54	51.28
LA3324-1-7		1441.15	1721.29	41.66	493.16	39.70	220.06	207.14	35.56
LA3324-1-8		1928.31	1298.37	28.50	540.88	66.22	333.50	227.22	25.96
LA3324-1-9		2477.99	762.48	41.50	599.00	66.22	362.62	303.66	65.00

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	976.75	944.61	12.66	200.00	20.10	49.90	35.50	35.44	267.80
LA3324-1-11	310.62	924.53	9.14	240.60	21.34	45.98	21.82	12.24	192.52
LA3324-1-12	425.10	986.69	17.18	187.40	19.86	78.62	7.18	25.56	180.44
LA3324-1-13	923.67	555.96	31.98	238.16	22.42	57.74	32.54	45.04	542.60
LA3324-1-14	677.54	627.80	28.66	227.08	17.46	88.74	40.58	16.04	442.32
LA3324-1-15	677.46	563.56	6.38	223.64	18.58	37.70	39.82	32.28	476.52
LA3324-1-16	535.94	376.48	6.38	220.16	19.58	16.78	25.42	50.76	176.44
LA3324-1-17	664.98	351.12	3.18	220.52	20.90	34.30	25.42	7.84	160.24
LA3324-1-18	577.62	336.28	9.62	237.36	19.58	25.58	5.82	48.28	158.04
SRM614-14	193.22	198.96	25.74	1791.45	494.82	279.74	124.62	824.52	950.01
SRM612-14	9145.75	8989.33	10.02	1022.05	511.82	12540.97	6144.81	43373.40	17032.10
SRM610-14	79991.35	69880.52	51.06	965.77	1765.63	84837.94	37862.11	417147.12	137151.81
AP1-14	147.06	2159.41	0.26	165.76	28.34	30.66	54.34	71419.28	638.24
AP2-14	710.10	3239.66	12.02	116.68	120.02	575.26	932.87	48656.47	2560.85
AP3-14	3386.20	6532.32	43.22	291.64	1022.91	5473.09	8337.95	151473.74	16591.97
AP4-14	4516.45	7489.60	45.86	220.60	1205.51	10902.44	10386.16	102960.10	21060.28

zero correction

SRM614-13	261.14	164.40	13.18	2407.33	697.66	400.38	132.06	1168.13	1250.33
SRM612-13	9468.67	9648.49	27.58	1244.49	739.90	15758.39	7016.78	53066.58	20139.27
SRM610-13	74487.20	69084.11	46.10	1112.97	2553.71	105623.29	39797.69	464059.80	151271.17
AP1-13	242.66	2600.41	6.94	233.24	38.54	97.30	93.86	112729.55	1019.81
AP2-13	931.95	4463.99	13.50	208.44	200.54	870.26	1321.39	72400.68	3751.06
AP3-13	3740.80	7576.08	47.06	392.76	1195.35	7436.10	9609.27	184279.12	19911.63
AP4-13	5955.57	11142.22	76.62	426.64	2079.03	19361.33	19316.13	210438.26	37101.69
LA3324-1-1	784.34	2261.57	4.42	185.20	31.70	112.14	94.02	176.36	392.16
LA3324-1-2	381.02	1712.73	0.54	171.04	13.90	66.14	52.86	21.24	131.32
LA3324-1-3	300.02	1499.73	0.00	137.00	21.50	48.30	48.74	137.64	145.16
LA3324-1-4	1819.55	1588.05	14.30	442.76	69.30	316.82	281.58	205.88	312.12
LA3324-1-5	1248.67	997.89	33.06	346.92	51.14	211.34	143.34	33.92	115.08
LA3324-1-6	1461.51	1338.41	25.90	403.08	71.94	233.30	207.54	51.28	200.60
LA3324-1-7	1441.15	1721.29	41.66	493.16	39.70	220.06	207.14	35.56	201.56
LA3324-1-8	1928.31	1298.37	28.50	540.88	66.22	333.50	227.22	25.96	357.76
LA3324-1-9	2477.99	762.48	41.50	599.00	66.22	362.62	303.66	65.00	695.96
LA3324-1-10	976.75	944.61	12.66	200.00	20.10	49.90	35.50	35.44	267.80
LA3324-1-11	310.62	924.53	9.14	240.60	21.34	45.98	21.82	12.24	192.52
LA3324-1-12	425.10	986.69	17.18	187.40	19.86	78.62	7.18	25.56	180.44
LA3324-1-13	923.67	555.96	31.98	238.16	22.42	57.74	32.54	45.04	542.60
LA3324-1-14	677.54	627.80	28.66	227.08	17.46	88.74	40.58	16.04	442.32
LA3324-1-15	677.46	563.56	6.38	223.64	18.58	37.70	39.82	32.28	476.52
LA3324-1-16	535.94	376.48	6.38	220.16	19.58	16.78	25.42	50.76	176.44
LA3324-1-17	664.98	351.12	3.18	220.52	20.90	34.30	25.42	7.84	160.24
LA3324-1-18	577.62	336.28	9.62	237.36	19.58	25.58	5.82	48.28	158.04
SRM614-14	193.22	198.96	25.74	1791.45	494.82	279.74	124.62	824.52	950.01
SRM612-14	9145.75	8989.33	10.02	1022.05	511.82	12540.97	6144.81	43373.40	17032.10
SRM610-14	79991.35	69880.52	51.06	965.77	1765.63	84837.94	37862.11	417147.12	137151.81
AP1-14	147.06	2159.41	0.26	165.76	28.34	30.66	54.34	71419.28	638.24
AP2-14	710.10	3239.66	12.02	116.68	120.02	575.26	932.87	48656.47	2560.85
AP3-14	3386.20	6532.32	43.22	291.64	1022.91	5473.09	8337.95	151473.74	16591.97
AP4-14	4516.45	7489.60	45.86	220.60	1205.51	10902.44	10386.16	102960.10	21060.28

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-13	0.000135	0.000085	0.000007	0.001243	0.000360	0.000207	0.000068	0.000603	0.000646
SRM612-13	0.005478	0.005582	0.000016	0.000720	0.000428	0.009116	0.004059	0.030699	0.011651
SRM610-13	0.077208	0.071607	0.000048	0.001154	0.002647	0.109481	0.041251	0.481008	0.156796
AP1-13	0.000016	0.000174	0.000000	0.000016	0.000003	0.000006	0.000006	0.007523	0.000068
AP2-13	0.000077	0.000368	0.000001	0.000017	0.000017	0.000072	0.000109	0.005967	0.000309
AP3-13	0.000208	0.000422	0.000003	0.000022	0.000067	0.000414	0.000535	0.010261	0.001109
AP4-13	0.000374	0.000701	0.000005	0.000027	0.000131	0.001217	0.001214	0.013231	0.002333
LA3324-1-1	0.000095	0.000275	0.000001	0.000022	0.000004	0.000014	0.000011	0.000021	0.000048

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000054	0.000244	0.000000	0.000024	0.000002	0.000009	0.000008	0.000003	0.000019
LA3324-1-3	0.000052	0.000258	0.000000	0.000024	0.000004	0.000008	0.000008	0.000024	0.000025
LA3324-1-4	0.000157	0.000137	0.000001	0.000038	0.000006	0.000027	0.000024	0.000018	0.000027
LA3324-1-5	0.000128	0.000102	0.000003	0.000035	0.000005	0.000022	0.000015	0.000003	0.000012
LA3324-1-6	0.000137	0.000125	0.000002	0.000038	0.000007	0.000022	0.000019	0.000005	0.000019
LA3324-1-7	0.000129	0.000154	0.000004	0.000044	0.000004	0.000020	0.000019	0.000003	0.000018
LA3324-1-8	0.000152	0.000102	0.000002	0.000043	0.000005	0.000026	0.000018	0.000002	0.000028
LA3324-1-9	0.000200	0.000062	0.000003	0.000048	0.000005	0.000029	0.000025	0.000005	0.000056
LA3324-1-10	0.000172	0.000166	0.000002	0.000035	0.000004	0.000009	0.000006	0.000006	0.000047
LA3324-1-11	0.000063	0.000188	0.000002	0.000049	0.000004	0.000009	0.000004	0.000002	0.000039
LA3324-1-12	0.000085	0.000197	0.000003	0.000037	0.000004	0.000016	0.000001	0.000005	0.000036
LA3324-1-13	0.000129	0.000077	0.000004	0.000033	0.000003	0.000008	0.000005	0.000006	0.000076
LA3324-1-14	0.000094	0.000087	0.000004	0.000031	0.000002	0.000012	0.000006	0.000002	0.000061
LA3324-1-15	0.000095	0.000079	0.000001	0.000031	0.000003	0.000005	0.000006	0.000005	0.000067
LA3324-1-16	0.000084	0.000059	0.000001	0.000035	0.000003	0.000003	0.000004	0.000008	0.000028
LA3324-1-17	0.000093	0.000049	0.000000	0.000031	0.000003	0.000005	0.000004	0.000001	0.000022
LA3324-1-18	0.000079	0.000046	0.000001	0.000033	0.000003	0.000004	0.000001	0.000007	0.000022
SRM614-14	0.000146	0.000151	0.000019	0.001355	0.000374	0.000212	0.000094	0.000624	0.000719
SRM612-14	0.006761	0.006645	0.000007	0.000756	0.000378	0.009271	0.004543	0.032064	0.012591
SRM610-14	0.097694	0.085346	0.000062	0.001179	0.002156	0.103613	0.046241	0.509465	0.167504
AP1-14	0.000012	0.000173	0.000000	0.000013	0.000002	0.000002	0.000004	0.005734	0.000051
AP2-14	0.000075	0.000343	0.000001	0.000012	0.000013	0.000061	0.000099	0.005154	0.000271
AP3-14	0.000232	0.000448	0.000003	0.000020	0.000070	0.000375	0.000572	0.010388	0.001138
AP4-14	0.000361	0.000599	0.000004	0.000018	0.000096	0.000872	0.000830	0.008233	0.001684

standardize signal averages AP

AP1	0.000014	0.000173	0.000000	0.000014	0.000002	0.000004	0.000005	0.006629	0.000060
AP2	0.000076	0.000356	0.000001	0.000015	0.000015	0.000066	0.000104	0.005560	0.000290
AP3	0.000220	0.000435	0.000003	0.000021	0.000068	0.000395	0.000553	0.010324	0.001123
AP4	0.000368	0.000650	0.000004	0.000022	0.000114	0.001045	0.001022	0.010732	0.002008

linest from std sig ave

	0.025924	0.051794	0.000000	0.000000	0.000000	0.012548	0.037267	0.008337	0.019143
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standardize signal averages SRM

srM614-2	0.000141	0.000118	0.000013	0.001299	0.000367	0.000209	0.000081	0.000613	0.000682
srM612-2	0.006119	0.006114	0.000012	0.000738	0.000403	0.009194	0.004301	0.031382	0.012121
srM610-2	0.087451	0.078476	0.000055	0.001167	0.002402	0.106547	0.043746	0.495236	0.162150

linest from std sig ave

	0.058701	0.056088	0.000000	0.000000	0.000000	0.026211	0.069213	0.010415	0.028542
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concentration data

SRM614-13	0.30	0.38	0.00	0.00	0.00	0.22	0.22	0.43	1.06
SRM612-13	12.18	24.79	0.00	0.00	0.00	9.81	12.97	21.95	19.13
SRM610-13	171.66	318.08	0.00	0.00	0.00	117.82	131.84	343.92	257.43
AP1-13	0.17	3.59	0.00	0.00	0.00	0.03	0.09	25.02	0.52
AP2-13	0.79	7.60	0.00	0.00	0.00	0.36	1.62	19.85	2.36
AP3-13	2.15	8.72	0.00	0.00	0.00	2.07	7.95	34.13	8.47
AP4-13	3.87	14.47	0.00	0.00	0.00	6.09	18.06	44.00	17.81
LA3324-1-1	0.99	5.68	0.00	0.00	0.00	0.07	0.17	0.07	0.36
LA3324-1-2	0.56	5.04	0.00	0.00	0.00	0.05	0.11	0.01	0.14
LA3324-1-3	0.53	5.34	0.00	0.00	0.00	0.04	0.12	0.08	0.19
LA3324-1-4	1.62	2.83	0.00	0.00	0.00	0.14	0.36	0.06	0.21
LA3324-1-5	1.32	2.11	0.00	0.00	0.00	0.11	0.22	0.01	0.09
LA3324-1-6	1.42	2.59	0.00	0.00	0.00	0.11	0.29	0.02	0.14
LA3324-1-7	1.34	3.19	0.00	0.00	0.00	0.10	0.28	0.01	0.14
LA3324-1-8	1.57	2.11	0.00	0.00	0.00	0.13	0.27	0.01	0.21
LA3324-1-9	2.07	1.27	0.00	0.00	0.00	0.15	0.36	0.02	0.43
LA3324-1-10	1.78	3.44	0.00	0.00	0.00	0.04	0.09	0.02	0.36
LA3324-1-11	0.65	3.89	0.00	0.00	0.00	0.05	0.07	0.01	0.30
LA3324-1-12	0.88	4.07	0.00	0.00	0.00	0.08	0.02	0.02	0.28
LA3324-1-13	1.33	1.60	0.00	0.00	0.00	0.04	0.07	0.02	0.58
LA3324-1-14	0.97	1.80	0.00	0.00	0.00	0.06	0.08	0.01	0.47
LA3324-1-15	0.98	1.64	0.00	0.00	0.00	0.03	0.08	0.02	0.51
LA3324-1-16	0.87	1.22	0.00	0.00	0.00	0.01	0.06	0.03	0.21
LA3324-1-17	0.96	1.01	0.00	0.00	0.00	0.02	0.05	0.00	0.17
LA3324-1-18	0.82	0.95	0.00	0.00	0.00	0.02	0.01	0.02	0.17
SRM614-14	0.32	0.67	0.00	0.00	0.00	0.23	0.30	0.45	1.18
SRM612-14	15.03	29.52	0.00	0.00	0.00	9.98	14.52	22.93	20.67
SRM610-14	217.21	379.10	0.00	0.00	0.00	111.51	147.79	364.27	275.01
AP1-14	0.12	3.58	0.00	0.00	0.00	0.01	0.06	19.07	0.39
AP2-14	0.78	7.09	0.00	0.00	0.00	0.31	1.47	17.14	2.07
AP3-14	2.40	9.26	0.00	0.00	0.00	1.88	8.50	34.55	8.69
AP4-14	3.73	12.37	0.00	0.00	0.00	4.36	12.35	27.38	12.86

certified concentration

SRM614	0.80	0.70							1.40
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	35.99	38.30		21.92	28.32	42.93	37.96
SRM610	439.90	376.80		239.40	259.40	441.40	396.30
STD AP1	0.28	5.23		0.00	0.05	29.00	0.47
STD AP2	0.87	7.01		0.76	2.62	28.72	3.23
STD AP3	2.01	9.07		3.05	8.49	29.84	8.97
STD AP4	3.94	13.11		4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn	
raw data										
blank-11		46.88	50.36	12.24	15.84	5.48	11.04	41.44	101.32	117.68
SRM614-11		170.44	213.56	38.76	2136.33	581.76	362.16	176.44	999.01	1083.21
SRM612-11		6034.43	7066.96	32.20	1234.21	1044.05	16208.29	6715.72	49272.96	17185.42
SRM610-11		44967.69	47152.75	102.16	1145.29	4719.71	96216.59	33844.03	403917.31	119060.55
AP1-11		174.88	1916.05	55.08	433.36	81.64	97.92	130.32	94579.70	909.93
AP2-11		619.88	4156.98	50.88	530.04	240.04	957.81	1218.77	67378.82	3157.46
AP3-11		2289.93	5093.19	114.88	1076.21	1301.33	6692.56	9652.89	199368.77	18424.26
AP4-11		3211.78	6121.83	105.40	688.92	1406.69	13674.08	11079.38	116864.38	20655.92
M17-24-141-1		116.80	436.16	23.56	211.08	16.84	27.24	54.52	67.84	129.20
M17-24-141-2		115.52	550.80	13.64	202.32	10.40	19.72	47.92	34.40	105.24
M17-24-141-3		128.92	629.44	24.92	209.08	5.76	13.84	50.08	27.48	125.40
M17-24-141-4		167.32	988.97	24.28	166.04	15.76	28.64	68.80	58.64	109.84
M17-24-141-5		207.92	965.61	18.84	171.52	15.40	17.96	57.24	32.08	119.64
M17-24-141-6		159.04	988.65	23.96	200.20	15.36	33.48	69.32	153.16	127.56
M17-24-141-7		191.64	1107.73	20.12	239.64	21.96	52.16	84.04	82.96	157.40
M17-24-141-8		157.28	1158.97	27.88	162.80	14.28	26.48	59.24	25.40	117.80
M17-24-141-9		148.76	1215.97	23.20	169.92	11.68	28.52	76.36	50.80	124.76
M17-24-141-10		960.65	1606.53	47.00	344.56	44.56	151.56	191.16	137.32	240.68
M17-24-141-11		2118.69	1896.33	79.04	347.04	104.56	188.28	289.60	46.60	249.68
M17-24-141-12		3816.46	1850.69	104.96	492.96	160.92	239.36	475.48	88.68	349.44
M17-24-141-13		18671.35	913.13	294.80	1218.17	698.28	994.25	1634.09	131.68	512.12
M17-24-141-14		20070.75	863.84	296.68	1040.37	727.00	801.84	1492.57	61.56	464.12
M17-24-141-15		20920.96	887.65	283.20	1051.85	724.44	750.16	1403.93	71.96	408.72
M17-24-141-16		8275.49	1482.29	259.92	1471.89	327.36	1297.77	1022.69	106.84	299.04
M17-24-141-17		7077.92	1272.97	276.08	1375.97	320.48	1164.33	1045.01	58.96	249.96
M17-24-141-18		5613.55	1263.77	242.16	1374.37	272.40	1154.17	939.61	66.72	285.84
SRM614-12		222.68	266.68	40.56	1955.05	562.60	307.36	194.28	874.12	1087.41
SRM612-12		9189.01	9798.42	48.00	1493.37	894.37	17858.58	8614.53	57143.12	21526.24
SRM610-12		71217.04	68407.59	85.52	1333.81	3415.18	111724.39	48052.75	516740.03	159234.69
AP1-12		179.40	1973.41	40.84	278.88	83.48	35.36	75.24	70375.40	840.12
AP2-12		751.84	4645.79	48.96	361.08	203.96	888.28	1328.73	68910.02	3492.50
AP3-12		3250.82	6987.88	73.84	672.72	1294.97	6978.12	10877.78	200848.38	20369.59
AP4-12		5097.19	9323.37	106.60	616.64	1865.21	17509.18	16155.65	170107.72	31089.65
blank-12		59.32	95.60	23.88	171.04	21.12	21.40	47.60	20.60	74.68
blank average		53.10	72.98	18.06	93.44	13.30	16.22	44.52	60.96	96.18

blank subtraction									
SRM614-11	117.34	140.58	20.70	2042.89	568.46	345.94	131.92	938.05	987.03
SRM612-11	5981.33	6993.98	14.14	1140.77	1030.75	16192.07	6671.20	49212.00	17089.24
SRM610-11	44914.59	47079.77	84.10	1051.85	4706.41	96200.37	33799.51	403856.35	118964.37
AP1-11	121.78	1843.07	37.02	339.92	68.34	81.70	85.80	94518.73	813.74
AP2-11	566.78	4084.00	32.82	436.60	226.74	941.59	1174.25	67317.86	3061.28
AP3-11	2236.83	5020.21	96.82	982.77	1288.03	6676.34	9608.37	199307.81	18328.08
AP4-11	3158.68	6048.85	87.34	595.48	1393.39	13657.86	11034.86	116803.42	20559.74
M17-24-141-1	63.70	363.18	5.50	117.64	3.54	11.02	10.00	6.88	33.02
M17-24-141-2	62.42	477.82	-4.42	108.88	-2.90	3.50	3.40	-26.56	9.06
M17-24-141-3	75.82	556.46	6.86	115.64	-7.54	-2.38	5.56	-33.48	29.22
M17-24-141-4	114.22	915.99	6.22	72.60	2.46	12.42	24.28	-2.32	13.66
M17-24-141-5	154.82	892.62	0.78	78.08	2.10	1.74	12.72	-28.88	23.46
M17-24-141-6	105.94	915.67	5.90	106.76	2.06	17.26	24.80	92.20	31.38
M17-24-141-7	138.54	1034.75	2.06	146.20	8.66	35.94	39.52	22.00	61.22
M17-24-141-8	104.18	1085.99	9.82	69.36	0.98	10.26	14.72	-35.56	21.62
M17-24-141-9	95.66	1142.99	5.14	76.48	-1.62	12.30	31.84	-10.16	28.58
M17-24-141-10	907.55	1533.55	28.94	251.12	31.26	135.34	146.64	76.36	144.50
M17-24-141-11	2065.59	1823.35	60.98	253.60	91.26	172.06	245.08	-14.36	153.50
M17-24-141-12	3763.36	1777.71	86.90	399.52	147.62	223.14	430.96	27.72	253.26
M17-24-141-13	18618.25	840.14	276.74	1124.73	684.98	978.03	1589.57	70.72	415.94
M17-24-141-14	20017.65	790.86	278.62	946.93	713.70	785.62	1448.05	0.60	367.94
M17-24-141-15	20867.86	814.66	265.14	958.41	711.14	733.94	1359.41	11.00	312.54
M17-24-141-16	8222.39	1409.31	241.86	1378.45	314.06	1281.55	978.17	45.88	202.86
M17-24-141-17	7024.82	1199.99	258.02	1282.53	307.18	1148.11	1000.49	-2.00	153.78
M17-24-141-18	5560.45	1190.79	224.10	1280.93	259.10	1137.95	895.09	5.76	189.66
SRM614-12	169.58	193.70	22.50	1861.61	549.30	291.14	149.76	813.16	991.23
SRM612-12	9135.91	9725.43	29.94	1399.93	881.06	17842.36	8570.01	57082.16	21430.06
SRM610-12	71217.94	68334.61	67.46	1240.37	3401.88	111708.17	48008.23	516679.07	159138.51
AP1-12	126.30	1900.43	22.78	185.44	70.18	19.14	30.72	70314.44	743.94
AP2-12	698.74	4572.81	30.90	267.64	190.66	872.06	1284.21	68849.06	3396.32
AP3-12	3197.72	6914.90	55.78	579.28	1281.67	6961.90	10833.26	200787.42	20273.41
AP4-12	5044.09	9250.39	88.54	523.20	1851.91	17492.96	16111.13	170046.76	30993.47

Appendix A. Raw trace element datasheets from laser ablation.

zero correction									
SRM614-11	117.34	140.58	20.70	2042.89	568.46	345.94	131.92	938.05	987.03
SRM612-11	5981.33	6993.98	14.14	1140.77	1030.75	16192.07	6671.20	49212.00	17089.24
SRM610-11	44914.59	47079.77	84.10	1051.85	4706.41	96200.37	33799.51	403856.35	118964.37
AP1-11	121.78	1843.07	37.02	339.92	68.34	81.70	85.80	94518.73	813.74
AP2-11	566.78	4084.00	32.82	436.60	226.74	941.59	1174.25	67317.86	3061.28
AP3-11	2236.83	5020.21	96.82	982.77	1288.03	6676.34	9608.37	199307.81	18328.08
AP4-11	3158.68	6048.85	87.34	595.48	1393.39	13657.86	11034.86	116803.42	20559.74
M17-24-141-1	63.70	363.18	5.50	117.64	3.54	11.02	10.00	6.88	33.02
M17-24-141-2	62.42	477.82	0.00	108.88	0.00	3.50	3.40	0.00	9.06
M17-24-141-3	75.82	556.46	6.86	115.64	0.00	0.00	5.56	0.00	29.22
M17-24-141-4	114.22	915.99	6.22	72.60	2.46	12.42	24.28	0.00	13.66
M17-24-141-5	154.82	892.62	0.78	78.08	2.10	1.74	12.72	0.00	23.46
M17-24-141-6	105.94	915.67	5.90	106.76	2.06	17.26	24.80	92.20	31.38
M17-24-141-7	138.54	1034.75	2.06	146.20	8.66	35.94	39.52	22.00	61.22
M17-24-141-8	104.18	1085.99	9.82	69.36	0.98	10.26	14.72	0.00	21.62
M17-24-141-9	95.66	1142.99	5.14	76.48	0.00	12.30	31.84	0.00	28.58
M17-24-141-10	907.55	1533.55	28.94	251.12	31.26	135.34	146.64	76.36	144.50
M17-24-141-11	2065.59	1823.35	60.98	253.60	91.26	172.06	245.08	0.00	153.50
M17-24-141-12	3763.36	1777.71	86.90	399.52	147.62	223.14	430.96	27.72	253.26
M17-24-141-13	18618.25	840.14	276.74	1124.73	684.98	978.03	1589.57	70.72	415.94
M17-24-141-14	20017.65	790.86	278.62	946.93	713.70	785.62	1448.05	0.60	367.94
M17-24-141-15	20867.86	814.66	265.14	958.41	711.14	733.94	1359.41	11.00	312.54
M17-24-141-16	8222.39	1409.31	241.86	1378.45	314.06	1281.55	978.17	45.88	202.86
M17-24-141-17	7024.82	1199.99	258.02	1282.53	307.18	1148.11	1000.49	0.00	153.78
M17-24-141-18	5560.45	1190.79	224.10	1280.93	259.10	1137.95	895.09	5.76	189.66
SRM614-12	169.58	193.70	22.50	1861.61	549.30	291.14	149.76	813.16	991.23
SRM612-12	9135.91	9725.43	29.94	1399.93	881.06	17842.36	8570.01	57082.16	21430.06
SRM610-12	71217.94	68334.61	67.46	1240.37	3401.88	111708.17	48008.23	516679.07	159138.51
AP1-12	126.30	1900.43	22.78	185.44	70.18	19.14	30.72	70314.44	743.94
AP2-12	698.74	4572.81	30.90	267.64	190.66	872.06	1284.21	68849.06	3396.32
AP3-12	3197.72	6914.90	55.78	579.28	1281.67	6961.90	10833.26	200787.42	20273.41
AP4-12	5044.09	9250.39	88.54	523.20	1851.91	17492.96	16111.13	170046.76	30993.47
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038
standardized signal									
SRM614-11	0.000063	0.000076	0.000011	0.001098	0.000306	0.000186	0.000071	0.000504	0.000531
SRM612-11	0.003093	0.003616	0.000007	0.000590	0.000533	0.008373	0.003450	0.025447	0.008837
SRM610-11	0.043941	0.046060	0.000082	0.001029	0.004604	0.094116	0.033067	0.395106	0.116387
AP1-11	0.000011	0.000161	0.000003	0.000030	0.000006	0.000007	0.000007	0.008240	0.000071
AP2-11	0.000053	0.000380	0.000003	0.000041	0.000021	0.000088	0.000109	0.006270	0.000285
AP3-11	0.000157	0.000353	0.000007	0.000069	0.000090	0.000469	0.000675	0.014004	0.001288
AP4-11	0.000233	0.000445	0.000006	0.000044	0.000103	0.001006	0.000813	0.008601	0.001514
M17-24-141-1	0.000029	0.000165	0.000003	0.000054	0.000002	0.000005	0.000005	0.000003	0.000015
M17-24-141-2	0.000026	0.000195	0.000000	0.000045	0.000000	0.000001	0.000001	0.000000	0.000004
M17-24-141-3	0.000028	0.000207	0.000003	0.000043	0.000000	0.000000	0.000002	0.000000	0.000011
M17-24-141-4	0.000034	0.000272	0.000002	0.000022	0.000001	0.000004	0.000007	0.000000	0.000004
M17-24-141-5	0.000048	0.000280	0.000000	0.000024	0.000001	0.000001	0.000004	0.000000	0.000007
M17-24-141-6	0.000034	0.000291	0.000002	0.000034	0.000001	0.000005	0.000008	0.000029	0.000010
M17-24-141-7	0.000047	0.000351	0.000001	0.000050	0.000003	0.000012	0.000013	0.000007	0.000021
M17-24-141-8	0.000037	0.000383	0.000003	0.000024	0.000000	0.000004	0.000005	0.000000	0.000008
M17-24-141-9	0.000032	0.000377	0.000002	0.000025	0.000000	0.000004	0.000011	0.000000	0.000009
M17-24-141-10	0.000195	0.000330	0.000006	0.000054	0.000007	0.000029	0.000032	0.000016	0.000031
M17-24-141-11	0.000323	0.000285	0.000010	0.000040	0.000014	0.000027	0.000038	0.000000	0.000024
M17-24-141-12	0.000508	0.000240	0.000012	0.000054	0.000020	0.000030	0.000058	0.000004	0.000034
M17-24-141-13	0.001113	0.000050	0.000017	0.000067	0.000041	0.000058	0.000095	0.000004	0.000025
M17-24-141-14	0.001191	0.000047	0.000017	0.000056	0.000042	0.000047	0.000086	0.000000	0.000022
M17-24-141-15	0.001230	0.000048	0.000016	0.000056	0.000042	0.000043	0.000080	0.000001	0.000018
M17-24-141-16	0.000460	0.000079	0.000014	0.000077	0.000018	0.000072	0.000055	0.000003	0.000011
M17-24-141-17	0.000382	0.000065	0.000014	0.000070	0.000017	0.000062	0.000054	0.000000	0.000008

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000300	0.000064	0.000012	0.000069	0.000014	0.000061	0.000048	0.000000	0.000010
SRM614-12	0.000115	0.000132	0.000015	0.001264	0.000373	0.000198	0.000102	0.000552	0.000673
SRM612-12	0.004834	0.005146	0.000016	0.000741	0.000466	0.009441	0.004535	0.030205	0.011340
SRM610-12	0.070648	0.067788	0.000067	0.001230	0.003375	0.110814	0.047624	0.512546	0.157865
AP1-12	0.000010	0.000158	0.000002	0.000015	0.000006	0.000002	0.000003	0.005832	0.000062
AP2-12	0.000057	0.000375	0.000003	0.000022	0.000016	0.000072	0.000105	0.005654	0.000279
AP3-12	0.000193	0.000417	0.000003	0.000035	0.000077	0.000420	0.000654	0.012112	0.001223
AP4-12	0.000312	0.000573	0.000005	0.000032	0.000115	0.001083	0.000998	0.010530	0.001919

standardize signal averages AP

AP1	0.000011	0.000159	0.000003	0.000023	0.000006	0.000004	0.000005	0.007036	0.000066
AP2	0.000055	0.000378	0.000003	0.000031	0.000018	0.000080	0.000107	0.005962	0.000282
AP3	0.000175	0.000385	0.000005	0.000052	0.000084	0.000445	0.000664	0.013058	0.001255
AP4	0.000272	0.000509	0.000006	0.000038	0.000109	0.001044	0.000905	0.009565	0.001717

linest from std sig ave

0.034268	0.059447	0.000000	0.000000	0.000000	0.012439	0.038333	0.007627	0.020624
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standardize signal averages SRM

srm614-2	0.000089	0.000104	0.000013	0.001181	0.000339	0.000192	0.000086	0.000528	0.000602
srm612-2	0.003964	0.004381	0.000012	0.000665	0.000500	0.008907	0.003992	0.027826	0.010088
srm610-2	0.057295	0.056924	0.000075	0.001130	0.003990	0.102465	0.040346	0.453826	0.137126

linest from std sig ave

0.089602	0.077328	0.000000	0.000000	0.000000	0.027253	0.075042	0.011366	0.033753
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concentration data

SRM614-11	0.19	0.39	0.00	0.00	0.00	0.20	0.23	0.33	0.94
SRM612-11	9.09	18.44	0.00	0.00	0.00	8.93	11.34	16.64	15.63
SRM610-11	129.14	234.83	0.00	0.00	0.00	100.40	108.71	258.44	205.87
AP1-11	0.15	3.81	0.00	0.00	0.00	0.04	0.11	25.07	0.58
AP2-11	0.72	9.02	0.00	0.00	0.00	0.44	1.67	19.08	2.35
AP3-11	2.15	8.37	0.00	0.00	0.00	2.33	10.32	42.61	10.60
AP4-11	3.18	10.56	0.00	0.00	0.00	4.99	12.43	26.17	12.46
M17-24-141-1	0.40	3.92	0.00	0.00	0.00	0.02	0.07	0.01	0.12
M17-24-141-2	0.35	4.63	0.00	0.00	0.00	0.01	0.02	0.00	0.03
M17-24-141-3	0.39	4.91	0.00	0.00	0.00	0.00	0.03	0.00	0.09
M17-24-141-4	0.46	6.44	0.00	0.00	0.00	0.02	0.11	0.00	0.03
M17-24-141-5	0.66	6.63	0.00	0.00	0.00	0.00	0.06	0.00	0.06
M17-24-141-6	0.46	6.89	0.00	0.00	0.00	0.03	0.12	0.09	0.08
M17-24-141-7	0.64	8.31	0.00	0.00	0.00	0.06	0.20	0.02	0.17
M17-24-141-8	0.50	9.08	0.00	0.00	0.00	0.02	0.08	0.00	0.06
M17-24-141-9	0.43	8.94	0.00	0.00	0.00	0.02	0.16	0.00	0.08
M17-24-141-10	2.67	7.83	0.00	0.00	0.00	0.14	0.48	0.05	0.26
M17-24-141-11	4.42	6.76	0.00	0.00	0.00	0.13	0.59	0.00	0.20
M17-24-141-12	6.95	5.69	0.00	0.00	0.00	0.15	0.89	0.01	0.28
M17-24-141-13	15.22	1.19	0.00	0.00	0.00	0.29	1.45	0.01	0.20
M17-24-141-14	16.28	1.12	0.00	0.00	0.00	0.23	1.32	0.00	0.18
M17-24-141-15	16.81	1.14	0.00	0.00	0.00	0.21	1.23	0.00	0.15
M17-24-141-16	6.29	1.87	0.00	0.00	0.00	0.36	0.84	0.01	0.09
M17-24-141-17	5.22	1.55	0.00	0.00	0.00	0.31	0.83	0.00	0.07
M17-24-141-18	4.10	1.52	0.00	0.00	0.00	0.30	0.74	0.00	0.08
SRM614-12	0.34	0.67	0.00	0.00	0.00	0.21	0.33	0.36	1.19
SRM612-12	14.21	26.24	0.00	0.00	0.00	10.07	14.91	19.76	20.06
SRM610-12	207.63	345.60	0.00	0.00	0.00	118.22	156.57	335.26	279.24
AP1-12	0.14	3.74	0.00	0.00	0.00	0.01	0.04	17.74	0.51
AP2-12	0.78	8.91	0.00	0.00	0.00	0.36	1.61	17.20	2.29
AP3-12	2.64	9.89	0.00	0.00	0.00	2.08	9.99	36.85	10.06
AP4-12	4.27	13.58	0.00	0.00	0.00	5.38	15.26	32.04	15.79

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-9	85.12	58.08	9.60	14.24	7.68	8.76	54.72	14.64	123.16
SRM614-9	365.32	360.60	52.60	2998.30	892.05	486.00	239.32	1429.81	1663.41
SRM612-9	9947.46	9517.21	43.88	1228.09	705.68	15105.49	6561.76	49490.64	19676.23
SRM610-9	79293.05	75563.59	68.68	1291.45	2756.38	118569.59	45757.26	523618.44	167338.75
AP1-9	312.56	2218.01	25.60	230.60	77.12	80.64	121.52	80214.06	1001.21
AP2-9	1070.69	5674.67	25.20	303.44	222.76	987.81	1543.13	82170.31	4371.58
AP3-9	3797.86	7041.96	54.64	464.88	1131.53	6428.08	9882.06	185416.28	20005.19

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	6154.91	11504.10	95.96	581.08	2167.13	19802.67	19170.11	223785.06	38332.77
M17-24-97-1	2646.62	2879.22	22.76	178.44	65.84	66.12	310.20	129.36	504.88
M17-24-97-2	2163.01	2576.45	29.24	225.08	60.12	46.52	302.56	32.36	395.88
M17-24-97-3	2028.85	3001.90	33.84	248.52	57.68	65.20	322.88	41.80	435.12
M17-24-97-4	1226.65	2168.85	34.00	198.20	37.96	74.36	219.76	145.48	406.12
M17-24-97-5	710.56	2084.37	24.60	234.24	24.72	42.72	145.20	37.08	220.88
M17-24-97-6	746.84	2167.89	20.40	251.76	36.04	51.32	156.40	47.72	240.04
M17-24-97-7	603.76	1673.33	21.60	199.60	38.44	69.00	143.48	103.24	439.80
M17-24-97-8	567.24	1461.57	20.40	242.44	31.52	49.96	108.76	43.72	294.36
M17-24-97-9	344.68	1607.53	28.36	202.12	28.56	46.84	120.24	65.76	238.56
M17-24-97-10	492.76	1228.17	24.20	178.16	19.92	58.00	123.16	98.00	378.40
M17-24-97-11	421.56	1358.01	26.24	235.44	24.80	49.00	125.24	43.68	262.12
M17-24-97-12	632.08	1528.65	32.20	232.92	30.80	46.36	127.72	46.12	280.48
M17-24-97-13	2699.98	1460.25	34.00	176.76	34.76	79.28	152.16	142.40	591.44
M17-24-97-14	665.76	1350.61	25.36	232.04	23.64	62.72	123.24	35.04	312.16
M17-24-97-15	567.00	1335.73	25.32	216.20	26.52	68.64	124.64	40.96	268.80
M17-24-97-16	1601.49	1638.77	35.88	201.32	30.00	86.96	206.68	180.84	413.28
M17-24-97-17	638.40	1752.69	33.08	258.52	24.56	37.88	153.92	56.40	269.08
M17-24-97-18	1793.37	1772.09	33.96	218.48	28.44	43.64	166.04	75.92	318.24
SRM614-10	367.52	413.72	45.76	2719.42	776.76	382.28	263.56	1232.21	1535.09
SRM612-10	9567.57	9341.05	45.84	1064.69	540.32	13646.88	6727.16	44534.73	17346.50
SRM610-10	80781.77	69126.07	82.96	1002.21	1636.61	83508.11	38167.54	410695.63	134403.08
AP1-10	187.24	2176.49	27.12	174.28	43.40	36.08	93.80	52868.06	717.24
AP2-10	848.68	4185.86	54.24	197.48	129.20	708.68	1074.69	51373.49	3014.62
AP3-10	3476.74	7620.88	68.72	478.96	1204.65	6105.11	10277.74	191339.44	19171.55
AP4-10	5495.07	10104.62	78.24	430.84	1732.45	16737.77	16134.61	175586.75	30983.78
blank-10	78.96	138.76	32.56	125.48	17.68	15.20	78.08	24.76	74.80
blank average	82.04	98.42	21.08	69.86	12.68	11.98	66.40	19.70	98.98

blank subtraction									
SRM614-9	283.28	262.18	31.52	2928.44	879.36	474.02	172.92	1410.11	1564.43
SRM612-9	9865.42	9418.79	22.80	1158.23	693.00	15093.50	6495.36	49470.94	19577.25
SRM610-9	79211.01	75465.17	47.60	1221.59	2743.70	118557.61	45690.86	523598.74	167239.77
AP1-9	230.52	2119.59	4.52	160.74	64.44	68.66	55.12	80194.35	902.23
AP2-9	988.65	5576.25	4.12	233.58	210.08	975.83	1476.73	82150.60	4272.60
AP3-9	3715.82	6943.54	33.56	395.02	1118.85	6416.10	9815.66	185396.58	19906.21
AP4-9	6072.87	11405.68	74.88	511.22	2154.45	19790.69	19103.71	223765.36	38233.79
M17-24-97-1	2564.57	2780.80	1.68	108.58	53.16	54.14	243.80	109.66	405.90
M17-24-97-2	2080.97	2478.03	8.16	155.22	47.44	34.54	236.16	12.66	296.90
M17-24-97-3	1946.81	2903.48	12.76	178.66	45.00	53.22	256.48	22.10	336.14
M17-24-97-4	1144.61	2070.43	12.92	128.34	25.28	62.38	153.36	125.78	307.14
M17-24-97-5	628.52	1985.95	3.52	164.38	12.04	30.74	78.80	17.38	121.90
M17-24-97-6	664.80	2069.47	-0.68	181.90	23.36	39.34	90.00	28.02	141.06
M17-24-97-7	521.72	1574.91	0.52	129.74	25.76	57.02	77.08	83.54	340.82
M17-24-97-8	485.20	1363.15	-0.68	172.58	18.84	37.98	42.36	24.02	195.38
M17-24-97-9	262.64	1509.11	7.28	132.26	15.88	34.86	53.84	46.06	139.58
M17-24-97-10	410.72	1129.75	3.12	108.30	7.24	46.02	56.76	78.30	279.42
M17-24-97-11	339.52	1259.59	5.16	165.58	12.12	37.02	58.84	23.98	163.14
M17-24-97-12	550.04	1430.23	11.12	163.06	18.12	34.38	61.32	26.42	181.50
M17-24-97-13	2617.93	1361.83	12.92	106.90	22.08	67.30	85.76	122.70	492.46
M17-24-97-14	583.72	1252.19	4.28	162.18	10.96	50.74	56.84	15.34	213.18
M17-24-97-15	484.96	1237.31	4.24	146.34	13.84	56.66	58.24	21.26	169.82
M17-24-97-16	1519.45	1540.35	14.80	131.46	17.32	74.98	140.28	161.14	314.30
M17-24-97-17	556.36	1654.27	12.00	188.66	11.88	25.90	87.52	36.70	170.10
M17-24-97-18	1711.33	1673.67	12.88	148.62	15.76	31.66	99.64	56.22	219.26
SRM614-10	285.48	315.30	24.68	2649.55	764.08	370.30	197.16	1212.51	1436.11
SRM612-10	9485.53	9242.63	24.76	994.83	527.64	13634.90	6660.76	44515.03	17247.52
SRM610-10	80699.73	69027.65	61.88	932.35	1623.93	83496.13	38101.13	410675.93	134304.10
AP1-10	105.20	2078.07	6.04	104.42	30.72	24.10	27.40	52848.36	618.26
AP2-10	766.64	4087.44	33.16	127.62	116.52	696.70	1008.29	51353.79	2915.64
AP3-10	3394.70	7522.46	47.64	409.10	1191.97	6093.13	10211.34	191319.74	19618.57
AP4-10	5413.03	10006.20	57.16	360.98	1719.77	16725.79	16068.21	175567.05	30884.79

zero correction									
SRM614-9	283.28	262.18	31.52	2928.44	879.36	474.02	172.92	1410.11	1564.43
SRM612-9	9865.42	9418.79	22.80	1158.23	693.00	15093.50	6495.36	49470.94	19577.25
SRM610-9	79211.01	75465.17	47.60	1221.59	2743.70	118557.61	45690.86	523598.74	167239.77
AP1-9	230.52	2119.59	4.52	160.74	64.44	68.66	55.12	80194.35	902.23
AP2-9	988.65	5576.25	4.12	233.58	210.08	975.83	1476.73	82150.60	4272.60
AP3-9	3715.82	6943.54	33.56	395.02	1118.85	6416.10	9815.66	185396.58	19906.21
AP4-9	6072.87	11405.68	74.88	511.22	2154.45	19790.69	19103.71	223765.36	38233.79
M17-24-97-1	2564.57	2780.80	1.68	108.58	53.16	54.14	243.80	109.66	405.90
M17-24-97-2	2080.97	2478.03	8.16	155.22	47.44	34.54	236.16	12.66	296.90
M17-24-97-3	1946.81	2903.48	12.76	178.66	45.00	53.22	256.48	22.10	336.14
M17-24-97-4	1144.61	2070.43	12.92	128.34	25.28	62.38	153.36	125.78	307.14
M17-24-97-5	628.52	1985.95	3.52	164.38	12.04	30.74	78.80	17.38	121.90
M17-24-97-6	664.80	2069.47	0.00	181.90	23.36	39.34	90.00	28.02	141.06
M17-24-97-7	521.72	1574.91	0.52	129.74	25.76	57.02	77.08	83.54	340.82

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	485.20	1363.15	0.00	172.58	18.84	37.98	42.36	24.02	195.38
M17-24-97-9	262.64	1509.11	7.28	132.26	15.88	34.86	53.84	46.06	139.58
M17-24-97-10	410.72	1129.75	3.12	108.30	7.24	46.02	56.76	78.30	279.42
M17-24-97-11	339.52	1259.59	5.16	165.58	12.12	37.02	58.84	23.98	163.14
M17-24-97-12	550.04	1430.23	11.12	163.06	18.12	34.38	61.32	26.42	181.50
M17-24-97-13	2617.93	1361.83	12.92	106.90	22.08	67.30	85.76	122.70	492.46
M17-24-97-14	583.72	1252.19	4.28	162.18	10.96	50.74	56.84	15.34	213.18
M17-24-97-15	484.96	1237.31	4.24	146.34	13.84	56.66	58.24	21.26	169.82
M17-24-97-16	1519.45	1540.35	14.80	131.46	17.32	74.98	140.28	161.14	314.30
M17-24-97-17	556.36	1654.27	12.00	188.66	11.88	25.90	87.52	36.70	170.10
M17-24-97-18	1711.33	1673.67	12.88	148.62	15.76	31.66	99.64	56.22	219.26
SRM614-10	285.48	315.30	24.68	2649.55	764.08	370.30	197.16	1212.51	1436.11
SRM612-10	9485.53	9242.63	24.76	994.83	527.64	13634.90	6660.76	44515.03	17247.52
SRM610-10	80699.73	69027.65	61.88	932.35	1623.93	83496.13	38101.13	410675.93	134304.10
AP1-10	105.20	2078.07	6.04	104.42	30.72	24.10	27.40	52848.36	618.26
AP2-10	766.64	4087.44	33.16	127.62	116.52	696.70	1008.29	51353.79	2915.64
AP3-10	3394.70	7522.46	47.64	409.10	1191.97	6093.13	10211.34	191319.74	19618.57
AP4-10	5413.03	10006.20	57.16	360.98	1719.77	16725.79	16068.21	175567.05	30884.79

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-9	0.000121	0.000112	0.000013	0.001246	0.000374	0.000202	0.000074	0.000600	0.000665
SRM612-9	0.005454	0.005207	0.000013	0.000640	0.000383	0.008344	0.003591	0.027347	0.010822
SRM610-9	0.078923	0.075191	0.000047	0.001217	0.002734	0.118127	0.045525	0.521697	0.166632
AP1-9	0.000018	0.000166	0.000000	0.000013	0.000005	0.000005	0.000004	0.006299	0.000071
AP2-9	0.000074	0.000416	0.000000	0.000017	0.000016	0.000073	0.000110	0.006124	0.000318
AP3-9	0.000208	0.000389	0.000002	0.000022	0.000063	0.000359	0.000549	0.010375	0.001114
AP4-9	0.000374	0.000703	0.000005	0.000031	0.000133	0.001219	0.001177	0.013788	0.002356
M17-24-97-1	0.000342	0.000370	0.000000	0.000014	0.000007	0.000007	0.000032	0.000015	0.000054
M17-24-97-2	0.000300	0.000358	0.000001	0.000022	0.000007	0.000005	0.000034	0.000002	0.000043
M17-24-97-3	0.000253	0.000377	0.000002	0.000023	0.000006	0.000007	0.000033	0.000003	0.000044
M17-24-97-4	0.000212	0.000384	0.000002	0.000024	0.000005	0.000012	0.000028	0.000023	0.000057
M17-24-97-5	0.000116	0.000367	0.000001	0.000030	0.000002	0.000006	0.000015	0.000003	0.000023
M17-24-97-6	0.000116	0.000360	0.000000	0.000032	0.000004	0.000007	0.000016	0.000005	0.000025
M17-24-97-7	0.000105	0.000318	0.000000	0.000026	0.000005	0.000012	0.000016	0.000017	0.000069
M17-24-97-8	0.000106	0.000299	0.000000	0.000038	0.000004	0.000008	0.000009	0.000005	0.000043
M17-24-97-9	0.000051	0.000292	0.000001	0.000026	0.000003	0.000007	0.000010	0.000009	0.000027
M17-24-97-10	0.000102	0.000280	0.000001	0.000027	0.000002	0.000011	0.000014	0.000019	0.000069
M17-24-97-11	0.000073	0.000271	0.000001	0.000036	0.000003	0.000008	0.000013	0.000005	0.000035
M17-24-97-12	0.000111	0.000288	0.000002	0.000033	0.000004	0.000007	0.000012	0.000005	0.000037
M17-24-97-13	0.000601	0.000313	0.000003	0.000025	0.000005	0.000015	0.000020	0.000028	0.000113
M17-24-97-14	0.000124	0.000265	0.000001	0.000034	0.000002	0.000011	0.000012	0.000003	0.000045
M17-24-97-15	0.000104	0.000265	0.000001	0.000031	0.000003	0.000012	0.000012	0.000005	0.000036
M17-24-97-16	0.000282	0.000286	0.000003	0.000024	0.000003	0.000014	0.000026	0.000030	0.000058
M17-24-97-17	0.000094	0.000279	0.000002	0.000032	0.000002	0.000004	0.000015	0.000006	0.000029
M17-24-97-18	0.000285	0.000279	0.000002	0.000025	0.000003	0.000005	0.000017	0.000009	0.000037
SRM614-10	0.000144	0.000159	0.000012	0.001340	0.000387	0.000187	0.000100	0.000613	0.000726
SRM612-10	0.006946	0.006768	0.000018	0.000728	0.000386	0.009984	0.004877	0.032595	0.012629
SRM610-10	0.100596	0.086046	0.000077	0.001162	0.002024	0.104082	0.047495	0.511927	0.167416
AP1-10	0.000010	0.000200	0.000001	0.000010	0.000003	0.000002	0.000002	0.005081	0.000059
AP2-10	0.000071	0.000378	0.000003	0.000012	0.000011	0.000064	0.000093	0.004752	0.000270
AP3-10	0.000232	0.000515	0.000003	0.000028	0.000082	0.000417	0.000699	0.013089	0.001342
AP4-10	0.000394	0.000728	0.000004	0.000026	0.000125	0.001218	0.001170	0.012781	0.002248

standardize signal averages AP									
AP1	0.000014	0.000183	0.000000	0.000011	0.000004	0.000004	0.000003	0.005690	0.000065
AP2	0.000072	0.000397	0.000002	0.000015	0.000013	0.000069	0.000102	0.005438	0.000294
AP3	0.000220	0.000452	0.000003	0.000025	0.000072	0.000388	0.000624	0.011732	0.001228
AP4	0.000384	0.000716	0.000004	0.000029	0.000129	0.001218	0.001173	0.013284	0.002302

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.025180	0.047583	0.000000	0.000000	0.000000	0.010820	0.032603	0.007169	0.016883
standardize signal averages SRM									
srms614-2	0.000132	0.000136	0.000013	0.001293	0.000380	0.000194	0.000087	0.000607	0.000696
srms612-2	0.006200	0.005987	0.000015	0.000684	0.000385	0.0009164	0.004234	0.029971	0.011726
srms610-2	0.089760	0.080619	0.000062	0.001190	0.002379	0.111104	0.046510	0.516812	0.167024

linest from std sig ave									
	0.057194	0.054608	0.000000	0.000000	0.000000	0.025143	0.065138	0.009981	0.027715

concentration data									
SRM614-9	0.26	0.46	0.00	0.00	0.00	0.19	0.21	0.37	0.96
SRM612-9	11.78	21.25	0.00	0.00	0.00	7.74	10.04	16.81	15.67
SRM610-9	170.44	306.85	0.00	0.00	0.00	109.62	127.29	320.74	241.27
AP1-9	0.18	3.16	0.00	0.00	0.00	0.02	0.06	18.01	0.48
AP2-9	0.74	7.89	0.00	0.00	0.00	0.31	1.43	17.51	2.15
AP3-9	2.09	7.38	0.00	0.00	0.00	1.55	7.14	29.67	7.50
AP4-9	3.76	13.34	0.00	0.00	0.00	5.26	15.31	39.43	15.87
M17-24-97-1	3.43	7.03	0.00	0.00	0.00	0.03	0.42	0.04	0.36
M17-24-97-2	3.02	6.79	0.00	0.00	0.00	0.02	0.44	0.01	0.29
M17-24-97-3	2.54	7.16	0.00	0.00	0.00	0.03	0.43	0.01	0.29
M17-24-97-4	2.13	7.29	0.00	0.00	0.00	0.05	0.37	0.07	0.38
M17-24-97-5	1.17	6.96	0.00	0.00	0.00	0.02	0.19	0.01	0.15
M17-24-97-6	1.16	6.84	0.00	0.00	0.00	0.03	0.20	0.01	0.17
M17-24-97-7	1.06	6.04	0.00	0.00	0.00	0.05	0.20	0.05	0.46
M17-24-97-8	1.07	5.67	0.00	0.00	0.00	0.04	0.12	0.02	0.29
M17-24-97-9	0.51	5.54	0.00	0.00	0.00	0.03	0.14	0.03	0.18
M17-24-97-10	1.02	5.32	0.00	0.00	0.00	0.05	0.18	0.06	0.47
M17-24-97-11	0.74	5.15	0.00	0.00	0.00	0.03	0.16	0.01	0.24
M17-24-97-12	1.11	5.48	0.00	0.00	0.00	0.03	0.16	0.02	0.25
M17-24-97-13	6.04	5.93	0.00	0.00	0.00	0.07	0.26	0.08	0.76
M17-24-97-14	1.24	5.03	0.00	0.00	0.00	0.05	0.16	0.01	0.30
M17-24-97-15	1.05	5.04	0.00	0.00	0.00	0.05	0.16	0.01	0.25
M17-24-97-16	2.84	5.44	0.00	0.00	0.00	0.06	0.34	0.09	0.39
M17-24-97-17	0.94	5.30	0.00	0.00	0.00	0.02	0.19	0.02	0.19
M17-24-97-18	2.87	5.30	0.00	0.00	0.00	0.02	0.22	0.03	0.25
SRM614-10	0.31	0.65	0.00	0.00	0.00	0.17	0.28	0.38	1.05
SRM612-10	15.00	27.62	0.00	0.00	0.00	9.26	13.64	20.04	18.29
SRM610-10	217.24	351.14	0.00	0.00	0.00	96.58	132.80	314.74	242.41
AP1-10	0.10	3.79	0.00	0.00	0.00	0.01	0.03	14.53	0.40
AP2-10	0.71	7.18	0.00	0.00	0.00	0.28	1.21	13.59	1.82
AP3-10	2.33	9.77	0.00	0.00	0.00	1.80	9.09	37.43	9.04
AP4-10	3.96	13.83	0.00	0.00	0.00	5.26	15.21	36.55	15.14

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-7	35.04	38.24	6.04	12.68	4.32	11.76	35.60	97.64	82.96
SRM614-7	198.40	233.08	44.36	2341.01	682.52	343.28	182.24	1036.57	1060.93
SRM612-7	5566.71	6372.20	42.32	1149.61	931.01	12831.67	5301.83	41640.11	14922.24
SRM610-7	40560.83	40541.87	86.28	975.85	4128.02	71254.16	25739.39	318187.31	99067.00
AP1-7	179.60	1452.13	39.80	369.60	75.16	87.84	97.48	57976.36	741.88
AP2-7	718.68	5553.35	65.88	532.28	262.76	1218.49	1531.37	81945.31	3647.18
AP3-7	3167.78	7479.04	149.08	1478.41	1934.49	11185.78	16226.53	342456.81	27993.48
AP4-7	4035.98	8359.01	114.52	865.68	1923.49	17907.74	14928.24	171915.13	28631.04
34HP45-837-1	1025.29	473.60	48.64	277.12	66.72	35.48	70.72	80.76	117.08
34HP45-837-2	1221.01	457.64	32.32	284.72	55.64	28.32	56.32	50.52	104.48
34HP45-837-3	1073.85	412.56	26.68	229.96	42.52	44.36	65.84	107.00	126.40
34HP45-837-4	3658.58	899.69	53.64	349.00	136.20	82.04	98.80	146.68	177.80
34HP45-837-5	3711.42	767.80	40.60	362.96	131.96	74.04	67.96	76.64	128.60
34HP45-837-6	3578.58	873.60	40.20	331.44	122.36	64.00	80.64	106.68	156.80
34HP45-837-7	3744.58	1460.65	66.64	425.88	149.68	90.72	136.40	171.32	228.92
34HP45-837-8	3087.94	1589.37	51.04	383.68	115.00	53.08	77.08	95.00	196.64
34HP45-837-9	2530.77	1509.45	49.68	246.68	80.96	70.84	72.64	129.12	188.72
34HP45-837-10	978.37	2592.77	25.20	241.00	42.80	78.24	85.84	260.04	220.44
34HP45-837-11	1030.45	2663.81	34.12	263.76	26.84	38.00	70.24	68.20	157.68
34HP45-837-12	1152.69	2380.77	40.00	247.36	49.20	38.04	80.64	91.16	180.84
34HP45-837-13	816.80	1074.77	33.56	298.64	41.68	115.84	118.44	228.00	272.84
34HP45-837-14	376.16	1199.17	27.00	249.32	27.56	48.68	82.56	122.40	202.32
34HP45-837-15	470.64	1274.45	30.44	234.32	18.52	64.08	100.96	113.76	232.80

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	290.40	375.84	48.36	2601.57	716.36	409.56	229.16	1196.25	1433.01
SRM612-8	9764.29	9515.45	33.00	1349.65	682.60	14624.04	6952.44	51184.05	19993.51
SRM610-8	89089.10	80872.38	96.40	1306.93	2967.34	106908.00	47303.63	561645.69	178205.92
AP1-8	258.12	2237.89	33.92	191.36	90.00	27.56	87.60	68311.70	918.89
AP2-8	1270.01	8199.73	55.52	324.48	289.60	1357.61	2088.21	103156.58	4810.51
AP3-8	4766.31	9771.05	110.36	888.16	2296.61	11104.58	19481.35	380706.50	33695.71
AP4-8	6046.79	11724.75	106.64	521.20	2189.41	20003.27	18441.10	210122.34	37033.77
blank-8	56.44	93.44	22.12	85.00	11.56	15.80	56.08	22.80	88.84
blank average	45.74	65.84	14.08	48.84	7.94	13.78	45.84	60.22	85.90
blank subtraction									
SRM614-7	152.66	167.24	30.28	2292.17	674.58	329.50	136.40	976.35	975.03
SRM612-7	5520.97	6306.36	28.24	1100.77	923.07	12817.89	5255.99	41579.89	14836.34
SRM610-7	40515.09	40476.03	72.20	927.01	4120.08	71240.38	25693.54	318127.09	98981.10
AP1-7	133.86	1386.29	25.72	320.76	67.22	74.06	51.64	57916.14	655.98
AP2-7	672.94	5487.51	51.80	483.44	254.82	1204.71	1485.53	81885.08	3561.28
AP3-7	3122.04	7413.20	135.00	1429.57	1926.55	11172.00	16180.69	342396.59	27907.58
AP4-7	3990.24	8293.17	100.44	816.84	1915.55	17893.96	14882.40	171854.91	28545.14
34HP45-837-1	979.55	407.76	34.56	228.28	58.78	21.70	24.88	20.54	31.18
34HP45-837-2	1175.27	391.80	18.24	235.88	47.70	14.54	10.48	-9.70	18.58
34HP45-837-3	1028.11	346.72	12.60	181.12	34.58	30.58	20.00	46.78	40.50
34HP45-837-4	3612.84	833.84	39.56	300.16	128.26	68.26	52.96	86.46	91.90
34HP45-837-5	3665.68	701.96	26.52	314.12	124.02	60.26	22.12	16.42	42.70
34HP45-837-6	3532.84	807.76	26.12	282.60	114.42	50.22	34.80	46.46	70.90
34HP45-837-7	3698.84	1394.81	52.56	377.04	141.74	76.94	90.56	111.10	143.02
34HP45-837-8	3042.20	1523.53	36.96	334.84	107.06	39.30	31.24	34.78	110.74
34HP45-837-9	2485.03	1443.61	35.60	197.84	73.02	57.06	26.80	68.90	102.82
34HP45-837-10	932.63	2526.93	11.12	192.16	34.86	64.46	40.00	199.82	134.54
34HP45-837-11	984.71	2597.97	20.04	214.92	18.90	24.22	24.40	7.98	71.78
34HP45-837-12	1106.95	2314.93	25.92	198.52	41.26	24.26	34.80	30.94	94.94
34HP45-837-13	771.06	1008.93	19.48	249.80	33.74	102.06	72.60	167.78	186.94
34HP45-837-14	330.42	1133.33	12.92	200.48	19.62	34.90	36.72	62.18	116.42
34HP45-837-15	424.90	1208.61	16.36	185.48	10.58	50.30	55.12	53.54	146.90
SRM614-8	244.66	310.00	34.28	2552.73	708.42	395.78	183.32	1136.03	1347.11
SRM612-8	9718.55	9449.61	18.92	1300.81	674.66	14610.26	6906.60	51123.83	19907.61
SRM610-8	89043.36	80806.53	82.32	1258.09	2959.40	106894.22	47257.78	561585.47	178120.02
AP1-8	212.38	2172.05	19.84	142.52	82.06	13.78	41.76	68251.48	832.98
AP2-8	1224.27	8133.89	41.44	275.64	281.66	1343.83	2042.37	103096.36	4724.61
AP3-8	4720.57	9705.21	96.28	839.32	2288.67	11090.80	19435.51	380646.28	33609.81
AP4-8	6001.05	11658.91	92.56	472.36	2181.47	19989.49	18395.26	210062.12	36947.87
zero correction									
SRM614-7	152.66	167.24	30.28	2292.17	674.58	329.50	136.40	976.35	975.03
SRM612-7	5520.97	6306.36	28.24	1100.77	923.07	12817.89	5255.99	41579.89	14836.34
SRM610-7	40515.09	40476.03	72.20	927.01	4120.08	71240.38	25693.54	318127.09	98981.10
AP1-7	133.86	1386.29	25.72	320.76	67.22	74.06	51.64	57916.14	655.98
AP2-7	672.94	5487.51	51.80	483.44	254.82	1204.71	1485.53	81885.08	3561.28
AP3-7	3122.04	7413.20	135.00	1429.57	1926.55	11172.00	16180.69	342396.59	27907.58
AP4-7	3990.24	8293.17	100.44	816.84	1915.55	17893.96	14882.40	171854.91	28545.14
34HP45-837-1	979.55	407.76	34.56	228.28	58.78	21.70	24.88	20.54	31.18
34HP45-837-2	1175.27	391.80	18.24	235.88	47.70	14.54	10.48	0.00	18.58
34HP45-837-3	1028.11	346.72	12.60	181.12	34.58	30.58	20.00	46.78	40.50
34HP45-837-4	3612.84	833.84	39.56	300.16	128.26	68.26	52.96	86.46	91.90
34HP45-837-5	3665.68	701.96	26.52	314.12	124.02	60.26	22.12	16.42	42.70
34HP45-837-6	3532.84	807.76	26.12	282.60	114.42	50.22	34.80	46.46	70.90
34HP45-837-7	3698.84	1394.81	52.56	377.04	141.74	76.94	90.56	111.10	143.02
34HP45-837-8	3042.20	1523.53	36.96	334.84	107.06	39.30	31.24	34.78	110.74
34HP45-837-9	2485.03	1443.61	35.60	197.84	73.02	57.06	26.80	68.90	102.82
34HP45-837-10	932.63	2526.93	11.12	192.16	34.86	64.46	40.00	199.82	134.54
34HP45-837-11	984.71	2597.97	20.04	214.92	18.90	24.22	24.40	7.98	71.78
34HP45-837-12	1106.95	2314.93	25.92	198.52	41.26	24.26	34.80	30.94	94.94
34HP45-837-13	771.06	1008.93	19.48	249.80	33.74	102.06	72.60	167.78	186.94
34HP45-837-14	330.42	1133.33	12.92	200.48	19.62	34.90	36.72	62.18	116.42
34HP45-837-15	424.90	1208.61	16.36	185.48	10.58	50.30	55.12	53.54	146.90
SRM614-8	244.66	310.00	34.28	2552.73	708.42	395.78	183.32	1136.03	1347.11
SRM612-8	9718.55	9449.61	18.92	1300.81	674.66	14610.26	6906.60	51123.83	19907.61
SRM610-8	89043.36	80806.53	82.32	1258.09	2959.40	106894.22	47257.78	561585.47	178120.02
AP1-8	212.38	2172.05	19.84	142.52	82.06	13.78	41.76	68251.48	832.98
AP2-8	1224.27	8133.89	41.44	275.64	281.66	1343.83	2042.37	103096.36	4724.61
AP3-8	4720.57	9705.21	96.28	839.32	2288.67	11090.80	19435.51	380646.28	33609.81
AP4-8	6001.05	11658.91	92.56	472.36	2181.47	19989.49	18395.26	210062.12	36947.87
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	2.01	9.07			3.05	8.49	29.84	8.97
STD AP4	3.94	13.11			4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-7	0.000069	0.000075	0.000014	0.001033	0.000304	0.000148	0.000061	0.000440	0.000439
SRM612-7	0.002970	0.003392	0.000015	0.000592	0.000497	0.006895	0.002827	0.022366	0.007980
SRM610-7	0.041844	0.041803	0.000075	0.000957	0.004255	0.073577	0.026536	0.328560	0.102227
AP1-7	0.000013	0.000133	0.000002	0.000031	0.000006	0.000007	0.000005	0.005556	0.000063
AP2-7	0.000056	0.000455	0.000004	0.000040	0.000021	0.000100	0.000123	0.006790	0.000295
AP3-7	0.000190	0.000450	0.000008	0.000087	0.000117	0.000679	0.000983	0.020803	0.001696
AP4-7	0.000276	0.000573	0.000007	0.000056	0.000132	0.001237	0.001028	0.011876	0.001973
34HP45-837-1	0.000240	0.000100	0.000008	0.000056	0.000014	0.000005	0.000006	0.000005	0.000008
34HP45-837-2	0.000296	0.000099	0.000005	0.000059	0.000012	0.000004	0.000003	0.000000	0.000005
34HP45-837-3	0.000310	0.000105	0.000004	0.000055	0.000010	0.000009	0.000006	0.000014	0.000012
34HP45-837-4	0.000393	0.000091	0.000004	0.000033	0.000014	0.000007	0.000006	0.000009	0.000010
34HP45-837-5	0.000430	0.000082	0.000003	0.000037	0.000015	0.000007	0.000003	0.000002	0.000005
34HP45-837-6	0.000446	0.000102	0.000003	0.000036	0.000014	0.000006	0.000004	0.000006	0.000009
34HP45-837-7	0.000467	0.000176	0.000007	0.000048	0.000018	0.000010	0.000011	0.000014	0.000018
34HP45-837-8	0.000379	0.000190	0.000005	0.000042	0.000013	0.000005	0.000004	0.000004	0.000014
34HP45-837-9	0.000385	0.000224	0.000006	0.000031	0.000011	0.000009	0.000004	0.000011	0.000016
34HP45-837-10	0.000192	0.000520	0.000002	0.000040	0.000007	0.000013	0.000008	0.000041	0.000028
34HP45-837-11	0.000185	0.000489	0.000004	0.000040	0.000004	0.000005	0.000005	0.000002	0.000014
34HP45-837-12	0.000194	0.000405	0.000005	0.000035	0.000007	0.000004	0.000006	0.000005	0.000017
34HP45-837-13	0.000214	0.000279	0.000005	0.000069	0.000009	0.000028	0.000020	0.000046	0.000052
34HP45-837-14	0.000090	0.000307	0.000004	0.000054	0.000005	0.000009	0.000010	0.000017	0.000032
34HP45-837-15	0.000106	0.000302	0.000004	0.000046	0.000003	0.000013	0.000014	0.000013	0.000037
SRM614-8	0.000137	0.000173	0.000019	0.001425	0.000395	0.000221	0.000102	0.000634	0.000752
SRM612-8	0.005955	0.005790	0.000012	0.000797	0.000413	0.008952	0.004232	0.031325	0.012198
SRM610-8	0.089922	0.081603	0.000083	0.001270	0.002989	0.107948	0.047724	0.567124	0.179877
AP1-8	0.000016	0.000164	0.000001	0.000011	0.000006	0.000001	0.000003	0.005142	0.000063
AP2-8	0.000079	0.000522	0.000003	0.000018	0.000018	0.000086	0.000131	0.006614	0.000303
AP3-8	0.000242	0.000498	0.000005	0.000043	0.000118	0.000569	0.000998	0.019546	0.001726
AP4-8	0.000356	0.000691	0.000005	0.000028	0.000129	0.001185	0.001090	0.012448	0.002189

standardize signal averages AP									
AP1	0.000014	0.000148	0.000002	0.000021	0.000006	0.000004	0.000004	0.005349	0.000063
AP2	0.000067	0.000488	0.000003	0.000029	0.000020	0.000093	0.000127	0.006702	0.000299
AP3	0.000216	0.000474	0.000007	0.000065	0.000117	0.000624	0.000991	0.020174	0.001711
AP4	0.000316	0.000632	0.000006	0.000042	0.000131	0.001211	0.001059	0.012162	0.002081

linest from std sig ave									
	0.028894	0.047556	0.000000	0.000000	0.000000	0.010465	0.029071	0.005264	0.016197

standardize signal averages SRM									
srm614-2	0.000103	0.000124	0.000016	0.001229	0.000350	0.000185	0.000082	0.000537	0.000596
srm612-2	0.004462	0.004591	0.000013	0.000695	0.000455	0.007923	0.003530	0.026845	0.010089
srm610-2	0.065883	0.061703	0.000079	0.001114	0.003622	0.090762	0.037130	0.447842	0.141052

linest from std sig ave									
	0.077928	0.071347	0.000000	0.000000	0.000000	0.030766	0.081568	0.011518	0.032817

concentration data									
SRM614-7	0.17	0.31	0.00	0.00	0.00	0.13	0.15	0.20	0.61
SRM612-7	7.36	13.84	0.00	0.00	0.00	6.19	7.05	10.10	11.09
SRM610-7	103.69	170.50	0.00	0.00	0.00	66.04	66.16	148.32	142.00
AP1-7	0.15	2.52	0.00	0.00	0.00	0.03	0.06	11.67	0.41
AP2-7	0.64	8.63	0.00	0.00	0.00	0.42	1.43	14.26	1.91
AP3-7	2.19	8.54	0.00	0.00	0.00	2.83	11.40	43.68	10.96
AP4-7	3.18	10.87	0.00	0.00	0.00	5.16	11.93	24.94	12.75
34HP45-837-1	2.77	1.90	0.00	0.00	0.00	0.02	0.07	0.01	0.05
34HP45-837-2	3.41	1.87	0.00	0.00	0.00	0.02	0.03	0.00	0.03
34HP45-837-3	3.58	1.99	0.00	0.00	0.00	0.04	0.07	0.03	0.08
34HP45-837-4	4.52	1.72	0.00	0.00	0.00	0.03	0.07	0.02	0.06
34HP45-837-5	4.95	1.56	0.00	0.00	0.00	0.03	0.03	0.00	0.03
34HP45-837-6	5.14	1.93	0.00	0.00	0.00	0.03	0.05	0.01	0.06
34HP45-837-7	5.38	3.34	0.00	0.00	0.00	0.04	0.13	0.03	0.12
34HP45-837-8	4.37	3.61	0.00	0.00	0.00	0.02	0.05	0.01	0.09
34HP45-837-9	4.44	4.25	0.00	0.00	0.00	0.04	0.05	0.02	0.10
34HP45-837-10	2.21	9.87	0.00	0.00	0.00	0.06	0.10	0.09	0.18

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	2.14	9.28	0.00	0.00	0.00	0.02	0.05	0.00	0.09
34HP45-837-12	2.23	7.68	0.00	0.00	0.00	0.02	0.07	0.01	0.11
34HP45-837-13	2.46	5.30	0.00	0.00	0.00	0.12	0.23	0.10	0.33
34HP45-837-14	1.03	5.83	0.00	0.00	0.00	0.04	0.12	0.04	0.20
34HP45-837-15	1.23	5.74	0.00	0.00	0.00	0.05	0.16	0.03	0.24
SRM614-8	0.34	0.71	0.00	0.00	0.00	0.20	0.26	0.29	1.04
SRM612-8	14.76	23.61	0.00	0.00	0.00	8.03	10.55	14.14	16.94
SRM610-8	222.83	332.82	0.00	0.00	0.00	96.88	118.98	256.02	249.86
AP1-8	0.18	3.10	0.00	0.00	0.00	0.00	0.04	10.80	0.41
AP2-8	0.91	9.90	0.00	0.00	0.00	0.36	1.52	13.89	1.96
AP3-8	2.79	9.45	0.00	0.00	0.00	2.38	11.57	41.04	11.15
AP4-8	4.10	13.11	0.00	0.00	0.00	4.95	12.64	26.14	14.15

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn	
raw data										
blank-5		42.08	72.88	8.08	11.24	11.64	43.68	70.60	201.96	112.36
SRM614-5		158.28	216.36	30.92	1629.25	416.40	270.52	157.24	789.88	976.09
SRM612-5		5573.19	6310.32	41.44	1093.45	896.45	13287.68	5672.39	42718.00	15789.25
SRM610-5		46992.54	48783.59	104.12	1153.09	4322.50	84922.28	31394.38	382684.03	119794.80
AP1-5		231.72	2211.25	49.96	649.04	79.68	88.64	131.68	130438.13	995.61
AP2-5		964.73	7541.32	81.16	687.08	293.12	1625.13	1886.33	105686.72	4364.06
AP3-5		3836.22	8480.53	143.56	1541.93	2279.69	13423.96	16858.33	371873.00	31871.66
AP4-5		4463.23	7234.00	117.40	674.40	1618.49	9991.46	11865.51	131875.42	24607.18
34HP45-718-1		2077.45	1609.81	79.36	429.76	93.32	523.24	117.96	98.16	462.08
34HP45-718-2		3342.86	2521.33	84.52	573.72	131.24	136.76	115.92	108.64	562.04
34HP45-718-3		4925.27	2434.33	80.88	550.04	168.04	738.24	144.04	137.16	650.40
34HP45-718-4		28581.32	380.24	274.28	1313.25	837.28	729.92	467.96	207.36	589.44
34HP45-718-5		19914.43	342.08	194.48	1020.25	565.04	436.24	430.52	114.52	435.68
34HP45-718-6		18145.74	393.44	167.88	1000.97	500.08	723.12	521.12	143.68	852.40
34HP45-718-7		14687.84	303.12	180.80	915.73	375.52	887.53	460.36	160.56	533.52
34HP45-718-8		15801.57	280.72	191.80	868.72	411.56	420.08	404.32	105.64	525.84
34HP45-718-9		18162.82	301.28	180.76	936.09	385.12	456.52	443.00	124.96	570.12
34HP45-718-10		15331.57	306.48	171.68	888.60	365.32	1649.17	407.88	276.92	1003.01
34HP45-718-11		17414.22	315.96	179.76	890.85	370.76	398.40	397.56	108.56	643.24
34HP45-718-12		16871.41	367.28	164.68	932.57	344.12	998.21	454.64	206.28	809.12
34HP45-718-13		11041.66	995.81	329.72	534.36	297.20	6238.92	967.73	818.52	5326.47
34HP45-718-14		13169.55	507.88	270.56	490.24	317.88	1902.05	462.20	383.28	2164.25
34HP45-718-15		9376.53	361.64	119.24	381.64	181.08	1169.97	307.24	159.72	1811.29
34HP45-718-16		6819.44	837.28	77.52	592.08	127.24	540.08	347.64	218.72	677.80
34HP45-718-17		6708.04	877.56	90.60	784.16	142.24	162.88	182.20	96.40	470.60
34HP45-718-18		6097.71	1449.97	90.00	565.76	119.52	323.44	140.76	79.68	664.84
SRM614-6		274.76	287.04	42.48	1670.61	463.36	260.12	189.80	825.28	1079.85
SRM612-6		8751.13	8898.21	54.60	1206.81	617.20	13473.80	6631.00	45553.14	18071.34
SRM610-6		82176.54	80266.41	116.68	1417.85	2606.65	108239.21	45873.14	568148.81	176714.64
AP1-6		333.96	2660.14	42.72	279.64	76.40	45.44	113.68	98666.39	937.37
AP2-6		1018.69	8061.77	47.08	378.08	244.04	1252.73	1910.41	92141.76	4440.83
AP3-6		4885.51	10081.02	107.20	924.09	2173.41	13471.20	20428.91	438231.28	36705.77
AP4-6		5360.95	7957.16	63.72	358.68	1346.05	7646.52	11449.02	116013.13	25006.82
blank-6		75.92	98.92	31.04	152.24	12.16	14.00	46.80	18.08	78.20
blank average		59.00	85.90	19.56	81.74	11.90	28.84	58.70	110.02	95.28

blank subtraction										
SRM614-5		99.28	130.46	11.36	1547.51	404.50	241.68	98.54	679.86	880.80
SRM612-5		5514.19	6224.41	21.88	1011.71	884.55	13258.83	5613.69	42607.98	15693.97
SRM610-5		46933.54	48697.69	84.56	1071.35	4310.60	84893.44	31335.68	382574.01	119699.52
AP1-5		172.72	2125.35	30.40	567.30	67.78	59.80	72.98	130328.11	900.33
AP2-5		905.73	7455.42	61.60	605.34	281.22	1596.29	1827.63	105576.70	4268.78
AP3-5		3777.22	8394.63	124.00	1460.19	2267.79	13395.11	16799.63	371762.98	31776.38
AP4-5		4404.22	7148.10	97.84	592.66	1606.59	9962.62	11806.81	131765.40	24511.90
34HP45-718-1		2018.45	1523.91	59.80	348.02	81.42	494.40	59.26	-11.86	366.80
34HP45-718-2		3283.86	2435.43	64.96	491.98	119.34	107.92	57.22	-1.38	466.76
34HP45-718-3		4866.27	2348.43	61.32	468.30	156.14	709.40	85.34	27.14	555.12
34HP45-718-4		28522.32	294.34	254.72	1231.51	825.38	701.08	409.26	97.34	494.16
34HP45-718-5		19855.43	256.18	174.92	938.51	553.14	407.40	371.82	4.50	340.40
34HP45-718-6		18086.74	307.54	148.32	919.23	488.18	694.28	462.42	33.66	757.12
34HP45-718-7		14628.84	217.22	161.24	833.98	363.62	858.68	401.66	50.54	438.24
34HP45-718-8		15742.57	194.82	172.24	786.98	399.66	391.24	345.62	-4.38	430.56
34HP45-718-9		18103.82	215.38	161.20	854.34	373.22	427.68	384.30	14.94	474.84
34HP45-718-10		15272.57	220.58	152.12	806.86	353.42	1620.33	349.18	166.90	907.73

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	17355.22	230.06	160.20	809.10	358.86	369.56	338.86	-1.46	547.96
34HP45-718-12	16812.41	281.38	145.12	850.82	332.22	969.37	395.94	96.26	713.84
34HP45-718-13	10982.66	909.91	310.16	452.62	285.30	6210.07	909.03	708.50	5231.19
34HP45-718-14	13110.55	421.98	251.00	408.50	305.98	1873.21	403.50	273.26	2068.97
34HP45-718-15	9317.53	275.74	99.68	299.90	169.18	1141.13	248.54	49.70	1716.01
34HP45-718-16	6760.44	751.38	57.96	510.34	115.34	511.24	288.94	108.70	582.52
34HP45-718-17	6649.04	791.66	71.04	702.42	130.34	134.04	123.50	-13.62	375.32
34HP45-718-18	6038.71	1364.07	70.44	484.02	107.62	294.60	82.06	-30.34	569.56
SRM614-6	215.76	201.14	22.92	1588.87	451.46	231.28	131.10	715.26	984.57
SRM612-6	8692.13	8812.31	35.04	1125.07	605.30	13444.96	6572.30	45443.12	17976.06
SRM610-6	82117.54	80180.51	97.12	1336.11	2594.75	108210.37	45814.44	568038.79	176619.36
AP1-6	274.96	2574.23	23.16	197.90	64.50	16.60	54.98	98556.37	842.08
AP2-6	959.69	7975.86	27.52	296.34	232.14	1223.89	1851.71	92031.74	4345.54
AP3-6	4826.51	9995.12	87.64	842.34	2161.51	13442.35	20370.21	438121.26	36610.49
AP4-6	5301.95	7871.26	44.16	276.94	1334.15	7617.68	11390.32	115903.11	24911.54

zero correction

SRM614-5	99.28	130.46	11.36	1547.51	404.50	241.68	98.54	679.86	880.80
SRM612-5	5514.19	6224.41	21.88	1011.71	884.55	13258.83	5613.69	42607.98	15693.97
SRM610-5	46933.54	48697.69	84.56	1071.35	4310.60	84893.44	31335.68	382574.01	119699.52
AP1-5	172.72	2125.35	30.40	567.30	67.78	59.80	72.98	130328.11	900.33
AP2-5	905.73	7455.42	61.60	605.34	281.22	1596.29	1827.63	105576.70	4268.78
AP3-5	3777.22	8394.63	124.00	1460.19	2267.79	13395.11	16799.63	371762.98	31776.38
AP4-5	4404.22	7148.10	97.84	592.66	1606.59	9962.62	11806.81	131765.40	24511.90
34HP45-718-1	2018.45	1523.91	59.80	348.02	81.42	494.40	59.26	0.00	366.80
34HP45-718-2	3283.86	2435.43	64.96	491.98	119.34	107.92	57.22	0.00	466.76
34HP45-718-3	4866.27	2348.43	61.32	468.30	156.14	709.40	85.34	27.14	555.12
34HP45-718-4	28522.32	294.34	254.72	1231.51	825.38	701.08	409.26	97.34	494.16
34HP45-718-5	19855.43	256.18	174.92	938.51	553.14	407.40	371.82	4.50	340.40
34HP45-718-6	18086.74	307.54	148.32	919.23	488.18	694.28	462.42	33.66	757.12
34HP45-718-7	14628.84	217.22	161.24	833.98	363.62	858.68	401.66	50.54	438.24
34HP45-718-8	15742.57	194.82	172.24	786.98	399.66	391.24	345.62	0.00	430.56
34HP45-718-9	18103.82	215.38	161.20	854.34	373.22	427.68	384.30	14.94	474.84
34HP45-718-10	15272.57	220.58	152.12	806.86	353.42	1620.33	349.18	166.90	907.73
34HP45-718-11	17355.22	230.06	160.20	809.10	358.86	369.56	338.86	0.00	547.96
34HP45-718-12	16812.41	281.38	145.12	850.82	332.22	969.37	395.94	96.26	713.84
34HP45-718-13	10982.66	909.91	310.16	452.62	285.30	6210.07	909.03	708.50	5231.19
34HP45-718-14	13110.55	421.98	251.00	408.50	305.98	1873.21	403.50	273.26	2068.97
34HP45-718-15	9317.53	275.74	99.68	299.90	169.18	1141.13	248.54	49.70	1716.01
34HP45-718-16	6760.44	751.38	57.96	510.34	115.34	511.24	288.94	108.70	582.52
34HP45-718-17	6649.04	791.66	71.04	702.42	130.34	134.04	123.50	0.00	375.32
34HP45-718-18	6038.71	1364.07	70.44	484.02	107.62	294.60	82.06	0.00	569.56
SRM614-6	215.76	201.14	22.92	1588.87	451.46	231.28	131.10	715.26	984.57
SRM612-6	8692.13	8812.31	35.04	1125.07	605.30	13444.96	6572.30	45443.12	17976.06
SRM610-6	82117.54	80180.51	97.12	1336.11	2594.75	108210.37	45814.44	568038.79	176619.36
AP1-6	274.96	2574.23	23.16	197.90	64.50	16.60	54.98	98556.37	842.08
AP2-6	959.69	7975.86	27.52	296.34	232.14	1223.89	1851.71	92031.74	4345.54
AP3-6	4826.51	9995.12	87.64	842.34	2161.51	13442.35	20370.21	438121.26	36610.49
AP4-6	5301.95	7871.26	44.16	276.94	1334.15	7617.68	11390.32	115903.11	24911.54

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-5	0.000066	0.000087	0.000008	0.001030	0.000269	0.000161	0.000066	0.000452	0.000586
SRM612-5	0.003177	0.003586	0.000013	0.000583	0.000510	0.007639	0.003234	0.024547	0.009042
SRM610-5	0.044059	0.045715	0.000079	0.001006	0.004047	0.079693	0.029416	0.359140	0.112368
AP1-5	0.000013	0.000162	0.000002	0.000043	0.000005	0.000005	0.000006	0.009943	0.000069
AP2-5	0.000064	0.000528	0.000004	0.000043	0.000020	0.000113	0.000129	0.007470	0.000302
AP3-5	0.000219	0.000488	0.000007	0.000085	0.000132	0.000778	0.000976	0.021598	0.001846
AP4-5	0.000265	0.000430	0.000006	0.000036	0.000097	0.000599	0.000710	0.007921	0.001473
34HP45-718-1	0.000239	0.000180	0.000007	0.000041	0.000010	0.000058	0.000007	0.000000	0.000043
34HP45-718-2	0.000258	0.000192	0.000005	0.000039	0.000009	0.000008	0.000005	0.000000	0.000037

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000325	0.000157	0.000004	0.000031	0.000010	0.000047	0.000006	0.000002	0.000037
34HP45-718-4	0.001347	0.000014	0.000012	0.000058	0.000039	0.000033	0.000019	0.000005	0.000023
34HP45-718-5	0.001204	0.000016	0.000011	0.000057	0.000034	0.000025	0.000023	0.000000	0.000021
34HP45-718-6	0.001149	0.000020	0.000009	0.000058	0.000031	0.000044	0.000029	0.000002	0.000048
34HP45-718-7	0.000848	0.000013	0.000009	0.000048	0.000021	0.000050	0.000023	0.000003	0.000025
34HP45-718-8	0.000865	0.000011	0.000009	0.000043	0.000022	0.000021	0.000019	0.000000	0.000024
34HP45-718-9	0.000949	0.000011	0.000008	0.000045	0.000020	0.000022	0.000020	0.000001	0.000025
34HP45-718-10	0.000962	0.000014	0.000010	0.000051	0.000022	0.000102	0.000022	0.000011	0.000057
34HP45-718-11	0.001023	0.000014	0.000009	0.000048	0.000021	0.000022	0.000020	0.000000	0.000032
34HP45-718-12	0.000924	0.000015	0.000008	0.000047	0.000018	0.000053	0.000022	0.000005	0.000039
34HP45-718-13	0.000691	0.000057	0.000020	0.000028	0.000018	0.000391	0.000057	0.000045	0.000329
34HP45-718-14	0.000811	0.000026	0.000016	0.000025	0.000019	0.000116	0.000025	0.000017	0.000128
34HP45-718-15	0.000522	0.000015	0.000006	0.000017	0.000009	0.000064	0.000014	0.000003	0.000096
34HP45-718-16	0.000424	0.000047	0.000004	0.000032	0.000007	0.000032	0.000018	0.000007	0.000037
34HP45-718-17	0.000357	0.000043	0.000004	0.000038	0.000007	0.000007	0.000007	0.000000	0.000020
34HP45-718-18	0.000359	0.000081	0.000004	0.000029	0.000006	0.000018	0.000005	0.000000	0.000034
SRM614-6	0.000178	0.000166	0.000019	0.001308	0.000372	0.000190	0.000108	0.000589	0.000811
SRM612-6	0.005763	0.005842	0.000023	0.000746	0.000401	0.008914	0.004357	0.030128	0.011918
SRM610-6	0.081961	0.080027	0.000097	0.001334	0.002590	0.108004	0.045727	0.566954	0.176282
AP1-6	0.000020	0.000184	0.000002	0.000014	0.000005	0.000001	0.000004	0.007052	0.000060
AP2-6	0.000063	0.000525	0.000002	0.000019	0.000015	0.000080	0.000122	0.006053	0.000286
AP3-6	0.000259	0.000536	0.000005	0.000045	0.000116	0.000721	0.001092	0.023491	0.001963
AP4-6	0.000312	0.000463	0.000003	0.000016	0.000079	0.000448	0.000670	0.006821	0.001466

standardize signal averages AP

AP1	0.000016	0.000173	0.000002	0.000029	0.000005	0.000003	0.000005	0.008497	0.000064
AP2	0.000064	0.000526	0.000003	0.000031	0.000018	0.000097	0.000126	0.006761	0.000294
AP3	0.000239	0.000512	0.000006	0.000065	0.000124	0.000749	0.001034	0.022545	0.001905
AP4	0.000288	0.000446	0.000004	0.000026	0.000088	0.000524	0.000690	0.007371	0.001470

linest from std sig ave

	0.029069	0.049256	0.000000	0.000000	0.000000	0.014450	0.031187	0.004927	0.017086
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standardize signal averages SRM

srM614-2	0.000122	0.000126	0.000013	0.001169	0.000320	0.000176	0.000087	0.000521	0.000698
srM612-2	0.004470	0.004714	0.000018	0.000664	0.000455	0.008276	0.003796	0.027338	0.010480
srM610-2	0.063010	0.062871	0.000088	0.001170	0.003318	0.093849	0.037572	0.463047	0.144325

linest from std sig ave

	0.081467	0.070020	0.000000	0.000000	0.000000	0.029752	0.080568	0.011140	0.032071
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concentration data

SRM614-5	0.16	0.37	0.00	0.00	0.00	0.20	0.18	0.19	0.86
SRM612-5	7.92	15.15	0.00	0.00	0.00	9.47	8.65	10.37	13.25
SRM610-5	109.84	193.12	0.00	0.00	0.00	98.76	78.68	151.76	164.66
AP1-5	0.15	3.19	0.00	0.00	0.00	0.03	0.07	19.54	0.47
AP2-5	0.74	10.37	0.00	0.00	0.00	0.65	1.61	14.68	2.06
AP3-5	2.54	9.58	0.00	0.00	0.00	4.49	12.14	42.45	12.58
AP4-5	3.07	8.44	0.00	0.00	0.00	3.45	8.83	15.57	10.04
34HP45-718-1	2.77	3.54	0.00	0.00	0.00	0.34	0.09	0.00	0.30
34HP45-718-2	3.00	3.77	0.00	0.00	0.00	0.05	0.06	0.00	0.25
34HP45-718-3	3.76	3.08	0.00	0.00	0.00	0.27	0.07	0.00	0.25
34HP45-718-4	15.62	0.27	0.00	0.00	0.00	0.19	0.24	0.01	0.16
34HP45-718-5	13.96	0.31	0.00	0.00	0.00	0.14	0.28	0.00	0.14
34HP45-718-6	13.32	0.38	0.00	0.00	0.00	0.25	0.37	0.00	0.33
34HP45-718-7	9.84	0.25	0.00	0.00	0.00	0.29	0.29	0.01	0.17
34HP45-718-8	10.03	0.21	0.00	0.00	0.00	0.12	0.24	0.00	0.16
34HP45-718-9	11.00	0.22	0.00	0.00	0.00	0.13	0.25	0.00	0.17
34HP45-718-10	11.16	0.27	0.00	0.00	0.00	0.59	0.27	0.02	0.39
34HP45-718-11	11.86	0.27	0.00	0.00	0.00	0.13	0.25	0.00	0.22
34HP45-718-12	10.72	0.30	0.00	0.00	0.00	0.31	0.27	0.01	0.27
34HP45-718-13	8.01	1.12	0.00	0.00	0.00	2.25	0.71	0.09	2.24
34HP45-718-14	9.41	0.51	0.00	0.00	0.00	0.67	0.31	0.03	0.87
34HP45-718-15	6.05	0.30	0.00	0.00	0.00	0.37	0.17	0.01	0.66
34HP45-718-16	4.92	0.93	0.00	0.00	0.00	0.18	0.23	0.01	0.25
34HP45-718-17	4.14	0.84	0.00	0.00	0.00	0.04	0.08	0.00	0.14
34HP45-718-18	4.16	1.59	0.00	0.00	0.00	0.10	0.06	0.00	0.23
SRM614-6	0.44	0.70	0.00	0.00	0.00	0.24	0.29	0.25	1.19
SRM612-6	14.37	24.68	0.00	0.00	0.00	11.05	11.65	12.73	17.46
SRM610-6	204.33	338.06	0.00	0.00	0.00	133.84	122.31	239.58	258.31
AP1-6	0.23	3.62	0.00	0.00	0.00	0.01	0.05	13.86	0.41
AP2-6	0.73	10.31	0.00	0.00	0.00	0.46	1.52	11.90	1.95
AP3-6	3.00	10.53	0.00	0.00	0.00	4.15	13.59	46.17	13.38
AP4-6	3.62	9.10	0.00	0.00	0.00	2.58	8.34	13.41	9.99

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	439.90	376.80			239.40	259.40	441.40	396.30
STD AP1	0.28	5.23			0.00	0.05	29.00	0.47
STD AP2	0.87	7.01			0.76	2.62	28.72	3.23
STD AP3	2.01	9.07			3.05	8.49	29.84	8.97
STD AP4	3.94	13.11			4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-3	45.28	56.40	9.28	16.56	5.56	11.12	40.40	35.56	119.72
SRM614-3	240.00	292.28	54.80	2511.37	758.12	446.20	234.16	1220.49	1314.01
SRM612-3	7674.24	9183.93	40.40	1644.13	1216.65	19584.47	9152.41	62364.63	21673.48
SRM610-3	52584.02	50809.61	95.68	1189.21	4637.03	76710.87	28647.24	338889.91	111362.87
AP1-3	380.96	3000.02	44.08	693.88	103.16	207.68	303.44	130815.34	1215.25
AP2-3	1347.25	9645.93	77.20	771.72	430.24	2310.01	2636.01	137163.69	5475.47
AP3-3	6968.52	15799.25	236.28	2853.98	4971.11	34426.59	42987.56	1033510.70	70805.59
AP4-3	5545.67	10192.94	153.08	982.73	2264.69	22297.85	17041.90	193994.94	34309.27
34HP45-856-1	7061.48	421.24	308.84	873.56	248.56	274.20	222.16	180.24	483.28
34HP45-856-2	7180.28	392.60	256.72	794.52	229.04	157.08	218.72	95.04	434.96
34HP45-856-3	6350.24	431.44	224.92	662.88	217.64	100.80	185.04	94.08	499.80
34HP45-856-4	8979.49	387.04	185.44	490.72	292.20	167.48	190.96	202.68	847.40
34HP45-856-5	10370.62	343.56	183.16	431.92	281.64	161.52	188.64	86.44	937.77
34HP45-856-6	10527.10	485.08	195.60	476.76	257.52	136.52	167.76	192.52	796.36
34HP45-856-7	11193.22	327.96	118.52	344.60	262.76	126.08	149.32	270.36	854.68
34HP45-856-8	14457.92	456.08	134.60	316.60	322.08	142.56	169.52	145.76	973.97
34HP45-856-9	10735.98	405.76	141.24	338.00	234.76	161.32	200.00	112.24	929.21
34HP45-856-10	5717.07	481.72	128.76	525.00	105.16	126.84	167.60	132.88	526.28
34HP45-856-11	6156.07	488.84	143.32	501.72	108.48	75.88	141.76	44.04	462.80
34HP45-856-12	6993.48	515.04	151.40	494.88	120.16	105.08	166.56	145.24	662.44
34HP45-856-13	5384.43	2494.49	125.68	552.64	105.56	117.76	160.00	114.48	436.72
34HP45-856-14	4566.31	3873.90	90.84	434.08	110.72	119.64	173.12	85.08	467.72
34HP45-856-15	3098.78	4626.15	104.92	391.80	75.96	87.80	138.24	53.44	358.52
34HP45-856-16	1876.85	6875.24	46.44	277.44	49.08	115.64	109.76	180.80	379.72
34HP45-856-17	1023.61	7323.16	47.24	359.36	48.88	49.84	99.08	48.96	249.96
34HP45-856-18	1148.65	6256.08	45.36	328.36	29.88	44.16	88.16	60.44	253.16
SRM614-4	292.64	307.44	62.96	2134.01	626.20	337.08	216.84	1106.73	1643.21
SRM612-4	11299.62	11492.27	39.56	1620.81	769.88	15837.09	7987.40	59033.53	22805.09
SRM610-4	105322.80	102377.26	86.60	1608.29	3044.54	127334.48	51323.41	686675.25	215190.05
AP1-4	293.20	2984.06	41.44	326.68	84.04	55.88	152.64	109935.86	1119.57
AP2-4	1386.17	10115.30	40.16	328.92	332.52	1510.57	2414.37	114552.92	5408.91
AP3-4	7750.76	17435.86	147.04	1555.41	4025.18	26552.91	40973.31	939234.88	70401.31
AP4-4	7661.12	14822.28	125.16	774.84	2777.74	33853.39	25643.15	288583.94	50365.20
blank-4	79.56	144.88	19.56	141.56	10.00	26.72	73.68	152.40	114.68
blank average	62.42	100.64	14.42	79.06	7.78	18.92	57.04	93.98	117.20

blank subtraction									
SRM614-3	177.58	191.64	40.38	2432.31	750.34	427.28	177.12	1126.51	1196.81
SRM612-3	7611.82	9083.29	25.98	1565.07	1208.87	19565.55	9095.37	62270.65	21556.28
SRM610-3	52521.60	50708.96	81.26	1110.15	4629.25	76691.95	28590.20	338795.93	111245.67
AP1-3	318.54	2899.38	29.66	614.82	95.38	188.76	246.40	130721.36	1098.05
AP2-3	1284.83	9545.29	62.78	692.66	422.46	2291.09	2578.97	137069.71	5358.27
AP3-3	6906.10	15698.61	221.86	2774.92	4963.33	34407.67	42930.52	1033416.72	70688.39
AP4-3	5483.25	10092.30	138.66	903.67	2256.91	22278.93	16984.86	193900.96	34192.07
34HP45-856-1	6999.06	320.60	294.42	794.50	240.78	255.28	165.12	86.26	366.08
34HP45-856-2	7117.86	291.96	242.30	715.46	221.26	138.16	161.68	1.06	317.76
34HP45-856-3	6287.82	330.80	210.50	583.82	209.86	81.88	128.00	0.10	382.60
34HP45-856-4	8917.07	286.40	171.02	411.66	284.42	148.56	133.92	108.70	730.20
34HP45-856-5	10308.20	242.92	168.74	352.86	273.86	142.60	131.60	-7.54	820.56
34HP45-856-6	10464.68	384.44	181.18	397.70	249.74	117.60	110.72	98.54	679.16
34HP45-856-7	11130.80	227.32	104.10	265.54	254.98	107.16	92.28	176.38	737.48
34HP45-856-8	14395.50	355.44	120.18	237.54	314.30	123.64	112.48	51.78	856.76
34HP45-856-9	10673.56	305.12	126.82	258.94	226.98	142.40	142.96	18.26	812.00
34HP45-856-10	5654.65	381.08	114.34	445.94	97.38	107.92	110.56	38.90	409.08
34HP45-856-11	6093.65	388.20	128.90	422.66	100.70	56.96	84.72	-49.94	345.60
34HP45-856-12	6931.06	414.40	136.98	415.82	112.38	86.16	109.52	51.26	545.24
34HP45-856-13	5322.01	2393.85	111.26	473.58	97.78	98.84	102.96	20.50	319.52
34HP45-856-14	4503.89	3773.26	76.42	355.02	102.94	100.72	116.08	-8.90	350.52
34HP45-856-15	3036.36	4525.51	90.50	312.74	68.18	68.88	81.20	-40.54	241.32
34HP45-856-16	1814.43	6774.60	32.02	198.38	41.30	96.72	52.72	86.82	262.52
34HP45-856-17	961.19	7222.52	32.82	280.30	41.10	30.92	42.04	-45.02	132.76
34HP45-856-18	1086.23	6155.43	30.94	249.30	22.10	25.24	31.12	-33.54	135.96
SRM614-4	230.22	206.80	48.54	2054.95	618.42	318.16	159.80	1012.75	1526.01
SRM612-4	11237.20	11391.62	25.14	1541.75	762.10	15818.17	7930.36	58939.55	22687.89
SRM610-4	105260.38	102276.62	72.18	1529.23	3036.76	127315.56	51266.37	686581.27	215072.85
AP1-4	230.78	2883.42	27.02	247.62	76.26	36.96	95.60	109841.88	1002.37
AP2-4	1323.75	10014.66	25.74	249.86	324.74	1491.65	2357.33	114458.94	5291.71
AP3-4	7688.34	17335.22	132.62	1476.35	4017.40	26533.99	40916.27	939140.90	70284.11
AP4-4	7598.70	14721.64	110.74	695.78	2769.96	33834.47	25586.10	288489.96	50248.00

Appendix A. Raw trace element datasheets from laser ablation.

zero correction									
SRM614-3	177.58	191.64	40.38	2432.31	750.34	427.28	177.12	1126.51	1196.81
SRM612-3	7611.82	9083.29	25.98	1565.07	1208.87	19565.55	9095.37	62270.65	21556.28
SRM610-3	52521.60	50708.96	81.26	1110.15	4629.25	76691.95	28590.20	338795.93	111245.67
AP1-3	318.54	2899.38	29.66	614.82	95.38	188.76	246.40	130721.36	1098.05
AP2-3	1284.83	9545.29	62.78	692.66	422.46	2291.09	2578.97	137069.71	5358.27
AP3-3	6906.10	15698.61	221.86	2774.92	4963.33	34407.67	42930.52	1033416.72	70688.39
AP4-3	5483.25	10092.30	138.66	903.67	2256.91	22278.93	16984.86	193900.96	34192.07
34HP45-856-1	6999.06	320.60	294.42	794.50	240.78	255.28	165.12	86.26	366.08
34HP45-856-2	7117.86	291.96	242.30	715.46	221.26	138.16	161.68	1.06	317.76
34HP45-856-3	6287.82	330.80	210.50	583.82	209.86	81.88	128.00	0.10	382.60
34HP45-856-4	8917.07	286.40	171.02	411.66	284.42	148.56	133.92	108.70	730.20
34HP45-856-5	10308.20	242.92	168.74	352.86	273.86	142.60	131.60	0.00	820.56
34HP45-856-6	10464.68	384.44	181.18	397.70	249.74	117.60	110.72	98.54	679.16
34HP45-856-7	11130.80	227.32	104.10	265.54	254.98	107.16	92.28	176.38	737.48
34HP45-856-8	14395.50	355.44	120.18	237.54	314.30	123.64	112.48	51.78	856.76
34HP45-856-9	10673.56	305.12	126.82	258.94	226.98	142.40	142.96	18.26	812.00
34HP45-856-10	5654.65	381.08	114.34	445.94	97.38	107.92	110.56	38.90	409.08
34HP45-856-11	6093.65	388.20	128.90	422.66	100.70	56.96	84.72	0.00	345.60
34HP45-856-12	6931.06	414.40	136.98	415.82	112.38	86.16	109.52	51.26	545.24
34HP45-856-13	5322.01	2393.85	111.26	473.58	97.78	98.84	102.96	20.50	319.52
34HP45-856-14	4503.89	3773.26	76.42	355.02	102.94	100.72	116.08	0.00	350.52
34HP45-856-15	3036.36	4525.51	90.50	312.74	68.18	68.88	81.20	0.00	241.32
34HP45-856-16	1814.43	6774.60	32.02	198.38	41.30	96.72	52.72	86.82	262.52
34HP45-856-17	961.19	7222.52	32.82	280.30	41.10	30.92	42.04	0.00	132.76
34HP45-856-18	1086.23	6155.43	30.94	249.30	22.10	25.24	31.12	0.00	135.96
SRM614-4	230.22	206.80	48.54	2054.95	618.42	318.16	159.80	1012.75	1526.01
SRM612-4	11237.20	11391.62	25.14	1541.75	762.10	15818.17	7930.36	58939.55	22687.89
SRM610-4	105260.38	102276.62	72.18	1529.23	3036.76	127315.56	51266.37	686581.27	215072.85
AP1-4	230.78	2883.42	27.02	247.62	76.26	36.96	95.60	109841.88	1002.37
AP2-4	1323.75	10014.66	25.74	249.86	324.74	1491.65	2357.33	114458.94	5291.71
AP3-4	7688.34	17335.22	132.62	1476.35	4017.40	26533.99	40916.27	939140.90	70284.11
AP4-4	7598.70	14721.64	110.74	695.78	2769.96	33834.47	25586.10	288489.96	50248.00

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-3	0.000075	0.000081	0.000017	0.001027	0.000317	0.000180	0.000075	0.000476	0.000505
SRM612-3	0.003080	0.003675	0.000011	0.000633	0.000489	0.007917	0.003680	0.025197	0.008722
SRM610-3	0.037976	0.036666	0.000059	0.000803	0.003347	0.055453	0.020672	0.244970	0.080437
AP1-3	0.000021	0.000191	0.000002	0.000041	0.000006	0.000012	0.000016	0.008614	0.000072
AP2-3	0.000079	0.000586	0.000004	0.000043	0.000026	0.000141	0.000158	0.008417	0.000329
AP3-3	0.000310	0.000704	0.000010	0.000124	0.000222	0.001542	0.001924	0.046314	0.003168
AP4-3	0.000291	0.000536	0.000007	0.000048	0.000120	0.001183	0.000902	0.010299	0.001816
34HP45-856-1	0.000412	0.000019	0.000017	0.000047	0.000014	0.000015	0.000010	0.000005	0.000022
34HP45-856-2	0.000434	0.000018	0.000015	0.000044	0.000013	0.000008	0.000010	0.000000	0.000019
34HP45-856-3	0.000416	0.000022	0.000014	0.000039	0.000014	0.000005	0.000008	0.000000	0.000025
34HP45-856-4	0.000701	0.000023	0.000013	0.000032	0.000022	0.000012	0.000011	0.000009	0.000057
34HP45-856-5	0.000716	0.000017	0.000012	0.000024	0.000019	0.000010	0.000009	0.000000	0.000057
34HP45-856-6	0.000669	0.000025	0.000012	0.000025	0.000016	0.000008	0.000007	0.000006	0.000043
34HP45-856-7	0.000824	0.000017	0.000008	0.000020	0.000019	0.000008	0.000007	0.000013	0.000055
34HP45-856-8	0.001036	0.000026	0.000009	0.000017	0.000023	0.000009	0.000008	0.000004	0.000062
34HP45-856-9	0.000794	0.000023	0.000009	0.000019	0.000017	0.000011	0.000011	0.000001	0.000060
34HP45-856-10	0.000380	0.000026	0.000008	0.000030	0.000007	0.000007	0.000007	0.000003	0.000028
34HP45-856-11	0.000402	0.000026	0.000008	0.000028	0.000007	0.000004	0.000006	0.000000	0.000023
34HP45-856-12	0.000454	0.000027	0.000009	0.000027	0.000007	0.000006	0.000007	0.000003	0.000036
34HP45-856-13	0.000339	0.000152	0.000007	0.000030	0.000006	0.000006	0.000007	0.000001	0.000020
34HP45-856-14	0.000313	0.000262	0.000005	0.000025	0.000007	0.000007	0.000008	0.000000	0.000024
34HP45-856-15	0.000242	0.000361	0.000007	0.000025	0.000005	0.000005	0.000006	0.000000	0.000019
34HP45-856-16	0.000192	0.000718	0.000003	0.000021	0.000004	0.000010	0.000006	0.000009	0.000028
34HP45-856-17	0.000100	0.000751	0.000003	0.000029	0.000004	0.000003	0.000004	0.000000	0.000014
34HP45-856-18	0.000138	0.000782	0.000004	0.000032	0.000003	0.000003	0.000004	0.000000	0.000017

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000155	0.000139	0.000033	0.001383	0.000416	0.000214	0.000108	0.000682	0.001027
SRM612-4	0.005960	0.006042	0.000013	0.000818	0.000404	0.008390	0.004206	0.031263	0.012034
SRM610-4	0.085007	0.082598	0.000058	0.001235	0.002452	0.102819	0.041402	0.554477	0.173691
AP1-4	0.000015	0.000187	0.000002	0.000016	0.000005	0.000002	0.000006	0.007115	0.000065
AP2-4	0.000079	0.000596	0.000002	0.000015	0.000019	0.000089	0.000140	0.006808	0.000315
AP3-4	0.000333	0.000750	0.000006	0.000064	0.000174	0.001148	0.001770	0.040627	0.003040
AP4-4	0.000369	0.000715	0.000005	0.000034	0.000134	0.001643	0.001242	0.014006	0.002439

standardize signal averages AP

AP1	0.000018	0.000189	0.000002	0.000028	0.000006	0.000007	0.000011	0.007864	0.000069
AP2	0.000079	0.000591	0.000003	0.000029	0.000023	0.000115	0.000149	0.007612	0.000322
AP3	0.000321	0.000727	0.000008	0.000094	0.000198	0.001345	0.001847	0.043470	0.003104
AP4	0.000330	0.000625	0.000006	0.000041	0.000127	0.001413	0.001072	0.012152	0.002128

linest from std sig ave

	0.023172	0.038295	0.000000	0.000000	0.000000	0.007200	0.017557	0.002456	0.010673
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standardize signal averages SRM

srM614-2	0.000115	0.000110	0.000025	0.001205	0.000366	0.000197	0.000091	0.000579	0.000766
srM612-2	0.004520	0.004859	0.000012	0.000726	0.000447	0.008154	0.003943	0.028230	0.010378
srM610-2	0.061492	0.059632	0.000059	0.001019	0.002900	0.079136	0.031037	0.399723	0.127064

linest from std sig ave

	0.083464	0.073798	0.000000	0.000000	0.000000	0.035232	0.097232	0.012900	0.036408
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concentration data

SRM614-3	0.15	0.27	0.00	0.00	0.00	0.11	0.11	0.10	0.46
SRM612-3	6.12	12.07	0.00	0.00	0.00	4.89	5.54	5.31	7.98
SRM610-3	75.47	120.42	0.00	0.00	0.00	34.24	31.13	51.60	73.63
AP1-3	0.19	2.92	0.00	0.00	0.00	0.04	0.11	8.44	0.31
AP2-3	0.73	8.95	0.00	0.00	0.00	0.40	1.11	8.25	1.40
AP3-3	2.86	10.75	0.00	0.00	0.00	4.43	13.48	45.38	13.49
AP4-3	2.69	8.19	0.00	0.00	0.00	3.40	6.32	10.09	7.73
34HP45-856-1	3.80	0.29	0.00	0.00	0.00	0.04	0.07	0.00	0.09
34HP45-856-2	4.01	0.27	0.00	0.00	0.00	0.02	0.07	0.00	0.08
34HP45-856-3	3.84	0.33	0.00	0.00	0.00	0.02	0.06	0.00	0.11
34HP45-856-4	6.48	0.34	0.00	0.00	0.00	0.03	0.07	0.01	0.24
34HP45-856-5	6.61	0.26	0.00	0.00	0.00	0.03	0.06	0.00	0.24
34HP45-856-6	6.18	0.38	0.00	0.00	0.00	0.02	0.05	0.01	0.18
34HP45-856-7	7.62	0.26	0.00	0.00	0.00	0.02	0.05	0.01	0.23
34HP45-856-8	9.58	0.39	0.00	0.00	0.00	0.03	0.06	0.00	0.26
34HP45-856-9	7.34	0.35	0.00	0.00	0.00	0.03	0.07	0.00	0.26
34HP45-856-10	3.52	0.39	0.00	0.00	0.00	0.02	0.05	0.00	0.12
34HP45-856-11	3.71	0.39	0.00	0.00	0.00	0.01	0.04	0.00	0.10
34HP45-856-12	4.20	0.41	0.00	0.00	0.00	0.02	0.05	0.00	0.15
34HP45-856-13	3.13	2.33	0.00	0.00	0.00	0.02	0.05	0.00	0.09
34HP45-856-14	2.89	4.00	0.00	0.00	0.00	0.02	0.06	0.00	0.10
34HP45-856-15	2.24	5.52	0.00	0.00	0.00	0.02	0.05	0.00	0.08
34HP45-856-16	1.78	10.97	0.00	0.00	0.00	0.03	0.04	0.01	0.12
34HP45-856-17	0.92	11.47	0.00	0.00	0.00	0.01	0.03	0.00	0.06
34HP45-856-18	1.28	11.95	0.00	0.00	0.00	0.01	0.03	0.00	0.07
SRM614-4	0.31	0.46	0.00	0.00	0.00	0.13	0.16	0.14	0.94
SRM612-4	11.85	19.84	0.00	0.00	0.00	5.18	6.33	6.59	11.02
SRM610-4	168.94	271.28	0.00	0.00	0.00	63.49	62.34	116.80	158.99
AP1-4	0.03	0.61	0.00	0.00	0.00	0.00	0.01	1.50	0.06
AP2-4	0.16	1.96	0.00	0.00	0.00	0.05	0.21	1.43	0.29
AP3-4	0.66	2.46	0.00	0.00	0.00	0.71	2.67	8.56	2.78
AP4-4	3.41	10.92	0.00	0.00	0.00	4.72	8.70	13.72	10.39

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

raw data

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	36.64	81.12	12.48	13.52	7.92	10.28	40.76	30.80	158.28
SRM614-1	260.88	255.52	48.16	2374.05	658.40	402.04	229.32	1142.77	1312.61
SRM612-1	9180.61	9787.94	44.28	1547.45	1069.81	19740.35	7971.52	60763.18	21904.00
SRM610-1	80924.85	87412.29	95.28	1712.73	5635.43	176732.95	64498.32	710373.25	205249.95
AP1-1	252.92	3147.86	39.08	483.36	55.24	84.28	191.04	94299.01	1117.77
AP2-1	1253.73	9326.05	56.44	493.96	326.16	1799.61	2188.85	112836.48	5124.67
AP3-1	5051.31	10407.86	126.88	1232.21	2624.09	17042.98	20563.56	413905.38	35772.84
AP4-1	7822.44	15055.65	160.32	889.77	3256.74	25328.42	25199.30	300897.06	49552.36

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	3338.98	3055.02	52.04	330.88	84.92	96.28	157.36	160.28	294.80
34HP45-695-2	1892.65	3092.94	35.72	292.40	62.16	53.64	134.32	119.92	270.32
34HP45-695-3	2323.65	3218.46	33.12	264.88	63.68	97.16	112.16	48.44	271.96
34HP45-695-4	5260.87	230.72	111.52	168.24	102.52	82.44	156.28	165.40	646.64
34HP45-695-5	4821.75	342.84	96.72	164.84	96.08	62.88	116.68	100.44	573.60
34HP45-695-6	5691.23	173.08	97.44	141.84	89.44	55.72	120.44	113.88	712.44
34HP45-695-7	4785.51	4353.86	91.08	232.72	104.80	88.76	132.80	145.84	533.20
34HP45-695-8	5975.39	3672.46	76.40	240.36	121.12	63.48	126.12	177.60	537.80
34HP45-695-9	4997.43	3766.70	81.48	242.92	86.28	82.12	126.24	85.96	547.20
34HP45-695-10	2591.57	6022.79	60.32	223.56	50.16	95.00	138.60	239.16	484.04
34HP45-695-11	2656.38	6294.96	42.76	222.24	57.36	40.16	108.84	61.16	463.84
34HP45-695-12	2931.62	6021.23	44.68	247.48	54.60	52.28	99.56	67.44	472.36
34HP45-695-13	5443.87	3495.42	54.52	232.20	70.08	98.04	124.24	244.20	652.32
34HP45-695-14	2612.33	3660.78	50.60	236.60	49.40	54.84	81.04	64.24	428.76
34HP45-695-15	2956.14	2745.54	53.48	201.20	61.36	65.32	91.52	97.60	512.80
34HP45-695-16	2530.85	2611.13	45.16	293.00	51.36	182.44	130.92	267.72	437.56
34HP45-695-17	1917.29	2610.61	50.84	336.48	29.72	47.04	103.44	54.08	285.68
34HP45-695-18	2145.05	2747.82	36.64	318.12	47.20	50.68	102.16	79.92	357.52
SRM614-2	362.56	365.48	45.64	2181.57	635.08	355.32	266.12	1048.29	1463.01
SRM612-2	11938.59	11483.31	40.60	1403.37	738.12	17271.94	8704.69	59014.93	22994.45
SRM610-2	110013.14	102542.66	88.88	1558.61	3081.78	151442.45	67701.82	723424.00	221296.28
AP1-2	258.60	3174.86	30.52	268.00	39.48	42.08	125.36	82537.83	1111.77
AP2-2	1231.25	8206.33	43.16	262.64	258.96	1399.73	1897.57	88816.90	4638.75
AP3-2	5329.99	10789.90	80.80	707.04	2053.49	14143.24	19322.43	367994.94	34151.87
AP4-2	8728.69	17118.22	137.16	628.24	3028.30	21275.88	27772.16	310331.19	53999.79
blank-2	86.76	118.80	27.84	110.84	22.36	8.84	71.56	46.60	99.92
blank average	61.70	99.96	20.16	62.18	15.14	9.56	56.16	38.70	129.10

blank subtraction									
SRM614-1	199.18	155.56	28.00	2311.87	643.26	392.48	173.16	1104.07	1183.51
SRM612-1	9118.91	9687.97	24.12	1485.27	1054.67	19730.79	7915.36	60724.48	21774.90
SRM610-1	80863.15	87312.33	75.12	1650.55	5620.29	176723.39	64442.16	710334.55	205120.85
AP1-1	191.22	3047.90	18.92	421.18	40.10	74.72	134.88	94260.31	988.67
AP2-1	1192.03	9226.09	36.28	431.78	311.02	1790.05	2132.69	112797.78	4995.57
AP3-1	4989.61	10307.90	106.72	1170.03	2608.95	17033.42	20507.39	413866.68	35643.74
AP4-1	7760.74	14955.68	140.16	827.58	3241.60	25318.86	25143.14	300858.36	49423.26
34HP45-695-1	3277.28	2955.06	31.88	268.70	69.78	86.72	101.20	121.58	165.70
34HP45-695-2	1830.95	2992.98	15.56	230.22	47.02	44.08	78.16	81.22	141.22
34HP45-695-3	2261.95	3118.50	12.96	202.70	48.54	87.60	56.00	9.74	142.86
34HP45-695-4	5199.17	130.76	91.36	106.06	87.38	72.88	100.12	126.70	517.54
34HP45-695-5	4760.05	242.88	76.56	102.66	80.94	53.32	60.52	61.74	444.50
34HP45-695-6	5629.53	73.12	77.28	79.66	74.30	46.16	64.28	75.18	583.34
34HP45-695-7	4723.81	4253.90	70.92	170.54	89.66	79.20	76.64	107.14	404.10
34HP45-695-8	5913.69	3572.50	56.24	178.18	105.98	53.92	69.96	138.90	408.70
34HP45-695-9	4935.73	3666.74	61.32	180.74	71.14	72.56	70.08	47.26	418.10
34HP45-695-10	2529.87	5922.83	40.16	161.38	35.02	85.44	82.44	200.46	354.94
34HP45-695-11	2594.67	6194.99	22.60	160.06	42.22	30.60	52.68	22.46	334.74
34HP45-695-12	2869.92	5921.27	24.52	185.30	39.46	42.72	43.40	28.74	343.26
34HP45-695-13	5382.17	3395.46	34.36	170.02	54.94	88.48	68.08	205.50	523.22
34HP45-695-14	2550.63	3560.82	30.44	174.42	34.26	45.28	24.88	25.54	299.66
34HP45-695-15	2894.44	2645.57	33.32	139.02	46.22	55.76	35.36	58.90	383.70
34HP45-695-16	2469.15	2511.17	25.00	230.82	36.22	172.88	74.76	229.02	308.46
34HP45-695-17	1855.59	2510.65	30.68	274.30	14.58	37.48	47.28	15.38	156.58
34HP45-695-18	2083.35	2647.85	16.48	255.94	32.06	41.12	46.00	41.22	228.42
SRM614-2	300.86	265.52	25.48	2119.39	619.94	345.76	209.96	1009.59	1333.91
SRM612-2	11876.89	11383.34	20.44	1341.19	722.98	17262.38	8648.53	58976.23	22865.35
SRM610-2	109951.44	102442.70	68.72	1496.43	3066.64	151432.89	67645.66	723385.30	221167.18
AP1-2	196.90	3074.90	10.36	205.82	24.34	32.52	69.20	82499.13	982.67
AP2-2	1169.55	8106.37	23.00	200.46	243.82	1390.17	1841.41	88778.20	4509.65
AP3-2	5268.29	10689.94	60.64	644.86	2038.35	14133.68	19266.27	367956.24	34022.77
AP4-2	8666.99	17018.26	117.00	566.06	3013.16	21266.32	27716.00	310292.49	53870.68

zero correction									
SRM614-1	199.18	155.56	28.00	2311.87	643.26	392.48	173.16	1104.07	1183.51
SRM612-1	9118.91	9687.97	24.12	1485.27	1054.67	19730.79	7915.36	60724.48	21774.90
SRM610-1	80863.15	87312.33	75.12	1650.55	5620.29	176723.39	64442.16	710334.55	205120.85
AP1-1	191.22	3047.90	18.92	421.18	40.10	74.72	134.88	94260.31	988.67
AP2-1	1192.03	9226.09	36.28	431.78	311.02	1790.05	2132.69	112797.78	4995.57
AP3-1	4989.61	10307.90	106.72	1170.03	2608.95	17033.42	20507.39	413866.68	35643.74
AP4-1	7760.74	14955.68	140.16	827.58	3241.60	25318.86	25143.14	300858.36	49423.26
34HP45-695-1	3277.28	2955.06	31.88	268.70	69.78	86.72	101.20	121.58	165.70
34HP45-695-2	1830.95	2992.98	15.56	230.22	47.02	44.08	78.16	81.22	141.22
34HP45-695-3	2261.95	3118.50	12.96	202.70	48.54	87.60	56.00	9.74	142.86
34HP45-695-4	5199.17	130.76	91.36	106.06	87.38	72.88	100.12	126.70	517.54
34HP45-695-5	4760.05	242.88	76.56	102.66	80.94	53.32	60.52	61.74	444.50
34HP45-695-6	5629.53	73.12	77.28	79.66	74.30	46.16	64.28	75.18	583.34
34HP45-695-7	4723.81	4253.90	70.92	170.54	89.66	79.20	76.64	107.14	404.10
34HP45-695-8	5913.69	3572.50	56.24	178.18	105.98	53.92	69.96	138.90	408.70

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	4935.73	3666.74	61.32	180.74	71.14	72.56	70.08	47.26	418.10
34HP45-695-10	2529.87	5922.83	40.16	161.38	35.02	85.44	82.44	200.46	354.94
34HP45-695-11	2594.67	6194.99	22.60	160.06	42.22	30.60	52.68	22.46	334.74
34HP45-695-12	2869.92	5921.27	24.52	185.30	39.46	42.72	43.40	28.74	343.26
34HP45-695-13	5382.17	3395.46	34.36	170.02	54.94	88.48	68.08	205.50	523.22
34HP45-695-14	2550.63	3560.82	30.44	174.42	34.26	45.28	24.88	25.54	299.66
34HP45-695-15	2894.44	2645.57	33.32	139.02	46.22	55.76	35.36	58.90	383.70
34HP45-695-16	2469.15	2511.17	25.00	230.82	36.22	172.88	74.76	229.02	308.46
34HP45-695-17	1855.59	2510.65	30.68	274.30	14.58	37.48	47.28	15.38	156.58
34HP45-695-18	2083.35	2647.85	16.48	255.94	32.06	41.12	46.00	41.22	228.42
SRM614-2	300.86	265.52	25.48	2119.39	619.94	345.76	209.96	1009.59	1333.91
SRM612-2	11876.89	11383.34	20.44	1341.19	722.98	17262.38	8648.53	58976.23	22865.35
SRM610-2	109951.44	102442.70	68.72	1496.43	3066.64	151432.89	67645.66	723385.30	221167.18
AP1-2	196.90	3074.90	10.36	205.82	24.34	32.52	69.20	82499.13	982.67
AP2-2	1169.55	8106.37	23.00	200.46	243.82	1390.17	1841.41	88778.20	4509.65
AP3-2	5268.29	10689.94	60.64	644.86	2038.35	14133.68	19266.27	367956.24	34022.77
AP4-2	8666.99	17018.26	117.00	566.06	3013.16	21266.32	27716.00	310292.49	53870.68

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-1	0.000098	0.000076	0.000014	0.001134	0.000315	0.000192	0.000085	0.000541	0.000580
SRM612-1	0.003951	0.004198	0.000010	0.000644	0.000457	0.008549	0.003430	0.026310	0.009435
SRM610-1	0.052668	0.056869	0.000049	0.001075	0.003661	0.115104	0.041973	0.462658	0.133600
AP1-1	0.000012	0.000192	0.000001	0.000027	0.000003	0.000005	0.000008	0.005936	0.000062
AP2-1	0.000067	0.000520	0.000002	0.000024	0.000018	0.000101	0.000120	0.006356	0.000281
AP3-1	0.000223	0.000461	0.000005	0.000052	0.000117	0.000761	0.000917	0.018498	0.001593
AP4-1	0.000343	0.000662	0.000006	0.000037	0.000143	0.001120	0.001112	0.013308	0.002186
34HP45-695-1	0.000297	0.000268	0.000003	0.000024	0.000006	0.000008	0.000009	0.000011	0.000015
34HP45-695-2	0.000221	0.000361	0.000002	0.000028	0.000006	0.000005	0.000009	0.000010	0.000017
34HP45-695-3	0.000261	0.000360	0.000001	0.000023	0.000006	0.000010	0.000006	0.000001	0.000016
34HP45-695-4	0.000311	0.000008	0.000005	0.000006	0.000005	0.000004	0.000006	0.000008	0.000031
34HP45-695-5	0.000323	0.000016	0.000005	0.000007	0.000005	0.000004	0.000004	0.000004	0.000030
34HP45-695-6	0.000468	0.000006	0.000006	0.000007	0.000006	0.000004	0.000005	0.000006	0.000048
34HP45-695-7	0.000308	0.000277	0.000005	0.000011	0.000006	0.000005	0.000005	0.000007	0.000026
34HP45-695-8	0.000389	0.000235	0.000004	0.000012	0.000007	0.000004	0.000005	0.000009	0.000027
34HP45-695-9	0.000309	0.000229	0.000004	0.000011	0.000004	0.000005	0.000004	0.000003	0.000026
34HP45-695-10	0.000194	0.000454	0.000003	0.000012	0.000003	0.000007	0.000006	0.000015	0.000027
34HP45-695-11	0.000204	0.000487	0.000002	0.000013	0.000003	0.000002	0.000004	0.000002	0.000026
34HP45-695-12	0.000258	0.000532	0.000002	0.000017	0.000004	0.000004	0.000004	0.000003	0.000031
34HP45-695-13	0.000397	0.000251	0.000003	0.000013	0.000004	0.000007	0.000005	0.000015	0.000039
34HP45-695-14	0.000200	0.000280	0.000002	0.000014	0.000003	0.000004	0.000002	0.000002	0.000024
34HP45-695-15	0.000225	0.000205	0.000003	0.000011	0.000004	0.000004	0.000003	0.000005	0.000030
34HP45-695-16	0.000201	0.000204	0.000002	0.000019	0.000003	0.000014	0.000006	0.000019	0.000025
34HP45-695-17	0.000158	0.000214	0.000003	0.000023	0.000001	0.000003	0.000004	0.000001	0.000013
34HP45-695-18	0.000167	0.000212	0.000001	0.000021	0.000003	0.000003	0.000004	0.000003	0.000018
SRM614-2	0.000191	0.000169	0.000016	0.001347	0.000394	0.000220	0.000133	0.000642	0.000848
SRM612-2	0.006769	0.006488	0.000012	0.000764	0.000412	0.009839	0.004929	0.033614	0.013032
SRM610-2	0.094901	0.088420	0.000059	0.001292	0.002647	0.130705	0.058386	0.624367	0.190893
AP1-2	0.000014	0.000218	0.000001	0.000015	0.000002	0.000002	0.000005	0.005842	0.000070
AP2-2	0.000078	0.000543	0.000002	0.000013	0.000016	0.000093	0.000123	0.005951	0.000302
AP3-2	0.000279	0.000566	0.000003	0.000034	0.000108	0.000748	0.001019	0.019466	0.001800
AP4-2	0.000429	0.000843	0.000006	0.000028	0.000149	0.001053	0.001373	0.015369	0.002668

standardize signal averages AP									
AP1	0.000013	0.000205	0.000001	0.000021	0.000002	0.000004	0.000007	0.005889	0.000066
AP2	0.000073	0.000532	0.000002	0.000019	0.000017	0.000097	0.000122	0.006153	0.000292
AP3	0.000251	0.000513	0.000004	0.000043	0.000112	0.000755	0.000968	0.018982	0.001697
AP4	0.000386	0.000752	0.000006	0.000032	0.000146	0.001087	0.001243	0.014339	0.002427

linest from std sig ave									
	0.024119	0.041967	0.000000	0.000000	0.000000	0.010809	0.027233	0.005301	0.014863

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srM614-2	0.000144	0.000123	0.000015	0.001240	0.000355	0.000206	0.000109	0.000592	0.000714
srM612-2	0.005360	0.005343	0.000011	0.000704	0.000435	0.009194	0.004179	0.029962	0.011233
srM610-2	0.073785	0.072644	0.000054	0.001183	0.003154	0.122904	0.050179	0.543513	0.162247

linest from std sig ave									
	0.069563	0.060604	0.000000	0.000000	0.000000	0.022740	0.060405	0.009491	0.028533

concentration data									
SRM614-1	0.20	0.27	0.00	0.00	0.00	0.18	0.20	0.25	0.74
SRM612-1	8.17	15.11	0.00	0.00	0.00	7.93	8.01	11.96	12.03
SRM610-1	108.94	204.68	0.00	0.00	0.00	106.71	98.03	210.34	170.30
AP1-1	0.12	3.21	0.00	0.00	0.00	0.02	0.09	12.55	0.37
AP2-1	0.65	8.70	0.00	0.00	0.00	0.43	1.31	13.44	1.67
AP3-1	2.15	7.71	0.00	0.00	0.00	3.28	9.96	39.12	9.45
AP4-1	3.30	11.08	0.00	0.00	0.00	4.83	12.08	28.14	12.96
34HP45-695-1	2.86	4.48	0.00	0.00	0.00	0.03	0.10	0.02	0.09
34HP45-695-2	2.12	6.04	0.00	0.00	0.00	0.02	0.10	0.02	0.10
34HP45-695-3	2.51	6.02	0.00	0.00	0.00	0.04	0.07	0.00	0.10
34HP45-695-4	2.99	0.13	0.00	0.00	0.00	0.02	0.07	0.02	0.18
34HP45-695-5	3.11	0.28	0.00	0.00	0.00	0.02	0.04	0.01	0.18
34HP45-695-6	4.50	0.10	0.00	0.00	0.00	0.02	0.06	0.01	0.29
34HP45-695-7	2.96	4.64	0.00	0.00	0.00	0.02	0.05	0.01	0.16
34HP45-695-8	3.74	3.94	0.00	0.00	0.00	0.02	0.05	0.02	0.16
34HP45-695-9	2.97	3.84	0.00	0.00	0.00	0.02	0.05	0.01	0.15
34HP45-695-10	1.87	7.60	0.00	0.00	0.00	0.03	0.07	0.03	0.16
34HP45-695-11	1.96	8.15	0.00	0.00	0.00	0.01	0.04	0.00	0.16
34HP45-695-12	2.48	8.90	0.00	0.00	0.00	0.02	0.04	0.01	0.18
34HP45-695-13	3.82	4.20	0.00	0.00	0.00	0.03	0.05	0.03	0.23
34HP45-695-14	1.93	4.68	0.00	0.00	0.00	0.02	0.02	0.00	0.14
34HP45-695-15	2.16	3.44	0.00	0.00	0.00	0.02	0.03	0.01	0.18
34HP45-695-16	1.93	3.42	0.00	0.00	0.00	0.06	0.07	0.04	0.15
34HP45-695-17	1.52	3.58	0.00	0.00	0.00	0.01	0.04	0.00	0.08
34HP45-695-18	1.61	3.56	0.00	0.00	0.00	0.01	0.04	0.01	0.11
SRM614-2	0.40	0.61	0.00	0.00	0.00	0.20	0.31	0.29	1.08
SRM612-2	14.00	23.35	0.00	0.00	0.00	9.12	11.51	15.28	16.61
SRM610-2	196.30	318.25	0.00	0.00	0.00	121.17	136.37	283.86	243.33
AP1-2	0.13	3.65	0.00	0.00	0.00	0.01	0.05	12.36	0.41
AP2-2	0.75	9.10	0.00	0.00	0.00	0.40	1.34	12.58	1.79
AP3-2	2.68	9.47	0.00	0.00	0.00	3.22	11.07	41.17	10.67
AP4-2	4.13	14.11	0.00	0.00	0.00	4.54	14.91	32.50	15.82

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	88.72	92.44	24.40	34.20	20.92	77.68	176.08	65.76	388.96
SRM614-1	936.13	802.92	103.32	6714.92	1918.13	793.04	669.76	3332.34	3951.26
SRM612-1	8868.25	8399.01	37.72	1063.41	479.08	5459.91	3820.06	27255.79	13313.56
SRM610-1	67927.98	59919.98	76.12	996.49	2081.17	49563.52	37048.73	193883.58	105838.03
AP1-1	473.52	5943.59	46.72	1074.69	262.20	1147.09	1690.17	227255.33	7267.16
AP2-1	1579.53	16234.97	50.28	538.76	561.24	6286.84	3111.38	146775.98	7677.36
AP3-1	5673.35	14821.40	91.36	1096.65	2610.33	26241.03	22689.85	452332.78	43931.93
AP4-1	10867.90	26386.43	161.44	829.72	4058.38	57965.65	41889.52	496790.81	78349.08
MZ1-1	581.92	3598.50	41.44	426.00	127.28	685.00	888.01	14233.08	1890.21
MZ1-2	454.60	3514.14	26.32	463.68	45.72	259.16	228.96	1488.09	676.64
MZ1-3	332.88	3405.82	23.08	461.48	26.28	107.64	156.92	629.92	485.64
MZ1-4	680.64	3155.26	34.76	454.00	48.56	600.88	246.20	1081.13	792.80
MZ1-5	730.32	3277.78	38.00	492.72	47.28	940.85	193.16	331.60	668.32
MZ1-6	485.24	2962.10	31.40	434.84	57.16	1219.09	154.84	282.68	1024.01
MZ1-7	630.68	5237.35	32.64	298.60	50.64	469.60	275.56	304.68	710.44
MZ1-8	685.88	7311.44	34.72	406.28	44.88	1705.73	283.60	222.88	639.84
MZ1-9	680.72	6594.08	30.60	363.60	34.44	472.68	313.48	188.16	651.72
MZ1-10	471.44	7254.84	29.56	339.08	37.16	435.88	236.92	346.56	494.08
MZ1-11	377.16	7747.20	30.80	390.88	31.60	277.60	272.12	171.84	467.36
MZ1-12	435.48	8508.01	29.80	417.68	37.04	608.80	258.60	101.52	495.00
MZ1-13	1384.81	11651.71	31.00	379.96	50.12	741.12	385.00	331.16	893.01
MZ1-14	1564.93	13879.32	40.64	453.08	72.48	755.88	531.88	180.92	947.97
MZ1-15	1291.25	13929.72	35.68	467.60	61.32	643.12	493.52	350.92	791.92
MZ1-16	469.64	12010.87	30.24	303.12	41.72	1422.89	436.72	922.41	677.24

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	413.88	15537.53	32.12	434.56	51.84	334.04	316.56	253.52	475.32
MZ1-18	854.32	18274.42	38.08	510.48	64.52	928.57	351.08	267.12	889.52
MZ1-19	774.44	9027.21	61.24	752.44	74.76	187.48	218.68	374.44	704.08
MZ1-20	676.12	10846.26	36.80	791.84	44.40	156.16	213.12	280.44	590.60
MZ1-21	801.32	14235.16	40.56	910.41	51.20	195.16	239.72	174.20	532.72
srM614-2	555.96	697.60	85.52	4719.43	1287.13	554.72	422.56	2296.21	2708.14
srM612-2	6116.07	7052.28	27.16	834.36	347.16	4170.70	2905.70	26929.43	10946.22
srM610-2	57673.72	56128.52	58.68	856.60	970.97	46071.14	20935.08	202527.38	83117.31
AP1-2	227.72	2458.49	33.24	220.84	80.40	156.84	220.00	78182.81	1091.05
AP2-2	866.68	6865.84	46.44	242.68	200.72	1025.53	1045.45	63306.64	3229.98
AP3-2	4044.46	8736.53	80.80	582.40	1654.69	12229.11	13077.79	254718.36	25277.26
AP4-2	7235.08	16648.37	109.92	569.44	2564.93	31239.46	24401.18	274197.25	47137.55
blank-2	58.88	120.24	31.20	88.96	25.20	25.52	111.80	43.96	175.68
blank ave	73.80	106.34	27.80	61.58	23.06	51.60	143.94	54.86	282.32

blank subtraction									
SRM614-1	862.32	696.58	75.52	6653.34	1895.07	741.44	525.82	3277.48	3668.94
SRM612-1	8794.45	8292.67	9.92	1001.83	456.02	5408.31	3676.12	27200.93	13031.23
SRM610-1	67854.18	59813.64	48.32	934.91	2058.11	49511.92	36904.79	193828.72	105555.71
AP1-1	399.72	5837.25	18.92	1013.11	239.14	1095.49	1546.23	227200.47	6984.84
AP2-1	1505.73	16128.63	22.48	477.18	538.18	6235.24	2967.44	146721.12	7395.04
AP3-1	5599.55	14715.06	63.56	1035.07	2587.27	26189.43	22545.91	452277.92	43649.60
AP4-1	10794.10	26280.09	133.64	768.14	4035.32	57914.04	41745.58	496735.95	78066.76
MZ1-1	508.12	3492.16	13.64	364.42	104.22	633.40	744.06	14178.22	1607.89
MZ1-2	380.80	3407.80	-1.48	402.10	22.66	207.56	85.02	1433.23	394.32
MZ1-3	259.08	3299.48	-4.72	399.90	3.22	56.04	12.98	575.06	203.32
MZ1-4	606.84	3048.92	6.96	392.42	25.50	549.28	102.26	1026.27	510.48
MZ1-5	656.52	3171.44	10.20	431.14	24.22	889.24	49.22	276.74	386.00
MZ1-6	411.44	2855.76	3.60	373.26	34.10	1167.49	10.90	227.82	741.68
MZ1-7	556.88	5131.01	4.84	237.02	27.58	418.00	131.62	249.82	428.12
MZ1-8	612.08	7205.10	6.92	344.70	21.82	1654.13	139.66	168.02	357.52
MZ1-9	606.92	6487.74	2.80	302.02	11.38	421.08	169.54	133.30	369.40
MZ1-10	397.64	7148.50	1.76	277.50	14.10	384.28	92.98	291.70	211.76
MZ1-11	303.36	7640.86	3.00	329.30	8.54	226.00	128.18	116.98	185.04
MZ1-12	361.68	8401.67	2.00	356.10	13.98	557.20	114.66	46.66	212.68
MZ1-13	1311.01	11545.37	3.20	318.38	27.06	689.52	241.06	276.30	610.68
MZ1-14	1491.13	13772.98	12.84	391.50	49.42	704.28	387.94	126.06	665.64
MZ1-15	1217.45	13823.38	7.88	406.02	38.26	591.52	349.58	296.06	509.60
MZ1-16	395.84	11904.53	2.44	241.54	18.66	1371.29	292.78	867.54	394.92
MZ1-17	340.08	15431.19	4.32	372.98	28.78	282.44	172.62	198.66	193.00
MZ1-18	780.52	18168.08	10.28	448.90	41.46	876.96	207.14	212.26	607.20
MZ1-19	700.64	8920.87	33.44	690.86	51.70	135.88	74.74	319.58	421.76
MZ1-20	602.32	10739.92	9.00	730.26	21.34	104.56	69.18	225.58	308.28
MZ1-21	727.52	14128.82	12.76	848.82	28.14	143.56	95.78	119.34	250.40
srM614-2	482.16	591.26	57.72	4657.85	1264.07	503.12	278.62	2241.35	2425.81
srM612-2	6042.27	6945.94	-0.64	772.78	324.10	4119.10	2761.76	26874.57	10663.90
srM610-2	57599.92	56022.18	30.88	795.02	947.91	46019.54	20791.14	202472.52	82834.98
AP1-2	153.92	2352.15	5.44	159.26	57.34	105.24	76.06	78127.94	808.72
AP2-2	792.88	6759.50	18.64	181.10	177.66	973.93	901.51	63251.78	2947.66
AP3-2	3970.66	8630.19	53.00	520.82	1631.63	12177.51	12933.85	254663.50	24994.94
AP4-2	7161.28	16542.03	82.12	507.86	2541.87	31187.86	24257.24	274142.39	46855.23

zero correction									
SRM614-1	862.32	696.58	75.52	6653.34	1895.07	741.44	525.82	3277.48	3668.94
SRM612-1	8794.45	8292.67	9.92	1001.83	456.02	5408.31	3676.12	27200.93	13031.23
SRM610-1	67854.18	59813.64	48.32	934.91	2058.11	49511.92	36904.79	193828.72	105555.71
AP1-1	399.72	5837.25	18.92	1013.11	239.14	1095.49	1546.23	227200.47	6984.84
AP2-1	1505.73	16128.63	22.48	477.18	538.18	6235.24	2967.44	146721.12	7395.04
AP3-1	5599.55	14715.06	63.56	1035.07	2587.27	26189.43	22545.91	452277.92	43649.60
AP4-1	10794.10	26280.09	133.64	768.14	4035.32	57914.04	41745.58	496735.95	78066.76
MZ1-1	508.12	3492.16	13.64	364.42	104.22	633.40	744.06	14178.22	1607.89
MZ1-2	380.80	3407.80	0.00	402.10	22.66	207.56	85.02	1433.23	394.32
MZ1-3	259.08	3299.48	0.00	399.90	3.22	56.04	12.98	575.06	203.32
MZ1-4	606.84	3048.92	6.96	392.42	25.50	549.28	102.26	1026.27	510.48
MZ1-5	656.52	3171.44	10.20	431.14	24.22	889.24	49.22	276.74	386.00
MZ1-6	411.44	2855.76	3.60	373.26	34.10	1167.49	10.90	227.82	741.68
MZ1-7	556.88	5131.01	4.84	237.02	27.58	418.00	131.62	249.82	428.12
MZ1-8	612.08	7205.10	6.92	344.70	21.82	1654.13	139.66	168.02	357.52
MZ1-9	606.92	6487.74	2.80	302.02	11.38	421.08	169.54	133.30	369.40
MZ1-10	397.64	7148.50	1.76	277.50	14.10	384.28	92.98	291.70	211.76
MZ1-11	303.36	7640.86	3.00	329.30	8.54	226.00	128.18	116.98	185.04
MZ1-12	361.68	8401.67	2.00	356.10	13.98	557.20	114.66	46.66	212.68
MZ1-13	1311.01	11545.37	3.20	318.38	27.06	689.52	241.06	276.30	610.68
MZ1-14	1491.13	13772.98	12.84	391.50	49.42	704.28	387.94	126.06	665.64
MZ1-15	1217.45	13823.38	7.88	406.02	38.26	591.52	349.58	296.06	509.60
MZ1-16	395.84	11904.53	2.44	241.54	18.66	1371.29	292.78	867.54	394.92
MZ1-17	340.08	15431.19	4.32	372.98	28.78	282.44	172.62	198.66	193.00
MZ1-18	780.52	18168.08	10.28	448.90	41.46	876.96	207.14	212.26	607.20

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	700.64	8920.87	33.44	690.86	51.70	135.88	74.74	319.58	421.76
MZ1-20	602.32	10739.92	9.00	730.26	21.34	104.56	69.18	225.58	308.28
MZ1-21	727.52	14128.82	12.76	848.82	28.14	143.56	95.78	119.34	250.40
srm614-2	482.16	591.26	57.72	4657.85	1264.07	503.12	278.62	2241.35	2425.81
srm612-2	6042.27	6945.94	0.00	772.78	324.10	4119.10	2761.76	26874.57	10663.90
srm610-2	57599.92	56022.18	30.88	795.02	947.91	46019.54	20791.14	202472.52	82834.98
AP1-2	153.92	2352.15	5.44	159.26	57.34	105.24	76.06	78127.94	808.72
AP2-2	792.88	6759.50	18.64	181.10	177.66	973.93	901.51	63251.78	2947.66
AP3-2	3970.66	8630.19	53.00	520.82	1631.63	12177.51	12933.85	254663.50	24994.94
AP4-2	7161.28	16542.03	82.12	507.86	2541.87	31187.86	24257.24	274142.39	46855.23

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-1	0.000192	0.000155	0.000017	0.001484	0.000423	0.000165	0.000117	0.000731	0.000818
SRM612-1	0.006885	0.006492	0.000008	0.000784	0.000357	0.004234	0.002878	0.021294	0.010201
SRM610-1	0.098798	0.087091	0.000070	0.001361	0.002997	0.072091	0.053735	0.282222	0.153693
AP1-1	0.000023	0.000339	0.000001	0.000059	0.000014	0.000064	0.000090	0.013212	0.000406
AP2-1	0.000104	0.001114	0.000002	0.000033	0.000037	0.000431	0.000205	0.010135	0.000511
AP3-1	0.000297	0.000781	0.000003	0.000055	0.000137	0.001391	0.001197	0.024015	0.002318
AP4-1	0.000628	0.001530	0.000008	0.000045	0.000235	0.003371	0.002430	0.028914	0.004544
MZ1-1	0.000044	0.000300	0.000001	0.000031	0.000009	0.000054	0.000064	0.001219	0.000138
MZ1-2	0.000037	0.000333	0.000000	0.000039	0.000002	0.000020	0.000008	0.000140	0.000038
MZ1-3	0.000029	0.000370	0.000000	0.000045	0.000000	0.000006	0.000001	0.000064	0.000023
MZ1-4	0.000058	0.000290	0.000001	0.000037	0.000002	0.000052	0.000010	0.000098	0.000049
MZ1-5	0.000066	0.000316	0.000001	0.000043	0.000002	0.000089	0.000005	0.000028	0.000039
MZ1-6	0.000047	0.000329	0.000000	0.000043	0.000004	0.000135	0.000001	0.000026	0.000085
MZ1-7	0.000047	0.000433	0.000000	0.000020	0.000002	0.000035	0.000011	0.000021	0.000036
MZ1-8	0.000049	0.000571	0.000001	0.000027	0.000002	0.000131	0.000011	0.000013	0.000028
MZ1-9	0.000055	0.000583	0.000000	0.000027	0.000001	0.000038	0.000015	0.000012	0.000033
MZ1-10	0.000050	0.000898	0.000000	0.000035	0.000002	0.000048	0.000012	0.000037	0.000027
MZ1-11	0.000037	0.000920	0.000000	0.000040	0.000001	0.000027	0.000015	0.000014	0.000022
MZ1-12	0.000043	0.001001	0.000000	0.000042	0.000002	0.000066	0.000014	0.000006	0.000025
MZ1-13	0.000134	0.001180	0.000000	0.000033	0.000003	0.000070	0.000025	0.000028	0.000062
MZ1-14	0.000124	0.001150	0.000001	0.000033	0.000004	0.000059	0.000032	0.000011	0.000056
MZ1-15	0.000101	0.001149	0.000001	0.000034	0.000003	0.000049	0.000029	0.000025	0.000042
MZ1-16	0.000050	0.001512	0.000000	0.000031	0.000002	0.000174	0.000037	0.000110	0.000050
MZ1-17	0.000037	0.001675	0.000000	0.000040	0.000003	0.000031	0.000019	0.000022	0.000021
MZ1-18	0.000058	0.001357	0.000001	0.000034	0.000003	0.000065	0.000015	0.000016	0.000045
MZ1-19	0.000039	0.000492	0.000002	0.000038	0.000003	0.000008	0.000004	0.000018	0.000023
MZ1-20	0.000034	0.000597	0.000001	0.000041	0.000001	0.000006	0.000004	0.000013	0.000017
MZ1-21	0.000038	0.000746	0.000001	0.000045	0.000001	0.000008	0.000005	0.000006	0.000013
srm614-2	0.000171	0.000210	0.000020	0.001652	0.000448	0.000178	0.000099	0.000795	0.000861
srm612-2	0.007886	0.009066	0.000000	0.001009	0.000423	0.005376	0.003605	0.035075	0.013918
srm610-2	0.104544	0.101681	0.000056	0.001443	0.001720	0.083526	0.037736	0.367489	0.150346
AP1-2	0.000016	0.000247	0.000001	0.000017	0.000006	0.000011	0.000008	0.008210	0.000085
AP2-2	0.000098	0.000832	0.000002	0.000022	0.000022	0.000120	0.000111	0.007787	0.000363
AP3-2	0.000319	0.000693	0.000004	0.000042	0.000131	0.000978	0.001039	0.020455	0.002008
AP4-2	0.000576	0.001329	0.000007	0.000041	0.000204	0.002506	0.001949	0.022032	0.003766

standardize signal averages AP									
AP1	0.000020	0.000293	0.000001	0.000038	0.000010	0.000037	0.000049	0.010711	0.000246
AP2	0.000101	0.000973	0.000002	0.000028	0.000030	0.000275	0.000158	0.008961	0.000437
AP3	0.000308	0.000737	0.000004	0.000048	0.000134	0.001184	0.001118	0.022235	0.002163
AP4	0.000602	0.001430	0.000007	0.000043	0.000220	0.002939	0.002190	0.025473	0.004155

linest from std sig ave									
	0.016531	0.023396	0.000000	0.000000	0.000000	0.004439	0.017604	0.003758	0.009390

standardize signal averages SRM									
srm614-2	0.000182	0.000183	0.000019	0.001568	0.000436	0.000172	0.000108	0.000763	0.000840
srm612-2	0.007385	0.007779	0.000004	0.000896	0.000390	0.004805	0.003241	0.028185	0.012060

Appendix A. Raw trace element datasheets from laser ablation.

srn610-2	0.101671	0.094386	0.000063	0.001402	0.002359	0.077808	0.045735	0.324855	0.152019
linest from std sig ave									
	0.050483	0.046622	0.000000	0.000000	0.000000	0.035941	0.066311	0.015857	0.030436
concentration data									
SRM614-1	0.27	0.31	0.00	0.00	0.00	0.06	0.18	0.24	0.66
SRM612-1	9.76	13.03	0.00	0.00	0.00	1.61	4.34	6.86	8.22
SRM610-1	140.07	174.75	0.00	0.00	0.00	27.45	81.13	90.97	123.77
AP1-1	0.15	3.17	0.00	0.00	0.00	0.11	0.63	19.81	1.52
AP2-1	0.69	10.40	0.00	0.00	0.00	0.76	1.44	15.19	1.91
AP3-1	1.96	7.29	0.00	0.00	0.00	2.46	8.41	36.01	8.68
AP4-1	4.14	14.28	0.00	0.00	0.00	5.97	17.07	43.35	17.02
MZ1-1	0.29	2.80	0.00	0.00	0.00	0.10	0.45	1.83	0.52
MZ1-2	0.25	3.10	0.00	0.00	0.00	0.04	0.06	0.21	0.14
MZ1-3	0.19	3.45	0.00	0.00	0.00	0.01	0.01	0.10	0.09
MZ1-4	0.38	2.71	0.00	0.00	0.00	0.09	0.07	0.15	0.18
MZ1-5	0.43	2.95	0.00	0.00	0.00	0.16	0.03	0.04	0.14
MZ1-6	0.31	3.07	0.00	0.00	0.00	0.24	0.01	0.04	0.32
MZ1-7	0.31	4.04	0.00	0.00	0.00	0.06	0.08	0.03	0.14
MZ1-8	0.32	5.33	0.00	0.00	0.00	0.23	0.08	0.02	0.11
MZ1-9	0.36	5.44	0.00	0.00	0.00	0.07	0.11	0.02	0.12
MZ1-10	0.33	8.38	0.00	0.00	0.00	0.09	0.08	0.05	0.10
MZ1-11	0.24	8.58	0.00	0.00	0.00	0.05	0.11	0.02	0.08
MZ1-12	0.28	9.34	0.00	0.00	0.00	0.12	0.10	0.01	0.09
MZ1-13	0.88	11.02	0.00	0.00	0.00	0.12	0.17	0.04	0.23
MZ1-14	0.82	10.73	0.00	0.00	0.00	0.10	0.23	0.02	0.21
MZ1-15	0.67	10.73	0.00	0.00	0.00	0.09	0.20	0.04	0.16
MZ1-16	0.33	14.12	0.00	0.00	0.00	0.31	0.26	0.17	0.19
MZ1-17	0.24	15.63	0.00	0.00	0.00	0.05	0.13	0.03	0.08
MZ1-18	0.38	12.66	0.00	0.00	0.00	0.12	0.11	0.02	0.17
MZ1-19	0.26	4.60	0.00	0.00	0.00	0.01	0.03	0.03	0.09
MZ1-20	0.22	5.58	0.00	0.00	0.00	0.01	0.03	0.02	0.06
MZ1-21	0.25	6.96	0.00	0.00	0.00	0.01	0.04	0.01	0.05
srn614-2	0.24	0.42	0.00	0.00	0.00	0.07	0.15	0.26	0.69
srn612-2	11.18	18.19	0.00	0.00	0.00	2.05	5.44	11.31	11.21
srn610-2	148.21	204.02	0.00	0.00	0.00	31.80	56.97	118.45	121.08
AP1-2	0.11	2.31	0.00	0.00	0.00	0.02	0.06	12.31	0.32
AP2-2	0.64	7.77	0.00	0.00	0.00	0.21	0.78	11.67	1.36
AP3-2	2.10	6.47	0.00	0.00	0.00	1.73	7.30	30.67	7.52
AP4-2	3.80	12.41	0.00	0.00	0.00	4.44	13.69	33.03	14.11
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-5	78.68	98.80	25.28	24.92	23.08	12.92	187.36	17.56	174.00
SRM614-5	273.76	386.72	47.12	2344.73	625.00	338.64	361.64	1399.85	1621.17
SRM612-5	10577.98	14272.08	28.96	1681.81	826.96	17574.94	9398.81	63569.12	26332.23
SRM610-5	75754.47	65474.65	68.20	1061.45	1402.65	78438.56	29386.29	323057.16	116739.22
AP1-5	221.80	2049.41	26.80	166.00	67.96	62.60	177.76	49214.84	881.04
AP2-5	733.80	7510.44	35.12	169.88	199.84	1274.69	1266.29	56798.64	3091.34
AP3-5	2261.69	5143.71	50.12	334.84	929.69	8969.29	7589.68	130001.89	13883.00
AP4-5	4379.30	9703.61	57.32	355.28	1162.13	8559.61	10819.54	107827.09	22100.36
MZ2-1b	126.84	739.20	26.24	136.88	16.88	28.48	100.88	190.68	273.76
MZ2-2b	172.28	817.00	39.08	174.16	25.96	41.36	110.04	38.08	286.28
MZ2-3b	149.60	757.52	15.40	131.32	17.48	38.32	101.84	64.16	274.00
MZ2-4b	146.36	2321.73	23.64	158.72	31.60	32.40	131.64	103.00	324.72
MZ2-5b	166.84	2147.97	18.24	156.16	27.56	22.80	113.20	41.04	313.84
MZ2-6b	121.40	1554.37	21.40	133.72	25.72	30.16	118.92	50.48	262.36
MZ2-7b	529.48	3265.90	20.76	146.64	30.96	31.04	112.12	26.00	321.76
MZ2-8b	300.80	3244.02	17.12	138.72	24.88	51.20	130.72	50.44	349.76
MZ2-9b	147.20	2415.09	21.64	129.92	31.20	37.36	101.32	43.44	326.08
MZ2-10b	152.60	2166.09	24.04	156.76	31.68	24.04	116.64	22.92	294.80
MZ2-11b	152.56	2280.61	32.84	148.68	26.64	29.36	128.48	26.36	278.36
MZ2-12b	129.52	2076.25	24.28	122.16	30.32	33.08	96.32	21.44	285.32
MZ2-13b	198.84	3453.86	22.64	175.48	27.44	34.08	116.12	35.40	310.60
MZ2-14b	245.72	4160.02	16.12	182.24	28.08	35.60	131.48	167.08	341.48
MZ2-15b	597.40	4438.06	31.36	196.84	34.80	38.92	125.08	73.68	331.20
srn614-6	218.88	314.96	44.80	1800.01	497.52	225.92	194.52	852.28	1143.09
srn612-6	7990.49	11112.06	44.52	1294.73	591.80	13456.12	7163.68	48671.40	19484.07

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	66037.77	54102.86	62.44	753.84	1143.65	62314.67	26148.63	265713.81	95054.98
AP1-6	125.04	1858.57	24.64	120.08	33.84	34.80	123.84	32001.46	631.76
AP2-6	605.40	5506.31	32.84	136.04	148.28	685.68	956.01	40693.39	2291.93
AP3-6	2004.37	4437.19	56.00	269.56	831.00	8798.05	6421.92	106590.40	11640.75
AP4-6	4265.02	9519.37	52.72	361.96	1086.85	7018.12	10315.22	97514.51	20934.80
blank-6	37.16	154.92	35.72	43.24	15.64	12.48	102.32	42.24	166.52
blank ave	57.92	126.86	30.50	34.08	19.36	12.70	144.84	29.90	170.26
blank subtraction									
SRM614-5	215.84	259.86	16.62	2310.65	605.64	325.94	216.80	1369.95	1450.91
SRM612-5	10520.06	14145.22	-1.54	1647.73	807.60	17562.24	9253.97	63539.22	26161.97
SRM610-5	75696.55	65347.79	37.70	1027.37	1383.29	78425.86	29241.44	323027.26	116568.96
AP1-5	163.88	1922.55	-3.70	131.92	48.60	49.90	32.92	49184.94	710.78
AP2-5	675.88	7383.58	4.62	135.80	180.48	1261.99	1121.45	56768.74	2921.08
AP3-5	2203.77	5016.85	19.62	300.76	910.33	8956.59	7444.84	129971.99	13712.74
AP4-5	4321.38	9576.75	26.82	321.20	1142.77	8546.91	10674.70	107797.19	21930.10
MZ2-1b	68.92	612.34	-4.26	102.80	-2.48	15.78	-43.96	160.78	103.50
MZ2-2b	114.36	690.14	8.58	140.08	6.60	28.66	-34.80	8.18	116.02
MZ2-3b	91.68	630.66	-15.10	97.24	-1.88	25.62	-43.00	34.26	103.74
MZ2-4b	88.44	2194.87	-6.86	124.64	12.24	19.70	-13.20	73.10	154.46
MZ2-5b	108.92	2021.11	-12.26	122.08	8.20	10.10	-31.64	11.14	143.58
MZ2-6b	63.48	1427.51	-9.10	99.64	6.36	17.46	-25.92	20.58	92.10
MZ2-7b	471.56	3139.04	-9.74	112.56	11.60	18.34	-32.72	-3.90	151.50
MZ2-8b	242.88	3117.16	-13.38	104.64	5.52	38.50	-14.12	20.54	179.50
MZ2-9b	89.28	2288.23	-8.86	95.84	11.84	24.66	-43.52	13.54	155.82
MZ2-10b	94.68	2039.23	-6.46	122.68	12.32	11.34	-28.20	-6.98	124.54
MZ2-11b	94.64	2153.75	2.34	114.60	7.28	16.66	-16.36	-3.54	108.10
MZ2-12b	71.60	1949.39	-6.22	88.08	10.96	20.38	-48.52	-8.46	115.06
MZ2-13b	140.92	3327.00	-7.86	141.40	8.08	21.38	-28.72	5.50	140.34
MZ2-14b	187.80	4033.16	-14.38	148.16	8.72	22.90	-13.36	137.18	171.22
MZ2-15b	539.48	4311.20	0.86	162.76	15.44	26.22	-19.76	43.78	160.94
srm614-6	160.96	188.10	14.30	1765.93	478.16	213.22	49.68	822.38	972.83
srm612-6	7932.57	10985.20	14.02	1260.65	572.44	13443.41	7018.84	48641.49	19313.81
srm610-6	65979.85	53976.00	31.94	719.76	1124.29	62301.97	26003.79	265683.91	94884.72
AP1-6	67.12	1731.71	-5.86	86.00	14.48	22.10	-21.00	31971.56	461.50
AP2-6	547.48	5379.45	2.34	101.96	128.92	672.98	811.16	40663.49	2121.67
AP3-6	1946.45	4310.32	25.50	235.48	811.64	8785.35	6277.08	106560.50	11470.48
AP4-6	4207.10	9392.51	22.22	327.88	1067.49	7005.42	10170.38	97484.61	20764.54
zero correction									
SRM614-5	215.84	259.86	16.62	2310.65	605.64	325.94	216.80	1369.95	1450.91
SRM612-5	10520.06	14145.22	0.00	1647.73	807.60	17562.24	9253.97	63539.22	26161.97
SRM610-5	75696.55	65347.79	37.70	1027.37	1383.29	78425.86	29241.44	323027.26	116568.96
AP1-5	163.88	1922.55	0.00	131.92	48.60	49.90	32.92	49184.94	710.78
AP2-5	675.88	7383.58	4.62	135.80	180.48	1261.99	1121.45	56768.74	2921.08
AP3-5	2203.77	5016.85	19.62	300.76	910.33	8956.59	7444.84	129971.99	13712.74
AP4-5	4321.38	9576.75	26.82	321.20	1142.77	8546.91	10674.70	107797.19	21930.10
MZ2-1b	68.92	612.34	0.00	102.80	0.00	15.78	0.00	160.78	103.50
MZ2-2b	114.36	690.14	8.58	140.08	6.60	28.66	0.00	8.18	116.02
MZ2-3b	91.68	630.66	0.00	97.24	0.00	25.62	0.00	34.26	103.74
MZ2-4b	88.44	2194.87	0.00	124.64	12.24	19.70	0.00	73.10	154.46
MZ2-5b	108.92	2021.11	0.00	122.08	8.20	10.10	0.00	11.14	143.58
MZ2-6b	63.48	1427.51	0.00	99.64	6.36	17.46	0.00	20.58	92.10
MZ2-7b	471.56	3139.04	0.00	112.56	11.60	18.34	0.00	0.00	151.50
MZ2-8b	242.88	3117.16	0.00	104.64	5.52	38.50	0.00	20.54	179.50
MZ2-9b	89.28	2288.23	0.00	95.84	11.84	24.66	0.00	13.54	155.82
MZ2-10b	94.68	2039.23	0.00	122.68	12.32	11.34	0.00	0.00	124.54
MZ2-11b	94.64	2153.75	2.34	114.60	7.28	16.66	0.00	0.00	108.10
MZ2-12b	71.60	1949.39	0.00	88.08	10.96	20.38	0.00	0.00	115.06
MZ2-13b	140.92	3327.00	0.00	141.40	8.08	21.38	0.00	5.50	140.34
MZ2-14b	187.80	4033.16	0.00	148.16	8.72	22.90	0.00	137.18	171.22
MZ2-15b	539.48	4311.20	0.86	162.76	15.44	26.22	0.00	43.78	160.94
srm614-6	160.96	188.10	14.30	1765.93	478.16	213.22	49.68	822.38	972.83
srm612-6	7932.57	10985.20	14.02	1260.65	572.44	13443.41	7018.84	48641.49	19313.81
srm610-6	65979.85	53976.00	31.94	719.76	1124.29	62301.97	26003.79	265683.91	94884.72
AP1-6	67.12	1731.71	0.00	86.00	14.48	22.10	0.00	31971.56	461.50
AP2-6	547.48	5379.45	2.34	101.96	128.92	672.98	811.16	40663.49	2121.67
AP3-6	1946.45	4310.32	25.50	235.48	811.64	8785.35	6277.08	106560.50	11470.48
AP4-6	4207.10	9392.51	22.22	327.88	1067.49	7005.42	10170.38	97484.61	20764.54
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-5	0.000181	0.000217	0.000014	0.001932	0.000507	0.000273	0.000181	0.001146	0.001213
SRM612-5	0.007077	0.009516	0.000000	0.001108	0.000543	0.011815	0.006225	0.042745	0.017600
SRM610-5	0.112829	0.097404	0.000056	0.001531	0.002062	0.116897	0.043586	0.481487	0.173751
AP1-5	0.000022	0.000264	0.000000	0.000018	0.000007	0.000007	0.000005	0.006741	0.000097
AP2-5	0.000086	0.000943	0.000001	0.000017	0.000023	0.000161	0.000143	0.007249	0.000373
AP3-5	0.000325	0.000739	0.000003	0.000044	0.000134	0.001320	0.001097	0.019149	0.002020
AP4-5	0.000426	0.000945	0.000003	0.000032	0.000113	0.000843	0.001053	0.010634	0.002163
MZ2-1b	0.000020	0.000182	0.000000	0.000031	0.000000	0.000005	0.000000	0.000048	0.000031
MZ2-2b	0.000031	0.000185	0.000002	0.000038	0.000002	0.000008	0.000000	0.000002	0.000031
MZ2-3b	0.000028	0.000189	0.000000	0.000029	0.000000	0.000008	0.000000	0.000010	0.000031
MZ2-4b	0.000019	0.000480	0.000000	0.000027	0.000003	0.000004	0.000000	0.000016	0.000034
MZ2-5b	0.000023	0.000431	0.000000	0.000026	0.000002	0.000002	0.000000	0.000002	0.000031
MZ2-6b	0.000016	0.000351	0.000000	0.000025	0.000002	0.000004	0.000000	0.000005	0.000023
MZ2-7b	0.000091	0.000606	0.000000	0.000022	0.000002	0.000004	0.000000	0.000000	0.000029
MZ2-8b	0.000047	0.000597	0.000000	0.000020	0.000001	0.000007	0.000000	0.000004	0.000034
MZ2-9b	0.000019	0.000499	0.000000	0.000021	0.000003	0.000005	0.000000	0.000003	0.000034
MZ2-10b	0.000023	0.000501	0.000000	0.000030	0.000003	0.000003	0.000000	0.000000	0.000031
MZ2-11b	0.000025	0.000576	0.000001	0.000031	0.000002	0.000004	0.000000	0.000000	0.000029
MZ2-12b	0.000022	0.000607	0.000000	0.000027	0.000003	0.000006	0.000000	0.000000	0.000036
MZ2-13b	0.000030	0.000707	0.000000	0.000030	0.000002	0.000005	0.000000	0.000001	0.000030
MZ2-14b	0.000034	0.000731	0.000000	0.000027	0.000002	0.000004	0.000000	0.000025	0.000031
MZ2-15b	0.000091	0.000723	0.000000	0.000027	0.000003	0.000004	0.000000	0.000007	0.000027
srm614-6	0.000178	0.000208	0.000016	0.001949	0.000528	0.000235	0.000055	0.000908	0.001074
srm612-6	0.007348	0.010176	0.000013	0.001168	0.000530	0.012453	0.006502	0.045057	0.017890
srm610-6	0.119308	0.097602	0.000058	0.001302	0.002033	0.112658	0.047022	0.480425	0.171576
AP1-6	0.000012	0.000308	0.000000	0.000015	0.000003	0.000004	0.000000	0.005686	0.000082
AP2-6	0.000088	0.000869	0.000000	0.000016	0.000021	0.000109	0.000131	0.006568	0.000343
AP3-6	0.000324	0.000718	0.000004	0.000039	0.000135	0.001464	0.001046	0.017757	0.001911
AP4-6	0.000466	0.001040	0.000002	0.000036	0.000118	0.000776	0.001127	0.010798	0.002300

standardize signal averages AP									
AP1	0.000017	0.000286	0.000000	0.000017	0.000005	0.000005	0.000002	0.006214	0.000090
AP2	0.000087	0.000906	0.000000	0.000017	0.000022	0.000135	0.000137	0.006909	0.000358
AP3	0.000325	0.000729	0.000004	0.000042	0.000135	0.001392	0.001071	0.018453	0.001966
AP4	0.000446	0.000993	0.000003	0.000034	0.000115	0.000810	0.001090	0.010716	0.002232

linest from std sig ave									
	0.020002	0.028472	0.000000	0.000000	0.000000	0.007906	0.027414	0.005809	0.014581

standardize signal averages SRM									
srm614-2	0.000179	0.000212	0.000015	0.001941	0.000517	0.000254	0.000118	0.001027	0.001144
srm612-2	0.007213	0.009846	0.000006	0.001138	0.000537	0.012134	0.006364	0.043901	0.017745
srm610-2	0.116069	0.097503	0.000057	0.001416	0.002047	0.114778	0.045304	0.480956	0.172664

linest from std sig ave									
	0.972124	0.998654	0.971320	1.016009	1.005807	1.017974	0.962398	1.000879	1.006151

concentration data									
SRM614-5	0.31	0.53	0.00	0.00	0.00	0.18	0.43	0.57	1.52
SRM612-5	12.14	23.24	0.00	0.00	0.00	8.01	14.64	21.30	22.01
SRM610-5	193.55	237.85	0.00	0.00	0.00	79.26	102.47	239.88	217.28
AP1-5	0.18	2.99	0.00	0.00	0.00	0.02	0.05	15.62	0.57
AP2-5	0.69	10.71	0.00	0.00	0.00	0.51	1.57	16.80	2.17
AP3-5	2.59	8.40	0.00	0.00	0.00	4.16	12.00	44.38	11.75
AP4-5	3.40	10.73	0.00	0.00	0.00	2.66	11.52	24.64	12.58
MZ2-1b	0.16	2.06	0.00	0.00	0.00	0.01	0.00	0.11	0.18
MZ2-2b	0.24	2.10	0.00	0.00	0.00	0.02	0.00	0.01	0.18
MZ2-3b	0.22	2.15	0.00	0.00	0.00	0.02	0.00	0.02	0.18
MZ2-4b	0.15	5.45	0.00	0.00	0.00	0.01	0.00	0.04	0.20
MZ2-5b	0.19	4.89	0.00	0.00	0.00	0.01	0.00	0.01	0.18
MZ2-6b	0.12	3.99	0.00	0.00	0.00	0.01	0.00	0.01	0.13
MZ2-7b	0.73	6.89	0.00	0.00	0.00	0.01	0.00	0.00	0.17
MZ2-8b	0.37	6.78	0.00	0.00	0.00	0.02	0.00	0.01	0.20
MZ2-9b	0.16	5.67	0.00	0.00	0.00	0.02	0.00	0.01	0.20
MZ2-10b	0.19	5.70	0.00	0.00	0.00	0.01	0.00	0.00	0.18
MZ2-11b	0.20	6.55	0.00	0.00	0.00	0.01	0.00	0.00	0.17
MZ2-12b	0.18	6.89	0.00	0.00	0.00	0.02	0.00	0.00	0.21

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	0.24	8.04	0.00	0.00	0.00	0.01	0.00	0.00	0.17
MZ2-14b	0.27	8.30	0.00	0.00	0.00	0.01	0.00	0.06	0.18
MZ2-15b	0.72	8.22	0.00	0.00	0.00	0.01	0.00	0.02	0.16
srm614-6	0.30	0.51	0.00	0.00	0.00	0.16	0.13	0.45	1.34
srm612-6	12.60	24.85	0.00	0.00	0.00	8.44	15.29	22.45	22.37
srm610-6	204.66	238.33	0.00	0.00	0.00	76.38	110.55	239.35	214.55
AP1-6	0.10	3.50	0.00	0.00	0.00	0.01	0.00	13.18	0.48
AP2-6	0.71	9.87	0.00	0.00	0.00	0.34	1.43	15.22	1.99
AP3-6	2.59	8.16	0.00	0.00	0.00	4.62	11.44	41.15	11.12
AP4-6	3.72	11.82	0.00	0.00	0.00	2.45	12.32	25.02	13.38

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-7	120.16	84.72	13.36	14.16	9.84	16.08	59.44	67.68	99.80
SRM614-7	464.40	430.68	58.16	3806.98	1036.57	615.40	312.84	1661.73	2001.45
SRM612-7	14472.40	14782.88	49.36	2024.97	1118.85	26246.27	9788.93	82490.82	31976.98
SRM610-7	133342.70	126169.83	127.88	2045.01	5506.39	224465.27	87335.21	945586.31	294215.72
AP1-7	377.08	2723.10	24.88	217.68	50.64	172.04	185.96	58612.69	1255.05
AP2-7	1410.81	6079.99	46.44	382.88	289.40	1679.05	1665.65	89698.98	5497.59
AP3-7	4974.99	9681.29	87.80	713.96	1585.85	11051.26	12198.59	255588.23	27223.40
AP4-7	7190.88	12515.67	87.84	482.60	1857.05	14434.96	14779.92	164810.02	34130.35
T1-1	643.04	295.48	16.12	641.36	36.40	363.20	240.80	250.88	428.44
T1-2	280.04	284.72	25.04	526.60	25.68	101.88	132.36	84.32	237.96
T1-3	218.88	261.04	27.72	420.72	29.16	73.32	120.60	76.24	256.96
T1-4	1571.37	187.16	19.28	314.20	46.32	432.68	192.76	289.88	729.04
T1-5	1382.25	170.56	20.48	315.68	31.64	108.28	161.76	134.20	735.44
T1-6	1420.97	175.48	21.32	337.16	29.96	248.36	168.80	133.36	654.16
T1-7	710.72	201.24	20.56	247.44	32.00	199.24	145.32	372.40	443.00
T1-8	333.16	176.16	14.76	213.64	17.96	48.20	99.32	136.04	313.68
T1-9	780.08	165.08	16.92	226.48	41.00	53.60	108.52	192.12	345.12
T1-10	553.36	172.48	18.96	203.64	32.68	108.32	151.72	295.12	454.00
T1-11	611.04	180.04	13.28	194.88	39.84	46.24	120.20	90.72	383.32
T1-12	400.00	169.00	16.96	213.88	30.32	54.96	110.52	171.04	411.28
T1-13	1061.65	175.72	25.88	240.92	36.64	99.12	125.40	324.52	443.44
T1-14	598.40	157.08	19.88	248.32	25.20	31.92	98.00	67.60	324.60
T1-15	699.24	169.92	31.96	241.16	26.52	42.08	103.12	102.44	353.60
T1-16	874.40	142.60	25.32	265.80	24.72	107.08	137.08	175.08	389.48
T1-17	1174.17	178.08	22.64	286.52	38.40	102.72	119.48	211.28	378.48
T1-18	871.36	148.24	20.96	242.80	25.08	79.16	105.36	233.60	400.40
SRM614-8	358.12	376.40	52.76	2498.41	696.00	386.52	248.60	1150.01	1446.13
SRM612-8	13461.32	12994.71	45.20	1566.13	718.48	19147.47	8870.45	61799.43	24955.46
SRM610-8	121819.69	101760.61	82.28	1397.57	2741.70	151768.25	63066.72	653899.94	206851.48
AP1-8	233.60	2350.49	25.36	125.96	38.52	47.08	117.00	39740.22	836.68
AP2-8	1140.25	4940.79	40.60	192.04	184.52	1035.09	1229.97	61399.82	3827.66
AP3-8	4565.83	8994.77	57.36	535.60	1466.41	11048.78	12124.35	237824.78	24827.18
AP4-8	5833.47	9128.49	69.16	329.76	1482.37	11746.55	13032.95	131638.06	26939.43
blank-8	72.80	124.00	17.52	90.32	18.44	9.72	57.64	28.12	92.16
blank average	96.48	104.36	15.44	52.24	14.14	12.90	58.54	47.90	95.98

blank subtraction									
SRM614-7	367.92	326.32	42.72	3754.74	1022.43	602.50	254.30	1613.83	1905.47
SRM612-7	14375.92	14678.52	33.92	1972.73	1104.71	26233.37	9730.39	82442.92	31881.00
SRM610-7	133246.22	126065.47	112.44	1992.77	5492.25	224452.37	87276.67	945538.41	294119.74
AP1-7	280.60	2618.73	9.44	165.44	36.50	159.14	127.42	58564.79	1159.07
AP2-7	1314.33	5975.63	31.00	330.64	275.26	1666.15	1607.11	89651.08	5401.61
AP3-7	4878.51	9576.93	72.36	661.72	1571.71	11038.36	12140.05	255540.33	27127.41
AP4-7	7094.40	12411.31	72.40	430.36	1842.91	14422.06	14721.38	164762.12	34034.37
T1-1	546.56	191.12	0.68	589.12	22.26	350.30	182.26	202.98	332.46
T1-2	183.56	180.36	9.60	474.36	11.54	88.98	73.82	36.42	141.98
T1-3	122.40	156.68	12.28	368.48	15.02	60.42	62.06	28.34	160.98
T1-4	1474.89	82.80	3.84	261.96	32.18	419.78	134.22	241.98	633.06
T1-5	1285.77	66.20	5.04	263.44	17.50	95.38	103.22	86.30	639.46
T1-6	1324.49	71.12	5.88	284.92	15.82	235.46	110.26	85.46	558.18
T1-7	614.24	96.88	5.12	195.20	17.86	186.34	86.78	324.50	347.02
T1-8	236.68	71.80	-0.68	161.40	3.82	35.30	40.78	88.14	217.70
T1-9	683.60	60.72	1.48	174.24	26.86	40.70	49.98	144.22	249.14
T1-10	456.88	68.12	3.52	151.40	18.54	95.42	93.18	247.22	358.02
T1-11	514.56	75.68	-2.16	142.64	25.70	33.34	61.66	42.82	287.34
T1-12	303.52	64.64	1.52	161.64	16.18	42.06	51.98	123.14	315.30

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	965.17	71.36	10.44	188.68	22.50	86.22	66.86	276.62	347.46
T1-14	501.92	52.72	4.44	196.08	11.06	19.02	39.46	19.70	228.62
T1-15	602.76	65.56	16.52	188.92	12.38	29.18	44.58	54.54	257.62
T1-16	777.92	38.24	9.88	213.56	10.58	94.18	78.54	127.18	293.50
T1-17	1077.69	73.72	7.20	234.28	24.26	89.82	60.94	163.38	282.50
T1-18	774.88	43.88	5.52	190.56	10.94	66.26	46.82	185.70	304.42
SRM614-8	261.64	272.04	37.32	2446.17	681.86	373.62	190.06	1102.11	1350.15
SRM612-8	13364.83	12890.35	29.76	1513.89	704.34	19134.57	8811.91	61751.53	24859.48
SRM610-8	121723.21	101656.25	66.84	1345.33	2727.56	151755.35	63008.17	653852.04	206755.50
AP1-8	137.12	2246.13	9.92	73.72	24.38	34.18	58.46	39692.32	740.70
AP2-8	1043.77	4836.43	25.16	139.80	170.38	1022.19	1171.43	61351.92	3731.68
AP3-8	4469.35	8890.41	41.92	483.36	1452.27	11035.88	12065.81	237776.88	24731.20
AP4-8	5736.99	9024.13	53.72	277.52	1468.23	11733.65	12974.41	131590.16	26843.45

zero correction

SRM614-7	367.92	326.32	42.72	3754.74	1022.43	602.50	254.30	1613.83	1905.47
SRM612-7	14375.92	14678.52	33.92	1972.73	1104.71	26233.37	9730.39	82442.92	31881.00
SRM610-7	133246.22	126065.47	112.44	1992.77	5492.25	224452.37	87276.67	945538.41	294119.74
AP1-7	280.60	2618.73	9.44	165.44	36.50	159.14	127.42	58564.79	1159.07
AP2-7	1314.33	5975.63	31.00	330.64	275.26	1666.15	1607.11	89651.08	5401.61
AP3-7	4878.51	9576.93	72.36	661.72	1571.71	11038.36	12140.05	255540.33	27127.41
AP4-7	7094.40	12411.31	72.40	430.36	1842.91	14422.06	14721.38	164762.12	34034.37
T1-1	546.56	191.12	0.68	589.12	22.26	350.30	182.26	202.98	332.46
T1-2	183.56	180.36	9.60	474.36	11.54	88.98	73.82	36.42	141.98
T1-3	122.40	156.68	12.28	368.48	15.02	60.42	62.06	28.34	160.98
T1-4	1474.89	82.80	3.84	261.96	32.18	419.78	134.22	241.98	633.06
T1-5	1285.77	66.20	5.04	263.44	17.50	95.38	103.22	86.30	639.46
T1-6	1324.49	71.12	5.88	284.92	15.82	235.46	110.26	85.46	558.18
T1-7	614.24	96.88	5.12	195.20	17.86	186.34	86.78	324.50	347.02
T1-8	236.68	71.80	0.00	161.40	3.82	35.30	40.78	88.14	217.70
T1-9	683.60	60.72	1.48	174.24	26.86	40.70	49.98	144.22	249.14
T1-10	456.88	68.12	3.52	151.40	18.54	95.42	93.18	247.22	358.02
T1-11	514.56	75.68	0.00	142.64	25.70	33.34	61.66	42.82	287.34
T1-12	303.52	64.64	1.52	161.64	16.18	42.06	51.98	123.14	315.30
T1-13	965.17	71.36	10.44	188.68	22.50	86.22	66.86	276.62	347.46
T1-14	501.92	52.72	4.44	196.08	11.06	19.02	39.46	19.70	228.62
T1-15	602.76	65.56	16.52	188.92	12.38	29.18	44.58	54.54	257.62
T1-16	777.92	38.24	9.88	213.56	10.58	94.18	78.54	127.18	293.50
T1-17	1077.69	73.72	7.20	234.28	24.26	89.82	60.94	163.38	282.50
T1-18	774.88	43.88	5.52	190.56	10.94	66.26	46.82	185.70	304.42
SRM614-8	261.64	272.04	37.32	2446.17	681.86	373.62	190.06	1102.11	1350.15
SRM612-8	13364.83	12890.35	29.76	1513.89	704.34	19134.57	8811.91	61751.53	24859.48
SRM610-8	121723.21	101656.25	66.84	1345.33	2727.56	151755.35	63008.17	653852.04	206755.50
AP1-8	137.12	2246.13	9.92	73.72	24.38	34.18	58.46	39692.32	740.70
AP2-8	1043.77	4836.43	25.16	139.80	170.38	1022.19	1171.43	61351.92	3731.68
AP3-8	4469.35	8890.41	41.92	483.36	1452.27	11035.88	12065.81	237776.88	24731.20
AP4-8	5736.99	9024.13	53.72	277.52	1468.23	11733.65	12974.41	131590.16	26843.45

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-7	0.000130	0.000115	0.000015	0.001323	0.000360	0.000212	0.000090	0.000569	0.000671
SRM612-7	0.005228	0.005338	0.000012	0.000717	0.000402	0.009540	0.003538	0.029980	0.011593
SRM610-7	0.080635	0.076289	0.000068	0.001206	0.003324	0.135828	0.052816	0.572197	0.177988
AP1-7	0.000017	0.000162	0.000001	0.000010	0.000002	0.000010	0.000008	0.003616	0.000072
AP2-7	0.000078	0.000353	0.000002	0.000020	0.000016	0.000098	0.000095	0.005295	0.000319
AP3-7	0.000238	0.000468	0.000004	0.000032	0.000077	0.000539	0.000593	0.012476	0.001324
AP4-7	0.000408	0.000714	0.000004	0.000025	0.000106	0.000829	0.000847	0.009476	0.001957
T1-1	0.000036	0.000013	0.000000	0.000039	0.000001	0.000023	0.000012	0.000014	0.000022
T1-2	0.000016	0.000016	0.000001	0.000042	0.000001	0.000008	0.000007	0.000003	0.000013
T1-3	0.000014	0.000018	0.000001	0.000043	0.000002	0.000007	0.000007	0.000003	0.000019
T1-4	0.000104	0.000006	0.000000	0.000019	0.000002	0.000030	0.000009	0.000017	0.000045

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000088	0.000005	0.000000	0.000018	0.000001	0.000007	0.000007	0.000006	0.000044
T1-6	0.000087	0.000005	0.000000	0.000019	0.000001	0.000015	0.000007	0.000006	0.000037
T1-7	0.000055	0.000009	0.000000	0.000018	0.000002	0.000017	0.000008	0.000029	0.000031
T1-8	0.000022	0.000007	0.000000	0.000015	0.000000	0.000003	0.000004	0.000008	0.000021
T1-9	0.000057	0.000005	0.000000	0.000014	0.000002	0.000003	0.000004	0.000012	0.000021
T1-10	0.000039	0.000006	0.000000	0.000013	0.000002	0.000008	0.000008	0.000021	0.000031
T1-11	0.000042	0.000006	0.000000	0.000012	0.000002	0.000003	0.000005	0.000003	0.000023
T1-12	0.000025	0.000005	0.000000	0.000013	0.000001	0.000003	0.000004	0.000010	0.000025
T1-13	0.000072	0.000005	0.000001	0.000014	0.000002	0.000006	0.000005	0.000021	0.000026
T1-14	0.000035	0.000004	0.000000	0.000014	0.000001	0.000001	0.000003	0.000001	0.000016
T1-15	0.000045	0.000005	0.000001	0.000014	0.000001	0.000002	0.000003	0.000004	0.000019
T1-16	0.000067	0.000003	0.000001	0.000018	0.000001	0.000008	0.000007	0.000011	0.000025
T1-17	0.000078	0.000005	0.000001	0.000017	0.000002	0.000007	0.000004	0.000012	0.000021
T1-18	0.000058	0.000003	0.000000	0.000014	0.000001	0.000005	0.000003	0.000014	0.000023
SRM614-8	0.000148	0.000154	0.000021	0.001383	0.000386	0.000211	0.000107	0.000623	0.000763
SRM612-8	0.006944	0.006697	0.000015	0.000787	0.000366	0.009941	0.004578	0.032083	0.012916
SRM610-8	0.103673	0.086582	0.000057	0.001146	0.002323	0.129252	0.053665	0.556893	0.176096
AP1-8	0.000012	0.000192	0.000001	0.000006	0.000002	0.000003	0.000005	0.003392	0.000063
AP2-8	0.000078	0.000363	0.000002	0.000010	0.000013	0.000077	0.000088	0.004604	0.000280
AP3-8	0.000276	0.000549	0.000003	0.000030	0.000090	0.000682	0.000746	0.014694	0.001528
AP4-8	0.000430	0.000676	0.000004	0.000021	0.000110	0.000879	0.000971	0.009852	0.002010
standardize signal averages AP									
AP1	0.000015	0.000177	0.000001	0.000008	0.000002	0.000006	0.000006	0.003504	0.000067
AP2	0.000078	0.000358	0.000002	0.000015	0.000015	0.000088	0.000091	0.004950	0.000300
AP3	0.000257	0.000508	0.000003	0.000031	0.000083	0.000610	0.000669	0.013585	0.001426
AP4	0.000419	0.000695	0.000004	0.000023	0.000108	0.000854	0.000909	0.009664	0.001984
linest from std sig ave									
	0.022653	0.047749	0.000000	0.000000	0.000000	0.013610	0.038134	0.007512	0.017979
standardize signal averages SRM									
srm614-2	0.000139	0.000134	0.000018	0.001353	0.000373	0.000212	0.000099	0.000596	0.000717
srm612-2	0.006086	0.006017	0.000014	0.000752	0.000384	0.009740	0.004058	0.031031	0.012254
srm610-2	0.092154	0.081435	0.000062	0.001176	0.002823	0.132540	0.053240	0.564545	0.177042
linest from std sig ave									
	0.055717	0.054061	0.000000	0.000000	0.000000	0.021089	0.056952	0.009138	0.026148
concentration data									
SRM614-7	0.25	0.47	0.00	0.00	0.00	0.25	0.29	0.37	1.04
SRM612-7	10.16	21.86	0.00	0.00	0.00	11.14	11.57	19.32	17.88
SRM610-7	156.66	312.41	0.00	0.00	0.00	158.54	172.73	368.65	274.44
AP1-7	0.16	3.08	0.00	0.00	0.00	0.05	0.12	10.84	0.51
AP2-7	0.70	6.72	0.00	0.00	0.00	0.53	1.44	15.87	2.29
AP3-7	2.15	8.91	0.00	0.00	0.00	2.93	9.02	37.39	9.50
AP4-7	3.69	13.60	0.00	0.00	0.00	4.50	12.88	28.40	14.04
T1-1	0.33	0.24	0.00	0.00	0.00	0.13	0.18	0.04	0.16
T1-2	0.15	0.31	0.00	0.00	0.00	0.04	0.10	0.01	0.09
T1-3	0.13	0.35	0.00	0.00	0.00	0.04	0.11	0.01	0.14
T1-4	0.94	0.11	0.00	0.00	0.00	0.16	0.14	0.05	0.32
T1-5	0.79	0.09	0.00	0.00	0.00	0.04	0.11	0.02	0.31
T1-6	0.79	0.09	0.00	0.00	0.00	0.08	0.11	0.02	0.26
T1-7	0.50	0.17	0.00	0.00	0.00	0.09	0.12	0.09	0.22
T1-8	0.20	0.13	0.00	0.00	0.00	0.02	0.06	0.03	0.15
T1-9	0.51	0.10	0.00	0.00	0.00	0.02	0.06	0.04	0.15
T1-10	0.36	0.11	0.00	0.00	0.00	0.04	0.12	0.06	0.22
T1-11	0.38	0.12	0.00	0.00	0.00	0.01	0.08	0.01	0.17
T1-12	0.22	0.10	0.00	0.00	0.00	0.02	0.06	0.03	0.18
T1-13	0.65	0.10	0.00	0.00	0.00	0.03	0.08	0.06	0.19
T1-14	0.32	0.07	0.00	0.00	0.00	0.01	0.04	0.00	0.11
T1-15	0.41	0.09	0.00	0.00	0.00	0.01	0.05	0.01	0.14
T1-16	0.60	0.06	0.00	0.00	0.00	0.04	0.10	0.03	0.18
T1-17	0.71	0.10	0.00	0.00	0.00	0.04	0.07	0.04	0.15
T1-18	0.52	0.06	0.00	0.00	0.00	0.03	0.05	0.04	0.16
SRM614-8	0.29	0.63	0.00	0.00	0.00	0.25	0.35	0.40	1.18
SRM612-8	13.49	27.43	0.00	0.00	0.00	11.60	14.97	20.67	19.91
SRM610-8	201.42	354.56	0.00	0.00	0.00	150.87	175.51	358.79	271.53
AP1-8	0.11	3.66	0.00	0.00	0.00	0.02	0.08	10.16	0.45
AP2-8	0.71	6.91	0.00	0.00	0.00	0.42	1.34	13.80	2.01
AP3-8	2.50	10.47	0.00	0.00	0.00	3.70	11.34	44.04	10.96
AP4-8	3.88	12.87	0.00	0.00	0.00	4.77	14.78	29.53	14.42
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	0.87	7.01			0.76	2.62	28.72	3.23
STD AP3	2.01	9.07			3.05	8.49	29.84	8.97
STD AP4	3.94	13.11			4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-5	92.76	93.24	13.80	11.64	11.76	34.80	75.84	118.28	198.64
SRM614-5	508.48	560.80	66.04	5122.71	1539.41	771.28	354.88	2496.01	2647.53
SRM612-5	15818.73	17830.70	47.36	2499.77	1384.65	28586.96	12575.51	96936.55	36942.21
SRM610-5	94279.13	101203.09	96.16	1683.09	3644.22	137343.86	55735.15	657545.06	217844.27
AP1-5	411.52	3373.90	43.20	394.44	36.00	246.04	253.60	107280.20	1387.53
AP2-5	1536.77	8773.41	60.32	528.12	383.44	2181.13	2642.17	141662.88	6794.64
AP3-5	7925.20	19763.07	196.92	2318.57	4593.35	30597.41	43972.81	954121.19	75743.70
AP4-5	6804.08	12033.59	116.40	647.60	2430.57	21332.64	19364.79	211303.67	39391.38
TGP12-1	181.16	476.80	27.32	260.96	20.12	69.08	103.80	279.56	197.08
TGP12-2	131.48	439.12	26.56	263.72	18.52	39.28	76.04	75.04	178.76
TGP12-3	138.12	451.44	16.24	272.04	25.12	29.36	85.80	175.60	179.60
TGP12-4	314.16	734.68	24.40	343.96	24.28	232.20	134.88	351.64	290.80
TGP12-5	270.20	646.20	20.80	520.96	22.04	62.40	75.08	58.76	203.24
TGP12-6	497.20	522.60	31.92	1021.57	30.04	127.80	123.44	185.04	323.08
TGP12-7	1060.05	299.64	31.64	1156.85	49.36	343.84	110.76	299.72	503.00
TGP12-8	718.20	250.40	45.12	1008.89	44.68	94.40	99.44	67.60	397.28
TGP12-9	612.16	238.64	40.12	962.61	35.28	82.12	101.68	116.24	339.12
TGP12-10	1524.41	220.84	32.56	695.00	50.56	193.68	115.44	310.52	445.24
TGP12-11	509.52	183.32	22.92	645.92	27.92	116.48	107.92	182.64	301.48
TGP12-12	490.32	192.20	30.76	646.24	38.28	75.56	79.68	89.36	304.36
TGP12-13	306.36	462.32	16.52	234.72	27.04	104.68	88.28	178.24	312.08
TGP12-14	251.60	448.28	19.16	274.20	17.60	82.24	90.68	90.20	258.36
TGP12-15	271.96	478.28	20.68	275.12	30.52	70.16	81.24	171.40	234.64
TGP12-16	1966.57	933.89	16.32	337.00	39.52	823.08	155.72	415.16	695.44
TGP12-17	2366.97	864.80	19.92	350.80	34.08	841.32	166.64	495.04	685.52
TGP12-18	483.16	859.16	19.64	366.68	23.80	195.12	126.76	432.96	389.40
SRM614-6	394.40	468.60	52.96	3322.14	989.09	531.12	309.56	1529.13	1837.89
SRM612-6	13612.32	13411.24	41.76	1686.25	763.20	18709.43	9306.69	63263.75	24892.26
SRM610-6	86086.72	80331.13	77.44	1166.65	1840.09	90949.87	38404.62	448264.94	151182.50
AP1-6	252.28	2655.18	31.96	195.04	42.04	36.64	104.88	62262.59	857.84
AP2-6	1237.33	7107.84	48.04	275.04	252.44	1248.09	1907.93	97319.83	4756.63
AP3-6	6619.56	13710.92	98.56	1096.77	2963.78	18523.23	27988.96	577107.81	48648.07
AP4-6	5857.99	10682.70	87.00	432.68	1801.05	18467.06	15034.13	157733.48	30074.09
blank-6	42.96	135.96	9.48	90.84	17.36	23.52	81.28	29.56	102.16
blank average	67.86	114.60	11.64	51.24	14.56	29.16	78.56	73.92	150.40

blank subtraction									
SRM614-5	440.62	446.20	54.40	5071.47	1524.85	742.12	276.32	2422.09	2497.13
SRM612-5	15750.87	17716.10	35.72	2448.53	1370.09	28557.80	12496.95	96862.63	36791.81
SRM610-5	94211.27	101088.49	84.52	1631.85	3629.66	137314.70	55656.59	657471.14	217693.87
AP1-5	343.66	3259.30	31.56	343.20	21.44	216.88	175.04	107206.28	1237.13
AP2-5	1468.91	8658.81	48.68	476.88	368.88	2151.97	2563.61	141588.96	6644.24
AP3-5	7857.34	19648.47	185.28	2267.33	4578.79	30568.25	43894.25	954047.27	75593.30
AP4-5	6736.22	11918.99	104.76	596.36	2416.01	21303.48	19286.23	211229.75	39240.98
TGP12-1	113.30	362.20	15.68	209.72	5.56	39.92	25.24	205.64	46.68
TGP12-2	63.62	324.52	14.92	212.48	3.96	10.12	-2.52	1.12	28.36
TGP12-3	70.26	336.84	4.60	220.80	10.56	0.20	7.24	101.68	29.20
TGP12-4	246.30	620.08	12.76	292.72	9.72	203.04	56.32	277.72	140.40
TGP12-5	202.34	531.60	9.16	469.72	7.48	33.24	-3.48	-15.16	52.84
TGP12-6	429.34	408.00	20.28	970.33	15.48	98.64	44.88	111.12	172.68
TGP12-7	992.19	185.04	20.00	1105.61	34.80	314.68	32.20	225.80	352.60
TGP12-8	650.34	135.80	33.48	957.65	30.12	65.24	20.88	-6.32	246.88
TGP12-9	544.30	124.04	28.48	911.37	20.72	52.96	23.12	42.32	188.72
TGP12-10	1456.55	106.24	20.92	643.76	36.00	164.52	36.88	236.60	294.84
TGP12-11	441.66	68.72	11.28	594.68	13.36	87.32	29.36	108.72	151.08
TGP12-12	422.46	77.60	19.12	595.00	23.72	46.40	1.12	15.44	153.96
TGP12-13	238.50	347.72	4.88	183.48	12.48	75.52	9.72	104.32	161.68
TGP12-14	183.74	333.68	7.52	222.96	3.04	53.08	12.12	16.28	107.96
TGP12-15	204.10	363.68	9.04	223.88	15.96	41.00	2.68	97.48	84.24
TGP12-16	1898.71	819.28	4.68	285.76	24.96	793.92	77.16	341.24	545.04
TGP12-17	2299.11	750.20	8.28	299.56	19.52	812.16	88.08	421.12	535.12
TGP12-18	415.30	744.56	8.00	315.44	9.24	165.96	48.20	359.04	239.00
SRM614-6	326.54	354.00	41.32	3270.90	974.53	501.96	231.00	1455.21	1687.49
SRM612-6	13544.46	13296.63	30.12	1635.01	748.64	18680.27	9228.13	63189.83	24741.86
SRM610-6	86018.86	80216.53	65.80	1115.41	1825.53	90920.71	38326.06	448191.02	151032.10
AP1-6	184.42	2540.57	20.32	143.80	27.48	7.48	26.32	62188.67	707.44
AP2-6	1169.47	6993.24	36.40	223.80	237.88	1218.93	1829.37	97245.91	4606.23
AP3-6	6551.70	13596.32	86.92	1045.53	2949.22	18494.06	27910.40	577033.89	48497.67
AP4-6	5790.13	10568.10	75.36	381.44	1786.49	18437.90	14955.56	157659.56	29923.69

zero correction									
SRM614-5	440.62	446.20	54.40	5071.47	1524.85	742.12	276.32	2422.09	2497.13

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	15750.87	17716.10	35.72	2448.53	1370.09	28557.80	12496.95	96862.63	36791.81
SRM610-5	94211.27	101088.49	84.52	1631.85	3629.66	137314.70	55656.59	657471.14	217693.87
AP1-5	343.66	3259.30	31.56	343.20	21.44	216.88	175.04	107206.28	1237.13
AP2-5	1468.91	8658.81	48.68	476.88	368.88	2151.97	2563.61	141588.96	6644.24
AP3-5	7857.34	19648.47	185.28	2267.33	4578.79	30568.25	43894.25	954047.27	75593.30
AP4-5	6736.22	11918.99	104.76	596.36	2416.01	21303.48	19286.23	211229.75	39240.98
TGP12-1	113.30	362.20	15.68	209.72	5.56	39.92	25.24	205.64	46.68
TGP12-2	63.62	324.52	14.92	212.48	3.96	10.12	0.00	1.12	28.36
TGP12-3	70.26	336.84	4.60	220.80	10.56	0.20	7.24	101.68	29.20
TGP12-4	246.30	620.08	12.76	292.72	9.72	203.04	56.32	277.72	140.40
TGP12-5	202.34	531.60	9.16	469.72	7.48	33.24	0.00	0.00	52.84
TGP12-6	429.34	408.00	20.28	970.33	15.48	98.64	44.88	111.12	172.68
TGP12-7	992.19	185.04	20.00	1105.61	34.80	314.68	32.20	225.80	352.60
TGP12-8	650.34	135.80	33.48	957.65	30.12	65.24	20.88	0.00	246.88
TGP12-9	544.30	124.04	28.48	911.37	20.72	52.96	23.12	42.32	188.72
TGP12-10	1456.55	106.24	20.92	643.76	36.00	164.52	36.88	236.60	294.84
TGP12-11	441.66	68.72	11.28	594.68	13.36	87.32	29.36	108.72	151.08
TGP12-12	422.46	77.60	19.12	595.00	23.72	46.40	1.12	15.44	153.96
TGP12-13	238.50	347.72	4.88	183.48	12.48	75.52	9.72	104.32	161.68
TGP12-14	183.74	333.68	7.52	222.96	3.04	53.08	12.12	16.28	107.96
TGP12-15	204.10	363.68	9.04	223.88	15.96	41.00	2.68	97.48	84.24
TGP12-16	1898.71	819.28	4.68	285.76	24.96	793.92	77.16	341.24	545.04
TGP12-17	2299.11	750.20	8.28	299.56	19.52	812.16	88.08	421.12	535.12
TGP12-18	415.30	744.56	8.00	315.44	9.24	165.96	48.20	359.04	239.00
SRM614-6	326.54	354.00	41.32	3270.90	974.53	501.96	231.00	1455.21	1687.49
SRM612-6	13544.46	13296.63	30.12	1635.01	748.64	18680.27	9228.13	63189.83	24741.86
SRM610-6	86018.86	80216.53	65.80	1115.41	1825.53	90920.71	38326.06	448191.02	151032.10
AP1-6	184.42	2540.57	20.32	143.80	27.48	7.48	26.32	62188.67	707.44
AP2-6	1169.47	6993.24	36.40	223.80	237.88	1218.93	1829.37	97245.91	4606.23
AP3-6	6551.70	13596.32	86.92	1045.53	2949.22	18494.06	27910.40	577033.89	48497.67
AP4-6	5790.13	10568.10	75.36	381.44	1786.49	18437.90	14955.56	157659.56	29923.69

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-5	0.000117	0.000119	0.000014	0.001348	0.000405	0.000197	0.000073	0.000644	0.000664
SRM612-5	0.004903	0.005514	0.000011	0.000762	0.000426	0.008889	0.003890	0.030149	0.011452
SRM610-5	0.066195	0.071027	0.000059	0.001147	0.002550	0.096480	0.039106	0.461954	0.152957
AP1-5	0.000021	0.000196	0.000002	0.000021	0.000001	0.000013	0.000011	0.006434	0.000074
AP2-5	0.000079	0.000464	0.000003	0.000026	0.000020	0.000115	0.000137	0.007590	0.000356
AP3-5	0.000303	0.000758	0.000007	0.000087	0.000177	0.001179	0.001694	0.036812	0.002917
AP4-5	0.000418	0.000739	0.000006	0.000037	0.000150	0.001320	0.001195	0.013092	0.002432
TGP12-1	0.000027	0.000085	0.000004	0.000049	0.000001	0.000009	0.000006	0.000048	0.000011
TGP12-2	0.000016	0.000080	0.000004	0.000053	0.000001	0.000003	0.000000	0.000000	0.000007
TGP12-3	0.000020	0.000094	0.000001	0.000061	0.000003	0.000000	0.000002	0.000028	0.000008
TGP12-4	0.000040	0.000100	0.000002	0.000047	0.000002	0.000033	0.000009	0.000045	0.000023
TGP12-5	0.000025	0.000066	0.000001	0.000058	0.000001	0.000004	0.000000	0.000000	0.000007
TGP12-6	0.000027	0.000026	0.000001	0.000062	0.000001	0.000006	0.000003	0.000007	0.000011
TGP12-7	0.000052	0.000010	0.000001	0.000057	0.000002	0.000016	0.000002	0.000012	0.000018
TGP12-8	0.000034	0.000007	0.000002	0.000051	0.000002	0.000003	0.000001	0.000000	0.000013
TGP12-9	0.000029	0.000007	0.000002	0.000049	0.000001	0.000003	0.000001	0.000002	0.000010
TGP12-10	0.000104	0.000008	0.000001	0.000046	0.000003	0.000012	0.000003	0.000017	0.000021
TGP12-11	0.000031	0.000005	0.000001	0.000042	0.000001	0.000006	0.000002	0.000008	0.000011
TGP12-12	0.000030	0.000006	0.000001	0.000043	0.000002	0.000003	0.000000	0.000001	0.000011
TGP12-13	0.000036	0.000052	0.000001	0.000027	0.000002	0.000011	0.000001	0.000016	0.000024
TGP12-14	0.000027	0.000048	0.000001	0.000032	0.000000	0.000008	0.000002	0.000002	0.000016
TGP12-15	0.000029	0.000051	0.000001	0.000032	0.000002	0.000006	0.000000	0.000014	0.000012
TGP12-16	0.000151	0.000065	0.000000	0.000023	0.000002	0.000063	0.000006	0.000027	0.000043
TGP12-17	0.000189	0.000062	0.000001	0.000025	0.000002	0.000067	0.000007	0.000035	0.000044
TGP12-18	0.000038	0.000069	0.000001	0.000029	0.000001	0.000015	0.000004	0.000033	0.000022
SRM614-6	0.000137	0.000149	0.000017	0.001376	0.000410	0.000211	0.000097	0.000612	0.000710
SRM612-6	0.006501	0.006382	0.000014	0.000785	0.000359	0.008967	0.004430	0.030331	0.011876

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.092731	0.086476	0.000071	0.001202	0.001968	0.098015	0.041317	0.483164	0.162817
AP1-6	0.000014	0.000193	0.000002	0.000011	0.000002	0.000001	0.000002	0.004725	0.000054
AP2-6	0.000079	0.000475	0.000002	0.000015	0.000016	0.000083	0.000124	0.006599	0.000313
AP3-6	0.000309	0.000640	0.000004	0.000049	0.000139	0.000871	0.001314	0.027172	0.002284
AP4-6	0.000428	0.000781	0.000006	0.000028	0.000132	0.001362	0.001105	0.011647	0.002211

standardize signal averages AP

AP1	0.000017	0.000194	0.000002	0.000016	0.000002	0.000007	0.000006	0.005580	0.000064
AP2	0.000079	0.000469	0.000003	0.000020	0.000018	0.000099	0.000131	0.007095	0.000334
AP3	0.000306	0.000699	0.000006	0.000068	0.000158	0.001025	0.001504	0.031992	0.002600
AP4	0.000423	0.000760	0.000006	0.000033	0.000141	0.001341	0.001150	0.012370	0.002321

linest from std sig ave

	0.021175	0.039017	0.000000	0.000000	0.000000	0.008446	0.021092	0.003381	0.012095
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standardize signal averages SRM

srm614-2	0.000127	0.000134	0.000016	0.001362	0.000408	0.000204	0.000085	0.000628	0.000687
srm612-2	0.005702	0.005948	0.000013	0.000773	0.000393	0.008928	0.004160	0.030240	0.011664
srm610-2	0.079463	0.078752	0.000065	0.001175	0.002259	0.097248	0.040211	0.472559	0.157887

linest from std sig ave

	0.064595	0.055899	0.000000	0.000000	0.000000	0.028703	0.075262	0.010914	0.029314
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concentration data

SRM614-5	0.21	0.40	0.00	0.00	0.00	0.14	0.13	0.19	0.69
SRM612-5	8.90	18.45	0.00	0.00	0.00	6.44	7.04	8.74	11.88
SRM610-5	120.21	237.67	0.00	0.00	0.00	69.89	70.74	133.94	158.66
AP1-5	0.17	3.04	0.00	0.00	0.00	0.04	0.09	8.68	0.36
AP2-5	0.67	7.22	0.00	0.00	0.00	0.39	1.16	10.24	1.72
AP3-5	2.56	11.80	0.00	0.00	0.00	3.97	14.25	49.65	14.07
AP4-5	3.53	11.50	0.00	0.00	0.00	4.45	10.06	17.66	11.74
TGP12-1	0.22	1.32	0.00	0.00	0.00	0.03	0.05	0.07	0.05
TGP12-2	0.13	1.25	0.00	0.00	0.00	0.01	0.00	0.00	0.03
TGP12-3	0.17	1.46	0.00	0.00	0.00	0.00	0.02	0.04	0.04
TGP12-4	0.33	1.55	0.00	0.00	0.00	0.11	0.08	0.06	0.11
TGP12-5	0.21	1.02	0.00	0.00	0.00	0.01	0.00	0.00	0.03
TGP12-6	0.23	0.40	0.00	0.00	0.00	0.02	0.02	0.01	0.05
TGP12-7	0.44	0.15	0.00	0.00	0.00	0.06	0.01	0.02	0.09
TGP12-8	0.29	0.11	0.00	0.00	0.00	0.01	0.01	0.00	0.06
TGP12-9	0.25	0.10	0.00	0.00	0.00	0.01	0.01	0.00	0.05
TGP12-10	0.88	0.12	0.00	0.00	0.00	0.04	0.02	0.02	0.10
TGP12-11	0.26	0.08	0.00	0.00	0.00	0.02	0.02	0.01	0.05
TGP12-12	0.26	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.05
TGP12-13	0.30	0.81	0.00	0.00	0.00	0.04	0.01	0.02	0.12
TGP12-14	0.23	0.75	0.00	0.00	0.00	0.03	0.01	0.00	0.08
TGP12-15	0.24	0.80	0.00	0.00	0.00	0.02	0.00	0.02	0.06
TGP12-16	1.28	1.01	0.00	0.00	0.00	0.21	0.05	0.04	0.21
TGP12-17	1.60	0.96	0.00	0.00	0.00	0.22	0.06	0.05	0.21
TGP12-18	0.32	1.07	0.00	0.00	0.00	0.05	0.04	0.04	0.11
SRM614-6	0.25	0.50	0.00	0.00	0.00	0.15	0.18	0.18	0.74
SRM612-6	11.81	21.36	0.00	0.00	0.00	6.50	8.01	8.79	12.32
SRM610-6	168.41	289.37	0.00	0.00	0.00	71.00	74.74	140.09	168.89
AP1-6	0.12	3.00	0.00	0.00	0.00	0.00	0.02	6.37	0.26
AP2-6	0.67	7.39	0.00	0.00	0.00	0.28	1.04	8.90	1.51
AP3-6	2.61	9.97	0.00	0.00	0.00	2.93	11.06	36.65	11.02
AP4-6	3.61	12.15	0.00	0.00	0.00	4.59	9.30	15.71	10.67

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

raw data

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-1	109.72	138.72	13.32	26.24	16.20	77.60	117.24	463.60	349.92
SRM614-1	664.88	668.48	76.92	5612.15	1510.13	703.64	386.20	2532.25	2803.34
SRM612-1	23272.09	21352.76	61.08	2666.66	1322.45	30012.77	13945.08	105784.04	41137.63
SRM610-1	128901.20	116624.09	101.92	1809.05	3016.50	143116.92	49371.16	672024.25	234697.69
AP1-1	564.84	5069.75	53.00	442.28	89.96	331.12	375.64	185279.28	1982.09
AP2-1	2725.38	16019.97	72.04	560.52	637.60	3295.34	4334.42	280224.34	10467.82
AP3-1	9461.85	17969.66	163.44	1321.45	4011.30	28603.64	39236.74	872645.56	69220.23
AP4-1	13049.91	25761.11	171.96	1031.53	5037.87	36072.16	48227.39	584745.13	91746.59
TGP18-1	489.60	306.24	22.12	385.24	48.96	77.32	121.80	435.08	398.72
TGP18-2	354.12	241.92	24.60	384.32	31.76	39.00	129.28	130.00	314.36

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	317.04	231.20	15.76	315.12	30.28	39.44	111.16	107.76	433.48
TGP18-4	882.64	277.56	33.92	839.60	47.60	91.24	213.72	352.32	634.76
TGP18-5	806.72	335.40	24.32	762.92	31.80	81.84	164.36	304.56	841.24
TGP18-6	461.88	204.44	26.56	521.00	30.52	37.36	76.28	108.60	466.08
TGP18-7	533.48	264.04	25.68	706.52	57.40	120.28	205.40	1119.05	618.68
TGP18-8	557.64	217.68	23.52	797.64	42.64	52.20	182.68	70.32	458.60
TGP18-9	595.56	234.40	35.56	847.24	56.92	69.76	166.12	124.16	502.36
TGP18-10	908.61	233.08	33.88	1435.61	47.92	122.04	141.04	391.96	564.96
TGP18-11	768.44	249.68	34.20	1789.29	41.16	93.96	141.52	280.48	560.88
TGP18-12	872.72	286.68	28.96	1612.89	41.36	78.72	120.84	137.32	561.68
SRM614-2	409.12	391.64	57.68	2836.50	830.32	397.04	295.04	1425.61	1627.33
SRM612-2	18144.90	16775.69	60.24	1999.17	990.73	22710.53	11575.43	80307.33	30765.93
SRM610-2	107633.52	98276.23	88.48	1391.09	2094.25	108849.53	47109.59	564762.00	187361.61
AP1-2	361.92	3608.54	37.24	216.28	72.68	53.76	163.68	84396.80	1153.61
AP2-2	1701.77	10315.10	48.44	299.12	365.12	1760.17	2958.30	160594.02	6743.00
AP3-2	7760.76	15914.61	137.16	1053.17	3322.14	20444.07	32771.43	690977.13	57330.12
AP4-2	11519.27	21886.56	131.92	843.80	4403.82	30251.09	44297.05	505541.31	82326.82
blank-2	81.64	133.48	26.20	75.96	16.08	43.08	101.12	230.32	130.92
blank ave	95.68	136.10	19.76	51.10	16.14	60.34	109.18	346.96	240.42

blank subtraction

SRM614-1	569.20	532.38	57.16	5561.05	1493.99	643.30	277.02	2185.29	2562.91
SRM612-1	23176.41	21216.66	41.32	2615.55	1306.31	29952.43	13835.90	105437.08	40897.21
SRM610-1	128805.52	116487.99	82.16	1757.95	3000.36	143056.58	49261.98	671677.29	234457.27
AP1-1	469.16	4933.65	33.24	391.18	73.82	270.78	266.46	184932.32	1741.67
AP2-1	2629.69	15883.87	52.28	509.42	621.46	3235.00	4225.24	279877.38	10227.40
AP3-1	9366.17	17833.56	143.68	1270.35	3995.16	28543.30	39127.56	872298.60	68979.81
AP4-1	12954.23	25625.00	152.20	980.43	5021.73	36011.82	48118.21	584398.17	91506.17
TGP18-1	393.92	170.14	2.36	334.14	32.82	16.98	12.62	88.12	158.30
TGP18-2	258.44	105.82	4.84	333.22	15.62	-21.34	20.10	-216.96	73.94
TGP18-3	221.36	95.10	-4.00	264.02	14.14	-20.90	1.98	-239.20	193.06
TGP18-4	786.96	141.46	14.16	788.50	31.46	30.90	104.54	5.36	394.34
TGP18-5	711.04	199.30	4.56	711.82	15.66	21.50	55.18	-42.40	600.82
TGP18-6	366.20	68.34	6.80	469.90	14.38	-22.98	-32.90	-238.36	225.66
TGP18-7	437.80	127.94	5.92	655.42	41.26	59.94	96.22	772.08	378.26
TGP18-8	461.96	81.58	3.76	746.54	26.50	-8.14	73.50	-276.64	218.18
TGP18-9	499.88	98.30	15.80	796.14	40.78	9.42	56.94	-222.80	261.94
TGP18-10	812.92	96.98	14.12	1384.51	31.78	61.70	31.86	45.00	324.54
TGP18-11	672.76	113.58	14.44	1738.19	25.02	33.62	32.34	-66.48	320.46
TGP18-12	777.04	150.58	9.20	1561.79	25.22	18.38	11.66	-209.64	321.26
SRM614-2	313.44	255.54	37.92	2785.40	814.18	336.70	185.86	1078.65	1386.91
SRM612-2	18049.22	16639.59	40.48	1948.07	974.59	22650.19	11466.24	79960.37	30525.51
SRM610-2	107537.84	98140.13	68.72	1339.99	2078.11	108789.19	47000.41	564415.04	187121.19
AP1-2	266.24	3472.44	17.48	165.18	56.54	-6.58	54.50	84049.84	913.19
AP2-2	1606.09	10179.00	28.68	248.02	348.98	1699.83	2849.12	160247.06	6502.58
AP3-2	7665.08	15778.51	117.40	1002.07	3306.00	20383.73	32662.25	690630.17	57089.70
AP4-2	11423.58	21750.46	112.16	792.70	4387.68	30190.75	44187.87	505194.35	82086.40

zero correction

SRM614-1	569.20	532.38	57.16	5561.05	1493.99	643.30	277.02	2185.29	2562.91
SRM612-1	23176.41	21216.66	41.32	2615.55	1306.31	29952.43	13835.90	105437.08	40897.21
SRM610-1	128805.52	116487.99	82.16	1757.95	3000.36	143056.58	49261.98	671677.29	234457.27
AP1-1	469.16	4933.65	33.24	391.18	73.82	270.78	266.46	184932.32	1741.67
AP2-1	2629.69	15883.87	52.28	509.42	621.46	3235.00	4225.24	279877.38	10227.40
AP3-1	9366.17	17833.56	143.68	1270.35	3995.16	28543.30	39127.56	872298.60	68979.81
AP4-1	12954.23	25625.00	152.20	980.43	5021.73	36011.82	48118.21	584398.17	91506.17
TGP18-1	393.92	170.14	2.36	334.14	32.82	16.98	12.62	88.12	158.30
TGP18-2	258.44	105.82	4.84	333.22	15.62	0.00	20.10	0.00	73.94
TGP18-3	221.36	95.10	0.00	264.02	14.14	0.00	1.98	0.00	193.06
TGP18-4	786.96	141.46	14.16	788.50	31.46	30.90	104.54	5.36	394.34
TGP18-5	711.04	199.30	4.56	711.82	15.66	21.50	55.18	0.00	600.82
TGP18-6	366.20	68.34	6.80	469.90	14.38	0.00	0.00	0.00	225.66
TGP18-7	437.80	127.94	5.92	655.42	41.26	59.94	96.22	772.08	378.26
TGP18-8	461.96	81.58	3.76	746.54	26.50	0.00	73.50	0.00	218.18
TGP18-9	499.88	98.30	15.80	796.14	40.78	9.42	56.94	0.00	261.94
TGP18-10	812.92	96.98	14.12	1384.51	31.78	61.70	31.86	45.00	324.54
TGP18-11	672.76	113.58	14.44	1738.19	25.02	33.62	32.34	0.00	320.46
TGP18-12	777.04	150.58	9.20	1561.79	25.22	18.38	11.66	0.00	321.26
SRM614-2	313.44	255.54	37.92	2785.40	814.18	336.70	185.86	1078.65	1386.91
SRM612-2	18049.22	16639.59	40.48	1948.07	974.59	22650.19	11466.24	79960.37	30525.51
SRM610-2	107537.84	98140.13	68.72	1339.99	2078.11	108789.19	47000.41	564415.04	187121.19
AP1-2	266.24	3472.44	17.48	165.18	56.54	0.00	54.50	84049.84	913.19
AP2-2	1606.09	10179.00	28.68	248.02	348.98	1699.83	2849.12	160247.06	6502.58
AP3-2	7665.08	15778.51	117.40	1002.07	3306.00	20383.73	32662.25	690630.17	57089.70
AP4-2	11423.58	21750.46	112.16	792.70	4387.68	30190.75	44187.87	505194.35	82086.40

certified concentration

SRM614	0.80	0.70							1.40
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-1	0.000144	0.000135	0.000014	0.001405	0.000378	0.000163	0.000070	0.000552	0.000648
SRM612-1	0.006331	0.005795	0.000011	0.000714	0.000357	0.008181	0.003779	0.028800	0.011171
SRM610-1	0.089618	0.081048	0.000057	0.001223	0.002088	0.099534	0.034275	0.467329	0.163127
AP1-1	0.000021	0.000225	0.000002	0.000018	0.000003	0.000012	0.000012	0.008420	0.000079
AP2-1	0.000111	0.000668	0.000002	0.000021	0.000026	0.000136	0.000178	0.011775	0.000430
AP3-1	0.000392	0.000746	0.000006	0.000053	0.000167	0.001194	0.001636	0.036477	0.002885
AP4-1	0.000581	0.001150	0.000007	0.000044	0.000225	0.001616	0.002159	0.026224	0.004106
TGP18-1	0.000017	0.000007	0.000000	0.000014	0.000001	0.000001	0.000001	0.000004	0.000007
TGP18-2	0.000013	0.000005	0.000000	0.000017	0.000001	0.000000	0.000001	0.000000	0.000004
TGP18-3	0.000012	0.000005	0.000000	0.000015	0.000001	0.000000	0.000000	0.000000	0.000011
TGP18-4	0.000025	0.000004	0.000000	0.000025	0.000001	0.000001	0.000003	0.000000	0.000013
TGP18-5	0.000023	0.000007	0.000000	0.000023	0.000001	0.000001	0.000002	0.000000	0.000020
TGP18-6	0.000016	0.000003	0.000000	0.000020	0.000001	0.000000	0.000000	0.000000	0.000010
TGP18-7	0.000016	0.000005	0.000000	0.000024	0.000001	0.000002	0.000003	0.000028	0.000014
TGP18-8	0.000016	0.000003	0.000000	0.000027	0.000001	0.000000	0.000003	0.000000	0.000008
TGP18-9	0.000017	0.000003	0.000001	0.000028	0.000001	0.000000	0.000002	0.000000	0.000009
TGP18-10	0.000027	0.000003	0.000000	0.000047	0.000001	0.000002	0.000001	0.000002	0.000011
TGP18-11	0.000021	0.000004	0.000000	0.000054	0.000001	0.000001	0.000001	0.000000	0.000010
TGP18-12	0.000024	0.000005	0.000000	0.000048	0.000001	0.000001	0.000000	0.000000	0.000010
SRM614-2	0.000169	0.000137	0.000020	0.001497	0.000438	0.000181	0.000100	0.000580	0.000746
SRM612-2	0.007199	0.006636	0.000016	0.000777	0.000389	0.009034	0.004573	0.031891	0.012175
SRM610-2	0.100509	0.091725	0.000064	0.001252	0.001942	0.101678	0.043928	0.527522	0.174890
AP1-2	0.000017	0.000220	0.000001	0.000010	0.000004	0.000000	0.000003	0.005329	0.000058
AP2-2	0.000089	0.000565	0.000002	0.000014	0.000019	0.000094	0.000158	0.008899	0.000361
AP3-2	0.000408	0.000839	0.000006	0.000053	0.000176	0.001084	0.001737	0.036731	0.003036
AP4-2	0.000628	0.001196	0.000006	0.000044	0.000241	0.001661	0.002431	0.027791	0.004516

standardize signal averages AP									
AP1	0.000019	0.000222	0.000001	0.000014	0.000003	0.000006	0.000008	0.006875	0.000069
AP2	0.000100	0.000617	0.000002	0.000018	0.000023	0.000115	0.000168	0.010337	0.000396
AP3	0.000400	0.000792	0.000006	0.000053	0.000171	0.001139	0.001687	0.036604	0.002960
AP4	0.000605	0.001173	0.000006	0.000044	0.000233	0.001638	0.002295	0.027008	0.004311

linest from std sig ave									
	0.015341	0.028893	0.000000	0.000000	0.000000	0.007166	0.015111	0.002717	0.008420

standardize signal averages SRM									
srm614-2	0.000156	0.000136	0.000017	0.001451	0.000408	0.000172	0.000085	0.000566	0.000697
srm612-2	0.006765	0.006216	0.000014	0.000746	0.000373	0.008608	0.004176	0.030345	0.011673
srm610-2	0.095063	0.086387	0.000061	0.001238	0.002015	0.100606	0.039101	0.497426	0.169009

linest from std sig ave									
	0.942686	0.938172	0.928284	0.974170	1.029356	0.989059	0.876878	0.939531	0.965160

concentration data									
SRM614-1	0.19	0.33	0.00	0.00	0.00	0.10	0.09	0.13	0.47
SRM612-1	8.33	14.36	0.00	0.00	0.00	5.03	4.90	6.71	8.07
SRM610-1	117.91	200.83	0.00	0.00	0.00	61.17	44.42	108.91	117.80
AP1-1	0.13	2.59	0.00	0.00	0.00	0.04	0.07	9.13	0.27
AP2-1	0.68	7.70	0.00	0.00	0.00	0.39	1.07	12.76	1.45
AP3-1	2.40	8.60	0.00	0.00	0.00	3.41	9.86	39.54	9.69
AP4-1	3.56	13.25	0.00	0.00	0.00	4.62	13.02	28.43	13.79
TGP18-1	0.10	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02
TGP18-2	0.08	0.06	0.00	0.00	0.00	0.00	0.01	0.00	0.01
TGP18-3	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.04
TGP18-4	0.15	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.04
TGP18-5	0.14	0.08	0.00	0.00	0.00	0.00	0.01	0.00	0.07
TGP18-6	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
TGP18-7	0.10	0.05	0.00	0.00	0.00	0.01	0.02	0.03	0.05
TGP18-8	0.10	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.03
TGP18-9	0.11	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.03

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.17	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.04
TGP18-11	0.13	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.03
TGP18-12	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.03
SRM614-2	1.03	1.58	0.00	0.00	0.00	0.52	0.60	0.63	2.50
SRM612-2	9.47	16.44	0.00	0.00	0.00	5.55	5.93	7.43	8.79
SRM610-2	132.24	227.29	0.00	0.00	0.00	62.49	56.93	122.94	126.29
AP1-2	0.02	0.55	0.00	0.00	0.00	0.00	0.00	1.24	0.04
AP2-2	0.55	6.52	0.00	0.00	0.00	0.27	0.95	9.65	1.21
AP3-2	2.49	9.67	0.00	0.00	0.00	3.10	10.47	39.82	10.20
AP4-2	3.85	13.79	0.00	0.00	0.00	4.75	14.65	30.13	15.17

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn	
raw data										
blank-7b		115	112	14	16	21	27	234	28	169
SRM614-7b		370	445	52	2873	821	506	312	1173	1738
SRM612-7		10792	14406	51	1778	769	18344	9693	64092	26232
SRM610-7		78852	66390	64	1027	1476	85245	30226	331879	121304
AP1-7		293	2772	31	187	69	118	235	60448	1161
AP2-7		744	9910	35	256	255	1876	1353	57526	3111
AP3-7		1859	3888	32	206	433	3049	3884	64017	8361
AP4-7		2986	7981	65	275	1210	9235	9178	88946	17752
MZ3-1		186	481	21	173	25	56	113	156	284
MZ3-2		186	528	27	201	22	40	120	44	282
MZ3-3		144	471	24	144	25	35	119	48	288
MZ3-4		969	453	37	856	47	937	184	140	673
MZ3-5		697	535	35	575	35	104	130	30	497
MZ3-6		887	459	30	703	44	109	169	51	535
MZ3-7		777	343	37	694	56	110	160	179	629
MZ3-8		743	312	33	678	59	376	190	152	518
MZ3-9		670	306	41	636	46	106	178	63	587
srm614-8		269	356	46	2076	603	290	238	945	1234
srm612-8		8128	10990	35	1313	603	13790	7097	48436	19458
srm610-8		71397	57025	75	859	1331	70242	28786	289223	101530
AP1-8		175	2010	22	128	49	34	146	38607	703
AP2-8		696	6893	33	166	156	865	859	43737	2314
AP3-8		1956	3937	47	226	451	2451	3924	63968	8134
AP4-8		3105	7105	51	226	876	8188	7617	74673	14967
blank-8		55	145	19	90	20	26	99	52	150
blank ave		85	128	17	53	21	26	166	40	160

blank subtraction									
SRM614-7b	284.72	316.58	35.30	2820.14	800.90	479.84	146.30	1133.07	1578.19
SRM612-7	10706.62	14277.78	34.50	1724.69	748.90	18318.02	9527.11	64051.82	26072.73
SRM610-7	78767.21	66261.84	47.78	974.33	1455.51	85219.00	30060.23	331838.39	121144.54
AP1-7	207.48	2643.71	14.98	133.52	48.18	91.44	68.94	60407.96	1001.19
AP2-7	658.44	9781.55	18.98	203.16	234.22	1850.13	1186.91	57485.63	2951.80
AP3-7	1773.45	3759.16	15.18	153.16	412.22	3022.50	3718.28	63976.46	8201.15
AP4-7	2900.50	7852.98	48.10	221.96	1189.35	9208.53	9012.23	88905.72	17592.08
MZ3-1	101.24	352.38	4.54	119.40	4.10	29.32	-53.14	116.10	124.66
MZ3-2	100.80	399.18	10.98	148.28	1.42	14.12	-46.18	3.50	122.70
MZ3-3	59.16	342.78	7.62	91.04	4.22	8.80	-47.10	7.42	128.42
MZ3-4	884.16	324.22	20.86	803.32	25.94	910.97	18.02	100.26	513.54
MZ3-5	612.20	406.22	18.78	521.36	14.90	77.96	-36.66	-9.74	337.46
MZ3-6	801.92	330.70	13.98	649.36	23.18	83.12	2.66	10.98	375.14
MZ3-7	691.96	214.94	20.46	641.16	35.66	83.84	-6.18	139.06	469.78
MZ3-8	658.12	183.10	16.86	624.48	38.82	349.48	23.70	111.90	358.26
MZ3-9	584.80	177.38	24.74	582.92	25.90	79.48	12.10	22.62	427.70
srm614-8	183.60	227.34	29.22	2023.09	582.22	263.76	71.58	905.35	1074.31
srm612-8	8042.37	10861.52	18.82	1259.57	582.90	13763.72	6930.54	48396.13	19298.57
srm610-8	71311.96	56896.58	58.70	806.08	1309.99	70215.63	28619.34	289182.36	101370.43
AP1-8	89.52	1881.87	5.66	74.92	28.70	7.52	-19.90	38567.16	543.62
AP2-8	610.68	6764.70	16.78	113.04	135.86	838.32	692.34	43696.91	2154.03
AP3-8	1871.33	3808.32	30.34	172.44	430.54	2424.33	3757.64	63927.98	7974.58
AP4-8	3020.34	6976.70	34.02	172.44	855.06	8161.85	7450.70	74632.96	14807.06

zero correction									
SRM614-7b	284.72	316.58	35.30	2820.14	800.90	479.84	146.30	1133.07	1578.19
SRM612-7	10706.62	14277.78	34.50	1724.69	748.90	18318.02	9527.11	64051.82	26072.73
SRM610-7	78767.21	66261.84	47.78	974.33	1455.51	85219.00	30060.23	331838.39	121144.54

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	207.48	2643.71	14.98	133.52	48.18	91.44	68.94	60407.96	1001.19
AP2-7	658.44	9781.55	18.98	203.16	234.22	1850.13	1186.91	57485.63	2951.80
AP3-7	1773.45	3759.16	15.18	153.16	412.22	3022.50	3718.28	63976.46	8201.15
AP4-7	2900.50	7852.98	48.10	221.96	1189.35	9208.53	9012.23	88905.72	17592.08
MZ3-1	101.24	352.38	4.54	119.40	4.10	29.32	0.00	116.10	124.66
MZ3-2	100.80	399.18	10.98	148.28	1.42	14.12	0.00	3.50	122.70
MZ3-3	59.16	342.78	7.62	91.04	4.22	8.80	0.00	7.42	128.42
MZ3-4	884.16	324.22	20.86	803.32	25.94	910.97	18.02	100.26	513.54
MZ3-5	612.20	406.22	18.78	521.36	14.90	77.96	0.00	0.00	337.46
MZ3-6	801.92	330.70	13.98	649.36	23.18	83.12	2.66	10.98	375.14
MZ3-7	691.96	214.94	20.46	641.16	35.66	83.84	0.00	139.06	469.78
MZ3-8	658.12	183.10	16.86	624.48	38.82	349.48	23.70	111.90	358.26
MZ3-9	584.80	177.38	24.74	582.92	25.90	79.48	12.10	22.62	427.70
srm614-8	183.60	227.34	29.22	2023.09	582.22	263.76	71.58	905.35	1074.31
srm612-8	8042.37	10861.52	18.82	1259.57	582.90	13763.72	6930.54	48396.13	19298.57
srm610-8	71311.96	56896.58	58.70	806.08	1309.99	70215.63	28619.34	289182.36	101370.43
AP1-8	89.52	1881.87	5.66	74.92	28.70	7.52	0.00	38567.16	543.62
AP2-8	610.68	6764.70	16.78	113.04	135.86	838.32	692.34	43696.91	2154.03
AP3-8	1871.33	3808.32	30.34	172.44	430.54	2424.33	3757.64	63927.98	7974.58
AP4-8	3020.34	6976.70	34.02	172.44	855.06	8161.85	7450.70	74632.96	14807.06

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-7b	0.000201	0.000224	0.000025	0.001991	0.000565	0.000339	0.000103	0.000800	0.001114
SRM612-7	0.006938	0.009252	0.000022	0.001118	0.000485	0.011870	0.006174	0.041505	0.016895
SRM610-7	0.111024	0.093397	0.000067	0.001373	0.002052	0.120118	0.042370	0.467732	0.170755
AP1-7	0.000023	0.000292	0.000002	0.000015	0.000005	0.000010	0.000008	0.006671	0.000111
AP2-7	0.000079	0.001166	0.000002	0.000024	0.000028	0.000221	0.000142	0.006855	0.000352
AP3-7	0.000212	0.000450	0.000002	0.000018	0.000049	0.000362	0.000445	0.007654	0.000981
AP4-7	0.000371	0.001005	0.000006	0.000028	0.000152	0.001179	0.001154	0.011381	0.002252
MZ3-1	0.000022	0.000078	0.000001	0.000026	0.000001	0.000006	0.000000	0.000026	0.000028
MZ3-2	0.000022	0.000087	0.000002	0.000032	0.000000	0.000003	0.000000	0.000001	0.000027
MZ3-3	0.000014	0.000083	0.000002	0.000022	0.000001	0.000002	0.000000	0.000002	0.000031
MZ3-4	0.000066	0.000024	0.000002	0.000060	0.000002	0.000068	0.000001	0.000007	0.000038
MZ3-5	0.000059	0.000039	0.000002	0.000050	0.000001	0.000008	0.000000	0.000000	0.000033
MZ3-6	0.000063	0.000026	0.000001	0.000051	0.000002	0.000007	0.000000	0.000001	0.000029
MZ3-7	0.000055	0.000017	0.000002	0.000051	0.000003	0.000007	0.000000	0.000011	0.000037
MZ3-8	0.000053	0.000015	0.000001	0.000050	0.000003	0.000028	0.000002	0.000009	0.000029
MZ3-9	0.000047	0.000014	0.000002	0.000047	0.000002	0.000006	0.000001	0.000002	0.000034
srm614-8	0.000181	0.000224	0.000029	0.001993	0.000573	0.000260	0.000071	0.000892	0.001058
srm612-8	0.007350	0.009926	0.000017	0.001151	0.000533	0.012578	0.006334	0.044228	0.017637
srm610-8	0.114412	0.091284	0.000094	0.001293	0.002102	0.112653	0.045917	0.463961	0.162638
AP1-8	0.000013	0.000267	0.000001	0.000011	0.000004	0.000001	0.000000	0.005477	0.000077
AP2-8	0.000087	0.000958	0.000002	0.000016	0.000019	0.000119	0.000098	0.006191	0.000305
AP3-8	0.000242	0.000493	0.000004	0.000022	0.000056	0.000314	0.000486	0.008273	0.001032
AP4-8	0.000428	0.000990	0.000005	0.000024	0.000121	0.001158	0.001057	0.010588	0.002101

standardize signal averages AP									
AP1	0.000018	0.000280	0.000001	0.000013	0.000005	0.000006	0.000004	0.006074	0.000094
AP2	0.000083	0.001062	0.000002	0.000020	0.000024	0.000170	0.000120	0.006523	0.000329
AP3	0.000227	0.000471	0.000003	0.000020	0.000053	0.000338	0.000466	0.007964	0.001007
AP4	0.000400	0.000998	0.000005	0.000026	0.000137	0.001168	0.001105	0.010985	0.002176

linest from std sig ave									
	0.024185	0.027161	0.000000	0.000000	0.000000	0.011240	0.035871	0.008897	0.018253

standardize signal averages SRM									
srm614-2	0.000191	0.000224	0.000027	0.001992	0.000569	0.000299	0.000087	0.000846	0.001086
srm612-2	0.007144	0.009589	0.000020	0.001134	0.000509	0.012224	0.006254	0.042867	0.017266
srm610-2	0.112718	0.092341	0.000081	0.001333	0.002077	0.116385	0.044143	0.465847	0.166696

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave									
	0.984915	1.010944	0.857978	1.004640	0.986428	1.031403	0.960373	1.003747	1.023863
concentration data									
SRM614-7b	0.42	0.52	0.00	0.00	0.00	0.33	0.32	0.61	1.74
SRM612-7	14.39	21.55	0.00	0.00	0.00	11.44	18.99	31.67	26.45
SRM610-7	230.28	217.56	0.00	0.00	0.00	115.79	130.35	356.90	267.31
AP1-7	0.22	3.16	0.00	0.00	0.00	0.05	0.11	23.68	0.81
AP2-7	0.76	12.64	0.00	0.00	0.00	0.99	2.03	24.33	2.56
AP3-7	2.05	4.87	0.00	0.00	0.00	1.62	6.37	27.17	7.14
AP4-7	3.58	10.89	0.00	0.00	0.00	5.29	16.51	40.40	16.40
MZ3-1	0.22	0.84	0.00	0.00	0.00	0.03	0.00	0.09	0.20
MZ3-2	0.21	0.95	0.00	0.00	0.00	0.01	0.00	0.00	0.20
MZ3-3	0.14	0.90	0.00	0.00	0.00	0.01	0.00	0.01	0.23
MZ3-4	0.64	0.26	0.00	0.00	0.00	0.31	0.02	0.03	0.28
MZ3-5	0.57	0.42	0.00	0.00	0.00	0.03	0.00	0.00	0.24
MZ3-6	0.61	0.28	0.00	0.00	0.00	0.03	0.00	0.00	0.21
MZ3-7	0.53	0.18	0.00	0.00	0.00	0.03	0.00	0.04	0.27
MZ3-8	0.51	0.16	0.00	0.00	0.00	0.13	0.03	0.03	0.21
MZ3-9	0.45	0.15	0.00	0.00	0.00	0.03	0.01	0.01	0.25
srm614-8	0.38	0.52	0.00	0.00	0.00	0.25	0.22	0.68	1.66
srm612-8	15.24	23.12	0.00	0.00	0.00	12.13	19.48	33.75	27.61
srm610-8	237.31	212.63	0.00	0.00	0.00	108.60	141.26	354.02	254.60
AP1-8	0.12	2.90	0.00	0.00	0.00	0.00	0.00	19.44	0.56
AP2-8	0.83	10.39	0.00	0.00	0.00	0.53	1.40	21.98	2.22
AP3-8	2.34	5.34	0.00	0.00	0.00	1.41	6.96	29.37	7.52
AP4-8	4.13	10.72	0.00	0.00	0.00	5.19	15.13	37.58	15.30
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97
raw data									
	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
blank-5	42.36	117.44	17.00	42.32	34.48	76.08	312.96	551.00	500.96
SRM614-5	677.56	773.04	65.16	5752.91	1189.77	807.24	485.64	2677.34	3087.30
SRM612-5	22240.93	23516.37	64.96	3003.66	1342.33	28166.36	14391.44	105087.55	42759.68
SRM610-5	102554.98	101971.89	85.28	1544.57	2269.73	108418.53	40845.43	513693.50	188059.45
AP1-5	415.48	3894.30	31.00	483.32	123.56	288.08	601.40	160936.34	1910.41
AP2-5	2176.53	19386.03	59.84	727.28	743.00	8044.29	4606.87	218343.39	9948.78
AP3-5	6828.84	15214.65	118.16	1174.49	3381.42	31998.54	29185.40	567895.25	51182.85
AP4-5	13536.32	37280.49	224.88	1751.73	6650.40	82722.79	69037.19	847948.06	127291.35
V1-1	9423.45	2608.93	31.64	321.84	111.08	763.84	462.96	4253.54	1121.01
V1-2	3406.86	2400.37	34.52	324.84	112.32	538.84	322.04	1100.13	968.09
V1-3	1457.93	2218.53	24.16	338.76	46.04	195.76	214.72	440.56	492.00
V1-4	1126.65	1941.25	21.80	272.24	47.32	503.48	222.80	485.56	694.72
V1-5	925.57	2206.77	33.28	292.92	28.76	527.36	161.16	195.36	560.40
V1-6	1227.33	2105.81	31.08	352.44	42.00	493.24	163.92	180.08	510.20
V1-7	1039.49	2570.49	21.72	259.00	43.28	693.20	223.20	618.76	739.92
V1-8	1013.05	2475.21	23.72	270.36	46.52	2393.57	203.12	119.60	553.76
V1-9	1689.17	3268.14	32.32	271.00	48.04	512.04	207.64	95.88	672.40
V1-10	701.48	2579.37	19.84	326.40	28.12	151.32	148.36	172.68	456.28
V1-11	795.36	2504.25	32.96	362.88	34.52	124.24	123.24	73.88	387.12
V1-12	580.08	2608.25	27.84	404.44	37.40	297.60	183.68	80.28	440.08
V1-13	598.60	2222.05	40.12	291.96	39.80	166.44	170.20	272.04	521.32
V1-14	450.32	2225.69	22.40	323.40	32.40	198.28	111.00	72.96	404.88
V1-15	393.60	2410.21	23.72	313.72	22.84	125.36	154.56	112.92	415.80
SRM614-6	264.04	388.24	45.08	1934.01	349.28	242.48	230.00	1105.61	1175.93
SRM612-6	16126.21	17153.34	71.80	1982.21	847.16	18387.38	9346.89	74155.54	30209.13
SRM610-6	110811.30	113199.20	85.08	1602.53	2334.37	108674.37	51019.93	603100.06	211412.27
AP1-6	213.24	2494.77	30.96	219.48	51.20	51.52	155.92	73901.34	877.52
AP2-6	1488.25	11984.95	45.20	325.52	361.64	1668.81	2391.73	118307.78	5770.47
AP3-6	5604.11	11685.67	114.56	688.04	2283.73	22280.21	18133.78	358595.81	34618.79
AP4-6	9140.93	20565.04	143.32	955.41	4029.90	30123.45	40030.95	475136.03	74042.14
blank-6	39.84	152.56	21.08	115.08	31.84	22.28	104.64	76.52	169.28
blank average	41.10	135.00	19.04	78.70	33.16	49.18	208.80	313.76	335.12
blank subtraction									
SRM614-5	636.46	638.04	46.12	5674.21	1156.61	758.06	276.84	2363.57	2752.18
SRM612-5	22199.83	23381.37	45.92	2924.96	1309.17	28117.18	14182.64	104773.79	42424.56
SRM610-5	102513.88	101836.89	66.24	1465.87	2236.57	108369.35	40636.63	513379.74	187724.33
AP1-5	374.38	3759.30	11.96	404.62	90.40	238.90	392.60	160622.58	1575.29
AP2-5	2135.43	19251.03	40.80	648.58	709.84	7995.10	4398.06	218029.63	9613.65

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	6787.74	15079.65	99.12	1095.79	3348.26	31949.36	28976.60	567581.49	50847.73
AP4-5	13495.22	37145.49	205.84	1673.03	6617.24	82673.61	68828.39	847634.30	126956.23
V1-1	9382.35	2473.93	12.60	243.14	77.92	714.66	254.16	3939.78	785.88
V1-2	3365.76	2265.37	15.48	246.14	79.16	489.66	113.24	786.36	632.96
V1-3	1416.83	2083.53	5.12	260.06	12.88	146.58	5.92	126.80	156.88
V1-4	1085.55	1806.25	2.76	193.54	14.16	454.30	14.00	171.80	359.60
V1-5	884.46	2071.77	14.24	214.22	-4.40	478.18	-47.64	-118.40	225.28
V1-6	1186.23	1970.81	12.04	273.74	8.84	444.06	-44.88	-133.68	175.08
V1-7	998.39	2435.49	2.68	180.30	10.12	644.02	14.40	305.00	404.80
V1-8	971.95	2340.21	4.68	191.66	13.36	2344.39	-5.68	-194.16	218.64
V1-9	1648.07	3133.14	13.28	192.30	14.88	462.86	-1.16	-217.88	337.28
V1-10	660.38	2444.37	0.80	247.70	-5.04	102.14	-60.44	-141.08	121.16
V1-11	754.26	2369.25	13.92	284.18	1.36	75.06	-85.56	-239.88	52.00
V1-12	538.98	2473.25	8.80	325.74	4.24	248.42	-25.12	-233.48	104.96
V1-13	557.50	2087.05	21.08	213.26	6.64	117.26	-38.60	-41.72	186.20
V1-14	409.22	2090.69	3.36	244.70	-0.76	149.10	-97.80	-240.80	69.76
V1-15	352.50	2275.21	4.68	235.02	-10.32	76.18	-54.24	-200.84	80.68
SRM614-6	222.94	253.24	26.04	1855.31	316.12	193.30	21.20	791.84	840.80
SRM612-6	16085.11	17018.34	52.76	1903.51	814.00	18338.20	9138.09	73841.78	29874.01
SRM610-6	110770.20	113064.20	66.04	1523.83	2301.21	108625.19	50811.12	602786.30	211077.15
AP1-6	172.14	2359.77	11.92	140.78	18.04	2.34	-52.88	73587.57	542.40
AP2-6	1447.15	11849.95	26.16	246.82	328.48	1619.63	2182.93	117994.02	5435.35
AP3-6	5563.01	11550.67	95.52	609.34	2250.57	22231.02	17924.98	358282.05	34283.67
AP4-6	9099.83	20430.03	124.28	876.70	3996.74	30074.27	39822.14	474822.27	73707.02

zero correction

SRM614-5	636.46	638.04	46.12	5674.21	1156.61	758.06	276.84	2363.57	2752.18
SRM612-5	22199.83	23381.37	45.92	2924.96	1309.17	28117.18	14182.64	104773.79	42424.56
SRM610-5	102513.88	101836.89	66.24	1465.87	2236.57	108369.35	40636.63	513379.74	187724.33
AP1-5	374.38	3759.30	11.96	404.62	90.40	238.90	392.60	160622.58	1575.29
AP2-5	2135.43	19251.03	40.80	648.58	709.84	7995.10	4398.06	218029.63	9613.65
AP3-5	6787.74	15079.65	99.12	1095.79	3348.26	31949.36	28976.60	567581.49	50847.73
AP4-5	13495.22	37145.49	205.84	1673.03	6617.24	82673.61	68828.39	847634.30	126956.23
V1-1	9382.35	2473.93	12.60	243.14	77.92	714.66	254.16	3939.78	785.88
V1-2	3365.76	2265.37	15.48	246.14	79.16	489.66	113.24	786.36	632.96
V1-3	1416.83	2083.53	5.12	260.06	12.88	146.58	5.92	126.80	156.88
V1-4	1085.55	1806.25	2.76	193.54	14.16	454.30	14.00	171.80	359.60
V1-5	884.46	2071.77	14.24	214.22	0.00	478.18	0.00	0.00	225.28
V1-6	1186.23	1970.81	12.04	273.74	8.84	444.06	0.00	0.00	175.08
V1-7	998.39	2435.49	2.68	180.30	10.12	644.02	14.40	305.00	404.80
V1-8	971.95	2340.21	4.68	191.66	13.36	2344.39	0.00	0.00	218.64
V1-9	1648.07	3133.14	13.28	192.30	14.88	462.86	0.00	0.00	337.28
V1-10	660.38	2444.37	0.80	247.70	0.00	102.14	0.00	0.00	121.16
V1-11	754.26	2369.25	13.92	284.18	1.36	75.06	0.00	0.00	52.00
V1-12	538.98	2473.25	8.80	325.74	4.24	248.42	0.00	0.00	104.96
V1-13	557.50	2087.05	21.08	213.26	6.64	117.26	0.00	0.00	186.20
V1-14	409.22	2090.69	3.36	244.70	0.00	149.10	0.00	0.00	69.76
V1-15	352.50	2275.21	4.68	235.02	0.00	76.18	0.00	0.00	80.68
SRM614-6	222.94	253.24	26.04	1855.31	316.12	193.30	21.20	791.84	840.80
SRM612-6	16085.11	17018.34	52.76	1903.51	814.00	18338.20	9138.09	73841.78	29874.01
SRM610-6	110770.20	113064.20	66.04	1523.83	2301.21	108625.19	50811.12	602786.30	211077.15
AP1-6	172.14	2359.77	11.92	140.78	18.04	2.34	0.00	73587.57	542.40
AP2-6	1447.15	11849.95	26.16	246.82	328.48	1619.63	2182.93	117994.02	5435.35
AP3-6	5563.01	11550.67	95.52	609.34	2250.57	22231.02	17924.98	358282.05	34283.67
AP4-6	9099.83	20430.03	124.28	876.70	3996.74	30074.27	39822.14	474822.27	73707.02

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration

SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal

SRM614-5	0.000160	0.000161	0.000012	0.001428	0.000291	0.000191	0.000070	0.000595	0.000693
SRM612-5	0.006348	0.006686	0.000013	0.000836	0.000374	0.008040	0.004055	0.029559	0.012131
SRM610-5	0.094252	0.093630	0.000061	0.001348	0.002056	0.099636	0.037362	0.472005	0.172595

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000024	0.000242	0.000001	0.000026	0.000006	0.000015	0.000025	0.010325	0.000101
AP2-5	0.000097	0.000876	0.000002	0.000029	0.000032	0.000364	0.000200	0.009917	0.000437
AP3-5	0.000350	0.000778	0.000005	0.000057	0.000173	0.001649	0.001496	0.029295	0.002624
AP4-5	0.000689	0.001896	0.000011	0.000085	0.000338	0.004220	0.003513	0.043264	0.006480
V1-1	0.001009	0.000266	0.000001	0.000026	0.000008	0.000077	0.000027	0.000424	0.000085
V1-2	0.000298	0.000201	0.000001	0.000022	0.000007	0.000043	0.000010	0.000070	0.000056
V1-3	0.000167	0.000245	0.000001	0.000031	0.000002	0.000017	0.000001	0.000015	0.000018
V1-4	0.000121	0.000201	0.000000	0.000022	0.000002	0.000051	0.000002	0.000019	0.000040
V1-5	0.000092	0.000215	0.000001	0.000022	0.000000	0.000050	0.000000	0.000000	0.000023
V1-6	0.000135	0.000224	0.000001	0.000031	0.000001	0.000050	0.000000	0.000000	0.000020
V1-7	0.000118	0.000287	0.000000	0.000021	0.000001	0.000076	0.000002	0.000036	0.000048
V1-8	0.000111	0.000268	0.000001	0.000022	0.000002	0.000268	0.000000	0.000000	0.000025
V1-9	0.000146	0.000277	0.000001	0.000017	0.000001	0.000041	0.000000	0.000000	0.000030
V1-10	0.000097	0.000358	0.000000	0.000036	0.000000	0.000015	0.000000	0.000000	0.000018
V1-11	0.000105	0.000330	0.000002	0.000040	0.000000	0.000010	0.000000	0.000000	0.000007
V1-12	0.000081	0.000372	0.000001	0.000049	0.000001	0.000037	0.000000	0.000000	0.000016
V1-13	0.000089	0.000333	0.000003	0.000034	0.000001	0.000019	0.000000	0.000000	0.000030
V1-14	0.000069	0.000354	0.000001	0.000041	0.000000	0.000025	0.000000	0.000000	0.000012
V1-15	0.000054	0.000351	0.000001	0.000036	0.000000	0.000012	0.000000	0.000000	0.000012
SRM614-6	0.000193	0.000219	0.000023	0.001607	0.000274	0.000167	0.000018	0.000686	0.000728
SRM612-6	0.007066	0.007476	0.000023	0.000836	0.000358	0.008056	0.004014	0.032437	0.013123
SRM610-6	0.100554	0.102637	0.000060	0.001383	0.002089	0.098607	0.046125	0.547194	0.191611
AP1-6	0.000017	0.000229	0.000001	0.000014	0.000002	0.000000	0.000000	0.007132	0.000053
AP2-6	0.000086	0.000707	0.000002	0.000015	0.000020	0.000097	0.000130	0.007040	0.000324
AP3-6	0.000313	0.000649	0.000005	0.000034	0.000126	0.001249	0.001007	0.020129	0.001926
AP4-6	0.000669	0.001501	0.000009	0.000064	0.000294	0.002210	0.002926	0.034886	0.005415

standardize signal averages AP

AP1	0.000020	0.000235	0.000001	0.000020	0.000004	0.000008	0.000013	0.008729	0.000077
AP2	0.000092	0.000791	0.000002	0.000022	0.000026	0.000230	0.000165	0.008478	0.000381
AP3	0.000331	0.000714	0.000005	0.000045	0.000150	0.001449	0.001251	0.024712	0.002275
AP4	0.000679	0.001698	0.000010	0.000075	0.000316	0.003215	0.003219	0.039075	0.005948

linest from std sig ave

	0.014827	0.021847	0.000000	0.000000	0.000000	0.004017	0.012407	0.002657	0.006819
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standardize signal averages SRM

srm614-2	0.000177	0.000190	0.000017	0.001518	0.000283	0.000179	0.000044	0.000640	0.000711
srm612-2	0.006707	0.007081	0.000018	0.000836	0.000366	0.008048	0.004035	0.031198	0.012627
srm610-2	0.097403	0.098133	0.000060	0.001366	0.002073	0.099121	0.041743	0.509600	0.182103

linest from std sig ave

	0.052707	0.044866	0.000000	0.000000	0.000000	0.028185	0.072544	0.010122	0.025421
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concentration data

SRM614-5	0.20	0.30	0.00	0.00	0.00	0.07	0.07	0.14	0.41
SRM612-5	8.07	12.53	0.00	0.00	0.00	2.77	4.32	6.83	7.09
SRM610-5	119.85	175.43	0.00	0.00	0.00	34.33	39.75	107.57	100.94
AP1-5	0.14	2.11	0.00	0.00	0.00	0.02	0.12	10.95	0.28
AP2-5	0.57	7.63	0.00	0.00	0.00	0.58	0.99	10.51	1.19
AP3-5	2.07	6.78	0.00	0.00	0.00	2.64	7.40	31.05	7.14
AP4-5	4.07	16.52	0.00	0.00	0.00	6.76	17.39	45.86	17.63
V1-1	5.97	2.32	0.00	0.00	0.00	0.12	0.14	0.45	0.23
V1-2	1.77	1.75	0.00	0.00	0.00	0.07	0.05	0.07	0.15
V1-3	0.99	2.14	0.00	0.00	0.00	0.03	0.00	0.02	0.05
V1-4	0.72	1.76	0.00	0.00	0.00	0.08	0.01	0.02	0.11
V1-5	0.54	1.87	0.00	0.00	0.00	0.08	0.00	0.00	0.06
V1-6	0.80	1.95	0.00	0.00	0.00	0.08	0.00	0.00	0.05
V1-7	0.70	2.50	0.00	0.00	0.00	0.12	0.01	0.04	0.13
V1-8	0.66	2.33	0.00	0.00	0.00	0.43	0.00	0.00	0.07
V1-9	0.86	2.41	0.00	0.00	0.00	0.07	0.00	0.00	0.08
V1-10	0.57	3.12	0.00	0.00	0.00	0.02	0.00	0.00	0.05
V1-11	0.62	2.88	0.00	0.00	0.00	0.02	0.00	0.00	0.02
V1-12	0.48	3.24	0.00	0.00	0.00	0.06	0.00	0.00	0.04
V1-13	0.53	2.90	0.00	0.00	0.00	0.03	0.00	0.00	0.08
V1-14	0.41	3.08	0.00	0.00	0.00	0.04	0.00	0.00	0.03
V1-15	0.32	3.06	0.00	0.00	0.00	0.02	0.00	0.00	0.03
SRM614-6	0.25	0.41	0.00	0.00	0.00	0.06	0.02	0.16	0.43
SRM612-6	8.99	14.01	0.00	0.00	0.00	2.78	4.27	7.39	7.67
SRM610-6	127.87	192.31	0.00	0.00	0.00	33.97	49.08	124.70	112.06
AP1-6	0.10	1.99	0.00	0.00	0.00	0.00	0.00	7.56	0.14
AP2-6	0.51	6.16	0.00	0.00	0.00	0.15	0.64	7.46	0.88
AP3-6	1.85	5.66	0.00	0.00	0.00	2.00	4.98	21.34	5.24
AP4-6	3.95	13.08	0.00	0.00	0.00	3.54	14.48	36.98	14.73

certified concentration

SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	439.90	376.80			239.40	259.40	441.40	396.30
STD AP1	0.28	5.23			0.00	0.05	29.00	0.47
STD AP2	0.87	7.01			0.76	2.62	28.72	3.23
STD AP3	2.01	9.07			3.05	8.49	29.84	8.97
STD AP4	3.94	13.11			4.79	14.95	30.42	14.97

	Zr	Mo	Ru	Rh	Pd	Ag	Cd	In	Sn
raw data									
blank-3	62.32	135.56	14.44	13.84	15.08	27.84	232.04	194.88	277.72
SRM614-3	609.32	585.32	69.48	4399.78	1241.93	668.44	446.12	2182.53	2498.01
SRM612-3	18620.31	18641.11	76.60	2275.25	1065.49	25625.47	12994.91	87930.85	34635.80
SRM610-3	96642.95	101432.61	83.08	1554.73	2007.37	114402.77	35579.40	510405.78	186408.33
AP1-3	642.72	5959.63	51.24	643.96	317.72	172.24	5292.59	293640.06	2656.34
AP2-3	2097.17	16117.29	59.16	635.08	655.12	3637.34	4074.42	231207.94	8452.65
AP3-3	6940.64	14047.68	126.40	961.45	2858.06	22297.37	24372.54	479050.97	46362.30
AP4-3	10793.46	25551.47	153.68	1014.81	4122.66	31231.58	38209.98	477263.53	76689.63
V3-1	415.16	1177.13	28.64	240.92	28.84	108.40	144.80	427.48	468.08
V3-2	268.64	1531.49	27.44	227.36	25.44	48.32	109.12	145.28	299.88
V3-3	313.04	1847.41	20.08	261.28	24.44	64.12	121.48	203.76	327.72
V3-4	613.24	2420.89	32.44	331.32	24.32	152.76	152.56	501.76	468.44
V3-5	338.12	2053.29	28.20	388.92	39.84	79.84	116.88	226.76	530.68
V3-6	401.52	2784.78	25.44	494.60	39.84	68.80	124.52	187.84	323.04
V3-7	921.49	2924.94	48.00	1010.45	81.20	163.72	215.76	730.44	708.76
V3-8	822.92	2862.66	44.72	1200.73	63.84	126.24	144.44	197.32	424.28
V3-9	899.77	2242.97	50.44	1269.77	66.04	114.72	163.04	149.44	496.20
SRM614-4	361.88	495.28	70.44	3051.38	825.16	376.52	295.36	1416.29	1641.81
SRM612-4	14245.80	14397.72	37.40	1729.25	822.52	18443.66	9570.37	67543.10	26202.47
SRM610-4	81933.78	91401.48	91.04	1362.29	1568.33	88512.98	35372.64	484119.88	168591.52
AP1-4	357.60	4696.55	47.40	359.48	90.60	63.56	549.60	145795.70	1325.49
AP2-4	1249.85	9807.05	48.20	295.80	298.60	1424.89	2341.97	114247.36	5052.99
AP3-4	6090.67	12208.35	116.60	702.80	2240.53	18210.70	19419.47	373643.38	36964.85
AP4-4	8639.61	17175.58	93.88	551.04	2688.90	21406.04	25093.58	284127.00	49244.76
blank-4	60.04	162.28	32.00	123.32	33.60	18.48	96.96	195.28	150.92
blank average	61.18	148.92	23.22	68.58	24.34	23.16	164.50	195.08	214.32

blank subtraction									
SRM614-3	548.14	436.40	46.26	4331.20	1217.59	645.28	281.62	1987.45	2283.69
SRM612-3	18559.12	18492.18	53.38	2206.67	1041.15	25602.30	12830.41	87735.77	34421.48
SRM610-3	96581.76	101283.69	59.86	1486.15	1983.03	114379.61	35414.90	510210.70	186194.01
AP1-3	581.54	5810.71	28.02	575.38	293.38	149.08	5128.09	293444.98	2442.01
AP2-3	2035.99	15968.37	35.94	566.50	630.78	3614.18	3909.92	231012.86	8238.33
AP3-3	6879.46	13898.76	103.18	892.87	2833.72	22274.20	24208.04	478855.89	46147.98
AP4-3	10732.28	25402.54	130.46	946.23	4098.32	31208.42	38045.48	477068.45	76475.31
V3-1	353.98	1028.21	5.42	172.34	4.50	85.24	-19.70	232.40	253.76
V3-2	207.46	1382.57	4.22	158.78	1.10	25.16	-55.38	-49.80	85.56
V3-3	251.86	1698.49	-3.14	192.70	0.10	40.96	-43.02	8.68	113.40
V3-4	552.06	2271.97	9.22	262.74	-0.02	129.60	-11.94	306.68	254.12
V3-5	276.94	1904.37	4.98	320.34	15.50	56.68	-47.62	31.68	316.36
V3-6	340.34	2635.85	2.22	426.02	15.50	45.64	-39.98	-7.24	108.72
V3-7	860.30	2776.02	24.78	941.87	56.86	140.56	51.26	535.36	494.44
V3-8	761.74	2713.74	21.50	1132.15	39.50	103.08	-20.06	2.24	209.96
V3-9	838.58	2094.05	27.22	1201.19	41.70	91.56	-1.46	-45.64	281.88
SRM614-4	300.70	346.36	47.22	2982.80	800.82	353.36	130.86	1221.21	1427.49
SRM612-4	14184.62	14248.80	14.18	1660.67	798.18	18420.50	9405.87	67348.02	25988.15
SRM610-4	81872.60	91252.56	67.82	1293.71	1543.99	88489.82	35208.14	483924.80	168377.20
AP1-4	296.42	4547.63	24.18	290.90	66.26	40.40	385.10	145600.62	1111.17
AP2-4	1188.67	9658.13	24.98	227.22	274.26	1401.73	2177.47	114052.28	4838.67
AP3-4	6029.49	12059.43	93.38	634.22	2216.19	18187.54	19254.97	373448.30	36750.53
AP4-4	8578.43	17026.66	70.66	482.46	2664.55	21382.88	24929.08	283931.92	49030.44

zero correction									
SRM614-3	548.14	436.40	46.26	4331.20	1217.59	645.28	281.62	1987.45	2283.69
SRM612-3	18559.12	18492.18	53.38	2206.67	1041.15	25602.30	12830.41	87735.77	34421.48
SRM610-3	96581.76	101283.69	59.86	1486.15	1983.03	114379.61	35414.90	510210.70	186194.01
AP1-3	581.54	5810.71	28.02	575.38	293.38	149.08	5128.09	293444.98	2442.01
AP2-3	2035.99	15968.37	35.94	566.50	630.78	3614.18	3909.92	231012.86	8238.33
AP3-3	6879.46	13898.76	103.18	892.87	2833.72	22274.20	24208.04	478855.89	46147.98
AP4-3	10732.28	25402.54	130.46	946.23	4098.32	31208.42	38045.48	477068.45	76475.31
V3-1	353.98	1028.21	5.42	172.34	4.50	85.24	0.00	232.40	253.76
V3-2	207.46	1382.57	4.22	158.78	1.10	25.16	0.00	0.00	85.56
V3-3	251.86	1698.49	0.00	192.70	0.10	40.96	0.00	8.68	113.40
V3-4	552.06	2271.97	9.22	262.74	0.00	129.60	0.00	306.68	254.12
V3-5	276.94	1904.37	4.98	320.34	15.50	56.68	0.00	31.68	316.36
V3-6	340.34	2635.85	2.22	426.02	15.50	45.64	0.00	0.00	108.72
V3-7	860.30	2776.02	24.78	941.87	56.86	140.56	51.26	535.36	494.44
V3-8	761.74	2713.74	21.50	1132.15	39.50	103.08	0.00	2.24	209.96
V3-9	838.58	2094.05	27.22	1201.19	41.70	91.56	0.00	0.00	281.88
SRM614-4	300.70	346.36	47.22	2982.80	800.82	353.36	130.86	1221.21	1427.49

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	14184.62	14248.80	14.18	1660.67	798.18	18420.50	9405.87	67348.02	25988.15
SRM610-4	81872.60	91252.56	67.82	1293.71	1543.99	88489.82	35208.14	483924.80	168377.20
AP1-4	296.42	4547.63	24.18	290.90	66.26	40.40	385.10	145600.62	1111.17
AP2-4	1188.67	9658.13	24.98	227.22	274.26	1401.73	2177.47	114052.28	4838.67
AP3-4	6029.49	12059.43	93.38	634.22	2216.19	18187.54	19254.97	373448.30	36750.53
AP4-4	8578.43	17026.66	70.66	482.46	2664.55	21382.88	24929.08	283931.92	49030.44

certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

standardized concentration									
SRM614	0.000009	0.000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000016
SRM612	0.000420	0.000447	0.000000	0.000000	0.000000	0.000256	0.000330	0.000501	0.000443
SRM610	0.005129	0.004394	0.000000	0.000000	0.000000	0.002791	0.003025	0.005147	0.004621
STD AP1	0.000001	0.000013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000073	0.000001
STD AP2	0.000002	0.000018	0.000000	0.000000	0.000000	0.000002	0.000007	0.000072	0.000008
STD AP3	0.000005	0.000023	0.000000	0.000000	0.000000	0.000008	0.000021	0.000075	0.000022
STD AP4	0.000010	0.000033	0.000000	0.000000	0.000000	0.000012	0.000037	0.000076	0.000038

standardized signal									
SRM614-3	0.000200	0.000159	0.000017	0.001581	0.000444	0.000236	0.000103	0.000726	0.000834
SRM612-3	0.007052	0.007027	0.000020	0.000838	0.000396	0.009728	0.004875	0.033337	0.013079
SRM610-3	0.098372	0.103161	0.000061	0.001514	0.002020	0.116499	0.036071	0.519666	0.189645
AP1-3	0.000025	0.000248	0.000001	0.000025	0.000013	0.000006	0.000219	0.012509	0.000104
AP2-3	0.000111	0.000874	0.000002	0.000031	0.000035	0.000198	0.000214	0.012646	0.000451
AP3-3	0.000318	0.000642	0.000005	0.000041	0.000131	0.001029	0.001118	0.022111	0.002131
AP4-3	0.000576	0.001364	0.000007	0.000051	0.000220	0.001675	0.002042	0.025610	0.004105
V3-1	0.000058	0.000168	0.000001	0.000028	0.000001	0.000014	0.000000	0.000038	0.000041
V3-2	0.000029	0.000195	0.000001	0.000022	0.000000	0.000004	0.000000	0.000000	0.000012
V3-3	0.000032	0.000213	0.000000	0.000024	0.000000	0.000005	0.000000	0.000001	0.000014
V3-4	0.000059	0.000241	0.000001	0.000028	0.000000	0.000014	0.000000	0.000033	0.000027
V3-5	0.000031	0.000210	0.000001	0.000035	0.000002	0.000006	0.000000	0.000003	0.000035
V3-6	0.000029	0.000221	0.000000	0.000036	0.000001	0.000004	0.000000	0.000000	0.000009
V3-7	0.000039	0.000126	0.000001	0.000043	0.000003	0.000006	0.000002	0.000024	0.000022
V3-8	0.000032	0.000114	0.000001	0.000048	0.000002	0.000004	0.000000	0.000000	0.000009
V3-9	0.000034	0.000084	0.000001	0.000048	0.000002	0.000004	0.000000	0.000000	0.000011
SRM614-4	0.000159	0.000184	0.000025	0.001581	0.000425	0.000187	0.000069	0.000647	0.000757
SRM612-4	0.007282	0.007315	0.000007	0.000853	0.000410	0.009457	0.004829	0.034576	0.013342
SRM610-4	0.097829	0.109038	0.000081	0.001546	0.001845	0.105736	0.042070	0.578241	0.201194
AP1-4	0.000016	0.000248	0.000001	0.000016	0.000004	0.000002	0.000021	0.007951	0.000061
AP2-4	0.000089	0.000719	0.000002	0.000017	0.000020	0.000104	0.000162	0.008495	0.000360
AP3-4	0.000323	0.000647	0.000005	0.000034	0.000119	0.000976	0.001033	0.020034	0.001972
AP4-4	0.000539	0.001070	0.000004	0.000030	0.000167	0.001343	0.001566	0.017837	0.003080

standardize signal averages AP									
AP1	0.000020	0.000248	0.000001	0.000020	0.000008	0.000004	0.000120	0.010230	0.000082
AP2	0.000100	0.000797	0.000002	0.000024	0.000027	0.000151	0.000188	0.010571	0.000406
AP3	0.000321	0.000644	0.000005	0.000038	0.000125	0.001002	0.001075	0.021073	0.002051
AP4	0.000558	0.001217	0.000006	0.000041	0.000194	0.001509	0.001804	0.021723	0.003593

linest from std sig ave									
	0.017349	0.027739	0.000000	0.000000	0.000000	0.007896	0.020565	0.004184	0.010663

standardize signal averages SRM									
srm614-2	0.000180	0.000171	0.000021	0.001581	0.000434	0.000211	0.000086	0.000686	0.000795
srm612-2	0.007167	0.007171	0.000014	0.000846	0.000403	0.009593	0.004852	0.033957	0.013211
srm610-2	0.098101	0.106099	0.000071	0.001530	0.001932	0.111118	0.039071	0.548954	0.195419

linest from std sig ave									
	0.052319	0.041504	0.000000	0.000000	0.000000	0.025132	0.077271	0.009396	0.023691

concentration data									
SRM614-3	0.30	0.38	0.00	0.00	0.00	0.16	0.18	0.26	0.76
SRM612-3	10.49	16.72	0.00	0.00	0.00	6.59	8.60	11.96	11.96
SRM610-3	146.37	245.42	0.00	0.00	0.00	78.89	63.62	186.47	173.43
AP1-3	0.17	2.74	0.00	0.00	0.00	0.02	1.79	20.88	0.44
AP2-3	0.77	9.67	0.00	0.00	0.00	0.62	1.76	21.11	1.92
AP3-3	2.20	7.10	0.00	0.00	0.00	3.24	9.17	36.91	9.06
AP4-3	3.99	15.09	0.00	0.00	0.00	5.28	16.76	42.75	17.46
V3-1	0.40	1.86	0.00	0.00	0.00	0.04	0.00	0.06	0.18
V3-2	0.20	2.15	0.00	0.00	0.00	0.01	0.00	0.00	0.05
V3-3	0.22	2.35	0.00	0.00	0.00	0.02	0.00	0.00	0.06

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	0.41	2.67	0.00	0.00	0.00	0.04	0.00	0.05	0.11
V3-5	0.21	2.32	0.00	0.00	0.00	0.02	0.00	0.01	0.15
V3-6	0.20	2.44	0.00	0.00	0.00	0.01	0.00	0.00	0.04
V3-7	0.27	1.39	0.00	0.00	0.00	0.02	0.02	0.04	0.10
V3-8	0.22	1.26	0.00	0.00	0.00	0.01	0.00	0.00	0.04
V3-9	0.23	0.93	0.00	0.00	0.00	0.01	0.00	0.00	0.05
SRM614-4	0.24	0.44	0.00	0.00	0.00	0.13	0.12	0.23	0.69
SRM612-4	10.84	17.40	0.00	0.00	0.00	6.40	8.52	12.41	12.20
SRM610-4	145.56	259.40	0.00	0.00	0.00	71.60	74.20	207.49	184.00
AP1-4	0.11	2.75	0.00	0.00	0.00	0.01	0.17	13.27	0.26
AP2-4	0.61	7.96	0.00	0.00	0.00	0.33	1.33	14.18	1.53
AP3-4	2.24	7.16	0.00	0.00	0.00	3.07	8.47	33.44	8.39
AP4-4	3.73	11.84	0.00	0.00	0.00	4.23	12.85	29.77	13.10
certified concentration									
SRM614	0.80	0.70							1.40
SRM612	35.99	38.30				21.92	28.32	42.93	37.96
SRM610	439.90	376.80				239.40	259.40	441.40	396.30
STD AP1	0.28	5.23				0.00	0.05	29.00	0.47
STD AP2	0.87	7.01				0.76	2.62	28.72	3.23
STD AP3	2.01	9.07				3.05	8.49	29.84	8.97
STD AP4	3.94	13.11				4.79	14.95	30.42	14.97

Appendix A. Raw trace element datasheets from laser ablation.

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-3	15.04	20555.24	104.40	168.04	8.96	15.40	12.68
SRM614-3	937.33	65224.29	2245.17	7168.76	1042.65	1550.73	1894.41
SRM612-3	38481.98	74874.31	119350.31	78510.28	51524.49	73592.53	97593.34
SRM610-3	183406.92	57694.20	489998.47	433076.69	307871.38	441418.53	611335.19
AP1-3	1088.05	68252.38	752.84	62722.31	240.80	343.28	289.36
AP2-3	3475.74	76978.71	796.04	156786.17	3587.82	4757.75	5868.11
AP3-3	16300.01	77715.56	1005.89	745950.75	18871.95	32328.78	34949.64
AP4-3	23880.33	79388.05	2288.29	989451.63	27162.95	45757.62	49934.64
EVA2.5-1	65.84	48838.91	244.60	1547974.80	2037.81	996.93	482.00
EVA2.5-2	55.48	41428.47	245.84	894885.88	1237.41	614.28	320.76
EVA2.5-3	60.16	42777.12	184.16	1182647.00	1671.33	918.57	393.00
EVA2.5-4	67.80	54449.59	208.40	2201333.80	2740.42	1206.77	614.36
EVA2.5-5	39.60	61768.71	233.24	2607212.80	3193.02	1220.49	673.56
EVA2.5-6	51.12	64401.20	196.64	2715033.50	3390.62	1303.25	699.08
EVA2.5-7	53.64	54887.87	236.80	119416.43	262.96	271.84	154.96
EVA2.5-8	26.84	58270.89	142.72	137363.89	326.80	223.64	95.16
EVA2.5-9	31.44	61516.75	138.12	150156.92	329.48	267.00	108.76
EVA2.5-10	56.72	50722.61	204.64	97865.23	204.96	203.16	116.24
EVA2.5-11	32.88	53597.46	117.20	120731.48	265.24	201.04	75.84
EVA2.5-12	31.44	56443.80	132.24	144122.33	318.84	215.88	91.64
EVA2.5-13	47.24	59693.73	142.80	130883.14	291.96	210.40	90.20
EVA2.5-14	31.08	63040.07	126.80	141812.59	328.52	182.64	69.00
EVA2.5-15	49.32	64695.29	120.04	141098.28	325.88	193.48	76.24
SRM614-4	672.40	84416.76	1332.37	4250.02	845.96	1247.61	1446.73
SRM612-4	27751.64	90440.95	75316.98	50069.00	45056.77	62321.71	75158.38
SRM610-4	163592.08	66084.29	379561.19	315312.53	300632.94	415106.19	517870.06
AP1-4	697.76	73601.85	556.32	37530.61	102.40	105.04	44.72
AP2-4	1935.09	81152.26	402.24	84673.80	2581.25	3165.22	3726.18
AP3-4	11448.74	76336.03	674.96	459047.00	14315.08	24341.02	24475.66
AP4-4	10914.94	79137.73	959.33	400717.81	15530.53	22265.33	24574.50
blank-4	23.52	24075.86	98.68	380.84	4.36	46.84	16.32
blank average	19.28	22315.55	101.54	274.44	6.66	31.12	14.50
blank subtraction							
SRM614-3	918.05	42908.74	2143.63	6894.32	1035.99	1519.61	1879.91
SRM612-3	38462.70	52558.76	119248.77	78235.84	51517.83	73561.41	97578.84
SRM610-3	183387.64	35378.66	489896.93	432802.25	307864.72	441387.41	611320.69
AP1-3	1068.77	45936.84	651.30	62447.87	234.14	312.16	274.86
AP2-3	3456.46	54663.17	694.50	156511.73	3581.16	4726.63	5853.61
AP3-3	16280.73	55400.01	904.35	745676.31	18865.28	32297.66	34935.14
AP4-3	23861.05	57072.50	2186.75	989177.19	27156.29	45726.50	49920.14
EVA2.5-1	46.56	26523.37	143.06	1547700.36	2031.15	965.81	467.50
EVA2.5-2	36.20	19112.93	144.30	894611.44	1230.75	583.16	306.26
EVA2.5-3	40.88	20461.58	82.62	1182372.56	1664.67	887.45	378.50
EVA2.5-4	48.52	32134.04	106.86	2201059.36	2733.76	1175.65	599.86
EVA2.5-5	20.32	39453.16	131.70	2606938.36	3186.36	1189.37	659.06
EVA2.5-6	31.84	42085.66	95.10	2714759.06	3383.96	1272.13	684.58
EVA2.5-7	34.36	32572.32	135.26	119141.99	256.30	240.72	140.46
EVA2.5-8	7.56	35955.34	41.18	137089.45	320.14	192.52	80.66
EVA2.5-9	12.16	39201.20	36.58	149882.48	322.82	235.88	94.26
EVA2.5-10	37.44	28407.06	103.10	97590.79	198.30	172.04	101.74
EVA2.5-11	13.60	31281.92	15.66	120457.04	258.58	169.92	61.34
EVA2.5-12	12.16	34128.25	30.70	143847.89	312.18	184.76	77.14
EVA2.5-13	27.96	37378.19	41.26	130608.70	285.30	179.28	75.70
EVA2.5-14	11.80	40724.53	25.26	141538.15	321.86	151.52	54.50
EVA2.5-15	30.04	42379.74	18.50	140823.84	319.22	162.36	61.74
SRM614-4	653.12	62101.21	1230.83	3975.58	839.30	1216.49	1432.23
SRM612-4	27732.36	68125.40	75215.44	49794.56	45050.11	62290.59	75143.88
SRM610-4	163572.80	43768.74	379459.65	315038.09	300626.28	415075.07	517855.56
AP1-4	678.48	51286.31	454.78	37256.17	95.74	73.92	30.22
AP2-4	1915.81	58836.71	300.70	84399.36	2574.59	3134.10	3711.68
AP3-4	11429.46	54020.49	573.42	458772.56	14308.42	24309.90	24461.16
AP4-4	10895.66	56822.18	857.78	400443.37	15523.87	22234.21	24560.00
zero correction							
SRM614-3	918.05	42908.74	2143.63	6894.32	1035.99	1519.61	1879.91
SRM612-3	38462.70	52558.76	119248.77	78235.84	51517.83	73561.41	97578.84

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	183387.64	35378.66	489896.93	432802.25	307864.72	441387.41	611320.69
AP1-3	1068.77	45936.84	651.30	62447.87	234.14	312.16	274.86
AP2-3	3456.46	54663.17	694.50	156511.73	3581.16	4726.63	5853.61
AP3-3	16280.73	55400.01	904.35	745676.31	18865.28	32297.66	34935.14
AP4-3	23861.05	57072.50	2186.75	989177.19	27156.29	45726.50	49920.14
EVA2.5-1	46.56	26523.37	143.06	1547700.36	2031.15	965.81	467.50
EVA2.5-2	36.20	19112.93	144.30	894611.44	1230.75	583.16	306.26
EVA2.5-3	40.88	20461.58	82.62	1182372.56	1664.67	887.45	378.50
EVA2.5-4	48.52	32134.04	106.86	2201059.36	2733.76	1175.65	599.86
EVA2.5-5	20.32	39453.16	131.70	2606938.36	3186.36	1189.37	659.06
EVA2.5-6	31.84	42085.66	95.10	2714759.06	3383.96	1272.13	684.58
EVA2.5-7	34.36	32572.32	135.26	119141.99	256.30	240.72	140.46
EVA2.5-8	7.56	35955.34	41.18	137089.45	320.14	192.52	80.66
EVA2.5-9	12.16	39201.20	36.58	149882.48	322.82	235.88	94.26
EVA2.5-10	37.44	28407.06	103.10	97590.79	198.30	172.04	101.74
EVA2.5-11	13.60	31281.92	15.66	120457.04	258.58	169.92	61.34
EVA2.5-12	12.16	34128.25	30.70	143847.89	312.18	184.76	77.14
EVA2.5-13	27.96	37378.19	41.26	130608.70	285.30	179.28	75.70
EVA2.5-14	11.80	40724.53	25.26	141538.15	321.86	151.52	54.50
EVA2.5-15	30.04	42379.74	18.50	140823.84	319.22	162.36	61.74
SRM614-4	653.12	62101.21	1230.83	3975.58	839.30	1216.49	1432.23
SRM612-4	27732.36	68125.40	75215.44	49794.56	45050.11	62290.59	75143.88
SRM610-4	163572.80	43768.74	379459.65	315038.09	300626.28	415075.07	517855.56
AP1-4	678.48	51286.31	454.78	37256.17	95.74	73.92	30.22
AP2-4	1915.81	58836.71	300.70	84399.36	2574.59	3134.10	3711.68
AP3-4	11429.46	54020.49	573.42	458772.56	14308.42	24309.90	24461.16
AP4-4	10895.66	56822.18	857.78	400443.37	15523.87	22234.21	24560.00

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-3	0.000225	0.010533	0.000526	0.001692	0.000254	0.000373	0.000461
SRM612-3	0.010793	0.014749	0.033464	0.021954	0.014457	0.020643	0.027383
SRM610-3	0.142331	0.027458	0.380220	0.335908	0.238941	0.342571	0.474460
AP1-3	0.000053	0.002293	0.000033	0.003117	0.000012	0.000016	0.000014
AP2-3	0.000165	0.002606	0.000033	0.007462	0.000171	0.000225	0.000279
AP3-3	0.000696	0.002368	0.000039	0.031873	0.000806	0.001381	0.001493
AP4-3	0.001183	0.002829	0.000108	0.049034	0.001346	0.002267	0.002475
EVA2.5-1	0.000004	0.002298	0.000012	0.134072	0.000176	0.000084	0.000040
EVA2.5-2	0.000005	0.002413	0.000018	0.112964	0.000155	0.000074	0.000039
EVA2.5-3	0.000005	0.002346	0.000009	0.135536	0.000191	0.000102	0.000043
EVA2.5-4	0.000003	0.002204	0.000007	0.150992	0.000188	0.000081	0.000041
EVA2.5-5	0.000001	0.002227	0.000007	0.147146	0.000180	0.000067	0.000037
EVA2.5-6	0.000002	0.002253	0.000005	0.145321	0.000181	0.000068	0.000037
EVA2.5-7	0.000003	0.002758	0.000011	0.010087	0.000022	0.000020	0.000012
EVA2.5-8	0.000001	0.002802	0.000003	0.010683	0.000025	0.000015	0.000006
EVA2.5-9	0.000001	0.002891	0.000003	0.011054	0.000024	0.000017	0.000007
EVA2.5-10	0.000004	0.003002	0.000011	0.010315	0.000021	0.000018	0.000011
EVA2.5-11	0.000001	0.002813	0.000001	0.010832	0.000023	0.000015	0.000006
EVA2.5-12	0.000001	0.002870	0.000003	0.012096	0.000026	0.000016	0.000006
EVA2.5-13	0.000002	0.003213	0.000004	0.011228	0.000025	0.000015	0.000007
EVA2.5-14	0.000001	0.003145	0.000002	0.010932	0.000025	0.000012	0.000004

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000002	0.003336	0.000001	0.011086	0.000025	0.000013	0.000005
SRM614-4	0.000270	0.025702	0.000509	0.001645	0.000347	0.000503	0.000593
SRM612-4	0.012248	0.030088	0.033219	0.021992	0.019897	0.027511	0.033188
SRM610-4	0.173587	0.046448	0.402690	0.334324	0.319030	0.440486	0.549558
AP1-4	0.000047	0.003567	0.000032	0.002591	0.000007	0.000005	0.000002
AP2-4	0.000131	0.004013	0.000021	0.005757	0.000176	0.000214	0.000253
AP3-4	0.000687	0.003249	0.000034	0.027589	0.000860	0.001462	0.001471
AP4-4	0.000819	0.004272	0.000064	0.030105	0.001167	0.001672	0.001846

standardize signal averages AP

AP1	0.000050	0.002930	0.000032	0.002854	0.000009	0.000010	0.000008
AP2	0.000148	0.003310	0.000027	0.006610	0.000173	0.000220	0.000266
AP3	0.000692	0.002808	0.000037	0.029731	0.000833	0.001421	0.001482
AP4	0.001001	0.003550	0.000086	0.039570	0.001257	0.001969	0.002160

linest from std sig ave

0.015821	0.045762	0.022704	0.006515	0.010826	0.006736	0.006252
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standardize signal averages SRM

srm614-2	0.000248	0.018118	0.000518	0.001669	0.000301	0.000438	0.000527
srm612-2	0.011521	0.022419	0.033341	0.021973	0.017177	0.024077	0.030285
srm610-2	0.157959	0.036953	0.391455	0.335116	0.278986	0.391528	0.512009

linest from std sig ave

0.027263	0.000000	0.010777	0.014779	0.019136	0.013356	0.009804
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concentration data

SRM614-3	0.31	41.34	1.02	0.95	0.24	0.22	0.25
SRM612-3	14.65	57.89	65.16	12.27	13.42	11.92	14.68
SRM610-3	193.12	107.77	740.35	187.68	221.85	197.89	254.39
AP1-3	0.34	41.85	0.29	8.10	0.05	0.04	0.03
AP2-3	1.04	47.58	0.30	19.39	0.74	0.61	0.70
AP3-3	4.39	43.23	0.35	82.84	3.48	3.71	3.72
AP4-3	7.47	51.65	0.98	127.44	5.81	6.09	6.17
EVA2.5-1	0.03	41.95	0.11	348.46	0.76	0.22	0.10
EVA2.5-2	0.03	44.06	0.17	293.60	0.67	0.20	0.10
EVA2.5-3	0.03	42.82	0.09	352.26	0.82	0.27	0.11
EVA2.5-4	0.02	40.24	0.07	392.43	0.81	0.22	0.10
EVA2.5-5	0.01	40.65	0.07	382.44	0.78	0.18	0.09
EVA2.5-6	0.01	41.13	0.05	377.69	0.78	0.18	0.09
EVA2.5-7	0.02	50.34	0.10	26.22	0.09	0.05	0.03
EVA2.5-8	0.00	51.15	0.03	27.77	0.11	0.04	0.02
EVA2.5-9	0.01	52.78	0.02	28.73	0.10	0.05	0.02
EVA2.5-10	0.02	54.81	0.10	26.81	0.09	0.05	0.03
EVA2.5-11	0.01	51.36	0.01	28.15	0.10	0.04	0.01
EVA2.5-12	0.01	52.39	0.02	31.44	0.11	0.04	0.02
EVA2.5-13	0.02	58.66	0.03	29.18	0.11	0.04	0.02
EVA2.5-14	0.01	57.42	0.02	28.41	0.11	0.03	0.01
EVA2.5-15	0.01	60.91	0.01	28.81	0.11	0.03	0.01
SRM614-4	0.37	100.87	0.99	0.92	0.32	0.29	0.32
SRM612-4	16.62	118.09	64.68	12.29	18.47	15.89	17.79
SRM610-4	235.53	182.30	784.11	186.80	296.20	254.45	294.65
AP1-4	0.30	65.12	0.29	6.73	0.03	0.01	0.01
AP2-4	0.82	73.27	0.19	14.96	0.76	0.57	0.63
AP3-4	4.34	59.31	0.31	71.70	3.72	3.93	3.67
AP4-4	5.17	77.99	0.58	78.24	5.04	4.49	4.60

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Sb I Cs Ba La Ce Pr

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	14.24	21185.76	97.48	141.52	8.44	19.72	15.36
SRM614-5	715.32	63708.52	1408.69	4652.63	758.96	1094.73	1501.69
SRM612-5	32212.14	73947.54	96115.66	66407.49	43997.05	62997.00	83876.99
SRM610-5	178727.16	55958.95	466358.16	407317.63	285711.13	404055.00	566125.38
AP1-5	737.96	63415.60	583.96	52015.85	151.36	192.28	127.24
AP2-5	2359.65	70511.00	565.96	112989.27	2594.13	3282.10	4161.62
AP3-5	8799.37	78057.12	634.60	449421.59	12672.39	19211.47	22626.01
AP4-5	13627.84	77694.32	1523.49	567298.13	18351.18	26671.87	31969.82
EVA3-1	41.00	54471.83	333.60	3225952.00	3940.62	2845.50	1057.69
EVA3-2	47.16	52220.34	261.68	2963857.80	3735.58	1943.41	819.04
EVA3-3	41.72	50947.01	271.56	2394661.50	3095.14	1793.73	703.68
SRM614-6	453.40	63750.24	919.37	2861.70	547.16	716.76	964.73
SRM612-6	25288.94	81941.86	68165.46	47020.22	37852.73	52524.34	67148.50
SRM610-6	177347.31	62996.23	388940.09	337498.06	281331.75	387619.63	520630.22
AP1-6	555.20	68504.55	509.08	35601.40	84.84	104.08	54.52
AP2-6	2061.89	75880.11	415.32	88451.38	2286.61	2892.06	3531.06
AP3-6	10674.70	77881.80	745.00	468454.28	13143.44	22450.33	23773.25
AP4-6	16040.25	77745.04	1561.49	591525.19	18641.39	30567.09	32666.23
blank-6	18.60	24286.66	166.24	211.84	7.68	31.80	16.84
blank average	16.42	22736.21	131.86	176.68	8.06	25.76	16.10

blank subtraction							
SRM614-5	698.90	40972.31	1276.83	4475.95	750.90	1068.97	1485.59
SRM612-5	32195.72	51211.33	95983.80	66230.81	43988.99	62971.24	83860.89
SRM610-5	178710.74	33222.75	466226.30	407140.95	285703.07	404029.24	566109.28
AP1-5	721.54	40679.39	452.10	51839.17	143.30	166.52	111.14
AP2-5	2343.23	47774.79	434.10	112812.59	2586.07	3256.34	4145.52
AP3-5	8782.95	55320.91	502.74	449244.91	12664.33	19185.71	22609.91
AP4-5	13611.42	54958.11	1391.63	567121.45	18343.12	26646.11	31953.72
EVA3-1	24.58	31735.62	201.74	3225775.32	3932.56	2819.74	1041.59
EVA3-2	30.74	29484.13	129.82	2963681.12	3727.52	1917.65	802.94
EVA3-3	25.30	28210.80	139.70	2394484.82	3087.08	1767.97	687.58
SRM614-6	436.98	41014.03	787.50	2685.02	539.10	691.00	948.63
SRM612-6	25272.52	59205.65	68033.60	46843.54	37844.67	52498.58	67132.40
SRM610-6	177330.89	40260.03	388808.23	337321.38	281323.69	387593.87	520614.12
AP1-6	538.78	45768.34	377.22	35424.72	76.78	78.32	38.42
AP2-6	2045.47	53143.90	283.46	88274.69	2278.55	2866.30	3514.96
AP3-6	10658.28	55145.59	613.14	468277.60	13135.37	22424.57	23757.15
AP4-6	16023.83	55008.83	1429.63	591348.51	18633.32	30541.33	32650.12

zero correction							
SRM614-5	698.90	40972.31	1276.83	4475.95	750.90	1068.97	1485.59
SRM612-5	32195.72	51211.33	95983.80	66230.81	43988.99	62971.24	83860.89
SRM610-5	178710.74	33222.75	466226.30	407140.95	285703.07	404029.24	566109.28
AP1-5	721.54	40679.39	452.10	51839.17	143.30	166.52	111.14
AP2-5	2343.23	47774.79	434.10	112812.59	2586.07	3256.34	4145.52
AP3-5	8782.95	55320.91	502.74	449244.91	12664.33	19185.71	22609.91
AP4-5	13611.42	54958.11	1391.63	567121.45	18343.12	26646.11	31953.72
EVA3-1	24.58	31735.62	201.74	3225775.32	3932.56	2819.74	1041.59
EVA3-2	30.74	29484.13	129.82	2963681.12	3727.52	1917.65	802.94
EVA3-3	25.30	28210.80	139.70	2394484.82	3087.08	1767.97	687.58
SRM614-6	436.98	41014.03	787.50	2685.02	539.10	691.00	948.63
SRM612-6	25272.52	59205.65	68033.60	46843.54	37844.67	52498.58	67132.40
SRM610-6	177330.89	40260.03	388808.23	337321.38	281323.69	387593.87	520614.12
AP1-6	538.78	45768.34	377.22	35424.72	76.78	78.32	38.42
AP2-6	2045.47	53143.90	283.46	88274.69	2278.55	2866.30	3514.96
AP3-6	10658.28	55145.59	613.14	468277.60	13135.37	22424.57	23757.15
AP4-6	16023.83	55008.83	1429.63	591348.51	18633.32	30541.33	32650.12

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
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Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000252	0.014793	0.000461	0.001616	0.000271	0.000386	0.000536
SRM612-5	0.010987	0.017477	0.032756	0.022602	0.015012	0.021490	0.028619
SRM610-5	0.148955	0.027691	0.388598	0.339350	0.238132	0.336757	0.471850
AP1-5	0.000043	0.002402	0.000027	0.003061	0.000008	0.000010	0.000007
AP2-5	0.000140	0.002854	0.000026	0.006740	0.000154	0.000195	0.000248
AP3-5	0.000431	0.002714	0.000025	0.022043	0.000621	0.000941	0.001109
AP4-5	0.000759	0.003064	0.000078	0.031622	0.001023	0.001486	0.001782
EVA3-1	0.000001	0.001719	0.000011	0.174691	0.000213	0.000153	0.000056
EVA3-2	0.000002	0.001742	0.000008	0.175101	0.000220	0.000113	0.000047
EVA3-3	0.000002	0.001869	0.000009	0.158660	0.000205	0.000117	0.000046
SRM614-6	0.000270	0.025384	0.000487	0.001662	0.000334	0.000428	0.000587
SRM612-6	0.011266	0.026394	0.030329	0.020883	0.016871	0.023404	0.029927
SRM610-6	0.166555	0.037814	0.365181	0.316823	0.264228	0.364041	0.488978
AP1-6	0.000038	0.003216	0.000027	0.002489	0.000005	0.000006	0.000003
AP2-6	0.000138	0.003574	0.000019	0.005936	0.000153	0.000193	0.000236
AP3-6	0.000591	0.003057	0.000034	0.025957	0.000728	0.001243	0.001317
AP4-6	0.001039	0.003566	0.000093	0.038332	0.001208	0.001980	0.002116

standardize signal averages AP

AP1	0.000040	0.002809	0.000027	0.002775	0.000007	0.000008	0.000005
AP2	0.000139	0.003214	0.000022	0.006338	0.000154	0.000194	0.000242
AP3	0.000511	0.002886	0.000029	0.024000	0.000675	0.001092	0.001213
AP4	0.000899	0.003315	0.000085	0.034977	0.001115	0.001733	0.001949

linest from std sig ave

	0.018590	0.046694	0.023434	0.007601	0.012538	0.008019	0.007149
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standardize signal averages SRM

srm614-2	0.000261	0.020089	0.000474	0.001639	0.000302	0.000407	0.000562
srm612-2	0.011127	0.021935	0.031543	0.021742	0.015941	0.022447	0.029273
srm610-2	0.157755	0.032752	0.376889	0.328087	0.251180	0.350399	0.480414

linest from std sig ave

	0.027301	0.000000	0.011195	0.015095	0.021253	0.014922	0.010448
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concentration data

SRM614-5	0.40	59.24	0.93	1.05	0.29	0.27	0.33
SRM612-5	17.52	69.99	65.83	14.73	16.14	14.78	17.55
SRM610-5	237.48	110.89	780.99	221.20	256.07	231.59	289.31
AP1-5	0.32	44.75	0.25	9.28	0.04	0.03	0.02
AP2-5	1.04	53.17	0.24	20.44	0.77	0.62	0.71
AP3-5	3.20	50.56	0.23	66.84	3.11	3.01	3.16
AP4-5	5.63	57.08	0.73	95.88	5.12	4.75	5.08
EVA3-1	0.01	32.01	0.10	529.68	1.07	0.49	0.16
EVA3-2	0.01	32.45	0.07	530.93	1.10	0.36	0.14
EVA3-3	0.01	34.82	0.09	481.08	1.02	0.37	0.13
SRM614-6	0.43	101.65	0.98	1.08	0.36	0.29	0.36
SRM612-6	17.96	105.70	60.95	13.61	18.14	16.09	18.35
SRM610-6	265.54	151.43	733.93	206.52	284.14	250.35	299.81
AP1-6	0.28	59.91	0.25	7.55	0.03	0.02	0.01
AP2-6	1.02	66.57	0.18	18.00	0.77	0.62	0.67
AP3-6	4.38	56.94	0.32	78.71	3.64	3.98	3.76
AP4-6	7.70	66.42	0.87	116.23	6.04	6.33	6.04

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-3	23.44	11544.43	96.24	22.28	10.68	30.08	33.88
SRM614-3	391.68	81281.86	850.60	2640.81	393.60	669.56	794.28
SRM612-3	276.76	69824.35	670.56	1723.01	308.08	539.64	641.96
SRM610-3	57580.72	59057.09	188831.19	171455.53	150954.97	205874.48	261569.44
AP1-3	1128.49	74441.54	601.52	43884.89	463.16	1219.69	311.32
AP2-3	4368.94	95855.78	716.80	129468.93	3553.50	6333.56	5774.39
AP3-3	21142.12	82000.14	765.40	554150.69	18134.70	33870.71	32205.14
AP4-3	42746.52	87058.33	3197.74	1082603.50	32214.06	63338.64	60475.82
MZ5-1	181.24	94152.57	719.72	911759.25	1625.29	1110.25	392.64
MZ5-2	107.08	96953.95	625.60	620969.63	1148.65	856.32	272.12
MZ5-3	132.24	78335.81	640.04	777739.19	1436.25	1020.53	326.52
MZ5-4	143.08	71533.48	162.84	68100.63	303.88	511.08	111.44
MZ5-5	81.24	68218.22	150.44	74142.70	294.92	379.08	79.60

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	125.84	75075.27	213.52	81666.34	329.68	446.28	94.72
MZ5-7	108.80	91573.12	165.08	97071.38	371.92	599.12	127.84
MZ5-8	120.64	80876.77	198.24	113722.56	359.32	438.08	111.72
MZ5-9	95.68	80625.70	144.52	99241.92	292.68	368.48	87.12
MZ5-10	128.72	84973.72	342.16	118837.71	846.00	1379.77	258.48
MZ5-11	98.76	88308.22	206.32	129863.65	584.16	785.32	176.92
MZ5-12	85.00	85825.20	204.88	119601.27	338.88	425.88	107.04
MZ5-13	154.32	86699.53	744.16	126036.23	415.80	624.88	158.76
MZ5-14	145.44	90768.07	665.80	131764.91	523.20	775.16	165.52
MZ5-15	139.92	89568.18	1008.01	147431.31	605.88	1390.33	229.96
MZ5-16	268.28	74430.94	1270.81	210241.98	771.28	1015.33	231.20
MZ5-17	117.96	76424.83	2065.05	221820.73	512.36	578.32	131.92
MZ5-18	186.36	76437.23	1068.21	225849.31	504.88	500.84	140.44
SRM614-4	261.84	54839.83	442.72	1522.69	287.32	450.20	494.92
SRM612-4	14335.20	52912.66	34827.28	17658.86	14275.80	22377.69	24134.70
SRM610-4	78247.04	50562.00	194710.25	140085.03	130530.81	194573.42	218360.03
AP1-4	630.68	66502.21	378.16	26086.15	309.96	502.68	122.48
AP2-4	1722.29	80936.73	274.24	61797.27	2014.25	2458.49	2883.06
AP3-4	10729.02	70733.68	349.28	283942.13	10559.90	18992.83	17964.42
AP4-4	19926.07	72468.53	1318.13	535514.81	18514.06	33616.51	31658.62
blank-4	23.20	27118.95	60.28	73.44	6.56	58.72	18.48
blank average	23.32	19331.69	78.26	47.86	8.62	44.40	26.18

blank subtraction

SRM614-3	368.36	61950.17	772.34	2592.95	384.98	625.16	768.10
SRM612-3	253.44	50492.66	592.30	1675.15	299.46	495.24	615.78
SRM610-3	57557.40	39725.41	188752.93	171407.67	150946.35	205830.08	261543.26
AP1-3	1105.17	55109.85	523.26	43837.03	454.54	1175.29	285.14
AP2-3	4345.62	76524.09	638.54	129421.07	3544.88	6289.16	5748.21
AP3-3	21118.80	62668.45	687.14	554102.83	18126.08	33826.31	32178.96
AP4-3	42723.20	67726.64	3119.48	1082555.64	32205.44	63294.24	60449.64
MZ5-1	157.92	74820.88	641.46	911711.39	1616.67	1065.85	366.46
MZ5-2	83.76	77622.26	547.34	620921.77	1140.03	811.92	245.94
MZ5-3	108.92	59004.12	561.78	777691.33	1427.63	976.13	300.34
MZ5-4	119.76	52201.80	84.58	68052.76	295.26	466.68	85.26
MZ5-5	57.92	48886.53	72.18	74094.83	286.30	334.68	53.42
MZ5-6	102.52	55743.58	135.26	81618.48	321.06	401.88	68.54
MZ5-7	85.48	72241.43	86.82	97023.52	363.30	554.72	101.66
MZ5-8	97.32	61545.08	119.98	113674.70	350.70	393.68	85.54
MZ5-9	72.36	61294.01	66.26	99194.06	284.06	324.08	60.94
MZ5-10	105.40	65642.03	263.90	118789.85	837.38	1335.37	232.30
MZ5-11	75.44	68976.53	128.06	129815.79	575.54	740.92	150.74
MZ5-12	61.68	66493.51	126.62	119553.41	330.26	381.48	80.86
MZ5-13	131.00	67367.84	665.90	125988.37	407.18	580.48	132.58
MZ5-14	122.12	71436.38	587.54	131717.05	514.58	730.76	139.34
MZ5-15	116.60	70236.49	929.75	147383.45	597.26	1345.93	203.78
MZ5-16	244.96	55099.25	1192.55	210194.12	762.66	970.93	205.02
MZ5-17	94.64	57093.14	1986.79	221772.87	503.74	533.92	105.74
MZ5-18	163.04	57105.54	989.95	225801.45	496.26	456.44	114.26
SRM614-4	238.52	35508.14	364.46	1474.83	278.70	405.80	468.74
SRM612-4	14311.88	33580.97	34749.02	17611.00	14267.18	22333.29	24108.51
SRM610-4	78223.72	31230.32	194631.99	140037.17	130522.19	194529.02	218333.85
AP1-4	607.36	47170.52	299.90	26038.29	301.34	458.28	96.30
AP2-4	1698.97	61605.05	195.98	61749.41	2005.63	2414.09	2856.88
AP3-4	10705.70	51401.99	271.02	283894.27	10551.28	18948.43	17938.24
AP4-4	19902.75	53136.84	1239.87	535466.95	18505.44	33572.11	31632.44

zero correction

SRM614-3	368.36	61950.17	772.34	2592.95	384.98	625.16	768.10
SRM612-3	253.44	50492.66	592.30	1675.15	299.46	495.24	615.78
SRM610-3	57557.40	39725.41	188752.93	171407.67	150946.35	205830.08	261543.26
AP1-3	1105.17	55109.85	523.26	43837.03	454.54	1175.29	285.14
AP2-3	4345.62	76524.09	638.54	129421.07	3544.88	6289.16	5748.21
AP3-3	21118.80	62668.45	687.14	554102.83	18126.08	33826.31	32178.96
AP4-3	42723.20	67726.64	3119.48	1082555.64	32205.44	63294.24	60449.64
MZ5-1	157.92	74820.88	641.46	911711.39	1616.67	1065.85	366.46
MZ5-2	83.76	77622.26	547.34	620921.77	1140.03	811.92	245.94
MZ5-3	108.92	59004.12	561.78	777691.33	1427.63	976.13	300.34
MZ5-4	119.76	52201.80	84.58	68052.76	295.26	466.68	85.26
MZ5-5	57.92	48886.53	72.18	74094.83	286.30	334.68	53.42
MZ5-6	102.52	55743.58	135.26	81618.48	321.06	401.88	68.54
MZ5-7	85.48	72241.43	86.82	97023.52	363.30	554.72	101.66
MZ5-8	97.32	61545.08	119.98	113674.70	350.70	393.68	85.54
MZ5-9	72.36	61294.01	66.26	99194.06	284.06	324.08	60.94
MZ5-10	105.40	65642.03	263.90	118789.85	837.38	1335.37	232.30
MZ5-11	75.44	68976.53	128.06	129815.79	575.54	740.92	150.74
MZ5-12	61.68	66493.51	126.62	119553.41	330.26	381.48	80.86
MZ5-13	131.00	67367.84	665.90	125988.37	407.18	580.48	132.58

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	122.12	71436.38	587.54	131717.05	514.58	730.76	139.34
MZ5-15	116.60	70236.49	929.75	147383.45	597.26	1345.93	203.78
MZ5-16	244.96	55099.25	1192.55	210194.12	762.66	970.93	205.02
MZ5-17	94.64	57093.14	1986.79	221772.87	503.74	533.92	105.74
MZ5-18	163.04	57105.54	989.95	225801.45	496.26	456.44	114.26
SRM614-4	238.52	35508.14	364.46	1474.83	278.70	405.80	468.74
SRM612-4	14311.88	33580.97	34749.02	17611.00	14267.18	22333.29	24108.51
SRM610-4	78223.72	31230.32	194631.99	140037.17	130522.19	194529.02	218333.85
AP1-4	607.36	47170.52	299.90	26038.29	301.34	458.28	96.30
AP2-4	1698.97	61605.05	195.98	61749.41	2005.63	2414.09	2856.88
AP3-4	10705.70	51401.99	271.02	283894.27	10551.28	18948.43	17938.24
AP4-4	19902.75	53136.84	1239.87	535466.95	18505.44	33572.11	31632.44

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-3	0.000314	0.052758	0.000658	0.002208	0.000328	0.000532	0.000654
SRM612-3	0.000295	0.058763	0.000689	0.001950	0.000349	0.000576	0.000717
SRM610-3	0.115499	0.079716	0.378765	0.343959	0.302899	0.413033	0.524831
AP1-3	0.000084	0.004201	0.000040	0.003342	0.000035	0.000090	0.000022
AP2-3	0.000299	0.005270	0.000044	0.008912	0.000244	0.000433	0.000396
AP3-3	0.001422	0.004221	0.000046	0.037320	0.001221	0.002278	0.002167
AP4-3	0.002618	0.004151	0.000191	0.066348	0.001974	0.003879	0.003705
MZ5-1	0.000012	0.005894	0.000051	0.071823	0.000127	0.000084	0.000029
MZ5-2	0.000006	0.005664	0.000040	0.045309	0.000083	0.000059	0.000018
MZ5-3	0.000009	0.005038	0.000048	0.066400	0.000122	0.000083	0.000026
MZ5-4	0.000014	0.006176	0.000010	0.008051	0.000035	0.000055	0.000010
MZ5-5	0.000006	0.005248	0.000008	0.007954	0.000031	0.000036	0.000006
MZ5-6	0.000010	0.005592	0.000014	0.008188	0.000032	0.000040	0.000007
MZ5-7	0.000006	0.004938	0.000006	0.006631	0.000025	0.000038	0.000007
MZ5-8	0.000006	0.003871	0.000008	0.007150	0.000022	0.000025	0.000005
MZ5-9	0.000005	0.004081	0.000004	0.006604	0.000019	0.000022	0.000004
MZ5-10	0.000006	0.003973	0.000016	0.007190	0.000051	0.000081	0.000014
MZ5-11	0.000004	0.003734	0.000007	0.007027	0.000031	0.000040	0.000008
MZ5-12	0.000004	0.003952	0.000008	0.007105	0.000020	0.000023	0.000005
MZ5-13	0.000010	0.005275	0.000052	0.009865	0.000032	0.000045	0.000010
MZ5-14	0.000009	0.005280	0.000043	0.009736	0.000038	0.000054	0.000010
MZ5-15	0.000008	0.004928	0.000065	0.010342	0.000042	0.000094	0.000014
MZ5-16	0.000017	0.003787	0.000082	0.014448	0.000052	0.000067	0.000014
MZ5-17	0.000006	0.003743	0.000130	0.014539	0.000033	0.000035	0.000007
MZ5-18	0.000010	0.003626	0.000063	0.014339	0.000032	0.000029	0.000007
SRM614-4	0.000360	0.053523	0.000549	0.002223	0.000420	0.000612	0.000707
SRM612-4	0.020166	0.047316	0.048962	0.024814	0.020103	0.031468	0.033969
SRM610-4	0.173695	0.069346	0.432177	0.310950	0.289823	0.431949	0.484807
AP1-4	0.000065	0.005031	0.000032	0.002777	0.000032	0.000049	0.000010
AP2-4	0.000169	0.006112	0.000019	0.006127	0.000199	0.000240	0.000283
AP3-4	0.000986	0.004734	0.000025	0.026149	0.000972	0.001745	0.001652
AP4-4	0.001778	0.004746	0.000111	0.047825	0.001653	0.002998	0.002825

standardize signal averages AP							
AP1	0.000075	0.004616	0.000036	0.003060	0.000033	0.000069	0.000016
AP2	0.000234	0.005691	0.000032	0.007520	0.000222	0.000336	0.000340
AP3	0.001204	0.004478	0.000036	0.031734	0.001096	0.002012	0.001910
AP4	0.002198	0.004448	0.000151	0.057086	0.001813	0.003439	0.003265

linest from std sig ave							
	0.007649	0.028875	0.013167	0.004906	0.007718	0.004125	0.004343

standardize signal averages SRM							
srm614-2	0.000337	0.053141	0.000604	0.002216	0.000374	0.000572	0.000680
srm612-2	0.010230	0.053040	0.024826	0.013382	0.010226	0.016022	0.017343
srm610-2	0.144597	0.074531	0.405471	0.327454	0.296361	0.422491	0.504819

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.029785	0.000000	0.010413	0.015131	0.018023	0.012381	0.009945
concentration data							
SRM614-3	0.21	130.65	0.74	0.93	0.22	0.19	0.24
SRM612-3	0.19	145.52	0.78	0.82	0.23	0.20	0.27
SRM610-3	75.77	197.41	427.73	144.72	200.50	146.11	195.47
AP1-3	0.26	48.40	0.21	6.54	0.11	0.15	0.04
AP2-3	0.91	60.70	0.23	17.44	0.75	0.71	0.69
AP3-3	4.34	48.62	0.24	73.04	3.76	3.75	3.75
AP4-3	7.99	47.81	1.00	129.86	6.08	6.38	6.42
MZ5-1	0.04	67.90	0.27	140.57	0.39	0.14	0.05
MZ5-2	0.02	65.25	0.21	88.68	0.26	0.10	0.03
MZ5-3	0.03	58.03	0.25	129.96	0.38	0.14	0.04
MZ5-4	0.04	71.14	0.05	15.76	0.11	0.09	0.02
MZ5-5	0.02	60.45	0.04	15.57	0.09	0.06	0.01
MZ5-6	0.03	64.41	0.07	16.02	0.10	0.07	0.01
MZ5-7	0.02	56.88	0.03	12.98	0.08	0.06	0.01
MZ5-8	0.02	44.59	0.04	13.99	0.07	0.04	0.01
MZ5-9	0.01	47.01	0.02	12.93	0.06	0.04	0.01
MZ5-10	0.02	45.77	0.08	14.07	0.16	0.13	0.02
MZ5-11	0.01	43.01	0.04	13.75	0.10	0.07	0.01
MZ5-12	0.01	45.52	0.04	13.91	0.06	0.04	0.01
MZ5-13	0.03	60.76	0.27	19.31	0.10	0.07	0.02
MZ5-14	0.03	60.82	0.23	19.06	0.12	0.09	0.02
MZ5-15	0.02	56.77	0.34	20.24	0.13	0.16	0.02
MZ5-16	0.05	43.63	0.43	28.28	0.16	0.11	0.02
MZ5-17	0.02	43.11	0.68	28.46	0.10	0.06	0.01
MZ5-18	0.03	41.77	0.33	28.06	0.10	0.05	0.01
SRM614-4	0.24	132.54	0.62	0.94	0.28	0.22	0.26
SRM612-4	13.23	117.17	55.29	10.44	13.31	11.13	12.65
SRM610-4	113.94	171.73	488.04	130.84	191.85	152.80	180.56
AP1-4	0.20	57.96	0.17	5.44	0.10	0.08	0.02
AP2-4	0.51	70.41	0.10	11.99	0.61	0.39	0.49
AP3-4	3.01	54.54	0.13	51.18	2.99	2.87	2.86
AP4-4	5.42	54.67	0.58	93.60	5.09	4.93	4.89
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-1	25.96	32393.34	147.00		31.72	10.64	43.84
SRM614-1	404.68	54683.39	628.16		2120.29	698.64	1217.25
SRM612-1	23433.69	62310.71	70331.56		36036.65	24376.78	39851.02
SRM610-1	71635.16	49405.84	191006.16		154595.55	118282.66	173927.50
AP1-1	856.56	62788.83	844.76		26379.03	242.16	478.04
AP2-1	1853.33	56931.44	1073.73		54774.43	1309.33	2034.25
AP3-1	2947.74	58425.13	646.60		96021.54	3645.94	5950.23
AP4-1	7760.64	62764.04	1032.29		235368.33	8679.61	14411.64
MZ4-1	121.04	53721.74	270.36		123708.45	305.44	354.92
MZ4-2	113.76	52250.93	376.64		427470.75	942.09	1146.41
MZ4-3	120.56	53736.02	343.08		970999.56	1570.13	1312.29
MZ4-4	132.92	56362.92	305.68		47284.59	322.76	945.17
MZ4-5	72.76	55254.47	233.04		40908.67	276.04	752.84
MZ4-6	80.88	52724.42	227.32		39335.38	318.44	1060.13
MZ4-7	91.20	49209.00	493.44		27418.19	284.52	988.53
MZ4-8	90.84	49478.96	551.80		23868.30	210.36	666.20
MZ4-9	102.60	49446.16	422.00		27145.39	260.68	756.56
MZ4-10	53.40	49131.80	288.40		41298.87	342.96	775.80
MZ4-11	43.52	53320.70	242.08		44564.85	343.92	802.96
MZ4-12	50.52	56392.16	238.72		54730.83	415.84	1003.57
SRM614-2	386.48	49423.76	917.37		2280.85	436.56	708.00
SRM612-2	19132.91	49942.08	52019.77		26191.19	21447.72	34309.31
SRM610-2	77284.20	43486.88	201636.53		156359.52	138917.06	204974.91
AP1-2	450.16	54711.95	410.96		16104.69	68.20	96.04
AP2-2	1305.69	51945.65	333.76		43269.96	946.69	1385.33
AP3-2	3284.34	54392.71	303.96		105662.12	4291.94	6916.20
AP4-2	6527.64	59049.93	634.60		202759.78	8445.49	12672.55
blank-2	24.00	27986.64	151.84		39.16	9.84	75.24
blank average	24.98	30189.99	149.42		35.44	10.24	59.54

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction							
SRM614-1	379.70	24493.40	478.74	2084.85	688.40	1157.71	716.58
SRM612-1	23408.71	32120.72	70182.13	36001.20	24366.54	39791.48	45173.67
SRM610-1	71610.18	19215.85	190856.74	154560.11	118272.42	173867.96	215735.59
AP1-1	831.58	32598.84	695.34	26343.59	231.92	418.50	317.50
AP2-1	1828.35	26741.45	924.31	54738.99	1299.09	1974.71	2077.91
AP3-1	2922.76	28235.14	497.18	95986.10	3635.70	5890.69	6273.06
AP4-1	7735.66	32574.05	882.86	235332.89	8669.37	14352.10	15198.30
MZ4-1	96.06	23531.75	120.94	123673.01	295.20	295.38	112.94
MZ4-2	88.78	22060.94	227.22	427435.31	931.85	1086.87	263.30
MZ4-3	95.58	23546.03	193.66	970964.12	1559.89	1252.75	403.42
MZ4-4	107.94	26172.93	156.26	47249.15	312.52	885.62	168.78
MZ4-5	47.78	25064.48	83.62	40873.23	265.80	693.30	103.18
MZ4-6	55.90	22534.43	77.90	39299.94	308.20	1000.59	153.10
MZ4-7	66.22	19019.01	344.02	27382.75	274.28	928.99	107.54
MZ4-8	65.86	19288.97	402.38	23832.85	200.12	606.66	84.78
MZ4-9	77.62	19256.17	272.58	27109.95	250.44	697.02	83.58
MZ4-10	28.42	18941.81	138.98	41263.43	332.72	716.26	140.50
MZ4-11	18.54	23130.71	92.66	44529.41	333.68	743.42	135.10
MZ4-12	25.54	26202.17	89.30	54695.39	405.60	944.03	157.90
SRM614-2	361.50	19233.77	767.94	2245.41	426.32	648.46	734.06
SRM612-2	19107.93	19752.09	51870.35	26155.75	21437.48	34249.77	36416.30
SRM610-2	77259.21	13296.89	201487.11	156324.08	138906.82	204915.37	237412.43
AP1-2	425.18	24521.96	261.54	16069.25	57.96	36.50	19.26
AP2-2	1280.71	21755.66	184.34	43234.52	936.45	1325.79	1470.03
AP3-2	3259.36	24202.72	154.54	105626.68	4281.70	6856.66	7061.50
AP4-2	6502.66	28859.94	485.18	202724.34	8435.25	12613.01	13786.78
zero correction							
SRM614-1	379.70	24493.40	478.74	2084.85	688.40	1157.71	716.58
SRM612-1	23408.71	32120.72	70182.13	36001.20	24366.54	39791.48	45173.67
SRM610-1	71610.18	19215.85	190856.74	154560.11	118272.42	173867.96	215735.59
AP1-1	831.58	32598.84	695.34	26343.59	231.92	418.50	317.50
AP2-1	1828.35	26741.45	924.31	54738.99	1299.09	1974.71	2077.91
AP3-1	2922.76	28235.14	497.18	95986.10	3635.70	5890.69	6273.06
AP4-1	7735.66	32574.05	882.86	235332.89	8669.37	14352.10	15198.30
MZ4-1	96.06	23531.75	120.94	123673.01	295.20	295.38	112.94
MZ4-2	88.78	22060.94	227.22	427435.31	931.85	1086.87	263.30
MZ4-3	95.58	23546.03	193.66	970964.12	1559.89	1252.75	403.42
MZ4-4	107.94	26172.93	156.26	47249.15	312.52	885.62	168.78
MZ4-5	47.78	25064.48	83.62	40873.23	265.80	693.30	103.18
MZ4-6	55.90	22534.43	77.90	39299.94	308.20	1000.59	153.10
MZ4-7	66.22	19019.01	344.02	27382.75	274.28	928.99	107.54
MZ4-8	65.86	19288.97	402.38	23832.85	200.12	606.66	84.78
MZ4-9	77.62	19256.17	272.58	27109.95	250.44	697.02	83.58
MZ4-10	28.42	18941.81	138.98	41263.43	332.72	716.26	140.50
MZ4-11	18.54	23130.71	92.66	44529.41	333.68	743.42	135.10
MZ4-12	25.54	26202.17	89.30	54695.39	405.60	944.03	157.90
SRM614-2	361.50	19233.77	767.94	2245.41	426.32	648.46	734.06
SRM612-2	19107.93	19752.09	51870.35	26155.75	21437.48	34249.77	36416.30
SRM610-2	77259.21	13296.89	201487.11	156324.08	138906.82	204915.37	237412.43
AP1-2	425.18	24521.96	261.54	16069.25	57.96	36.50	19.26
AP2-2	1280.71	21755.66	184.34	43234.52	936.45	1325.79	1470.03
AP3-2	3259.36	24202.72	154.54	105626.68	4281.70	6856.66	7061.50
AP4-2	6502.66	28859.94	485.18	202724.34	8435.25	12613.01	13786.78
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-1	0.000476	0.030701	0.000600	0.002613	0.000863	0.001451	0.000898
SRM612-1	0.016846	0.023116	0.050506	0.025908	0.017535	0.028636	0.032509

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.163872	0.043973	0.436753	0.353693	0.270653	0.397876	0.493686
AP1-1	0.000101	0.003979	0.000085	0.003215	0.000028	0.000051	0.000039
AP2-1	0.000270	0.003953	0.000137	0.008093	0.000192	0.000292	0.000307
AP3-1	0.000452	0.004369	0.000077	0.014854	0.000563	0.000912	0.000971
AP4-1	0.000911	0.003836	0.000104	0.027713	0.001021	0.001690	0.001790
MZ4-1	0.000015	0.003727	0.000019	0.019587	0.000047	0.000047	0.000018
MZ4-2	0.000014	0.003361	0.000035	0.065128	0.000142	0.000166	0.000040
MZ4-3	0.000015	0.003621	0.000030	0.149329	0.000240	0.000193	0.000062
MZ4-4	0.000017	0.004152	0.000025	0.007496	0.000050	0.000140	0.000027
MZ4-5	0.000008	0.004072	0.000014	0.006640	0.000043	0.000113	0.000017
MZ4-6	0.000009	0.003667	0.000013	0.006396	0.000050	0.000163	0.000025
MZ4-7	0.000013	0.003789	0.000069	0.005455	0.000055	0.000185	0.000021
MZ4-8	0.000014	0.004009	0.000084	0.004954	0.000042	0.000126	0.000018
MZ4-9	0.000016	0.003884	0.000055	0.005468	0.000051	0.000141	0.000017
MZ4-10	0.000006	0.003901	0.000029	0.008499	0.000069	0.000148	0.000029
MZ4-11	0.000003	0.003883	0.000016	0.007476	0.000056	0.000125	0.000023
MZ4-12	0.000004	0.003875	0.000013	0.008088	0.000060	0.000140	0.000023
SRM614-2	0.000345	0.018379	0.000734	0.002146	0.000407	0.000620	0.000701
SRM612-2	0.018365	0.018985	0.049855	0.025139	0.020604	0.032919	0.035001
SRM610-2	0.173093	0.029791	0.451415	0.350231	0.311209	0.459095	0.531902
AP1-2	0.000074	0.004288	0.000046	0.002810	0.000010	0.000006	0.000003
AP2-2	0.000215	0.003650	0.000031	0.007253	0.000157	0.000222	0.000247
AP3-2	0.000508	0.003771	0.000024	0.016458	0.000667	0.001068	0.001100
AP4-2	0.000819	0.003636	0.000061	0.025541	0.001063	0.001589	0.001737
standardize signal averages AP							
AP1	0.000088	0.004133	0.000065	0.003013	0.000019	0.000029	0.000021
AP2	0.000243	0.003802	0.000084	0.007673	0.000175	0.000257	0.000277
AP3	0.000480	0.004070	0.000051	0.015656	0.000615	0.000990	0.001036
AP4	0.000865	0.003736	0.000083	0.026627	0.001042	0.001640	0.001763
linest from std sig ave							
	0.019141	0.035994	0.017267	0.010259	0.013473	0.008556	0.008012
standardize signal averages SRM							
srm614-2	0.000411	0.024540	0.000667	0.002379	0.000635	0.001035	0.000800
srm612-2	0.017606	0.021050	0.050181	0.025524	0.019070	0.030777	0.033755
srm610-2	0.168482	0.036882	0.444084	0.351962	0.290931	0.428486	0.512794
linest from std sig ave							
	0.025502	0.000000	0.009478	0.014067	0.018347	0.012198	0.009786
concentration data							
SRM614-1	0.78	94.77	0.89	2.30	1.00	1.06	0.62
SRM612-1	27.65	71.36	74.80	22.79	20.26	21.01	22.34
SRM610-1	269.02	135.74	646.79	311.19	312.74	291.97	339.21
AP1-1	0.78	57.13	0.58	13.16	0.15	0.17	0.12
AP2-1	2.06	56.77	0.94	33.12	1.03	1.00	0.98
AP3-1	3.45	62.74	0.53	60.79	3.02	3.11	3.10
AP4-1	6.96	55.08	0.72	113.42	5.49	5.77	5.72
MZ4-1	0.12	53.52	0.13	80.16	0.25	0.16	0.06
MZ4-2	0.10	48.27	0.24	266.54	0.76	0.57	0.13
MZ4-3	0.11	52.00	0.21	611.14	1.29	0.66	0.20
MZ4-4	0.13	59.62	0.17	30.68	0.27	0.48	0.09
MZ4-5	0.06	58.47	0.09	27.17	0.23	0.38	0.05
MZ4-6	0.07	52.66	0.09	26.18	0.27	0.56	0.08
MZ4-7	0.10	54.40	0.47	22.33	0.29	0.63	0.07
MZ4-8	0.10	57.57	0.58	20.27	0.22	0.43	0.06
MZ4-9	0.12	55.77	0.38	22.38	0.27	0.48	0.05
MZ4-10	0.04	56.02	0.20	34.78	0.37	0.50	0.09
MZ4-11	0.02	55.76	0.11	30.60	0.30	0.43	0.07
MZ4-12	0.03	55.64	0.09	33.10	0.32	0.48	0.07
SRM614-2	0.57	56.74	1.09	1.89	0.47	0.45	0.48
SRM612-2	30.15	58.60	73.83	22.12	23.81	24.16	24.05
SRM610-2	284.15	91.96	668.50	308.14	359.60	336.89	365.47
AP1-2	0.57	61.57	0.32	11.50	0.05	0.02	0.01
AP2-2	1.64	52.41	0.21	29.68	0.84	0.76	0.79
AP3-2	3.88	54.15	0.17	67.36	3.59	3.65	3.52
AP4-2	6.26	52.21	0.42	104.53	5.71	5.42	5.55
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-3	13.76	16766.14	68.80	179.68	6.44	14.88	8.80
SRM614-3	637.32	53549.02	1815.41	7257.20	584.20	1162.49	1192.09
SRM612-3	27624.23	56049.68	95985.14	95836.58	30784.97	44822.61	61378.23
SRM610-3	173218.66	42386.44	470376.81	441070.84	220209.44	325738.47	458470.47
AP1-3	1057.09	65127.69	1255.57	166326.78	638.00	1094.41	592.48
AP2-3	2821.62	72469.13	1037.61	212685.28	2775.74	3780.18	4385.63
AP3-3	16848.54	81066.14	1619.09	680240.75	13366.20	21976.12	25072.90
AP4-3	26119.55	77171.39	2664.49	1034079.10	23695.73	40663.27	46014.90
TGP3-1	174.40	64597.08	504.76	5360544.00	6746.24	3626.38	1583.65
TGP3-2	121.68	64507.84	317.16	4594051.00	5806.99	3054.90	1336.25
TGP3-3	113.00	61654.03	321.76	4186615.80	5146.47	2421.09	1134.13
TGP3-4	179.76	69017.63	412.60	5461645.00	7334.72	4757.35	1798.69
TGP3-5	141.84	67601.98	302.44	4993306.00	6243.40	3095.02	1441.49
TGP3-6	148.36	65563.25	342.32	4890549.00	6420.36	3478.54	1490.41
TGP3-7	272.96	61563.31	1096.57	5048298.50	12995.91	16601.21	4571.43
TGP3-8	136.48	61234.34	497.52	4388544.50	8537.09	8612.85	2655.34
TGP3-9	99.72	65154.48	276.84	4044007.50	5937.23	4313.82	1600.61
TGP3-10	212.12	60710.42	533.80	3610331.50	7382.96	8311.01	2471.13
TGP3-11	165.24	63518.68	340.60	3893973.30	6311.16	5817.19	1817.25
TGP3-12	282.04	63986.00	299.72	3714917.50	5331.11	3918.74	1389.53
TGP3-13	164.44	52512.54	438.24	448407.81	14233.04	24654.38	6251.84
TGP3-14	61.08	56265.96	179.04	385099.31	6368.72	11089.18	2637.61
TGP3-15	100.92	62218.19	280.84	566809.88	25782.51	44456.49	11079.78
SRM614-4	602.00	78354.76	1154.93	4527.51	596.04	997.29	1158.29
SRM612-4	23006.57	83276.19	66650.73	45442.46	34580.11	48723.47	60450.50
SRM610-4	133626.19	50623.81	350141.34	287229.22	238879.47	332830.38	432228.38
AP1-4	534.32	71090.00	480.64	30795.98	101.20	111.36	54.12
AP2-4	1850.41	75638.42	405.20	76161.19	1905.93	2444.49	2954.86
AP3-4	9860.42	79666.61	485.48	318346.44	9347.65	14475.60	15661.13
AP4-4	18986.67	75564.74	1569.81	684289.50	20603.04	34792.64	36532.32
blank-4	31.48	23798.37	101.88	532.96	9.76	47.84	20.36
blank average	22.62	20282.25	85.34	356.32	8.10	31.36	14.58
blank subtraction							
SRM614-3	614.70	33266.77	1730.07	6900.88	576.10	1131.13	1177.51
SRM612-3	27601.61	35767.42	95899.80	95480.26	30776.87	44791.25	61363.65
SRM610-3	173196.04	22104.18	470291.47	440714.52	220201.34	325707.11	458455.89
AP1-3	1034.47	44845.43	1170.23	165970.46	629.90	1063.05	577.90
AP2-3	2799.00	52186.87	952.27	212328.96	2767.64	3748.82	4371.04
AP3-3	16825.91	60783.89	1533.75	679884.43	13358.09	21944.76	25058.32
AP4-3	26096.93	56889.14	2579.15	1033722.78	23687.63	40631.91	46000.32
TGP3-1	151.78	44314.83	419.42	5360187.68	6738.14	3595.02	1569.07
TGP3-2	99.06	44225.59	231.82	4593694.68	5798.89	3023.54	1321.67
TGP3-3	90.38	41371.77	236.42	4186259.48	5138.37	2389.73	1119.55
TGP3-4	157.14	48735.37	327.26	5461288.68	7326.62	4725.99	1784.11
TGP3-5	119.22	47319.72	217.10	4992949.68	6235.29	3063.66	1426.91
TGP3-6	125.74	45281.00	256.98	4890192.68	6412.26	3447.18	1475.83
TGP3-7	250.34	41281.05	1011.23	5047942.18	12987.81	16569.85	4556.85
TGP3-8	113.86	40952.09	412.18	4388188.18	8528.99	8581.49	2640.75
TGP3-9	77.10	44872.23	191.50	4043651.18	5929.13	4282.46	1586.03
TGP3-10	189.50	40428.17	448.46	3609975.18	7374.86	8279.65	2456.55
TGP3-11	142.62	43236.43	255.26	3893616.98	6303.06	5785.83	1802.67
TGP3-12	259.42	43703.75	214.38	3714561.18	5323.01	3887.38	1374.95
TGP3-13	141.82	32230.28	352.90	448051.49	14224.94	24623.02	6237.25
TGP3-14	38.46	35983.70	93.70	384742.99	6360.62	11057.82	2623.03
TGP3-15	78.30	41935.93	195.50	566453.56	25774.41	44425.13	11065.20
SRM614-4	579.38	58072.50	1069.59	4171.18	587.94	965.93	1143.71
SRM612-4	22983.95	62993.93	66565.39	45086.13	34572.01	48692.11	60435.92
SRM610-4	133603.57	30341.55	350056.00	286872.90	238871.37	332799.02	432213.80
AP1-4	511.70	50807.75	395.30	30439.65	93.10	80.00	39.54
AP2-4	1827.79	55356.17	319.86	75804.87	1897.83	2413.13	2940.28
AP3-4	9837.79	59384.36	400.14	317990.12	9339.55	14444.24	15646.55
AP4-4	18964.05	55282.49	1484.47	683933.18	20594.93	34761.28	36517.74
zero correction							
SRM614-3	614.70	33266.77	1730.07	6900.88	576.10	1131.13	1177.51
SRM612-3	27601.61	35767.42	95899.80	95480.26	30776.87	44791.25	61363.65
SRM610-3	173196.04	22104.18	470291.47	440714.52	220201.34	325707.11	458455.89
AP1-3	1034.47	44845.43	1170.23	165970.46	629.90	1063.05	577.90
AP2-3	2799.00	52186.87	952.27	212328.96	2767.64	3748.82	4371.04
AP3-3	16825.91	60783.89	1533.75	679884.43	13358.09	21944.76	25058.32
AP4-3	26096.93	56889.14	2579.15	1033722.78	23687.63	40631.91	46000.32
TGP3-1	151.78	44314.83	419.42	5360187.68	6738.14	3595.02	1569.07
TGP3-2	99.06	44225.59	231.82	4593694.68	5798.89	3023.54	1321.67
TGP3-3	90.38	41371.77	236.42	4186259.48	5138.37	2389.73	1119.55

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	157.14	48735.37	327.26	5461288.68	7326.62	4725.99	1784.11
TGP3-5	119.22	47319.72	217.10	4992949.68	6235.29	3063.66	1426.91
TGP3-6	125.74	45281.00	256.98	4890192.68	6412.26	3447.18	1475.83
TGP3-7	250.34	41281.05	1011.23	5047942.18	12987.81	16569.85	4556.85
TGP3-8	113.86	40952.09	412.18	4388188.18	8528.99	8581.49	2640.75
TGP3-9	77.10	44872.23	191.50	4043651.18	5929.13	4282.46	1586.03
TGP3-10	189.50	40428.17	448.46	3609975.18	7374.86	8279.65	2456.55
TGP3-11	142.62	43236.43	255.26	3893616.98	6303.06	5785.83	1802.67
TGP3-12	259.42	43703.75	214.38	3714561.18	5323.01	3887.38	1374.95
TGP3-13	141.82	32230.28	352.90	448051.49	14224.94	24623.02	6237.25
TGP3-14	38.46	35983.70	93.70	384742.99	6360.62	11057.82	2623.03
TGP3-15	78.30	41935.93	195.50	566453.56	25774.41	44425.13	11065.20
SRM614-4	579.38	58072.50	1069.59	4171.18	587.94	965.93	1143.71
SRM612-4	22983.95	62993.93	66565.39	45086.13	34572.01	48692.11	60435.92
SRM610-4	133603.57	30341.55	350056.00	286872.90	238871.37	332799.02	432213.80
AP1-4	511.70	50807.75	395.30	30439.65	93.10	80.00	39.54
AP2-4	1827.79	55356.17	319.86	75804.87	1897.83	2413.13	2940.28
AP3-4	9837.79	59384.36	400.14	317990.12	9339.55	14444.24	15646.55
AP4-4	18964.05	55282.49	1484.47	683933.18	20594.93	34761.28	36517.74

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-3	0.000190	0.010288	0.000535	0.002134	0.000178	0.000350	0.000364
SRM612-3	0.009009	0.011675	0.031303	0.031166	0.010046	0.014620	0.020030
SRM610-3	0.127291	0.016246	0.345643	0.323905	0.161838	0.239380	0.336944
AP1-3	0.000057	0.002492	0.000065	0.009223	0.000035	0.000059	0.000032
AP2-3	0.000162	0.003019	0.000055	0.012281	0.000160	0.000217	0.000253
AP3-3	0.000756	0.002731	0.000069	0.030547	0.000600	0.000986	0.001126
AP4-3	0.001330	0.002899	0.000131	0.052677	0.001207	0.002071	0.002344
TGP3-1	0.000006	0.001733	0.000016	0.209572	0.000263	0.000141	0.000061
TGP3-2	0.000004	0.001904	0.000010	0.197777	0.000250	0.000130	0.000057
TGP3-3	0.000004	0.001978	0.000011	0.200187	0.000246	0.000114	0.000054
TGP3-4	0.000006	0.001900	0.000013	0.212886	0.000286	0.000184	0.000070
TGP3-5	0.000005	0.001954	0.000009	0.206211	0.000258	0.000127	0.000059
TGP3-6	0.000005	0.001977	0.000011	0.213524	0.000280	0.000151	0.000064
TGP3-7	0.000012	0.001926	0.000047	0.235567	0.000606	0.000773	0.000213
TGP3-8	0.000005	0.001942	0.000020	0.208082	0.000404	0.000407	0.000125
TGP3-9	0.000003	0.001871	0.000008	0.168626	0.000247	0.000179	0.000066
TGP3-10	0.000009	0.002023	0.000022	0.180622	0.000369	0.000414	0.000123
TGP3-11	0.000007	0.002067	0.000012	0.186172	0.000301	0.000277	0.000086
TGP3-12	0.000012	0.002026	0.000010	0.172162	0.000247	0.000180	0.000064
TGP3-13	0.000013	0.002866	0.000031	0.039842	0.001265	0.002190	0.000555
TGP3-14	0.000003	0.003136	0.000008	0.033534	0.000554	0.000964	0.000229
TGP3-15	0.000005	0.002840	0.000013	0.038362	0.001746	0.003009	0.000749
SRM614-4	0.000295	0.029523	0.000544	0.002121	0.000299	0.000491	0.000581
SRM612-4	0.010617	0.029099	0.030749	0.020827	0.015970	0.022492	0.027917
SRM610-4	0.141379	0.032107	0.370428	0.303568	0.252773	0.352166	0.457367
AP1-4	0.000040	0.003989	0.000031	0.002390	0.000007	0.000006	0.000003
AP2-4	0.000138	0.004169	0.000024	0.005709	0.000143	0.000182	0.000221
AP3-4	0.000600	0.003621	0.000024	0.019391	0.000570	0.000881	0.000954
AP4-4	0.001231	0.003589	0.000096	0.044403	0.001337	0.002257	0.002371

standardize signal averages AP							
AP1	0.000049	0.003240	0.000048	0.005806	0.000021	0.000033	0.000018
AP2	0.000150	0.003594	0.000040	0.008995	0.000152	0.000199	0.000237
AP3	0.000678	0.003176	0.000047	0.024969	0.000585	0.000933	0.001040
AP4	0.001281	0.003244	0.000114	0.048540	0.001272	0.002164	0.002357

linest from std sig ave							
	0.013225	0.042717	0.017141	0.005839	0.011626	0.006926	0.006334

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srn614-2	0.000242	0.019906	0.000539	0.002127	0.000239	0.000420	0.000473
srn612-2	0.009813	0.020387	0.031026	0.025996	0.013008	0.018556	0.023973
srn610-2	0.134335	0.024176	0.358035	0.313737	0.207305	0.295773	0.397156

linest from std sig ave							
	0.032058	0.000000	0.011782	0.015770	0.025752	0.017679	0.012638

concentration data							
SRM614-3	0.22	37.69	0.79	1.07	0.18	0.21	0.20
SRM612-3	10.22	42.77	46.02	15.61	10.02	8.68	10.88
SRM610-3	144.38	59.52	508.12	162.19	161.37	142.19	183.05
AP1-3	0.30	42.47	0.44	21.48	0.16	0.16	0.08
AP2-3	0.85	51.44	0.38	28.61	0.74	0.60	0.64
AP3-3	3.99	46.54	0.47	71.15	2.78	2.72	2.85
AP4-3	7.02	49.40	0.90	122.70	5.60	5.72	5.92
TGP3-1	0.03	29.53	0.11	488.14	1.22	0.39	0.16
TGP3-2	0.02	32.45	0.07	460.67	1.16	0.36	0.14
TGP3-3	0.02	33.71	0.08	466.28	1.14	0.32	0.14
TGP3-4	0.03	32.37	0.09	495.86	1.32	0.51	0.18
TGP3-5	0.03	33.30	0.06	480.31	1.19	0.35	0.15
TGP3-6	0.03	33.69	0.08	497.35	1.30	0.42	0.16
TGP3-7	0.06	32.83	0.32	548.69	2.81	2.14	0.54
TGP3-8	0.03	33.09	0.13	484.67	1.88	1.12	0.32
TGP3-9	0.02	31.89	0.05	392.77	1.15	0.49	0.17
TGP3-10	0.05	34.47	0.15	420.71	1.71	1.14	0.31
TGP3-11	0.04	35.23	0.08	433.64	1.40	0.76	0.22
TGP3-12	0.06	34.52	0.07	401.01	1.14	0.50	0.16
TGP3-13	0.07	48.84	0.21	92.80	5.87	6.05	1.40
TGP3-14	0.02	53.45	0.06	78.11	2.57	2.66	0.58
TGP3-15	0.03	48.40	0.09	89.35	8.10	8.31	1.89
SRM614-4	0.33	108.16	0.80	1.06	0.30	0.29	0.32
SRM612-4	12.04	106.61	45.20	10.43	15.92	13.36	15.17
SRM610-4	160.36	117.63	544.56	152.01	252.04	209.18	248.47
AP1-4	0.21	67.97	0.21	5.57	0.03	0.02	0.01
AP2-4	0.73	71.04	0.16	13.30	0.66	0.50	0.56
AP3-4	3.17	61.71	0.17	45.17	2.64	2.43	2.41
AP4-4	6.50	61.16	0.66	103.43	6.20	6.24	5.99

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-1	12.36	17915.54	46.68	216.28	13.56	30.28	8.32
SRM614-1	757.88	55103.91	2001.13	5807.31	706.16	1107.33	1344.57
SRM612-1	31093.86	56284.84	113117.68	72214.81	34246.11	50983.17	67904.70
SRM610-1	145173.58	40921.67	464514.53	348985.56	194520.02	277634.25	401094.56
AP1-1	1221.77	66625.26	829.32	81335.58	278.24	492.48	226.68
AP2-1	3366.66	67182.34	1344.09	174520.98	2982.02	4363.06	4921.55
AP3-1	20480.52	71960.16	1372.41	887536.81	17806.98	35156.72	36605.61
AP4-1	29939.89	71314.56	2862.90	1125255.10	24326.82	44713.77	47841.23
TGP2-1	401.52	63288.36	741.36	3837617.00	5344.67	4713.11	1526.57
TGP2-2	408.48	62723.15	508.44	3593808.30	4935.47	3841.50	1238.97
TGP2-3	794.76	68402.83	703.20	3401618.50	5609.15	6365.40	1601.37
TGP2-4	563.28	54223.54	446.56	529182.06	1329.65	1991.53	461.04
TGP2-5	112.36	55740.07	207.08	187207.94	615.52	782.12	191.24
TGP2-6	129.32	51829.25	274.92	170348.56	509.08	711.20	173.72
TGP2-7	340.68	52157.70	416.92	165371.89	854.56	2093.57	413.80
TGP2-8	127.64	53690.94	182.00	103101.30	437.36	773.80	201.76
TGP2-9	91.88	54215.67	195.20	97597.83	354.48	542.88	147.32
TGP2-10	43.48	61426.63	166.28	111051.83	308.44	323.04	82.60
TGP2-11	65.20	63309.44	140.88	362487.94	781.04	708.80	225.12
TGP2-12	42.72	61052.31	203.72	141735.28	560.52	920.61	250.76
TGP2-13	110.60	63966.68	274.72	514610.59	1172.25	1657.53	379.84
TGP2-14	67.88	64414.52	169.92	586120.56	1076.85	985.13	280.44
TGP2-15	59.08	68639.70	198.04	1047111.90	1736.85	1360.29	462.64
TGP2-16	90.24	63806.12	251.12	2653912.50	3730.46	1956.33	782.60
TGP2-17	118.16	63444.00	234.56	2612857.50	3539.26	1627.65	776.24
TGP2-18	56.20	65177.09	190.24	2749921.30	3740.46	1818.61	797.00
SRM614-2	608.32	77650.32	1149.57	3645.98	674.24	997.45	1204.93
SRM612-2	23906.30	78753.52	66830.09	43040.08	34105.27	48522.20	59944.78

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	131010.98	49766.04	327639.66	259271.81	215383.92	299959.78	389963.00
AP1-2	641.04	71435.72	335.60	36512.21	114.36	98.88	38.04
AP2-2	2017.49	69963.59	325.28	73368.38	2081.37	2735.02	3179.98
AP3-2	15692.13	78767.28	617.84	615891.63	17181.30	32305.42	32024.82
AP4-2	16509.37	75369.55	1338.77	572432.63	17686.90	28333.92	30290.89
blank-2	21.76	22052.84	97.76	264.72	3.56	29.80	12.68
blank average	17.06	19984.19	72.22	240.50	8.56	30.04	10.50
blank subtraction							
SRM614-1	740.82	35119.72	1928.91	5566.81	697.60	1077.29	1334.07
SRM612-1	31076.79	36300.64	113045.46	71974.30	34237.55	50953.13	67894.20
SRM610-1	145156.52	20937.48	464442.31	348745.06	194511.46	277604.21	401084.06
AP1-1	1204.71	46641.07	757.10	81095.08	269.68	462.44	216.18
AP2-1	3349.60	47198.14	1271.87	174280.48	2973.46	4333.02	4911.05
AP3-1	20463.46	51975.97	1300.19	887296.31	17798.42	35126.68	36595.10
AP4-1	29922.83	51330.37	2790.68	1125014.60	24318.26	44683.73	47830.73
TGP2-1	384.46	43304.16	669.14	3837376.50	5336.11	4683.07	1516.07
TGP2-2	391.42	42738.96	436.22	3593567.80	4926.91	3811.46	1228.47
TGP2-3	777.70	48418.64	630.98	3401378.00	5600.59	6335.36	1590.87
TGP2-4	546.22	34239.35	374.34	528941.56	1321.09	1961.49	450.54
TGP2-5	95.30	35755.88	134.86	186967.44	606.96	752.08	180.74
TGP2-6	112.26	31845.06	202.70	170108.06	500.52	681.16	163.22
TGP2-7	323.62	32173.50	344.70	165131.39	846.00	2063.53	403.30
TGP2-8	110.58	33706.75	109.78	102860.80	428.80	743.76	191.26
TGP2-9	74.82	34231.48	122.98	97357.33	345.92	512.84	136.82
TGP2-10	26.42	41442.43	94.06	110811.33	299.88	293.00	72.10
TGP2-11	48.14	43325.25	68.66	362247.44	772.48	678.76	214.62
TGP2-12	25.66	41068.11	131.50	141494.78	551.96	890.56	240.26
TGP2-13	93.54	43982.49	202.50	514370.09	1163.69	1627.49	369.34
TGP2-14	50.82	44430.33	97.70	585880.06	1068.29	955.09	269.94
TGP2-15	42.02	48655.51	125.82	1046871.40	1728.29	1330.25	452.14
TGP2-16	73.18	43821.93	178.90	2653672.00	3721.90	1926.29	772.10
TGP2-17	101.10	43459.80	162.34	2612617.00	3530.70	1597.61	765.74
TGP2-18	39.14	45192.89	118.02	2749680.80	3731.90	1788.57	786.50
SRM614-2	591.26	57666.13	1077.35	3405.48	665.68	967.41	1194.43
SRM612-2	23889.23	58769.33	66757.87	42799.58	34096.71	48492.15	59934.28
SRM610-2	130993.92	29781.85	327567.44	259031.31	215375.36	299929.74	389952.50
AP1-2	623.98	51451.53	263.38	36271.71	105.80	68.84	27.54
AP2-2	2000.43	49979.40	253.06	73127.87	2072.81	2704.98	3169.48
AP3-2	15675.07	58783.09	545.62	615651.13	17172.74	32275.38	32014.32
AP4-2	16492.31	55385.35	1266.55	572192.13	17678.34	28303.88	30280.39
zero correction							
SRM614-1	740.82	35119.72	1928.91	5566.81	697.60	1077.29	1334.07
SRM612-1	31076.79	36300.64	113045.46	71974.30	34237.55	50953.13	67894.20
SRM610-1	145156.52	20937.48	464442.31	348745.06	194511.46	277604.21	401084.06
AP1-1	1204.71	46641.07	757.10	81095.08	269.68	462.44	216.18
AP2-1	3349.60	47198.14	1271.87	174280.48	2973.46	4333.02	4911.05
AP3-1	20463.46	51975.97	1300.19	887296.31	17798.42	35126.68	36595.10
AP4-1	29922.83	51330.37	2790.68	1125014.60	24318.26	44683.73	47830.73
TGP2-1	384.46	43304.16	669.14	3837376.50	5336.11	4683.07	1516.07
TGP2-2	391.42	42738.96	436.22	3593567.80	4926.91	3811.46	1228.47
TGP2-3	777.70	48418.64	630.98	3401378.00	5600.59	6335.36	1590.87
TGP2-4	546.22	34239.35	374.34	528941.56	1321.09	1961.49	450.54
TGP2-5	95.30	35755.88	134.86	186967.44	606.96	752.08	180.74
TGP2-6	112.26	31845.06	202.70	170108.06	500.52	681.16	163.22
TGP2-7	323.62	32173.50	344.70	165131.39	846.00	2063.53	403.30
TGP2-8	110.58	33706.75	109.78	102860.80	428.80	743.76	191.26
TGP2-9	74.82	34231.48	122.98	97357.33	345.92	512.84	136.82
TGP2-10	26.42	41442.43	94.06	110811.33	299.88	293.00	72.10
TGP2-11	48.14	43325.25	68.66	362247.44	772.48	678.76	214.62
TGP2-12	25.66	41068.11	131.50	141494.78	551.96	890.56	240.26
TGP2-13	93.54	43982.49	202.50	514370.09	1163.69	1627.49	369.34
TGP2-14	50.82	44430.33	97.70	585880.06	1068.29	955.09	269.94
TGP2-15	42.02	48655.51	125.82	1046871.40	1728.29	1330.25	452.14
TGP2-16	73.18	43821.93	178.90	2653672.00	3721.90	1926.29	772.10
TGP2-17	101.10	43459.80	162.34	2612617.00	3530.70	1597.61	765.74
TGP2-18	39.14	45192.89	118.02	2749680.80	3731.90	1788.57	786.50
SRM614-2	591.26	57666.13	1077.35	3405.48	665.68	967.41	1194.43
SRM612-2	23889.23	58769.33	66757.87	42799.58	34096.71	48492.15	59934.28
SRM610-2	130993.92	29781.85	327567.44	259031.31	215375.36	299929.74	389952.50
AP1-2	623.98	51451.53	263.38	36271.71	105.80	68.84	27.54
AP2-2	2000.43	49979.40	253.06	73127.87	2072.81	2704.98	3169.48
AP3-2	15675.07	58783.09	545.62	615651.13	17172.74	32275.38	32014.32
AP4-2	16492.31	55385.35	1266.55	572192.13	17678.34	28303.88	30280.39
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-1	0.000190	0.008985	0.000493	0.001424	0.000178	0.000276	0.000341
SRM612-1	0.009191	0.010736	0.033434	0.021287	0.010126	0.015070	0.020080
SRM610-1	0.130862	0.018876	0.418706	0.314402	0.175357	0.250267	0.361587
AP1-1	0.000056	0.002173	0.000035	0.003778	0.000013	0.000022	0.000010
AP2-1	0.000204	0.002877	0.000078	0.010625	0.000181	0.000264	0.000299
AP3-1	0.000973	0.002472	0.000062	0.042200	0.000847	0.001671	0.001740
AP4-1	0.001513	0.002595	0.000141	0.056870	0.001229	0.002259	0.002418
TGP2-1	0.000015	0.001690	0.000026	0.149770	0.000208	0.000183	0.000059
TGP2-2	0.000016	0.001783	0.000018	0.149928	0.000206	0.000159	0.000051
TGP2-3	0.000032	0.002019	0.000026	0.141858	0.000234	0.000264	0.000066
TGP2-4	0.000050	0.003116	0.000034	0.048136	0.000120	0.000179	0.000041
TGP2-5	0.000008	0.003069	0.000012	0.016049	0.000052	0.000065	0.000016
TGP2-6	0.000011	0.003230	0.000021	0.017253	0.000051	0.000069	0.000017
TGP2-7	0.000035	0.003521	0.000038	0.018069	0.000093	0.000226	0.000044
TGP2-8	0.000011	0.003443	0.000011	0.010508	0.000044	0.000076	0.000020
TGP2-9	0.000008	0.003447	0.000012	0.009803	0.000035	0.000052	0.000014
TGP2-10	0.000002	0.003240	0.000007	0.008663	0.000023	0.000023	0.000006
TGP2-11	0.000003	0.003071	0.000005	0.025673	0.000055	0.000048	0.000015
TGP2-12	0.000002	0.003237	0.000010	0.011151	0.000044	0.000070	0.000019
TGP2-13	0.000008	0.003712	0.000017	0.043416	0.000098	0.000137	0.000031
TGP2-14	0.000004	0.003312	0.000007	0.043675	0.000080	0.000071	0.000020
TGP2-15	0.000003	0.003106	0.000008	0.066836	0.000110	0.000085	0.000029
TGP2-16	0.000003	0.002024	0.000008	0.122544	0.000172	0.000089	0.000036
TGP2-17	0.000005	0.002004	0.000007	0.120449	0.000163	0.000074	0.000035
TGP2-18	0.000002	0.002070	0.000005	0.125970	0.000171	0.000082	0.000036
SRM614-2	0.000267	0.025994	0.000486	0.001535	0.000300	0.000436	0.000538
SRM612-2	0.011254	0.027684	0.031448	0.020162	0.016062	0.022843	0.028233
SRM610-2	0.153184	0.034827	0.383056	0.302910	0.251859	0.350736	0.456008
AP1-2	0.000042	0.003458	0.000018	0.002438	0.000007	0.000005	0.000002
AP2-2	0.000168	0.004201	0.000021	0.006146	0.000174	0.000227	0.000266
AP3-2	0.000859	0.003220	0.000030	0.033726	0.000941	0.001768	0.001754
AP4-2	0.001103	0.003705	0.000085	0.038272	0.001182	0.001893	0.002025

standardize signal averages AP							
AP1	0.000049	0.002815	0.000026	0.003108	0.000010	0.000013	0.000006
AP2	0.000186	0.003539	0.000049	0.008385	0.000178	0.000246	0.000283
AP3	0.000916	0.002846	0.000046	0.037963	0.000894	0.001719	0.001747
AP4	0.001308	0.003150	0.000113	0.047571	0.001206	0.002076	0.002222

linest from std sig ave							
	0.012049	0.045531	0.017271	0.005290	0.010827	0.006015	0.005757

standardize signal averages SRM							
srm614-2	0.000228	0.017489	0.000490	0.001480	0.000239	0.000356	0.000440
srm612-2	0.010222	0.019210	0.032441	0.020724	0.013094	0.018957	0.024157
srm610-2	0.142023	0.026851	0.400881	0.308656	0.213608	0.300501	0.408797

linest from std sig ave							
	0.030324	0.000000	0.010526	0.016045	0.024994	0.017400	0.012279

concentration data							
SRM614-1	0.20	35.08	0.73	0.65	0.17	0.14	0.17
SRM612-1	9.50	41.92	49.52	9.66	9.40	7.77	9.91
SRM610-1	135.22	73.71	620.17	142.65	162.82	129.11	178.52
AP1-1	0.27	39.47	0.24	7.97	0.05	0.05	0.02
AP2-1	0.98	52.26	0.53	22.42	0.78	0.63	0.69
AP3-1	4.68	44.90	0.43	89.07	3.66	4.01	4.00
AP4-1	7.27	47.13	0.97	120.03	5.31	5.42	5.55
TGP2-1	0.07	30.70	0.18	316.10	0.90	0.44	0.14
TGP2-2	0.08	32.39	0.13	316.43	0.89	0.38	0.12
TGP2-3	0.16	36.68	0.18	299.40	1.01	0.63	0.15

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	0.24	56.60	0.23	101.59	0.52	0.43	0.09
TGP2-5	0.04	55.75	0.08	33.87	0.23	0.15	0.04
TGP2-6	0.05	58.67	0.14	36.41	0.22	0.17	0.04
TGP2-7	0.17	63.95	0.26	38.14	0.40	0.54	0.10
TGP2-8	0.05	62.55	0.08	22.18	0.19	0.18	0.04
TGP2-9	0.04	62.61	0.09	20.69	0.15	0.12	0.03
TGP2-10	0.01	58.85	0.05	18.28	0.10	0.05	0.01
TGP2-11	0.02	55.77	0.03	54.18	0.24	0.12	0.03
TGP2-12	0.01	58.79	0.07	23.54	0.19	0.17	0.04
TGP2-13	0.04	67.43	0.12	91.63	0.42	0.33	0.07
TGP2-14	0.02	60.16	0.05	92.18	0.34	0.17	0.05
TGP2-15	0.01	56.42	0.06	141.06	0.48	0.20	0.07
TGP2-16	0.02	36.76	0.06	258.64	0.74	0.21	0.08
TGP2-17	0.02	36.39	0.05	254.21	0.70	0.18	0.08
TGP2-18	0.01	37.61	0.04	265.87	0.74	0.20	0.08
SRM614-2	0.28	101.50	0.72	0.70	0.28	0.22	0.27
SRM612-2	11.63	108.11	46.58	9.15	14.91	11.78	13.94
SRM610-2	158.29	135.99	567.37	137.44	233.86	180.95	225.13
AP1-2	0.20	62.81	0.12	5.14	0.03	0.01	0.00
AP2-2	0.81	76.30	0.15	12.97	0.75	0.55	0.61
AP3-2	4.13	58.49	0.21	71.18	4.06	4.24	4.03
AP4-2	5.30	67.29	0.58	80.78	5.11	4.54	4.65

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-11	22.96	20274.83	88.80	51.84	4.28	18.20	16.28
SRM614-11	860.68	62751.95	2178.57	7546.04	880.20	1330.41	1724.57
SRM612-11	32114.30	57215.72	109062.26	74954.70	39178.66	58522.85	76969.07
SRM610-11	232638.14	40525.55	639224.63	524773.38	309250.06	470882.94	632662.06
AP1-11	1337.09	57700.97	1293.41	77489.72	448.44	798.20	587.40
AP2-11	3774.30	61842.27	1391.97	173181.58	3195.82	4853.79	5502.27
AP3-11	21590.92	71026.04	1653.89	770730.19	17442.98	30967.10	32814.11
AP4-11	58444.89	63972.20	4918.23	2127252.50	43173.84	88703.26	89235.02
GCK4-1	144.80	52335.29	524.64	1210281.40	1761.57	935.33	491.88
GCK4-2	104.52	49548.12	391.52	973608.31	1420.29	720.04	404.16
GCK4-3	81.48	51367.45	309.72	1083319.30	1595.65	713.80	372.64
GCK4-4	152.52	63239.68	441.28	1529033.10	2127.73	985.81	602.80
GCK4-5	72.36	65706.17	249.96	1496118.30	2051.97	834.84	465.00
GCK4-6	78.88	65725.73	232.60	1713613.50	2289.21	924.49	491.96
GCK4-7	124.32	46043.26	261.88	141299.55	337.68	263.68	188.32
GCK4-8	49.28	44782.25	119.44	77715.80	278.76	338.64	85.20
GCK4-9	73.00	48558.79	187.96	280430.47	559.24	345.44	147.96
GCK4-10	132.16	53227.74	293.44	55151.95	186.36	298.40	182.08
GCK4-11	35.68	43926.13	124.64	24648.70	78.24	107.16	54.72
GCK4-12	75.00	45251.77	188.44	25930.99	100.48	151.72	66.48
GCK4-13	101.08	58860.21	298.80	53781.74	155.92	262.16	138.20
GCK4-14	50.84	59434.09	107.56	49839.48	133.68	124.84	57.52
GCK4-15	57.44	57763.45	157.60	50463.29	162.72	201.28	78.32
GCK4-16	27.64	66490.45	108.28	62253.71	140.96	123.04	40.24
GCK4-17	32.00	68097.02	88.32	61519.91	128.92	113.44	47.60
GCK4-18	28.88	69011.43	91.20	61321.70	147.40	102.16	38.24
SRM614-11	313.88	57107.20	562.04	1874.05	337.80	543.88	647.92
SRM612-11	16137.81	61854.51	39760.63	27431.80	23124.53	31623.30	39720.82
SRM610-11	110124.46	42713.52	264764.00	201713.14	170701.41	252089.83	306470.50
AP1-11	592.44	61117.18	523.00	30785.29	137.96	162.04	81.96
AP2-11	1935.61	65376.81	468.84	75429.66	2129.73	2738.74	3295.58
AP3-11	10022.34	69976.04	458.48	333685.53	10410.02	17869.22	17937.86
AP4-11	25084.58	61239.02	1839.17	763994.88	22343.09	42398.00	40391.23
blank-11	24.76	22514.21	46.04	80.04	8.44	18.56	22.20
blank average	23.86	21394.52	67.42	65.94	6.36	18.38	19.24

blank subtraction							
SRM614-11	836.82	41357.43	2111.15	7480.10	873.84	1312.03	1705.33
SRM612-11	32090.44	35821.20	108994.84	74888.76	39172.30	58504.47	76949.83
SRM610-11	232614.28	19131.03	639157.21	524707.44	309243.70	470864.56	632642.82
AP1-11	1313.23	36306.44	1225.99	77423.78	442.08	779.82	568.16
AP2-11	3750.44	40447.75	1324.55	173115.64	3189.46	4835.41	5483.03
AP3-11	21567.06	49631.52	1586.47	770664.25	17436.62	30948.72	32794.86
AP4-11	58421.03	42577.68	4850.81	2127186.56	43167.48	88684.88	89215.78

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	120.94	30940.77	457.22	1210215.46	1755.21	916.95	472.64
GCK4-2	80.66	28153.60	324.10	973542.37	1413.93	701.66	384.92
GCK4-3	57.62	29972.93	242.30	1083253.36	1589.29	695.42	353.40
GCK4-4	128.66	41845.16	373.86	1528967.16	2121.37	967.43	583.56
GCK4-5	48.50	44311.65	182.54	1496052.36	2045.61	816.46	445.76
GCK4-6	55.02	44331.21	165.18	1713547.56	2282.85	906.11	472.72
GCK4-7	100.46	24648.74	194.46	141233.61	331.32	245.30	169.08
GCK4-8	25.42	23387.73	52.02	77649.86	272.40	320.26	65.96
GCK4-9	49.14	27164.27	120.54	280364.53	552.88	327.06	128.72
GCK4-10	108.30	31833.22	226.02	55086.01	180.00	280.02	162.84
GCK4-11	11.82	22531.60	57.22	24582.76	71.88	88.78	35.48
GCK4-12	51.14	23857.25	121.02	25865.05	94.12	133.34	47.24
GCK4-13	77.22	37465.69	231.38	53715.80	149.56	243.78	118.96
GCK4-14	26.98	38039.57	40.14	49773.54	127.32	106.46	38.28
GCK4-15	33.58	36368.92	90.18	50397.34	156.36	182.90	59.08
GCK4-16	3.78	45095.93	40.86	62187.77	134.60	104.66	21.00
GCK4-17	8.14	46702.50	20.90	61453.97	122.56	95.06	28.36
GCK4-18	5.02	47616.91	23.78	61255.76	141.04	83.78	19.00
SRM614-11	290.02	35712.68	494.62	1808.11	331.44	525.50	628.68
SRM612-11	16113.95	40459.99	39693.20	27365.85	23118.17	31604.92	39701.58
SRM610-11	110100.60	21319.00	264696.58	201647.20	170695.05	252071.45	306451.26
AP1-11	568.58	39722.66	455.58	30719.35	131.60	143.66	62.72
AP2-11	1911.75	43982.29	401.42	75363.72	2123.37	2720.36	3276.34
AP3-11	9998.48	48581.52	391.06	333619.59	10403.66	17850.84	17918.62
AP4-11	25060.72	39844.50	1771.75	763928.94	22336.73	42379.62	40371.99

zero correction

SRM614-11	836.82	41357.43	2111.15	7480.10	873.84	1312.03	1705.33
SRM612-11	32090.44	35821.20	108994.84	74888.76	39172.30	58504.47	76949.83
SRM610-11	232614.28	19131.03	639157.21	524707.44	309243.70	470864.56	632642.82
AP1-11	1313.23	36306.44	1225.99	77423.78	442.08	779.82	568.16
AP2-11	3750.44	40447.75	1324.55	173115.64	3189.46	4835.41	5483.03
AP3-11	21567.06	49631.52	1586.47	770664.25	17436.62	30948.72	32794.86
AP4-11	58421.03	42577.68	4850.81	2127186.56	43167.48	88684.88	89215.78
GCK4-1	120.94	30940.77	457.22	1210215.46	1755.21	916.95	472.64
GCK4-2	80.66	28153.60	324.10	973542.37	1413.93	701.66	384.92
GCK4-3	57.62	29972.93	242.30	1083253.36	1589.29	695.42	353.40
GCK4-4	128.66	41845.16	373.86	1528967.16	2121.37	967.43	583.56
GCK4-5	48.50	44311.65	182.54	1496052.36	2045.61	816.46	445.76
GCK4-6	55.02	44331.21	165.18	1713547.56	2282.85	906.11	472.72
GCK4-7	100.46	24648.74	194.46	141233.61	331.32	245.30	169.08
GCK4-8	25.42	23387.73	52.02	77649.86	272.40	320.26	65.96
GCK4-9	49.14	27164.27	120.54	280364.53	552.88	327.06	128.72
GCK4-10	108.30	31833.22	226.02	55086.01	180.00	280.02	162.84
GCK4-11	11.82	22531.60	57.22	24582.76	71.88	88.78	35.48
GCK4-12	51.14	23857.25	121.02	25865.05	94.12	133.34	47.24
GCK4-13	77.22	37465.69	231.38	53715.80	149.56	243.78	118.96
GCK4-14	26.98	38039.57	40.14	49773.54	127.32	106.46	38.28
GCK4-15	33.58	36368.92	90.18	50397.34	156.36	182.90	59.08
GCK4-16	3.78	45095.93	40.86	62187.77	134.60	104.66	21.00
GCK4-17	8.14	46702.50	20.90	61453.97	122.56	95.06	28.36
GCK4-18	5.02	47616.91	23.78	61255.76	141.04	83.78	19.00
SRM614-11	290.02	35712.68	494.62	1808.11	331.44	525.50	628.68
SRM612-11	16113.95	40459.99	39693.20	27365.85	23118.17	31604.92	39701.58
SRM610-11	110100.60	21319.00	264696.58	201647.20	170695.05	252071.45	306451.26
AP1-11	568.58	39722.66	455.58	30719.35	131.60	143.66	62.72
AP2-11	1911.75	43982.29	401.42	75363.72	2123.37	2720.36	3276.34
AP3-11	9998.48	48581.52	391.06	333619.59	10403.66	17850.84	17918.62
AP4-11	25060.72	39844.50	1771.75	763928.94	22336.73	42379.62	40371.99

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000231	0.011411	0.000583	0.002064	0.000241	0.000362	0.000471
SRM612-11	0.010154	0.011334	0.034487	0.023695	0.012394	0.018511	0.024347
SRM610-11	0.142953	0.011757	0.392793	0.322458	0.190045	0.289369	0.388789
AP1-11	0.000065	0.001802	0.000061	0.003843	0.000022	0.000039	0.000028
AP2-11	0.000203	0.002188	0.000072	0.009364	0.000173	0.000262	0.000297
AP3-11	0.001003	0.002308	0.000074	0.035831	0.000811	0.001439	0.001525
AP4-11	0.002626	0.001914	0.000218	0.095621	0.001940	0.003987	0.004010
GCK4-1	0.000007	0.001722	0.000025	0.067335	0.000098	0.000051	0.000026
GCK4-2	0.000004	0.001552	0.000018	0.053667	0.000078	0.000039	0.000021
GCK4-3	0.000003	0.001521	0.000012	0.054983	0.000081	0.000035	0.000018
GCK4-4	0.000005	0.001538	0.000014	0.056209	0.000078	0.000036	0.000021
GCK4-5	0.000002	0.001637	0.000007	0.055263	0.000076	0.000030	0.000016
GCK4-6	0.000002	0.001632	0.000006	0.063076	0.000084	0.000033	0.000017
GCK4-7	0.000011	0.002583	0.000020	0.014798	0.000035	0.000026	0.000018
GCK4-8	0.000003	0.003006	0.000007	0.009981	0.000035	0.000041	0.000008
GCK4-9	0.000004	0.002384	0.000011	0.024609	0.000049	0.000029	0.000011
GCK4-10	0.000010	0.002966	0.000021	0.005132	0.000017	0.000026	0.000015
GCK4-11	0.000002	0.004136	0.000011	0.004513	0.000013	0.000016	0.000007
GCK4-12	0.000008	0.003954	0.000020	0.004287	0.000016	0.000022	0.000008
GCK4-13	0.000006	0.002916	0.000018	0.004181	0.000012	0.000019	0.000009
GCK4-14	0.000002	0.002972	0.000003	0.003889	0.000010	0.000008	0.000003
GCK4-15	0.000003	0.002867	0.000007	0.003973	0.000012	0.000014	0.000005
GCK4-16	0.000000	0.002755	0.000002	0.003799	0.000008	0.000006	0.000001
GCK4-17	0.000001	0.002881	0.000001	0.003791	0.000008	0.000006	0.000002
GCK4-18	0.000000	0.003028	0.000002	0.003896	0.000009	0.000005	0.000001
SRM614-11	0.000303	0.037271	0.000516	0.001887	0.000346	0.000548	0.000656
SRM612-11	0.012834	0.032224	0.031613	0.021795	0.018412	0.025171	0.031620
SRM610-11	0.177716	0.034412	0.427253	0.325484	0.275523	0.406875	0.494651
AP1-11	0.000047	0.003270	0.000038	0.002529	0.000011	0.000012	0.000005
AP2-11	0.000163	0.003757	0.000034	0.006438	0.000181	0.000232	0.000280
AP3-11	0.000752	0.003656	0.000029	0.025109	0.000783	0.001343	0.001349
AP4-11	0.001919	0.003051	0.000136	0.058505	0.001711	0.003246	0.003092
standardize signal averages AP							
AP1	0.000056	0.002536	0.000049	0.003186	0.000016	0.000025	0.000017
AP2	0.000183	0.002972	0.000053	0.007901	0.000177	0.000247	0.000288
AP3	0.000878	0.002982	0.000052	0.030470	0.000797	0.001391	0.001437
AP4	0.002273	0.002483	0.000177	0.077063	0.001826	0.003616	0.003551
linest from std sig ave							
	0.007707	0.049611	0.011348	0.003775	0.008163	0.004188	0.004244
standardize signal averages SRM							
srm614-2	0.000267	0.024341	0.000549	0.001975	0.000294	0.000455	0.000563
srm612-2	0.011494	0.021779	0.033050	0.022745	0.015403	0.021841	0.027983
srm610-2	0.160334	0.023084	0.410023	0.323971	0.232784	0.348122	0.441720
linest from std sig ave							
	0.026861	0.000000	0.010292	0.015284	0.022929	0.015020	0.011362
concentration data							
SRM614-11	0.15	48.55	0.57	0.67	0.17	0.13	0.17
SRM612-11	6.71	48.22	33.56	7.67	8.68	6.65	8.86
SRM610-11	94.49	50.02	382.29	104.39	133.04	103.93	141.51
AP1-11	0.20	35.66	0.28	5.79	0.07	0.06	0.05
AP2-11	0.62	43.30	0.32	14.10	0.56	0.44	0.50
AP3-11	3.08	45.67	0.33	53.96	2.64	2.40	2.58
AP4-11	8.07	37.88	0.99	143.99	6.32	6.66	6.79
GCK4-1	0.02	34.07	0.12	101.39	0.32	0.09	0.04
GCK4-2	0.01	30.72	0.08	80.81	0.25	0.06	0.04
GCK4-3	0.01	30.11	0.06	82.79	0.26	0.06	0.03
GCK4-4	0.01	30.45	0.06	84.64	0.25	0.06	0.04
GCK4-5	0.01	32.40	0.03	83.22	0.25	0.05	0.03
GCK4-6	0.01	32.30	0.03	94.98	0.27	0.06	0.03
GCK4-7	0.03	51.11	0.09	22.28	0.11	0.04	0.03
GCK4-8	0.01	59.50	0.03	15.03	0.11	0.07	0.01
GCK4-9	0.01	47.19	0.05	37.06	0.16	0.05	0.02
GCK4-10	0.03	58.69	0.10	7.73	0.05	0.04	0.03
GCK4-11	0.01	81.86	0.05	6.80	0.04	0.03	0.01
GCK4-12	0.03	78.26	0.09	6.46	0.05	0.04	0.01
GCK4-13	0.02	57.72	0.08	6.30	0.04	0.03	0.02
GCK4-14	0.01	58.82	0.01	5.86	0.03	0.01	0.01
GCK4-15	0.01	56.74	0.03	5.98	0.04	0.02	0.01
GCK4-16	0.00	54.52	0.01	5.72	0.03	0.01	0.00
GCK4-17	0.00	57.02	0.01	5.71	0.02	0.01	0.00
GCK4-18	0.00	59.94	0.01	5.87	0.03	0.01	0.00
SRM614-11	0.20	158.58	0.50	0.61	0.24	0.20	0.24

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	8.48	137.10	30.77	7.06	12.89	9.04	11.51
SRM610-11	117.47	146.41	415.83	105.37	192.88	146.14	180.04
AP1-11	0.14	64.71	0.17	3.81	0.04	0.02	0.01
AP2-11	0.50	74.36	0.16	9.69	0.59	0.39	0.47
AP3-11	2.31	72.36	0.13	37.81	2.55	2.24	2.28
AP4-11	5.90	60.39	0.61	88.10	5.57	5.42	5.23

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-9	26.00	18903.03	55.52	202.56	2.12	25.12	19.44
SRM614-9	690.60	51226.25	1636.33	4493.59	631.96	837.32	1117.57
SRM612-9	31364.22	65446.61	115245.97	67901.98	34511.15	50090.72	68203.86
SRM610-9	224944.86	49265.64	771570.38	529500.75	265709.53	407907.31	562838.13
AP1-9	1056.53	66538.06	693.32	69281.95	211.08	350.84	266.36
AP2-9	3046.02	70023.99	757.52	143045.84	2643.90	3582.98	4617.95
AP3-9	12733.67	79198.69	708.64	662964.63	15395.93	26242.63	30051.53
AP4-9	23631.81	76058.19	2454.05	1031452.30	22891.93	39358.70	45845.14
GCK3-1	871.56	78643.16	160.88	754124.25	1095.57	705.04	271.56
GCK3-2	3097.82	83312.83	377.24	1932619.00	2460.17	1478.69	575.40
GCK3-3	3155.26	74703.54	338.88	1812416.50	2425.53	1538.69	578.88
GCK3-4	217.52	52689.94	361.04	90995.11	366.00	533.16	158.20
GCK3-5	149.20	54711.83	151.60	80582.93	269.20	239.48	99.20
GCK3-6	142.72	55147.31	130.32	76878.95	237.08	312.56	93.56
GCK3-7	265.76	71700.92	477.48	124793.90	401.88	537.40	227.04
GCK3-8	180.20	73230.49	246.20	106571.32	283.40	275.12	89.48
GCK3-9	199.00	74814.30	165.16	104262.66	289.24	292.16	126.64
GCK3-10	228.60	69420.52	380.84	91468.80	407.20	641.08	277.32
GCK3-11	151.60	71165.24	158.44	84298.71	264.44	275.76	94.88
GCK3-12	165.92	70801.36	140.40	75991.23	265.00	297.04	87.76
GCK3-13	237.04	73620.17	472.68	107633.93	348.28	674.80	306.80
GCK3-14	120.04	75295.51	146.84	96075.58	425.12	486.16	167.04
GCK3-15	108.40	78048.28	132.16	102683.94	268.28	226.12	85.72
GCK3-16	142.24	86688.25	317.40	165016.53	557.72	545.76	195.16
GCK3-17	119.16	88247.73	134.04	162255.55	409.64	342.96	127.04
GCK3-18	121.52	90070.63	127.84	164828.41	405.88	307.44	116.80
SRM614-10	528.12	78541.00	1038.37	3158.26	589.20	892.53	1058.21
SRM612-10	24596.02	90628.91	67589.02	43594.52	33452.55	47160.07	59703.62
SRM610-10	164344.97	60553.14	430093.66	335222.50	261384.75	370407.69	484033.53
AP1-10	751.68	79990.05	355.04	42836.80	120.36	124.88	40.32
AP2-10	1728.41	73976.73	275.92	70351.80	1831.05	2182.01	2759.58
AP3-10	9960.70	88915.74	372.12	445143.63	13313.12	22683.69	24392.94
AP4-10	19270.43	82718.87	1651.69	729715.44	20745.72	35941.08	37936.77
blank-10	27.08	26468.11	59.24	211.04	13.24	37.24	14.88
blank average	26.54	22685.57	57.38	206.80	7.68	31.18	17.16

blank subtraction							
SRM614-9	664.06	28540.68	1578.95	4286.78	624.28	806.14	1100.41
SRM612-9	31337.68	42761.04	115188.59	67695.18	34503.47	50059.54	68186.70
SRM610-9	224918.32	26580.07	771513.00	529293.95	265701.85	407876.13	562820.97
AP1-9	1029.99	43852.49	635.94	69075.15	203.40	319.66	249.20
AP2-9	3019.48	47338.43	700.14	142839.04	2636.21	3551.80	4600.79
AP3-9	12707.13	56513.12	651.26	662757.83	15388.25	26211.45	30034.37
AP4-9	23605.27	53372.62	2396.67	1031245.50	22884.25	39327.52	45827.98
GCK3-1	845.02	55957.60	103.50	753917.45	1087.89	673.86	254.40
GCK3-2	3071.28	60627.26	319.86	1932412.20	2452.49	1447.51	558.24
GCK3-3	3128.72	52017.97	281.50	1812209.70	2417.85	1507.51	561.72
GCK3-4	190.98	30004.37	303.66	90788.31	358.32	501.98	141.04
GCK3-5	122.66	32026.26	94.22	80376.13	261.52	208.30	82.04
GCK3-6	116.18	32461.75	72.94	76672.15	229.40	281.38	76.40
GCK3-7	239.22	49015.36	420.10	124587.10	394.20	506.22	209.88
GCK3-8	153.66	50544.93	188.82	106364.52	275.72	243.94	72.32
GCK3-9	172.46	52128.73	107.78	104055.86	281.56	260.98	109.48
GCK3-10	202.06	46734.95	323.46	91262.00	399.52	609.90	260.16
GCK3-11	125.06	48479.68	101.06	84091.91	256.76	244.58	77.72
GCK3-12	139.38	48115.79	83.02	75784.43	257.32	265.86	70.60
GCK3-13	210.50	50934.61	415.30	107427.13	340.60	643.62	289.64
GCK3-14	93.50	52609.94	89.46	95868.78	417.44	454.98	149.88
GCK3-15	81.86	55362.71	74.78	102477.14	260.60	194.94	68.56
GCK3-16	115.70	64002.68	260.02	164809.73	550.04	514.58	178.00

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	92.62	65562.17	76.66	162048.75	401.96	311.78	109.88
GCK3-18	94.98	67385.06	70.46	164621.61	398.20	276.26	99.64
SRM614-10	501.58	55855.43	980.99	2951.46	581.52	861.34	1041.05
SRM612-10	24569.48	67943.34	67531.64	43387.72	33444.87	47128.89	59686.46
SRM610-10	164318.43	37867.57	430036.28	335015.70	261377.07	370376.51	484016.37
AP1-10	725.14	57304.48	297.66	42630.00	112.68	93.70	23.16
AP2-10	1701.87	51291.17	218.54	70145.00	1823.37	2150.83	2742.42
AP3-10	9934.16	66230.18	314.74	444936.83	13305.43	22652.51	24375.78
AP4-10	19243.89	60033.30	1594.31	729508.64	20738.04	35909.90	37919.61

zero correction

SRM614-9	664.06	28540.68	1578.95	4286.78	624.28	806.14	1100.41
SRM612-9	31337.68	42761.04	115188.59	67695.18	34503.47	50059.54	68186.70
SRM610-9	224918.32	26580.07	771513.00	529293.95	265701.85	407876.13	562820.97
AP1-9	1029.99	43852.49	635.94	69075.15	203.40	319.66	249.20
AP2-9	3019.48	47338.43	700.14	142839.04	2636.21	3551.80	4600.79
AP3-9	12707.13	56513.12	651.26	662757.83	15388.25	26211.45	30034.37
AP4-9	23605.27	53372.62	2396.67	1031245.50	22884.25	39327.52	45827.98
GCK3-1	845.02	55957.60	103.50	753917.45	1087.89	673.86	254.40
GCK3-2	3071.28	60627.26	319.86	1932412.20	2452.49	1447.51	558.24
GCK3-3	3128.72	52017.97	281.50	1812209.70	2417.85	1507.51	561.72
GCK3-4	190.98	30004.37	303.66	90788.31	358.32	501.98	141.04
GCK3-5	122.66	32026.26	94.22	80376.13	261.52	208.30	82.04
GCK3-6	116.18	32461.75	72.94	76672.15	229.40	281.38	76.40
GCK3-7	239.22	49015.36	420.10	124587.10	394.20	506.22	209.88
GCK3-8	153.66	50544.93	188.82	106364.52	275.72	243.94	72.32
GCK3-9	172.46	52128.73	107.78	104055.86	281.56	260.98	109.48
GCK3-10	202.06	46734.95	323.46	91262.00	399.52	609.90	260.16
GCK3-11	125.06	48479.68	101.06	84091.91	256.76	244.58	77.72
GCK3-12	139.38	48115.79	83.02	75784.43	257.32	265.86	70.60
GCK3-13	210.50	50934.61	415.30	107427.13	340.60	643.62	289.64
GCK3-14	93.50	52609.94	89.46	95868.78	417.44	454.98	149.88
GCK3-15	81.86	55362.71	74.78	102477.14	260.60	194.94	68.56
GCK3-16	115.70	64002.68	260.02	164809.73	550.04	514.58	178.00
GCK3-17	92.62	65562.17	76.66	162048.75	401.96	311.78	109.88
GCK3-18	94.98	67385.06	70.46	164621.61	398.20	276.26	99.64
SRM614-10	501.58	55855.43	980.99	2951.46	581.52	861.34	1041.05
SRM612-10	24569.48	67943.34	67531.64	43387.72	33444.87	47128.89	59686.46
SRM610-10	164318.43	37867.57	430036.28	335015.70	261377.07	370376.51	484016.37
AP1-10	725.14	57304.48	297.66	42630.00	112.68	93.70	23.16
AP2-10	1701.87	51291.17	218.54	70145.00	1823.37	2150.83	2742.42
AP3-10	9934.16	66230.18	314.74	444936.83	13305.43	22652.51	24375.78
AP4-10	19243.89	60033.30	1594.31	729508.64	20738.04	35909.90	37919.61

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-9	0.000194	0.008336	0.000461	0.001252	0.000182	0.000235	0.000321
SRM612-9	0.008430	0.011503	0.030987	0.018211	0.009282	0.013466	0.018343
SRM610-9	0.124963	0.014768	0.428647	0.294072	0.147622	0.226613	0.312700
AP1-9	0.000044	0.001856	0.000027	0.002924	0.000009	0.000014	0.000011
AP2-9	0.000153	0.002397	0.000035	0.007231	0.000133	0.000180	0.000233
AP3-9	0.000476	0.002115	0.000024	0.024809	0.000576	0.000981	0.001124
AP4-9	0.001058	0.002393	0.000107	0.046238	0.001026	0.001763	0.002055
GCK3-1	0.000038	0.002497	0.000005	0.033639	0.000049	0.000030	0.000011
GCK3-2	0.000122	0.002403	0.000013	0.076593	0.000097	0.000057	0.000022
GCK3-3	0.000136	0.002266	0.000012	0.078939	0.000105	0.000066	0.000024
GCK3-4	0.000021	0.003373	0.000034	0.010205	0.000040	0.000056	0.000016
GCK3-5	0.000013	0.003393	0.000010	0.008516	0.000028	0.000022	0.000009
GCK3-6	0.000013	0.003507	0.000008	0.008282	0.000025	0.000030	0.000008
GCK3-7	0.000015	0.003066	0.000026	0.007793	0.000025	0.000032	0.000013
GCK3-8	0.000010	0.003205	0.000012	0.006744	0.000017	0.000015	0.000005

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000011	0.003321	0.000007	0.006629	0.000018	0.000017	0.000007
GCK3-10	0.000016	0.003591	0.000025	0.007012	0.000031	0.000047	0.000020
GCK3-11	0.000009	0.003546	0.000007	0.006151	0.000019	0.000018	0.000006
GCK3-12	0.000011	0.003698	0.000006	0.005824	0.000020	0.000020	0.000005
GCK3-13	0.000014	0.003479	0.000028	0.007337	0.000023	0.000044	0.000020
GCK3-14	0.000006	0.003523	0.000006	0.006419	0.000028	0.000030	0.000010
GCK3-15	0.000005	0.003603	0.000005	0.006670	0.000017	0.000013	0.000004
GCK3-16	0.000006	0.003483	0.000014	0.008970	0.000030	0.000028	0.000010
GCK3-17	0.000005	0.003573	0.000004	0.008830	0.000022	0.000017	0.000006
GCK3-18	0.000005	0.003312	0.000003	0.008091	0.000020	0.000014	0.000005
SRM614-10	0.000264	0.029408	0.000516	0.001554	0.000306	0.000453	0.000548
SRM612-10	0.011574	0.032006	0.031812	0.020439	0.015755	0.022201	0.028116
SRM610-10	0.152138	0.035061	0.398159	0.310182	0.242002	0.342922	0.448138
AP1-10	0.000043	0.003361	0.000017	0.002500	0.000007	0.000005	0.000001
AP2-10	0.000139	0.004199	0.000018	0.005743	0.000149	0.000176	0.000225
AP3-10	0.000498	0.003319	0.000016	0.022295	0.000667	0.001135	0.001221
AP4-10	0.001129	0.003523	0.000094	0.042816	0.001217	0.002108	0.002226

standardize signal averages AP

AP1	0.000043	0.002608	0.000022	0.002712	0.000008	0.000010	0.000006
AP2	0.000146	0.003298	0.000027	0.006487	0.000141	0.000178	0.000229
AP3	0.000487	0.002717	0.000020	0.023552	0.000621	0.001058	0.001173
AP4	0.001094	0.002958	0.000101	0.044527	0.001122	0.001935	0.002140

linest from std sig ave

	0.015882	0.048432	0.019810	0.006349	0.012752	0.007449	0.006728
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standardize signal averages SRM

srm614-2	0.000229	0.018872	0.000489	0.001403	0.000244	0.000344	0.000435
srm612-2	0.010002	0.021755	0.031399	0.019325	0.012518	0.017834	0.023230
srm610-2	0.138551	0.024914	0.413403	0.302127	0.194812	0.284767	0.380419

linest from std sig ave

	0.031084	0.000000	0.010209	0.016394	0.027401	0.018362	0.013194
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concentration data

SRM614-9	0.26	34.63	0.78	0.68	0.20	0.15	0.19
SRM612-9	11.48	47.78	52.64	9.92	10.15	8.60	10.58
SRM610-9	170.21	61.34	728.25	160.12	161.45	144.78	180.43
AP1-9	0.28	35.86	0.21	7.41	0.04	0.04	0.03
AP2-9	0.97	46.31	0.28	18.32	0.68	0.53	0.63
AP3-9	3.01	40.87	0.19	62.84	2.93	2.92	3.02
AP4-9	6.71	46.24	0.85	117.11	5.22	5.24	5.52
GCK3-1	0.24	48.24	0.04	85.20	0.25	0.09	0.03
GCK3-2	0.77	46.43	0.10	193.99	0.49	0.17	0.06
GCK3-3	0.86	43.78	0.10	199.93	0.54	0.20	0.07
GCK3-4	0.14	65.17	0.27	25.85	0.20	0.17	0.04
GCK3-5	0.08	65.56	0.08	21.57	0.14	0.07	0.02
GCK3-6	0.08	67.75	0.06	20.98	0.13	0.09	0.02
GCK3-7	0.09	59.24	0.21	19.74	0.13	0.09	0.04
GCK3-8	0.06	61.92	0.09	17.08	0.09	0.05	0.01
GCK3-9	0.07	64.16	0.05	16.79	0.09	0.05	0.02
GCK3-10	0.10	69.38	0.20	17.76	0.16	0.14	0.05
GCK3-11	0.06	68.51	0.06	15.58	0.10	0.05	0.02
GCK3-12	0.07	71.44	0.05	14.75	0.10	0.06	0.01
GCK3-13	0.09	67.21	0.22	18.58	0.12	0.13	0.05
GCK3-14	0.04	68.06	0.05	16.26	0.14	0.09	0.03
GCK3-15	0.03	69.62	0.04	16.89	0.09	0.04	0.01
GCK3-16	0.04	67.30	0.11	22.72	0.15	0.08	0.03
GCK3-17	0.03	69.03	0.03	22.37	0.11	0.05	0.02
GCK3-18	0.03	63.99	0.03	20.49	0.10	0.04	0.01
SRM614-10	0.36	122.15	0.88	0.85	0.33	0.29	0.32
SRM612-10	15.76	132.94	54.05	11.13	17.23	14.18	16.22
SRM610-10	207.22	145.63	676.45	168.89	264.67	219.08	258.58
AP1-10	0.27	64.93	0.14	6.33	0.03	0.02	0.00
AP2-10	0.88	81.13	0.14	14.54	0.76	0.52	0.60
AP3-10	3.15	64.12	0.12	56.47	3.39	3.37	3.28
AP4-10	7.16	68.08	0.74	108.44	6.19	6.26	5.97

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-7	32.08	19553.47	133.80	160.08	7.80	24.12	14.68
SRM614-7	698.36	59605.30	1546.61	5467.15	886.52	1279.01	1559.41
SRM612-7	26026.91	58783.33	83993.99	63261.40	44791.29	63811.36	77577.12
SRM610-7	138888.19	40216.95	439592.28	333921.63	279500.06	409488.75	499293.69
AP1-7	1220.29	55226.99	906.61	72010.33	359.56	598.88	383.20
AP2-7	3293.94	54004.27	827.20	137815.38	3279.50	4634.35	5034.51
AP3-7	11866.15	59363.90	710.56	563730.81	18503.58	32473.42	31974.42
AP4-7	21874.56	57971.09	1956.17	821505.75	26302.11	45789.98	44836.25
GCK2-1	87.76	36126.00	316.52	147126.42	342.80	308.32	135.52
GCK2-2	37.32	36195.77	224.44	117616.70	232.76	150.80	81.32
GCK2-3	36.36	35924.24	219.32	119866.39	256.32	182.44	70.20
GCK2-4	101.92	37517.13	332.84	121249.77	308.12	366.16	151.92
GCK2-5	28.80	39110.94	204.32	111465.27	272.68	214.08	73.96
GCK2-6	30.36	40618.99	226.76	129905.38	292.48	222.00	81.24
GCK2-7	118.04	41446.72	326.84	110579.91	324.60	464.16	179.12
GCK2-8	59.84	44034.13	233.04	109477.05	251.64	251.08	84.76
GCK2-9	45.68	43618.81	169.00	103379.10	286.84	271.00	114.76
GCK2-10	110.12	51105.45	264.00	2961117.80	3955.62	1716.01	804.96
GCK2-11	82.36	50492.93	247.28	2773277.80	3637.62	1893.01	798.32
GCK2-12	72.84	51025.93	209.76	2556245.30	3304.10	1417.57	700.60
GCK2-13	134.20	51392.97	212.96	2510150.50	3301.54	1367.45	701.20
GCK2-14	73.24	49207.52	159.56	2133203.80	2952.22	1225.89	583.44
GCK2-15	67.52	50777.13	169.64	2598278.30	3593.42	1389.81	665.08
GCK2-16	72.84	45899.22	140.36	1685564.00	2494.93	1231.93	507.44
GCK2-17	65.24	45485.38	122.32	1291745.00	1926.09	860.04	419.84
GCK2-18	40.64	43024.96	115.96	566449.69	1108.17	674.80	261.76
SRM614-8	476.72	64711.04	881.00	3081.14	597.20	899.65	964.49
SRM612-8	19844.11	69355.71	54378.23	35346.40	34251.59	47167.31	54118.50
SRM610-8	132675.70	44611.45	342039.13	250656.78	251833.25	360225.63	405186.47
AP1-8	642.28	58053.57	517.44	35776.76	101.44	117.16	61.00
AP2-8	2090.25	56193.52	399.76	76150.95	2189.53	2918.34	3170.50
AP3-8	9746.46	61742.63	488.36	411738.91	14672.20	25739.82	24346.62
AP4-8	12549.47	59252.85	1167.89	432299.00	18017.86	27383.59	27840.44
blank-8	21.04	21035.76	87.08	525.28	11.16	62.56	30.44
blank average	26.56	20294.61	110.44	342.68	9.48	43.34	22.56
blank subtraction							
SRM614-7	671.80	39310.68	1436.17	5124.47	877.04	1235.67	1536.85
SRM612-7	26000.35	38488.72	83883.55	62918.71	44781.81	63768.02	77554.56
SRM610-7	138861.63	19922.33	439481.84	333578.95	279490.58	409445.41	499271.13
AP1-7	1193.73	34932.38	796.16	71667.65	350.08	555.54	360.64
AP2-7	3267.38	33709.65	716.76	137472.70	3270.02	4591.01	5011.95
AP3-7	11839.59	39069.28	600.12	563388.13	18494.10	32430.08	31951.86
AP4-7	21848.00	37676.47	1845.73	821163.07	26292.63	45746.64	44813.69
GCK2-1	61.20	15831.39	206.08	146783.74	333.32	264.98	112.96
GCK2-2	10.76	15901.15	114.00	117274.02	223.28	107.46	58.76
GCK2-3	9.80	15629.63	108.88	119523.71	246.84	139.10	47.64
GCK2-4	75.36	17222.52	222.40	120907.09	298.64	322.82	129.36
GCK2-5	2.24	18816.33	93.88	111122.59	263.20	170.74	51.40
GCK2-6	3.80	20324.37	116.32	129562.70	283.00	178.66	58.68
GCK2-7	91.48	21152.10	216.40	110237.23	315.12	420.82	156.56
GCK2-8	33.28	23739.51	122.60	109134.37	242.16	207.74	62.20
GCK2-9	19.12	23324.19	58.56	103036.42	277.36	227.66	92.20
GCK2-10	83.56	30810.83	153.56	2960775.12	3946.14	1672.67	782.40
GCK2-11	55.80	30198.31	136.84	2772935.12	3628.14	1849.67	775.76
GCK2-12	46.28	30731.31	99.32	2555902.62	3294.62	1374.23	678.04
GCK2-13	107.64	31098.35	102.52	2509807.82	3292.06	1324.11	678.64
GCK2-14	46.68	28912.90	49.12	2132861.12	2942.74	1182.55	560.88
GCK2-15	40.96	30482.51	59.20	2597935.62	3583.94	1346.47	642.52
GCK2-16	46.28	25604.60	29.92	1685221.32	2485.45	1188.59	484.88
GCK2-17	38.68	25190.76	11.88	1291402.32	1916.61	816.70	397.28
GCK2-18	14.08	22730.35	5.52	566107.01	1098.69	631.46	239.20
SRM614-8	450.16	44416.43	770.56	2738.46	587.72	856.30	941.93
SRM612-8	19817.55	49061.10	54267.79	35003.72	34242.11	47123.96	54095.94
SRM610-8	132649.14	24316.83	341928.69	250314.10	251823.77	360182.29	405163.91
AP1-8	615.72	37758.95	407.00	35434.08	91.96	73.82	38.44
AP2-8	2063.69	35898.90	289.32	75808.27	2180.05	2875.00	3147.94
AP3-8	9719.89	41448.01	377.92	411396.23	14662.72	25696.48	24324.06
AP4-8	12522.91	38958.24	1057.45	431956.32	18008.38	27340.25	27817.88
zero correction							
SRM614-7	671.80	39310.68	1436.17	5124.47	877.04	1235.67	1536.85
SRM612-7	26000.35	38488.72	83883.55	62918.71	44781.81	63768.02	77554.56
SRM610-7	138861.63	19922.33	439481.84	333578.95	279490.58	409445.41	499271.13
AP1-7	1193.73	34932.38	796.16	71667.65	350.08	555.54	360.64
AP2-7	3267.38	33709.65	716.76	137472.70	3270.02	4591.01	5011.95

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	11839.59	39069.28	600.12	563388.13	18494.10	32430.08	31951.86
AP4-7	21848.00	37676.47	1845.73	821163.07	26292.63	45746.64	44813.69
GCK2-1	61.20	15831.39	206.08	146783.74	333.32	264.98	112.96
GCK2-2	10.76	15901.15	114.00	117274.02	223.28	107.46	58.76
GCK2-3	9.80	15629.63	108.88	119523.71	246.84	139.10	47.64
GCK2-4	75.36	17222.52	222.40	120907.09	298.64	322.82	129.36
GCK2-5	2.24	18816.33	93.88	111122.59	263.20	170.74	51.40
GCK2-6	3.80	20324.37	116.32	129562.70	283.00	178.66	58.68
GCK2-7	91.48	21152.10	216.40	110237.23	315.12	420.82	156.56
GCK2-8	33.28	23739.51	122.60	109134.37	242.16	207.74	62.20
GCK2-9	19.12	23324.19	58.56	103036.42	277.36	227.66	92.20
GCK2-10	83.56	30810.83	153.56	2960775.12	3946.14	1672.67	782.40
GCK2-11	55.80	30198.31	136.84	2772935.12	3628.14	1849.67	775.76
GCK2-12	46.28	30731.31	99.32	2555902.62	3294.62	1374.23	678.04
GCK2-13	107.64	31098.35	102.52	2509807.82	3292.06	1324.11	678.64
GCK2-14	46.68	28912.90	49.12	2132861.12	2942.74	1182.55	560.88
GCK2-15	40.96	30482.51	59.20	2597935.62	3583.94	1346.47	642.52
GCK2-16	46.28	25604.60	29.92	1685221.32	2485.45	1188.59	484.88
GCK2-17	38.68	25190.76	11.88	1291402.32	1916.61	816.70	397.28
GCK2-18	14.08	22730.35	5.52	566107.01	1098.69	631.46	239.20
SRM614-8	450.16	44416.43	770.56	2738.46	587.72	856.30	941.93
SRM612-8	19817.55	49061.10	54267.79	35003.72	34242.11	47123.96	54095.94
SRM610-8	132649.14	24316.83	341928.69	250314.10	251823.77	360182.29	405163.91
AP1-8	615.72	37758.95	407.00	35434.08	91.96	73.82	38.44
AP2-8	2063.69	35898.90	289.32	75808.27	2180.05	2875.00	3147.94
AP3-8	9719.89	41448.01	377.92	411396.23	14662.72	25696.48	24324.06
AP4-8	12522.91	38958.24	1057.45	431956.32	18008.38	27340.25	27817.88

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-7	0.000269	0.015763	0.000576	0.002055	0.000352	0.000495	0.000616
SRM612-7	0.010938	0.016192	0.035289	0.026469	0.018839	0.026826	0.032626
SRM610-7	0.143880	0.020642	0.455365	0.345635	0.289592	0.424243	0.517315
AP1-7	0.000065	0.001898	0.000043	0.003894	0.000019	0.000030	0.000020
AP2-7	0.000218	0.002251	0.000048	0.009182	0.000218	0.000307	0.000335
AP3-7	0.000581	0.001919	0.000029	0.027669	0.000908	0.001593	0.001569
AP4-7	0.001274	0.002196	0.000108	0.047871	0.001533	0.002667	0.002612
GCK2-1	0.000011	0.002801	0.000036	0.025966	0.000059	0.000047	0.000020
GCK2-2	0.000002	0.003088	0.000022	0.022772	0.000043	0.000021	0.000011
GCK2-3	0.000002	0.003076	0.000021	0.023523	0.000049	0.000027	0.000009
GCK2-4	0.000013	0.002968	0.000038	0.020839	0.000051	0.000056	0.000022
GCK2-5	0.000000	0.003095	0.000015	0.018275	0.000043	0.000028	0.000008
GCK2-6	0.000001	0.002946	0.000017	0.018779	0.000041	0.000026	0.000009
GCK2-7	0.000015	0.003438	0.000035	0.017918	0.000051	0.000068	0.000025
GCK2-8	0.000005	0.003444	0.000018	0.015834	0.000035	0.000030	0.000009
GCK2-9	0.000003	0.003607	0.000009	0.015934	0.000043	0.000035	0.000014
GCK2-10	0.000006	0.002264	0.000011	0.217578	0.000290	0.000123	0.000057
GCK2-11	0.000004	0.002290	0.000010	0.210263	0.000275	0.000140	0.000059
GCK2-12	0.000004	0.002364	0.000008	0.196650	0.000253	0.000106	0.000052
GCK2-13	0.000008	0.002305	0.000008	0.186026	0.000244	0.000098	0.000050
GCK2-14	0.000004	0.002292	0.000004	0.169051	0.000233	0.000094	0.000044
GCK2-15	0.000003	0.002232	0.000004	0.190207	0.000262	0.000099	0.000047
GCK2-16	0.000004	0.002280	0.000003	0.150067	0.000221	0.000106	0.000043
GCK2-17	0.000004	0.002322	0.000001	0.119059	0.000177	0.000075	0.000037
GCK2-18	0.000002	0.002667	0.000001	0.066423	0.000129	0.000074	0.000028
SRM614-8	0.000332	0.032772	0.000569	0.002021	0.000434	0.000632	0.000695
SRM612-8	0.013193	0.032661	0.036127	0.023303	0.022796	0.031371	0.036013
SRM610-8	0.187036	0.034287	0.482121	0.352944	0.355072	0.507858	0.571282
AP1-8	0.000047	0.002877	0.000031	0.002700	0.000007	0.000006	0.000003
AP2-8	0.000187	0.003257	0.000026	0.006877	0.000198	0.000261	0.000286
AP3-8	0.000590	0.002516	0.000023	0.024969	0.000890	0.001560	0.001476

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.001012	0.003149	0.000085	0.034916	0.001456	0.002210	0.002249
standardize signal averages AP							
AP1	0.000056	0.002388	0.000037	0.003297	0.000013	0.000018	0.000011
AP2	0.000203	0.002754	0.000037	0.008029	0.000208	0.000284	0.000310
AP3	0.000586	0.002217	0.000026	0.026319	0.000899	0.001576	0.001523
AP4	0.001143	0.002673	0.000097	0.041394	0.001494	0.002438	0.002431
linest from std sig ave							
	0.014902	0.057170	0.020569	0.006560	0.009372	0.005653	0.005721
standardize signal averages SRM							
srm614-2	0.000301	0.024268	0.000572	0.002038	0.000393	0.000564	0.000656
srm612-2	0.012065	0.024426	0.035708	0.024886	0.020817	0.029099	0.034319
srm610-2	0.165458	0.027465	0.468743	0.349289	0.322332	0.466051	0.544299
linest from std sig ave							
	0.026028	0.000000	0.009004	0.014175	0.016560	0.011220	0.009221
concentration data							
SRM614-7	0.34	77.29	1.02	1.16	0.28	0.24	0.30
SRM612-7	13.98	79.39	62.25	14.89	15.14	13.01	16.01
SRM610-7	183.89	101.21	803.29	194.45	232.76	205.70	253.83
AP1-7	0.39	43.29	0.35	10.19	0.07	0.07	0.04
AP2-7	1.30	51.35	0.39	24.03	0.82	0.69	0.76
AP3-7	3.46	43.76	0.24	72.41	3.40	3.59	3.58
AP4-7	7.57	50.09	0.88	125.28	5.73	6.01	5.96
GCK2-1	0.06	63.87	0.30	67.95	0.22	0.11	0.05
GCK2-2	0.01	70.42	0.18	59.59	0.16	0.05	0.03
GCK2-3	0.01	70.16	0.18	61.56	0.18	0.06	0.02
GCK2-4	0.08	67.70	0.31	54.53	0.19	0.13	0.05
GCK2-5	0.00	70.58	0.13	47.83	0.16	0.06	0.02
GCK2-6	0.00	67.19	0.14	49.14	0.15	0.06	0.02
GCK2-7	0.09	78.41	0.29	46.89	0.19	0.15	0.06
GCK2-8	0.03	78.55	0.15	41.44	0.13	0.07	0.02
GCK2-9	0.02	82.26	0.07	41.70	0.16	0.08	0.03
GCK2-10	0.04	51.64	0.09	569.40	1.08	0.28	0.13
GCK2-11	0.03	52.22	0.09	550.25	1.03	0.32	0.13
GCK2-12	0.02	53.93	0.06	514.63	0.95	0.24	0.12
GCK2-13	0.05	52.57	0.06	486.83	0.91	0.22	0.11
GCK2-14	0.02	52.27	0.03	442.40	0.87	0.21	0.10
GCK2-15	0.02	50.90	0.04	497.77	0.98	0.22	0.11
GCK2-16	0.02	52.00	0.02	392.72	0.83	0.24	0.10
GCK2-17	0.02	52.97	0.01	311.58	0.66	0.17	0.08
GCK2-18	0.01	60.83	0.01	173.83	0.48	0.17	0.06
SRM614-8	0.42	160.68	1.00	1.14	0.35	0.31	0.34
SRM612-8	16.86	160.14	63.73	13.11	18.32	15.21	17.67
SRM610-8	239.05	168.11	850.49	198.56	285.39	246.24	280.31
AP1-8	0.28	65.62	0.25	7.07	0.03	0.01	0.01
AP2-8	1.11	74.28	0.22	18.00	0.74	0.59	0.65
AP3-8	3.51	57.37	0.19	65.34	3.33	3.52	3.37
AP4-8	6.02	71.82	0.70	91.37	5.44	4.98	5.13
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-5	100.84	32649.50	133.76	842.24	17.00	55.16	40.52
SRM614-5	819.84	77881.23	1767.89	12068.47	1121.09	2246.61	1828.13
SRM612-5	28229.76	77329.44	82625.95	60488.42	47238.66	68197.27	78302.28
SRM610-5	183518.95	51107.49	467851.47	391693.38	343910.13	518744.88	593814.56
AP1-5	1249.65	61295.18	907.05	61772.27	330.96	625.80	378.52
AP2-5	3374.86	59600.54	864.88	133996.56	3681.94	5398.39	5261.31
AP3-5	26498.63	63931.08	1028.41	979600.81	30057.45	58757.17	53091.62
AP4-5	52034.61	56907.44	3871.38	1677651.10	48202.11	98340.44	87060.77
GCK1-1	225.64	64578.84	401.72	865959.75	1491.49	1110.13	434.08
GCK1-2	168.80	66375.21	307.52	1201376.90	1817.09	1021.61	400.00
GCK1-3	156.88	57952.57	335.96	701615.31	1185.49	803.60	323.28
GCK1-4	317.72	60542.06	448.00	952187.94	1813.57	1802.01	462.40
GCK1-5	256.88	60737.62	280.04	839109.94	1437.21	875.08	375.40
GCK1-6	142.36	59380.41	166.64	452522.09	856.60	618.64	236.96

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	243.04	47027.55	517.48	61007.74	239.80	597.84	238.52
GCK1-8	65.96	47622.67	182.56	40663.91	161.36	226.80	66.64
GCK1-9	83.72	48268.99	229.64	44317.85	164.72	256.44	73.80
GCK1-10	233.60	60326.66	276.08	621099.25	1063.53	776.44	324.72
GCK1-11	164.76	58444.05	162.64	481337.81	886.80	562.04	218.00
GCK1-12	209.36	59069.93	175.00	501082.81	969.97	748.24	259.56
GCK1-13	105.84	55349.51	308.96	56219.32	263.36	445.84	169.16
GCK1-14	67.24	57906.16	174.72	52330.18	276.92	519.28	157.92
GCK1-15	62.60	56280.36	160.76	44159.69	278.40	504.40	101.80
GCK1-16	171.16	48279.47	338.60	42635.00	266.36	539.96	203.24
GCK1-17	69.76	55683.99	143.76	45849.22	292.52	555.24	125.52
GCK1-18	95.84	51016.81	127.88	41694.23	280.04	603.04	131.08
SRM614-6	429.84	63837.08	897.13	3103.10	613.68	979.61	974.97
SRM612-6	17996.38	72397.69	50895.49	34289.31	33631.51	45957.70	52297.90
SRM610-6	122330.77	46965.38	333731.72	265840.66	270780.09	384276.41	431488.72
AP1-6	588.72	56097.84	539.16	32385.74	107.64	163.36	61.48
AP2-6	1807.49	54350.82	422.48	71397.45	2281.81	2916.78	3145.62
AP3-6	13158.51	56603.60	555.80	486547.22	17269.30	32287.06	28964.72
AP4-6	18251.78	52790.06	1375.13	583903.13	20491.52	36588.45	33829.23
blank-6	34.20	20955.20	104.60	216.72	12.72	65.68	24.24
blank average	67.52	26802.35	119.18	529.48	14.86	60.42	32.38

blank subtraction

SRM614-5	752.32	51078.88	1648.71	11538.99	1106.23	2186.19	1795.75
SRM612-5	28162.24	50527.09	82506.76	59958.94	47223.80	68136.85	78269.90
SRM610-5	183451.43	24305.14	467732.29	391163.90	343895.27	518684.46	593782.18
AP1-5	1182.13	34492.83	787.86	61242.79	316.10	565.38	346.14
AP2-5	3307.34	32798.18	745.70	133467.08	3667.08	5337.97	5228.93
AP3-5	26431.11	37128.73	909.23	979071.33	30042.59	58696.75	53059.24
AP4-5	51967.09	30105.09	3752.20	1677121.62	48187.25	98280.02	87028.39
GCK1-1	158.12	37776.49	282.54	865430.27	1476.63	1049.71	401.70
GCK1-2	101.28	39572.86	188.34	1200847.42	1802.23	961.19	367.62
GCK1-3	89.36	31150.22	216.78	701085.83	1170.63	743.18	290.90
GCK1-4	250.20	33739.71	328.82	951658.46	1798.71	1741.59	430.02
GCK1-5	189.36	33935.27	160.86	838580.46	1422.35	814.66	343.02
GCK1-6	74.84	32578.06	47.46	451992.61	841.74	558.22	204.58
GCK1-7	175.52	20225.20	398.30	60478.26	224.94	537.42	206.14
GCK1-8	-1.56	20820.32	63.38	40134.43	146.50	166.38	34.26
GCK1-9	16.20	21466.64	110.46	43788.37	149.86	196.02	41.42
GCK1-10	166.08	33524.31	156.90	620569.77	1048.67	716.02	292.34
GCK1-11	97.24	31641.70	43.46	480808.33	871.94	501.62	185.62
GCK1-12	141.84	32267.58	55.82	500553.33	955.11	687.82	227.18
GCK1-13	38.32	28547.16	189.78	55689.83	248.50	385.42	136.78
GCK1-14	-0.28	31103.81	55.54	51800.69	262.06	458.86	125.54
GCK1-15	-4.92	29478.00	41.58	43630.21	263.54	443.98	69.42
GCK1-16	103.64	21477.12	219.42	42105.52	251.50	479.54	170.86
GCK1-17	2.24	28881.64	24.58	45319.74	277.66	494.82	93.14
GCK1-18	28.32	24214.46	8.70	41164.75	265.18	542.62	98.70
SRM614-6	362.32	37034.73	777.94	2573.61	598.82	919.19	942.59
SRM612-6	17928.86	45595.34	50776.31	33759.83	33616.65	45897.28	52265.51
SRM610-6	122263.25	20163.03	333612.54	265311.18	270765.23	384215.99	431456.34
AP1-6	521.20	29295.49	419.98	31856.26	92.78	102.94	29.10
AP2-6	1739.97	27548.47	303.30	70867.96	2266.95	2856.36	3113.24
AP3-6	13090.99	29801.25	436.62	486017.74	17254.44	32226.64	28932.34
AP4-6	18184.26	25987.71	1255.95	583373.65	20476.66	36528.02	33796.85

zero correction

SRM614-5	752.32	51078.88	1648.71	11538.99	1106.23	2186.19	1795.75
SRM612-5	28162.24	50527.09	82506.76	59958.94	47223.80	68136.85	78269.90
SRM610-5	183451.43	24305.14	467732.29	391163.90	343895.27	518684.46	593782.18
AP1-5	1182.13	34492.83	787.86	61242.79	316.10	565.38	346.14
AP2-5	3307.34	32798.18	745.70	133467.08	3667.08	5337.97	5228.93
AP3-5	26431.11	37128.73	909.23	979071.33	30042.59	58696.75	53059.24
AP4-5	51967.09	30105.09	3752.20	1677121.62	48187.25	98280.02	87028.39
GCK1-1	158.12	37776.49	282.54	865430.27	1476.63	1049.71	401.70
GCK1-2	101.28	39572.86	188.34	1200847.42	1802.23	961.19	367.62
GCK1-3	89.36	31150.22	216.78	701085.83	1170.63	743.18	290.90
GCK1-4	250.20	33739.71	328.82	951658.46	1798.71	1741.59	430.02
GCK1-5	189.36	33935.27	160.86	838580.46	1422.35	814.66	343.02
GCK1-6	74.84	32578.06	47.46	451992.61	841.74	558.22	204.58
GCK1-7	175.52	20225.20	398.30	60478.26	224.94	537.42	206.14
GCK1-8	0.00	20820.32	63.38	40134.43	146.50	166.38	34.26
GCK1-9	16.20	21466.64	110.46	43788.37	149.86	196.02	41.42
GCK1-10	166.08	33524.31	156.90	620569.77	1048.67	716.02	292.34
GCK1-11	97.24	31641.70	43.46	480808.33	871.94	501.62	185.62
GCK1-12	141.84	32267.58	55.82	500553.33	955.11	687.82	227.18
GCK1-13	38.32	28547.16	189.78	55689.83	248.50	385.42	136.78
GCK1-14	0.00	31103.81	55.54	51800.69	262.06	458.86	125.54

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	0.00	29478.00	41.58	43630.21	263.54	443.98	69.42
GCK1-16	103.64	21477.12	219.42	42105.52	251.50	479.54	170.86
GCK1-17	2.24	28881.64	24.58	45319.74	277.66	494.82	93.14
GCK1-18	28.32	24214.46	8.70	41164.75	265.18	542.62	98.70
SRM614-6	362.32	37034.73	777.94	2573.61	598.82	919.19	942.59
SRM612-6	17928.86	45595.34	50776.31	33759.83	33616.65	45897.28	52265.51
SRM610-6	122263.25	20163.03	333612.54	265311.18	270765.23	384215.99	431456.34
AP1-6	521.20	29295.49	419.98	31856.26	92.78	102.94	29.10
AP2-6	1739.97	27548.47	303.30	70867.96	2266.95	2856.36	3113.24
AP3-6	13090.99	29801.25	436.62	486017.74	17254.44	32226.64	28932.34
AP4-6	18184.26	25987.71	1255.95	583373.65	20476.66	36528.02	33796.85

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-5	0.000305	0.020721	0.000669	0.004681	0.000449	0.000887	0.000728
SRM612-5	0.012629	0.022658	0.036999	0.026887	0.021177	0.030555	0.035099
SRM610-5	0.170577	0.022599	0.434906	0.363711	0.319760	0.482282	0.552110
AP1-5	0.000069	0.001999	0.000046	0.003549	0.000018	0.000033	0.000020
AP2-5	0.000233	0.002315	0.000053	0.009419	0.000259	0.000377	0.000369
AP3-5	0.001303	0.001830	0.000045	0.048254	0.001481	0.002893	0.002615
AP4-5	0.002835	0.001642	0.000205	0.091498	0.002629	0.005362	0.004748
GCK1-1	0.000009	0.002111	0.000016	0.048366	0.000083	0.000059	0.000022
GCK1-2	0.000005	0.001991	0.000009	0.060417	0.000091	0.000048	0.000018
GCK1-3	0.000006	0.002069	0.000014	0.046564	0.000078	0.000049	0.000019
GCK1-4	0.000013	0.001808	0.000018	0.050989	0.000096	0.000093	0.000023
GCK1-5	0.000010	0.001784	0.000008	0.044076	0.000075	0.000043	0.000018
GCK1-6	0.000005	0.002075	0.000003	0.028795	0.000054	0.000036	0.000013
GCK1-7	0.000021	0.002435	0.000048	0.007282	0.000027	0.000065	0.000025
GCK1-8	0.000000	0.002597	0.000008	0.005007	0.000018	0.000021	0.000004
GCK1-9	0.000002	0.002578	0.000013	0.005260	0.000018	0.000024	0.000005
GCK1-10	0.000009	0.001720	0.000008	0.031842	0.000054	0.000037	0.000015
GCK1-11	0.000006	0.001958	0.000003	0.029749	0.000054	0.000031	0.000011
GCK1-12	0.000008	0.001929	0.000003	0.029923	0.000057	0.000041	0.000014
GCK1-13	0.000003	0.002558	0.000017	0.004991	0.000022	0.000035	0.000012
GCK1-14	0.000000	0.002739	0.000005	0.004561	0.000023	0.000040	0.000011
GCK1-15	0.000000	0.002772	0.000004	0.004104	0.000025	0.000042	0.000007
GCK1-16	0.000013	0.002638	0.000027	0.005172	0.000031	0.000059	0.000021
GCK1-17	0.000000	0.003057	0.000003	0.004796	0.000029	0.000052	0.000010
GCK1-18	0.000004	0.003066	0.000001	0.005213	0.000034	0.000069	0.000012
SRM614-6	0.000269	0.027463	0.000577	0.001908	0.000444	0.000682	0.000699
SRM612-6	0.012633	0.032127	0.035778	0.023788	0.023687	0.032340	0.036827
SRM610-6	0.166594	0.027474	0.454574	0.361508	0.368940	0.523526	0.587894
AP1-6	0.000044	0.002456	0.000035	0.002671	0.000008	0.000009	0.000002
AP2-6	0.000170	0.002691	0.000030	0.006922	0.000221	0.000279	0.000304
AP3-6	0.000858	0.001952	0.000029	0.031842	0.001130	0.002111	0.001896
AP4-6	0.001644	0.002350	0.000114	0.052755	0.001852	0.003303	0.003056

standardize signal averages AP							
AP1	0.000056	0.002227	0.000040	0.003110	0.000013	0.000021	0.000011
AP2	0.000202	0.002503	0.000041	0.008170	0.000240	0.000328	0.000337
AP3	0.001080	0.001891	0.000037	0.040048	0.001306	0.002502	0.002255
AP4	0.002240	0.001996	0.000159	0.072126	0.002240	0.004333	0.003902

linest from std sig ave							
	0.007659	0.065550	0.012576	0.003879	0.006312	0.003284	0.003644

standardize signal averages SRM							
srm614-2	0.000287	0.024092	0.000623	0.003295	0.000446	0.000784	0.000714
srm612-2	0.012631	0.027393	0.036388	0.025338	0.022432	0.031447	0.035963
srm610-2	0.168585	0.025037	0.444740	0.362610	0.344350	0.502904	0.570002

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.025543	0.000000	0.009488	0.013655	0.015501	0.010397	0.008805
concentration data							
SRM614-5	0.20	116.49	0.72	1.56	0.24	0.25	0.23
SRM612-5	8.29	127.38	39.91	8.95	11.46	8.61	10.97
SRM610-5	112.04	127.05	469.09	121.00	173.11	135.85	172.57
AP1-5	0.21	52.27	0.23	5.49	0.05	0.04	0.03
AP2-5	0.71	60.53	0.26	14.58	0.65	0.49	0.54
AP3-5	3.98	47.85	0.22	74.67	3.73	3.79	3.80
AP4-5	8.66	42.95	1.03	141.60	6.62	7.03	6.90
GCK1-1	0.03	55.21	0.08	74.85	0.21	0.08	0.03
GCK1-2	0.02	52.06	0.05	93.50	0.23	0.06	0.03
GCK1-3	0.02	54.10	0.07	72.06	0.20	0.06	0.03
GCK1-4	0.04	47.27	0.09	78.91	0.24	0.12	0.03
GCK1-5	0.03	46.64	0.04	68.21	0.19	0.06	0.03
GCK1-6	0.01	54.27	0.02	44.56	0.14	0.05	0.02
GCK1-7	0.06	63.69	0.24	11.27	0.07	0.08	0.04
GCK1-8	0.00	67.92	0.04	7.75	0.05	0.03	0.01
GCK1-9	0.01	67.43	0.07	8.14	0.05	0.03	0.01
GCK1-10	0.03	44.98	0.04	49.28	0.14	0.05	0.02
GCK1-11	0.02	51.20	0.01	46.04	0.14	0.04	0.02
GCK1-12	0.03	50.44	0.02	46.31	0.14	0.05	0.02
GCK1-13	0.01	66.91	0.09	7.72	0.06	0.05	0.02
GCK1-14	0.00	71.62	0.02	7.06	0.06	0.05	0.02
GCK1-15	0.00	72.50	0.02	6.35	0.06	0.05	0.01
GCK1-16	0.04	68.99	0.14	8.00	0.08	0.08	0.03
GCK1-17	0.00	79.93	0.01	7.42	0.07	0.07	0.01
GCK1-18	0.01	80.19	0.01	8.07	0.08	0.09	0.02
SRM614-6	0.18	154.39	0.62	0.63	0.24	0.19	0.22
SRM612-6	8.30	180.61	38.59	7.91	12.82	9.11	11.51
SRM610-6	109.42	154.45	490.30	120.27	199.73	147.47	183.75
AP1-6	0.13	64.23	0.18	4.13	0.02	0.01	0.00
AP2-6	0.52	70.36	0.15	10.71	0.56	0.37	0.44
AP3-6	2.62	51.06	0.14	49.28	2.85	2.77	2.76
AP4-6	5.02	61.46	0.57	81.64	4.66	4.33	4.44
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-1	15.40	13813.36	71.24	33.80	9.84	22.20	28.88
SRM614-1	918.69	115257.09	1801.21	23931.41	1219.81	2284.09	1858.73
SRM612-1	27795.84	108599.49	79418.01	70805.28	45490.06	64474.44	79833.49
SRM610-1	145315.73	80224.29	434950.84	409309.16	322101.22	473449.34	580119.44
AP1-1	1454.17	85236.72	770.24	70037.91	548.72	1009.89	485.64
AP2-1	4310.58	89076.46	563.00	179840.45	4109.30	5834.87	6291.32
AP3-1	33447.63	90233.19	1001.73	1023420.50	30577.25	55544.39	55038.95
AP4-1	44834.73	92456.56	2882.22	1229770.30	39122.78	70008.71	70382.72
V2-1	101.00	68760.19	240.28	159779.34	386.48	543.36	159.04
V2-2	59.04	64726.16	184.44	127001.59	283.08	379.80	95.40
V2-3	45.44	59180.45	174.96	99274.36	259.24	273.40	88.08
V2-4	548.08	67205.90	479.52	404772.03	1007.25	2203.01	489.12
V2-5	82.28	65194.81	258.28	832996.25	1345.13	1260.69	396.12
V2-6	161.36	62977.72	301.28	923027.75	1453.09	1403.49	434.48
V2-7	401.88	59377.38	631.84	305744.97	1045.81	2921.98	548.36
V2-8	82.84	57884.77	309.68	236131.25	631.00	1023.53	194.92
V2-9	186.12	55100.31	328.32	206943.05	660.40	1300.73	240.04
V2-10	252.28	51844.85	397.76	242330.97	707.08	1731.69	359.00
V2-11	84.48	52640.38	216.96	171170.53	398.52	826.60	143.52
V2-12	141.56	52255.57	292.88	162549.59	403.36	900.09	197.60
V2-13	137.60	74625.62	515.44	4991170.00	6786.08	6090.55	1626.77
V2-14	70.92	77954.08	266.68	5074384.00	6454.52	4626.27	1556.57
V2-15	97.96	80732.73	371.60	5606374.00	7080.56	4627.95	1655.01
SRM614-2	532.88	77902.60	1053.65	4968.15	678.44	1189.57	1099.73
SRM612-2	22207.69	85906.13	63787.88	42173.20	37696.73	52377.29	61495.87
SRM610-2	132987.78	60400.62	411074.41	320486.97	293091.38	433809.72	501639.97
AP1-2	684.52	71018.48	426.40	34507.00	121.52	175.92	91.56
AP2-2	2284.93	70426.67	333.32	92367.00	2631.37	3267.98	3795.62
AP3-2	10119.14	72287.33	362.84	333175.41	12350.39	21089.84	20717.00
AP4-2	24988.90	74674.02	1589.65	628665.50	23108.89	38968.82	39264.70

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	25.24	27575.28	75.64	840.96	9.80	55.12	15.08
blank average	20.32	20694.32	73.44	437.38	9.82	38.66	21.98
blank subtraction							
SRM614-1	898.37	94562.77	1727.77	23494.03	1209.99	2245.43	1836.75
SRM612-1	27775.52	87905.17	79344.57	70367.90	45480.23	64435.78	79811.51
SRM610-1	145295.41	59529.97	434877.40	408871.78	322091.40	473410.68	580097.46
AP1-1	1433.85	64542.40	696.80	69600.53	538.90	971.23	463.66
AP2-1	4290.26	68382.15	489.56	179403.07	4099.48	5796.21	6269.34
AP3-1	33427.31	69538.87	928.29	1022983.12	30567.43	55505.73	55016.97
AP4-1	44814.41	71762.25	2808.78	1229332.92	39112.96	69970.05	70360.74
V2-1	80.68	48065.87	166.84	159341.96	376.66	504.70	137.06
V2-2	38.72	44031.85	111.00	126564.21	273.26	341.14	73.42
V2-3	25.12	38486.14	101.52	98836.98	249.42	234.74	66.10
V2-4	527.76	46511.58	406.08	404334.65	997.43	2164.35	467.14
V2-5	61.96	44500.49	184.84	832558.87	1335.31	1222.03	374.14
V2-6	141.04	42283.40	227.84	922590.37	1443.27	1364.83	412.50
V2-7	381.56	38683.06	558.40	305307.59	1035.99	2883.32	526.38
V2-8	62.52	37190.45	236.24	235693.87	621.18	984.87	172.94
V2-9	165.80	34405.99	254.88	206505.67	650.58	1262.07	218.06
V2-10	231.96	31150.54	324.32	241893.59	697.26	1693.03	337.02
V2-11	64.16	31946.06	143.52	170733.15	388.70	787.94	121.54
V2-12	121.24	31561.26	219.44	162112.21	393.54	861.42	175.62
V2-13	117.28	53931.30	442.00	4990732.62	6776.26	6051.89	1604.79
V2-14	50.60	57259.76	193.24	5073946.62	6444.70	4587.61	1534.59
V2-15	77.64	60038.42	298.16	5605936.62	7070.74	4589.29	1633.03
SRM614-2	512.56	57208.29	980.21	4530.77	668.62	1150.91	1077.75
SRM612-2	22187.37	65211.81	63714.44	41735.81	37686.91	52338.63	61473.89
SRM610-2	132967.46	39706.31	411000.97	320049.59	293081.56	433771.06	501617.99
AP1-2	664.20	50324.16	352.96	34069.61	111.70	137.26	69.58
AP2-2	2264.61	49732.36	259.88	91929.62	2621.55	3229.32	3773.64
AP3-2	10098.82	51593.01	289.40	332738.03	12340.57	21051.18	20695.02
AP4-2	24968.58	53979.70	1516.21	628228.12	23099.07	38930.16	39242.72
zero correction							
SRM614-1	898.37	94562.77	1727.77	23494.03	1209.99	2245.43	1836.75
SRM612-1	27775.52	87905.17	79344.57	70367.90	45480.23	64435.78	79811.51
SRM610-1	145295.41	59529.97	434877.40	408871.78	322091.40	473410.68	580097.46
AP1-1	1433.85	64542.40	696.80	69600.53	538.90	971.23	463.66
AP2-1	4290.26	68382.15	489.56	179403.07	4099.48	5796.21	6269.34
AP3-1	33427.31	69538.87	928.29	1022983.12	30567.43	55505.73	55016.97
AP4-1	44814.41	71762.25	2808.78	1229332.92	39112.96	69970.05	70360.74
V2-1	80.68	48065.87	166.84	159341.96	376.66	504.70	137.06
V2-2	38.72	44031.85	111.00	126564.21	273.26	341.14	73.42
V2-3	25.12	38486.14	101.52	98836.98	249.42	234.74	66.10
V2-4	527.76	46511.58	406.08	404334.65	997.43	2164.35	467.14
V2-5	61.96	44500.49	184.84	832558.87	1335.31	1222.03	374.14
V2-6	141.04	42283.40	227.84	922590.37	1443.27	1364.83	412.50
V2-7	381.56	38683.06	558.40	305307.59	1035.99	2883.32	526.38
V2-8	62.52	37190.45	236.24	235693.87	621.18	984.87	172.94
V2-9	165.80	34405.99	254.88	206505.67	650.58	1262.07	218.06
V2-10	231.96	31150.54	324.32	241893.59	697.26	1693.03	337.02
V2-11	64.16	31946.06	143.52	170733.15	388.70	787.94	121.54
V2-12	121.24	31561.26	219.44	162112.21	393.54	861.42	175.62
V2-13	117.28	53931.30	442.00	4990732.62	6776.26	6051.89	1604.79
V2-14	50.60	57259.76	193.24	5073946.62	6444.70	4587.61	1534.59
V2-15	77.64	60038.42	298.16	5605936.62	7070.74	4589.29	1633.03
SRM614-2	512.56	57208.29	980.21	4530.77	668.62	1150.91	1077.75
SRM612-2	22187.37	65211.81	63714.44	41735.81	37686.91	52338.63	61473.89
SRM610-2	132967.46	39706.31	411000.97	320049.59	293081.56	433771.06	501617.99
AP1-2	664.20	50324.16	352.96	34069.61	111.70	137.26	69.58
AP2-2	2264.61	49732.36	259.88	91929.62	2621.55	3229.32	3773.64
AP3-2	10098.82	51593.01	289.40	332738.03	12340.57	21051.18	20695.02
AP4-2	24968.58	53979.70	1516.21	628228.12	23099.07	38930.16	39242.72
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-1	0.000358	0.037711	0.000689	0.009369	0.000483	0.000895	0.000732
SRM612-1	0.012428	0.039332	0.035502	0.031485	0.020350	0.028831	0.035711
SRM610-1	0.139073	0.056981	0.416254	0.391362	0.308298	0.453137	0.555255
AP1-1	0.000084	0.003793	0.000041	0.004091	0.000032	0.000057	0.000027
AP2-1	0.000249	0.003963	0.000028	0.010396	0.000238	0.000336	0.000363
AP3-1	0.001591	0.003310	0.000044	0.048693	0.001455	0.002642	0.002619
AP4-1	0.002232	0.003575	0.000140	0.061238	0.001948	0.003485	0.003505
V2-1	0.000009	0.005325	0.000018	0.017654	0.000042	0.000056	0.000015
V2-2	0.000005	0.005528	0.000014	0.015890	0.000034	0.000043	0.000009
V2-3	0.000004	0.005830	0.000015	0.014972	0.000038	0.000036	0.000010
V2-4	0.000063	0.005557	0.000049	0.048305	0.000119	0.000259	0.000056
V2-5	0.000007	0.004935	0.000021	0.092336	0.000148	0.000136	0.000041
V2-6	0.000016	0.004711	0.000025	0.102793	0.000161	0.000152	0.000046
V2-7	0.000062	0.006270	0.000091	0.049486	0.000168	0.000467	0.000085
V2-8	0.000010	0.006221	0.000040	0.039426	0.000104	0.000165	0.000029
V2-9	0.000031	0.006498	0.000048	0.039001	0.000123	0.000238	0.000041
V2-10	0.000045	0.006100	0.000064	0.047365	0.000137	0.000332	0.000066
V2-11	0.000014	0.006876	0.000031	0.036747	0.000084	0.000170	0.000026
V2-12	0.000027	0.007059	0.000049	0.036259	0.000088	0.000193	0.000039
V2-13	0.000007	0.003018	0.000025	0.279303	0.000379	0.000339	0.000090
V2-14	0.000003	0.003118	0.000011	0.276253	0.000351	0.000250	0.000084
V2-15	0.000004	0.003013	0.000015	0.281341	0.000355	0.000230	0.000082
SRM614-2	0.000339	0.037829	0.000648	0.002996	0.000442	0.000761	0.000713
SRM612-2	0.012927	0.037995	0.037123	0.024317	0.021958	0.030495	0.035817
SRM610-2	0.148607	0.044377	0.459343	0.357694	0.327554	0.484791	0.560619
AP1-2	0.000054	0.004115	0.000029	0.002786	0.000009	0.000011	0.000006
AP2-2	0.000182	0.003987	0.000021	0.007370	0.000210	0.000259	0.000303
AP3-2	0.000783	0.003999	0.000022	0.025793	0.000957	0.001632	0.001604
AP4-2	0.001683	0.003638	0.000102	0.042345	0.001557	0.002624	0.002645
standardize signal averages AP							
AP1	0.000069	0.003954	0.000035	0.003438	0.000020	0.000034	0.000016
AP2	0.000215	0.003975	0.000025	0.008883	0.000224	0.000297	0.000333
AP3	0.001187	0.003655	0.000033	0.037243	0.001206	0.002137	0.002111
AP4	0.001958	0.003607	0.000121	0.051792	0.001753	0.003055	0.003075
linest from std sig ave							
	0.008394	0.037479	0.016452	0.005055	0.007669	0.004394	0.004392
standardize signal averages SRM							
srm614-2	0.000349	0.037770	0.000669	0.006183	0.000462	0.000828	0.000723
srm612-2	0.012678	0.038664	0.036312	0.027901	0.021154	0.029663	0.035764
srm610-2	0.143840	0.050679	0.437799	0.374528	0.317926	0.468964	0.557937
linest from std sig ave							
	0.029914	0.000000	0.009638	0.013216	0.016788	0.011150	0.008995
concentration data							
SRM614-1	0.26	121.22	0.97	4.06	0.32	0.34	0.28
SRM612-1	8.95	126.43	50.09	13.65	13.38	10.86	13.45
SRM610-1	100.12	183.15	587.31	169.67	202.77	170.74	209.15
AP1-1	0.28	56.72	0.27	8.25	0.10	0.10	0.05
AP2-1	0.83	59.25	0.19	20.97	0.73	0.59	0.64
AP3-1	5.33	49.49	0.29	98.20	4.45	4.63	4.59
AP4-1	7.48	53.45	0.92	123.50	5.96	6.11	6.14
V2-1	0.03	79.62	0.12	35.60	0.13	0.10	0.03
V2-2	0.02	82.66	0.09	32.04	0.10	0.08	0.02
V2-3	0.01	87.17	0.10	30.19	0.12	0.06	0.02
V2-4	0.21	83.08	0.32	97.41	0.36	0.45	0.10
V2-5	0.02	73.79	0.13	186.21	0.45	0.24	0.07
V2-6	0.05	70.44	0.17	207.30	0.49	0.27	0.08
V2-7	0.21	93.75	0.59	99.79	0.51	0.82	0.15
V2-8	0.04	93.02	0.26	79.51	0.32	0.29	0.05
V2-9	0.10	97.15	0.32	78.65	0.38	0.42	0.07
V2-10	0.15	91.20	0.42	95.52	0.42	0.58	0.12
V2-11	0.05	102.80	0.20	74.11	0.26	0.30	0.05
V2-12	0.09	105.55	0.32	73.12	0.27	0.34	0.07
V2-13	0.02	45.13	0.16	563.25	1.16	0.59	0.16
V2-14	0.01	46.61	0.07	557.10	1.07	0.44	0.15
V2-15	0.01	45.05	0.10	567.36	1.09	0.40	0.14
SRM614-2	0.24	121.59	0.91	1.30	0.29	0.29	0.27
SRM612-2	9.31	122.13	52.38	10.54	14.44	11.49	13.49

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	106.98	142.64	648.11	155.07	215.43	182.67	211.17
AP1-2	0.18	61.52	0.19	5.62	0.03	0.02	0.01
AP2-2	0.61	59.61	0.14	14.86	0.64	0.45	0.53
AP3-2	2.62	59.80	0.15	52.01	2.93	2.86	2.81
AP4-2	5.64	54.40	0.67	85.39	4.76	4.60	4.63

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-23	7.72	25975.87	80.04	143.40	4.00	20.36	14.04
SRM614-23	438.92	45549.50	1072.41	4423.90	361.40	654.12	775.24
SRM612-23	15922.85	54497.07	55519.99	53048.06	18592.82	26755.63	36496.20
SRM610-23	77576.04	41625.75	228661.13	205344.72	105431.52	144490.22	213350.69
AP1-23	429.68	56240.40	590.84	37590.01	283.40	730.32	199.56
AP2-23	2783.14	58243.45	493.04	111259.38	1998.45	3175.98	3275.98
AP3-23	8245.89	63244.72	479.12	336597.91	7659.24	13324.56	14839.92
AP4-23	11212.18	68041.55	1260.81	484730.06	11960.35	18527.02	22466.01
34HP45-494-1	304.96	57926.05	482.08	1159798.80	73049.93	148644.84	32026.06
34HP45-494-2	235.68	55337.47	337.16	1008491.60	44665.77	88021.98	19655.63
34HP45-494-3	301.92	57023.20	731.44	1104156.30	68212.95	123666.41	26316.43
34HP45-494-4	232.28	66817.66	1700.61	3883171.30	35402.36	54944.95	11295.58
34HP45-494-5	100.08	66271.02	800.76	2986244.30	58127.13	86371.13	18537.58
34HP45-494-6	120.84	64594.65	912.65	3377382.30	44472.77	69000.95	14669.16
34HP45-494-7	190.20	57540.56	814.08	1814841.50	42820.40	80565.01	16115.13
34HP45-494-8	209.20	59676.62	1465.25	4747665.00	35548.32	46007.42	9884.30
34HP45-494-9	167.28	60512.26	1224.05	4628775.00	40663.75	56771.36	11952.15
34HP45-494-10	468.76	70534.88	1157.85	3308809.50	172195.17	350555.91	56466.20
34HP45-494-11	490.80	68031.59	756.12	5125562.00	141995.31	264139.56	43914.61
34HP45-494-12	335.40	73581.49	821.28	4584644.50	162003.31	314758.81	49850.80
34HP45-494-13	300.68	66270.89	1146.73	1559295.00	51131.05	114033.20	18296.46
34HP45-494-14	469.16	69774.71	1212.13	1634970.40	49415.00	109879.66	17438.82
34HP45-494-15	428.00	69176.99	977.29	1808329.40	46622.22	108210.21	16486.61
34HP45-494-16	176.32	63361.00	496.24	3889585.50	10476.06	10558.42	2138.61
34HP45-494-17	248.00	66656.70	784.64	4892358.50	12930.83	11927.47	2605.93
34HP45-494-18	158.36	70091.75	541.08	3257086.80	8309.05	8531.33	1825.57
SRM614-24	388.68	67235.54	749.56	3964.78	484.64	776.60	765.96
SRM612-24	15048.60	72487.53	41482.95	28698.68	23368.65	31872.90	39871.70
SRM610-24	90984.67	48848.20	215650.02	178504.41	157130.89	213170.80	276114.88
AP1-24	360.88	64447.64	476.68	20465.76	69.52	105.40	40.96
AP2-24	2033.45	63418.72	384.48	71818.33	1819.33	2623.17	2957.78
AP3-24	7982.48	65318.01	446.92	292913.88	8955.13	15455.05	15480.25
AP4-24	10084.42	68870.91	952.41	387359.22	12901.67	19759.87	21741.36
blank-24	11.80	29652.53	87.56	761.04	8.28	45.08	22.80
blank average	9.76	27814.20	83.80	452.22	6.14	32.72	18.42

blank subtraction							
SRM614-23	429.16	17735.30	988.61	3971.68	355.26	621.40	756.82
SRM612-23	15913.09	26682.87	55436.19	52595.84	18586.68	26722.91	36477.78
SRM610-23	77566.28	13811.56	228577.33	204892.50	105425.38	144457.50	213332.27
AP1-23	419.92	28426.20	507.04	37137.79	277.26	697.60	181.14
AP2-23	2773.38	30429.25	409.24	110807.16	1992.31	3143.26	3257.56
AP3-23	8236.13	35430.52	395.32	336145.69	7653.10	13291.83	14821.50
AP4-23	11202.42	40227.35	1177.01	484277.84	11954.21	18494.30	22447.59
34HP45-494-1	295.20	30111.85	398.28	1159346.58	73043.79	148612.12	32007.64
34HP45-494-2	225.92	27523.28	253.36	1008039.38	44659.63	87989.26	19637.21
34HP45-494-3	292.16	29209.01	647.64	1103704.08	68206.80	123633.69	26298.01
34HP45-494-4	222.52	39003.46	1616.81	3882719.08	35396.22	54912.23	11277.16
34HP45-494-5	90.32	38456.82	716.96	2985792.08	58120.99	86338.40	18519.16
34HP45-494-6	111.08	36780.45	828.84	3376930.08	44466.63	68968.22	14560.74
34HP45-494-7	180.44	29726.37	730.28	1814389.28	42814.26	80532.29	16096.71
34HP45-494-8	199.44	31862.42	1381.45	4747212.78	35542.18	45974.70	9865.88
34HP45-494-9	157.52	32698.07	1140.25	4628322.78	40657.61	56738.64	11933.73
34HP45-494-10	459.00	42720.68	1074.05	3308357.28	172189.03	350523.19	56447.77
34HP45-494-11	481.04	40217.39	672.32	5125109.78	141989.17	264106.84	43896.18
34HP45-494-12	325.64	45767.30	737.48	4584192.28	161997.17	314726.09	49832.38
34HP45-494-13	290.92	38456.70	1062.93	1558842.78	51124.91	114000.48	18278.04
34HP45-494-14	459.40	41960.52	1128.33	1634518.18	49408.86	109846.94	17420.40
34HP45-494-15	418.24	41362.80	893.48	1807877.18	46616.08	108177.49	16468.19
34HP45-494-16	166.56	35546.80	412.44	3889133.28	10469.92	10525.70	2120.19
34HP45-494-17	238.24	38842.50	700.84	4891906.28	12924.69	11894.75	2587.51

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	148.60	42277.55	457.28	3256634.58	8302.91	8498.61	1807.15
SRM614-24	378.92	39421.34	665.76	3512.56	478.50	743.88	747.54
SRM612-24	15038.84	44673.34	41399.15	28246.46	23362.51	31840.18	39853.28
SRM610-24	90974.91	21034.00	215566.22	178052.19	157124.75	213138.08	276096.46
AP1-24	351.12	36633.45	392.88	20013.53	63.38	72.68	22.54
AP2-24	2023.69	35604.52	300.68	71366.11	1813.19	2590.45	2939.36
AP3-24	7972.72	37503.81	363.12	292461.66	8948.99	15422.33	15461.83
AP4-24	10074.66	41056.71	868.60	386907.00	12895.53	19727.15	21722.94

zero correction

SRM614-23	429.16	17735.30	988.61	3971.68	355.26	621.40	756.82
SRM612-23	15913.09	26682.87	55436.19	52595.84	18586.68	26722.91	36477.78
SRM610-23	77566.28	13811.56	228577.33	204892.50	105425.38	144457.50	213332.27
AP1-23	419.92	28426.20	507.04	37137.79	277.26	697.60	181.14
AP2-23	2773.38	30429.25	409.24	110807.16	1992.31	3143.26	3257.56
AP3-23	8236.13	35430.52	395.32	336145.69	7653.10	13291.83	14821.50
AP4-23	11202.42	40227.35	1177.01	484277.84	11954.21	18494.30	22447.59
34HP45-494-1	295.20	30111.85	398.28	1159346.58	73043.79	148612.12	32007.64
34HP45-494-2	225.92	27523.28	253.36	1008039.38	44659.63	87989.26	19637.21
34HP45-494-3	292.16	29209.01	647.64	1103704.08	68206.80	123633.69	26298.01
34HP45-494-4	222.52	39003.46	1616.81	3882719.08	35396.22	54912.23	11277.16
34HP45-494-5	90.32	38456.82	716.96	2985792.08	58120.99	86338.40	18519.16
34HP45-494-6	111.08	36780.45	828.84	3376930.08	44466.63	68968.22	14650.74
34HP45-494-7	180.44	29726.37	730.28	1814389.28	42814.26	80532.29	16096.71
34HP45-494-8	199.44	31862.42	1381.45	4747212.78	35542.18	45974.70	9865.88
34HP45-494-9	157.52	32698.07	1140.25	4628322.78	40657.61	56738.64	11933.73
34HP45-494-10	459.00	42720.68	1074.05	3308357.28	172189.03	350523.19	56447.77
34HP45-494-11	481.04	40217.39	672.32	5125109.78	141989.17	264106.84	43896.18
34HP45-494-12	325.64	45767.30	737.48	4584192.28	161997.17	314726.09	49832.38
34HP45-494-13	290.92	38456.70	1062.93	1558842.78	51124.91	114000.48	18278.04
34HP45-494-14	459.40	41960.52	1128.33	1634518.18	49408.86	109846.94	17420.40
34HP45-494-15	418.24	41362.80	893.48	1807877.18	46616.08	108177.49	16468.19
34HP45-494-16	166.56	35546.80	412.44	3889133.28	10469.92	10525.70	2120.19
34HP45-494-17	238.24	38842.50	700.84	4891906.28	12924.69	11894.75	2587.51
34HP45-494-18	148.60	42277.55	457.28	3256634.58	8302.91	8498.61	1807.15
SRM614-24	378.92	39421.34	665.76	3512.56	478.50	743.88	747.54
SRM612-24	15038.84	44673.34	41399.15	28246.46	23362.51	31840.18	39853.28
SRM610-24	90974.91	21034.00	215566.22	178052.19	157124.75	213138.08	276096.46
AP1-24	351.12	36633.45	392.88	20013.53	63.38	72.68	22.54
AP2-24	2023.69	35604.52	300.68	71366.11	1813.19	2590.45	2939.36
AP3-24	7972.72	37503.81	363.12	292461.66	8948.99	15422.33	15461.83
AP4-24	10074.66	41056.71	868.60	386907.00	12895.53	19727.15	21722.94

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-23	0.000206	0.008533	0.000476	0.001911	0.000171	0.000299	0.000364
SRM612-23	0.008174	0.013706	0.028475	0.027016	0.009547	0.013726	0.018737
SRM610-23	0.107035	0.019059	0.315416	0.282733	0.145478	0.199338	0.294379
AP1-23	0.000042	0.002815	0.000050	0.003677	0.000027	0.000069	0.000018
AP2-23	0.000204	0.002243	0.000030	0.008168	0.000147	0.000232	0.000240
AP3-23	0.000546	0.002351	0.000026	0.022304	0.000508	0.000882	0.000983
AP4-23	0.000749	0.002690	0.000079	0.032388	0.000799	0.001237	0.001501
34HP45-494-1	0.000019	0.001983	0.000026	0.076344	0.004810	0.009786	0.002108
34HP45-494-2	0.000017	0.002072	0.000019	0.075901	0.003363	0.006625	0.001479
34HP45-494-3	0.000023	0.002328	0.000052	0.087971	0.005436	0.009854	0.002096
34HP45-494-4	0.000016	0.002775	0.000115	0.276228	0.002518	0.003907	0.000802
34HP45-494-5	0.000006	0.002738	0.000051	0.212555	0.004138	0.006146	0.001318
34HP45-494-6	0.000009	0.002942	0.000066	0.270142	0.003557	0.005517	0.001172
34HP45-494-7	0.000016	0.002628	0.000065	0.160383	0.003785	0.007119	0.001423
34HP45-494-8	0.000020	0.003127	0.000136	0.465943	0.003488	0.004512	0.000968
34HP45-494-9	0.000016	0.003336	0.000116	0.472217	0.004148	0.005789	0.001218

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.000036	0.003381	0.000085	0.261818	0.013627	0.027740	0.004467
34HP45-494-11	0.000035	0.002943	0.000049	0.375092	0.010392	0.019329	0.003213
34HP45-494-12	0.000023	0.003295	0.000053	0.330039	0.011663	0.022659	0.003588
34HP45-494-13	0.000024	0.003127	0.000086	0.126765	0.004157	0.009270	0.001486
34HP45-494-14	0.000036	0.003246	0.000087	0.126451	0.003822	0.008498	0.001348
34HP45-494-15	0.000031	0.003093	0.000067	0.135172	0.003485	0.008088	0.001231
34HP45-494-16	0.000015	0.003211	0.000037	0.351329	0.000946	0.000951	0.000192
34HP45-494-17	0.000020	0.003223	0.000058	0.405965	0.001073	0.000987	0.000215
34HP45-494-18	0.000011	0.003163	0.000034	0.243634	0.000621	0.000636	0.000135
SRM614-24	0.000284	0.029567	0.000499	0.002634	0.000359	0.000558	0.000561
SRM612-24	0.011605	0.034474	0.031948	0.021798	0.018029	0.024571	0.030755
SRM610-24	0.173099	0.040022	0.410160	0.338782	0.298963	0.405540	0.525332
AP1-24	0.000040	0.004214	0.000045	0.002302	0.000007	0.000008	0.000003
AP2-24	0.000175	0.003083	0.000026	0.006180	0.000157	0.000224	0.000255
AP3-24	0.000614	0.002890	0.000028	0.022535	0.000690	0.001188	0.001191
AP4-24	0.000784	0.003194	0.000068	0.030097	0.001003	0.001535	0.001690

standardize signal averages AP

AP1	0.000041	0.003515	0.000048	0.002990	0.000017	0.000039	0.000010
AP2	0.000190	0.002663	0.000028	0.007174	0.000152	0.000228	0.000247
AP3	0.000580	0.002620	0.000027	0.022419	0.000599	0.001035	0.001087
AP4	0.000766	0.002942	0.000073	0.031243	0.000901	0.001386	0.001596

linest from std sig ave

0.019892	0.049884	0.025054	0.008361	0.015046	0.009414	0.008471
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standardize signal averages SRM

srM614-2	0.000245	0.019050	0.000487	0.002273	0.000265	0.000428	0.000462
srM612-2	0.009890	0.024090	0.030211	0.024407	0.013788	0.019149	0.024746
srM610-2	0.140067	0.029540	0.362788	0.310758	0.222220	0.302439	0.409856

linest from std sig ave

0.030749	0.000000	0.011630	0.015926	0.024024	0.017288	0.012247
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concentration data

SRM614-23	0.35	36.51	1.02	1.37	0.22	0.24	0.26
SRM612-23	13.94	58.64	61.18	19.37	12.32	11.08	13.61
SRM610-23	182.60	81.54	677.73	202.74	187.73	160.95	213.87
AP1-23	0.33	56.01	0.50	12.27	0.16	0.26	0.06
AP2-23	1.62	44.64	0.30	27.25	0.88	0.87	0.81
AP3-23	4.34	46.78	0.26	74.40	3.05	3.31	3.32
AP4-23	5.95	53.54	0.79	108.03	4.80	4.65	5.07
34HP45-494-1	0.15	39.46	0.26	254.65	28.87	36.75	7.12
34HP45-494-2	0.13	41.24	0.19	253.18	20.18	24.88	5.00
34HP45-494-3	0.18	46.33	0.52	293.44	32.63	37.01	7.08
34HP45-494-4	0.13	55.22	1.15	921.38	15.12	14.67	2.71
34HP45-494-5	0.05	54.48	0.51	708.99	24.84	23.08	4.46
34HP45-494-6	0.07	58.55	0.66	901.08	21.35	20.72	3.96
34HP45-494-7	0.13	52.29	0.65	534.97	22.72	26.74	4.81
34HP45-494-8	0.16	62.24	1.36	1554.19	20.94	16.95	3.27
34HP45-494-9	0.13	66.39	1.16	1575.12	24.90	21.74	4.11
34HP45-494-10	0.29	67.28	0.85	873.32	81.79	104.18	15.10
34HP45-494-11	0.28	58.57	0.49	1251.15	62.38	72.59	10.86
34HP45-494-12	0.19	65.57	0.53	1100.87	70.01	85.10	12.12
34HP45-494-13	0.19	62.23	0.86	422.83	24.96	34.82	5.02
34HP45-494-14	0.28	64.60	0.87	421.79	22.94	31.92	4.55
34HP45-494-15	0.25	61.54	0.67	450.88	20.92	30.38	4.16
34HP45-494-16	0.12	63.90	0.37	1171.89	5.68	3.57	0.65
34HP45-494-17	0.16	64.15	0.58	1354.13	6.44	3.71	0.73
34HP45-494-18	0.09	62.94	0.34	812.66	3.73	2.39	0.46
SRM614-24	0.48	126.49	1.07	1.89	0.46	0.45	0.41
SRM612-24	19.80	147.49	68.65	15.63	23.26	19.84	22.34
SRM610-24	295.30	171.22	881.31	242.93	385.79	327.43	381.66
AP1-24	0.32	83.87	0.45	7.68	0.04	0.03	0.01
AP2-24	1.39	61.36	0.26	20.61	0.94	0.84	0.86
AP3-24	4.87	57.51	0.28	75.17	4.14	4.46	4.03
AP4-24	6.22	63.56	0.68	100.39	6.02	5.76	5.71

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

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Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-21	14.12	29962.77	111.80	662.12	10.68	31.00	16.60
SRM614-21	249.44	42763.28	652.28	3406.10	253.68	415.88	430.16
SRM612-21	15922.29	49664.24	55178.39	63836.72	15860.13	24297.62	30509.61
SRM610-21	113715.68	47135.38	343021.53	271644.31	125974.39	178736.41	256059.92
AP1-21	659.28	54992.27	1163.17	75971.07	1151.61	2411.05	832.68
AP2-21	1989.29	60483.66	584.28	97871.83	1845.05	2456.17	2681.06
AP3-21	1643.61	61223.27	294.96	72100.73	1259.41	1653.01	2205.85
AP4-21	21670.60	67741.70	2134.37	778848.63	17217.30	31197.86	34623.20
34HP45-671-1	323.64	75148.70	746.88	2844547.80	190539.16	166994.33	70679.56
34HP45-671-2	301.60	74884.38	592.12	2062846.30	229144.39	149379.97	80775.09
34HP45-671-3	260.56	74942.46	447.64	1732693.50	36222.45	34627.76	13258.15
34HP45-671-4	711.20	76382.07	925.13	3077716.00	21818.08	40746.83	8645.45
34HP45-671-5	405.80	74320.98	303.04	1851162.30	10585.62	22640.81	4337.94
34HP45-671-6	555.76	73812.06	658.44	1480634.50	11441.23	21522.16	3960.98
34HP45-671-7	771.68	80976.22	951.77	2293847.80	44682.41	69166.79	15907.09
34HP45-671-8	289.00	81127.62	269.96	1521501.00	26746.79	35314.44	8594.69
34HP45-671-9	329.52	83096.63	462.60	1554480.40	26543.91	35163.64	7748.24
34HP45-671-10	848.00	82788.83	1187.81	1762956.80	200150.05	298042.56	67709.54
34HP45-671-11	290.44	82926.75	429.00	1097281.50	152804.38	210740.50	48438.03
34HP45-671-12	722.68	82088.54	518.28	1232981.80	181449.94	239728.88	59859.94
34HP45-671-13	210.52	60865.30	646.04	607229.44	5053.07	15722.57	2142.25
34HP45-671-14	100.40	56542.64	261.40	377394.94	1734.77	3539.58	604.84
34HP45-671-15	99.04	54676.95	191.40	351513.13	1033.41	1805.13	340.48
34HP45-671-16	112.36	52979.54	237.72	298080.53	1543.45	3824.58	608.20
34HP45-671-17	55.48	54173.82	130.44	254069.50	971.61	1872.21	353.76
34HP45-671-18	79.88	54875.23	178.52	280074.28	1176.45	2045.65	402.12
SRM614-22	312.56	67381.78	575.00	4779.87	454.00	859.28	645.52
SRM612-22	13992.52	74949.95	38631.10	28505.92	19312.43	26601.71	34524.52
SRM610-22	117408.70	60810.98	276262.13	224120.09	171754.77	234970.00	319607.94
AP1-22	506.44	76900.23	510.96	23774.29	75.84	124.72	60.00
AP2-22	1543.21	72743.97	388.16	57202.16	1345.09	1735.93	2090.57
AP3-22	8740.25	75055.54	534.08	299940.25	8777.61	15227.45	15761.25
AP4-22	12938.55	76207.15	1110.81	431272.88	12824.71	21544.56	23288.13
blank-22	14.04	37275.09	98.92	523.24	6.08	47.56	14.72
blank average	14.08	33618.93	105.36	592.68	8.38	39.28	15.66
blank subtraction							
SRM614-21	235.36	9144.35	546.92	2813.42	245.30	376.60	414.50
SRM612-21	15908.21	16045.31	55073.03	63244.04	15851.75	24258.34	30493.95
SRM610-21	113701.60	13516.45	342916.17	271051.63	125966.01	178697.13	256044.26
AP1-21	645.20	21373.34	1057.81	75378.39	1143.23	2371.77	817.02
AP2-21	1975.21	26864.73	478.92	97279.14	1836.67	2416.89	2665.40
AP3-21	1629.53	27604.34	189.60	71508.04	1251.03	1613.73	2190.19
AP4-21	21656.52	34122.77	2029.01	778255.95	17208.92	31158.57	34607.53
34HP45-671-1	309.56	41529.77	641.52	2843955.12	190530.78	166955.05	70663.89
34HP45-671-2	287.52	41265.45	486.76	2062253.62	229136.01	149340.69	80759.43
34HP45-671-3	246.48	41323.53	342.28	1732100.82	36214.06	34588.48	13242.49
34HP45-671-4	697.12	42763.14	819.76	3077123.32	21809.70	40707.55	8629.79
34HP45-671-5	391.72	40702.05	197.68	1850569.62	10577.24	22601.53	4322.28
34HP45-671-6	541.68	40193.13	553.08	1480041.82	11432.84	21482.88	3945.32
34HP45-671-7	757.60	47357.29	846.40	2293255.12	44674.03	69127.51	15891.43
34HP45-671-8	274.92	47508.69	164.60	1520908.32	26738.41	35275.16	8579.03
34HP45-671-9	315.44	49477.70	357.24	1553887.72	26535.53	35124.36	7732.58
34HP45-671-10	833.92	49169.90	1082.45	1762364.12	200141.67	298003.28	67693.88
34HP45-671-11	276.36	49307.82	323.64	1096688.82	152796.00	210701.22	48422.37
34HP45-671-12	708.60	48469.61	412.92	1232389.12	181441.56	239689.60	59844.28
34HP45-671-13	196.44	27246.37	540.68	606636.76	5044.69	15683.29	2126.59
34HP45-671-14	86.32	22923.71	156.04	376802.26	1726.39	3500.30	589.18
34HP45-671-15	84.96	21058.02	86.04	350920.45	1025.03	1765.85	324.82
34HP45-671-16	98.28	19360.61	132.36	297487.85	1535.07	3785.30	592.54
34HP45-671-17	41.40	20554.90	25.08	253476.82	963.23	1832.93	338.10
34HP45-671-18	65.80	21256.30	73.16	279481.60	1168.07	2006.37	386.46
SRM614-22	298.48	33762.85	469.64	4187.18	445.62	820.00	629.86
SRM612-22	13978.44	41331.02	38525.74	27913.24	19304.05	26562.43	34508.86
SRM610-22	117394.62	27192.05	276156.77	223527.41	171746.39	234930.72	319592.28
AP1-22	492.36	43281.31	405.60	23181.61	67.46	85.44	44.34
AP2-22	1529.13	39125.04	282.80	56609.48	1336.71	1696.65	2074.91
AP3-22	8726.17	41436.61	428.72	299347.57	8769.23	15188.16	15745.59
AP4-22	12924.47	42588.22	1005.45	430680.20	12816.33	21505.28	23272.47
zero correction							
SRM614-21	235.36	9144.35	546.92	2813.42	245.30	376.60	414.50
SRM612-21	15908.21	16045.31	55073.03	63244.04	15851.75	24258.34	30493.95
SRM610-21	113701.60	13516.45	342916.17	271051.63	125966.01	178697.13	256044.26
AP1-21	645.20	21373.34	1057.81	75378.39	1143.23	2371.77	817.02
AP2-21	1975.21	26864.73	478.92	97279.14	1836.67	2416.89	2665.40
AP3-21	1629.53	27604.34	189.60	71508.04	1251.03	1613.73	2190.19

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	21656.52	34122.77	2029.01	778255.95	17208.92	31158.57	34607.53
34HP45-671-1	309.56	41529.77	641.52	2843955.12	190530.78	166955.05	70663.89
34HP45-671-2	287.52	41265.45	486.76	2062253.62	229136.01	149340.69	80759.43
34HP45-671-3	246.48	41323.53	342.28	1732100.82	36214.06	34588.48	13242.49
34HP45-671-4	697.12	42763.14	819.76	3077123.32	21809.70	40707.55	8629.79
34HP45-671-5	391.72	40702.05	197.68	1850569.62	10577.24	22601.53	4322.28
34HP45-671-6	541.68	40193.13	553.08	1480041.82	11432.84	21482.88	3945.32
34HP45-671-7	757.60	47357.29	846.40	2293255.12	44674.03	69127.51	15891.43
34HP45-671-8	274.92	47508.69	164.60	1520908.32	26738.41	35275.16	8579.03
34HP45-671-9	315.44	49477.70	357.24	1553887.72	26535.53	35124.36	7732.58
34HP45-671-10	833.92	49169.90	1082.45	1762364.12	200141.67	298003.28	67693.88
34HP45-671-11	276.36	49307.82	323.64	1096688.82	152796.00	210701.22	48422.37
34HP45-671-12	708.60	48469.61	412.92	1232389.12	181441.56	239689.60	59844.28
34HP45-671-13	196.44	27246.37	540.68	606636.76	5044.69	15683.29	2126.59
34HP45-671-14	86.32	22923.71	156.04	376802.26	1726.39	3500.30	589.18
34HP45-671-15	84.96	21058.02	86.04	350920.45	1025.03	1765.85	324.82
34HP45-671-16	98.28	19360.61	132.36	297487.85	1535.07	3785.30	592.54
34HP45-671-17	41.40	20554.90	25.08	253476.82	963.23	1832.93	338.10
34HP45-671-18	65.80	21256.30	73.16	279481.60	1168.07	2006.37	386.46
SRM614-22	298.48	33762.85	469.64	4187.18	445.62	820.00	629.86
SRM612-22	13978.44	41331.02	38525.74	27913.24	19304.05	26562.43	34508.86
SRM610-22	117394.62	27192.05	276156.77	223527.41	171746.39	234930.72	319592.28
AP1-22	492.36	43281.31	405.60	23181.61	67.46	85.44	44.34
AP2-22	1529.13	39125.04	282.80	56609.48	1336.71	1696.65	2074.91
AP3-22	8726.17	41436.61	428.72	299347.57	8769.23	15188.16	15745.59
AP4-22	12924.47	42588.22	1005.45	430680.20	12816.33	21505.28	23272.47

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-21	0.000175	0.006817	0.000408	0.002097	0.000183	0.000281	0.000309
SRM612-21	0.008062	0.008131	0.027910	0.032051	0.008033	0.012294	0.015454
SRM610-21	0.110727	0.013163	0.333945	0.263960	0.122670	0.174022	0.249346
AP1-21	0.000062	0.002057	0.000102	0.007253	0.000110	0.000228	0.000079
AP2-21	0.000150	0.002036	0.000036	0.007373	0.000139	0.000183	0.000202
AP3-21	0.000133	0.002259	0.000016	0.005853	0.000102	0.000132	0.000179
AP4-21	0.001273	0.002006	0.000119	0.045761	0.001012	0.001832	0.002035
34HP45-671-1	0.000016	0.002159	0.000033	0.147853	0.009905	0.008680	0.003674
34HP45-671-2	0.000016	0.002359	0.000028	0.117869	0.013096	0.008536	0.004616
34HP45-671-3	0.000015	0.002483	0.000021	0.104070	0.002176	0.002078	0.000796
34HP45-671-4	0.000038	0.002311	0.000044	0.166260	0.001178	0.002199	0.000466
34HP45-671-5	0.000024	0.002443	0.000012	0.111079	0.000635	0.001357	0.000259
34HP45-671-6	0.000038	0.002849	0.000039	0.104917	0.000810	0.001523	0.000280
34HP45-671-7	0.000041	0.002584	0.000046	0.125131	0.002438	0.003772	0.000867
34HP45-671-8	0.000016	0.002694	0.000009	0.086240	0.001516	0.002000	0.000486
34HP45-671-9	0.000017	0.002731	0.000020	0.085755	0.001464	0.001938	0.000427
34HP45-671-10	0.000055	0.003215	0.000071	0.115230	0.013086	0.019485	0.004426
34HP45-671-11	0.000019	0.003418	0.000022	0.076025	0.010592	0.014606	0.003357
34HP45-671-12	0.000051	0.003469	0.000030	0.088196	0.012985	0.017153	0.004283
34HP45-671-13	0.000031	0.004250	0.000084	0.094636	0.000787	0.002447	0.000332
34HP45-671-14	0.000016	0.004360	0.000030	0.071664	0.000328	0.000666	0.000112
34HP45-671-15	0.000017	0.004153	0.000017	0.069209	0.000202	0.000348	0.000064
34HP45-671-16	0.000021	0.004050	0.000028	0.062227	0.000321	0.000792	0.000124
34HP45-671-17	0.000007	0.003445	0.000004	0.042484	0.000161	0.000307	0.000057
34HP45-671-18	0.000010	0.003361	0.000012	0.044196	0.000185	0.000317	0.000061
SRM614-22	0.000289	0.032705	0.000455	0.004056	0.000432	0.000794	0.000610
SRM612-22	0.011588	0.034262	0.031936	0.023139	0.016002	0.022019	0.028607
SRM610-22	0.174739	0.040475	0.411053	0.332716	0.255641	0.349689	0.475706
AP1-22	0.000050	0.004379	0.000041	0.002346	0.000007	0.000009	0.000004
AP2-22	0.000148	0.003793	0.000027	0.005488	0.000130	0.000164	0.000201
AP3-22	0.000665	0.003156	0.000033	0.022803	0.000668	0.001157	0.001199
AP4-22	0.000985	0.003247	0.000077	0.032838	0.000977	0.001640	0.001774

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP							
AP1	0.000056	0.003218	0.000071	0.004799	0.000058	0.000118	0.000042
AP2	0.000149	0.002915	0.000032	0.006430	0.000134	0.000174	0.000202
AP3	0.000399	0.002708	0.000024	0.014328	0.000385	0.000645	0.000689
AP4	0.001129	0.002627	0.000098	0.039299	0.000995	0.001736	0.001905
linest from std sig ave							
	0.015636	0.049883	0.018155	0.007432	0.015084	0.008715	0.007974
standardize signal averages SRM							
srms614-2	0.000232	0.019761	0.000431	0.003077	0.000307	0.000538	0.000460
srms612-2	0.009825	0.021197	0.029923	0.027595	0.012018	0.017156	0.022030
srms610-2	0.142733	0.026819	0.372499	0.298338	0.189156	0.261856	0.362526
linest from std sig ave							
	0.030176	0.000000	0.011329	0.016569	0.028221	0.019966	0.013845
concentration data							
SRM614-21	0.24	29.17	0.63	1.34	0.24	0.21	0.21
SRM612-21	10.81	34.79	43.46	20.43	10.39	9.19	10.57
SRM610-21	148.49	56.31	519.95	168.25	158.69	130.06	170.53
AP1-21	0.39	40.93	0.74	21.50	0.66	0.79	0.25
AP2-21	0.93	40.52	0.26	21.86	0.84	0.64	0.64
AP3-21	0.83	44.96	0.11	17.35	0.62	0.46	0.57
AP4-21	7.94	39.93	0.86	135.68	6.09	6.37	6.47
34HP45-671-1	0.10	42.97	0.24	438.39	59.61	30.18	11.69
34HP45-671-2	0.10	46.94	0.20	349.48	78.81	29.68	14.68
34HP45-671-3	0.09	49.41	0.15	308.57	13.09	7.23	2.53
34HP45-671-4	0.23	45.98	0.32	492.96	7.09	7.65	1.48
34HP45-671-5	0.15	48.62	0.09	329.35	3.82	4.72	0.83
34HP45-671-6	0.24	56.70	0.28	311.08	4.88	5.29	0.89
34HP45-671-7	0.26	51.42	0.33	371.01	14.67	13.11	2.76
34HP45-671-8	0.10	53.61	0.07	255.70	9.12	6.95	1.55
34HP45-671-9	0.11	54.34	0.14	254.26	8.81	6.74	1.36
34HP45-671-10	0.34	63.98	0.51	341.66	78.75	67.74	14.08
34HP45-671-11	0.12	68.02	0.16	225.41	63.74	50.78	10.68
34HP45-671-12	0.32	69.03	0.21	261.50	78.14	59.64	13.62
34HP45-671-13	0.19	84.59	0.61	280.60	4.74	8.51	1.06
34HP45-671-14	0.10	86.76	0.21	212.49	1.98	2.31	0.36
34HP45-671-15	0.10	82.65	0.12	205.20	1.22	1.21	0.20
34HP45-671-16	0.13	80.59	0.20	184.50	1.93	2.75	0.39
34HP45-671-17	0.04	68.56	0.03	125.97	0.97	1.07	0.18
34HP45-671-18	0.06	66.89	0.08	131.04	1.11	1.10	0.19
SRM614-22	0.39	139.92	0.71	2.59	0.56	0.59	0.42
SRM612-22	15.54	146.58	49.72	14.75	20.70	16.46	19.56
SRM610-22	234.33	173.16	640.01	212.08	330.71	261.36	325.34
AP1-22	0.31	87.15	0.30	6.95	0.04	0.03	0.01
AP2-22	0.92	75.48	0.20	16.27	0.78	0.57	0.64
AP3-22	4.15	62.81	0.24	67.61	4.02	4.02	3.82
AP4-22	6.15	64.62	0.56	97.36	5.88	5.70	5.64
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-19	10.92	63448.24	129.80	14.20	3.68	24.16	7.92
SRM614-19	616.08	92648.00	1337.21	5544.59	695.84	1158.57	1053.61
SRM612-19	18987.91	95271.34	54810.03	49828.92	18646.15	27036.51	35839.28
SRM610-19	104546.51	78238.28	323936.75	273879.53	139398.94	197494.52	289051.22
AP1-19	570.88	96653.31	390.60	30974.02	270.52	275.40	119.88
AP2-19	3536.54	105440.11	540.44	150542.61	2708.58	4477.87	3926.34
AP3-19	23172.73	97967.07	798.16	773505.50	15586.77	26818.95	30157.73
AP4-19	35685.36	102939.70	2916.58	1213180.30	24920.18	45770.30	50638.88
34HP60-102-1	101.40	90017.31	310.56	897829.13	36074.32	34416.23	14675.28
34HP60-102-2	65.52	80022.65	185.64	411864.91	15968.57	23832.73	9212.89
34HP60-102-3	49.80	73791.57	171.12	328655.41	5545.11	10449.22	3219.22
34HP60-102-4	30.20	71705.16	174.40	107535.97	2822.90	3731.82	1832.05
34HP60-102-5	53.16	74312.86	198.68	225577.39	14414.00	8461.09	7377.64
34HP60-102-6	131.68	87201.01	297.28	616527.19	41526.75	20688.72	16635.49
34HP60-102-7	41.96	77831.68	157.52	159785.45	7294.88	4204.50	3711.74

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	93.08	80570.85	186.52	350218.56	27486.40	16080.29	13132.23
34HP60-102-9	126.60	82690.23	236.24	444876.97	42119.00	24862.90	19407.95
34HP60-102-10	425.04	112797.35	230.36	945353.06	26910.07	12771.27	8592.45
34HP60-102-11	270.76	110969.38	194.64	807368.00	20040.55	9055.37	6057.67
34HP60-102-12	808.52	118727.47	225.48	1100522.00	26645.43	13249.64	8144.85
34HP60-102-13	222.00	120436.12	185.56	1369986.40	52304.06	26209.27	15411.77
34HP60-102-14	237.04	121442.73	227.92	1336261.60	43559.52	23826.06	13047.35
34HP60-102-15	188.08	116830.38	162.32	1126286.60	32903.22	18070.86	10061.02
34HP60-102-16	116.76	97250.02	246.16	624777.75	7055.40	12906.51	3290.10
34HP60-102-17	99.60	98062.71	136.20	609637.88	5875.83	11361.47	2672.66
34HP60-102-18	52.00	86938.01	129.16	291871.16	1798.85	3704.22	828.48
SRM614-20	387.64	105115.67	801.12	2869.70	405.40	621.20	727.40
SRM612-20	15465.01	107401.29	45724.66	29993.17	20433.96	28048.88	37536.53
SRM610-20	118689.31	78403.92	298793.59	235626.17	168272.98	234849.25	320482.84
AP1-20	448.36	98870.52	418.64	23030.53	80.40	83.20	47.28
AP2-20	1751.01	91409.80	322.52	64345.92	1427.61	1855.77	2224.13
AP3-20	10336.18	94204.41	448.28	312833.84	8433.17	13898.96	15278.53
AP4-20	20041.23	100006.00	1545.01	646179.88	16918.34	30184.93	32534.70
blank-20	16.84	65131.85	115.84	378.24	11.28	54.00	23.24
blank average	13.88	64290.04	122.82	196.22	7.48	39.08	15.58
blank subtraction							
SRM614-19	602.20	28357.96	1214.39	5348.37	688.36	1119.49	1038.03
SRM612-19	18974.03	30981.29	54687.21	49632.70	18638.66	26997.43	35823.70
SRM610-19	104532.63	13948.24	323813.93	273683.31	139391.46	197455.44	289035.64
AP1-19	557.00	32363.26	267.78	30777.79	263.04	236.32	104.30
AP2-19	3522.66	41150.07	417.62	150346.39	2701.10	4438.78	3910.76
AP3-19	23158.85	33677.03	675.34	773309.28	15579.29	26779.87	30142.15
AP4-19	35671.48	38649.66	2793.76	1212984.08	24912.70	45731.22	50623.30
34HP60-102-1	87.52	25727.26	187.74	897632.91	36066.84	34377.15	14659.70
34HP60-102-2	51.64	15732.61	62.82	411668.69	15961.09	23793.65	9197.31
34HP60-102-3	35.92	9501.53	48.30	328459.19	5537.63	10410.14	3203.64
34HP60-102-4	16.32	7415.12	51.58	107339.75	2815.42	3692.74	1816.47
34HP60-102-5	39.28	10022.82	75.86	225381.17	14406.52	8422.01	7362.06
34HP60-102-6	117.80	22910.97	174.46	616330.97	41519.27	20649.63	16619.91
34HP60-102-7	28.08	13541.64	34.70	159589.23	7287.40	4165.42	3696.16
34HP60-102-8	79.20	16280.81	63.70	350022.34	27478.91	16041.21	13116.65
34HP60-102-9	112.72	18400.18	113.42	444680.75	42111.52	24823.82	19392.37
34HP60-102-10	411.16	48507.31	107.54	945156.84	26902.59	12732.19	8576.87
34HP60-102-11	256.88	46679.34	71.82	807171.78	20033.07	9016.29	6042.09
34HP60-102-12	794.64	54437.43	102.66	1100325.78	26637.95	13210.55	8129.27
34HP60-102-13	208.12	56146.08	62.74	1369790.18	52296.57	26170.19	15396.19
34HP60-102-14	223.16	57152.69	105.10	1336065.38	43552.04	23786.97	13031.77
34HP60-102-15	174.20	52540.34	39.50	1126090.38	32895.74	18031.78	10045.44
34HP60-102-16	102.88	32959.98	123.34	624581.53	7047.92	12867.43	3274.52
34HP60-102-17	85.72	33772.67	13.38	609441.66	5868.35	11322.38	2657.08
34HP60-102-18	38.12	22647.97	6.34	291674.94	1791.37	3665.14	812.90
SRM614-20	373.76	40825.63	678.30	2673.47	397.92	582.12	711.82
SRM612-20	15451.13	43111.25	45601.84	29796.95	20426.47	28009.80	37520.95
SRM610-20	118675.43	14113.88	298670.77	235429.95	168265.50	234810.17	320467.26
AP1-20	434.48	34580.47	295.82	22834.31	72.92	44.12	31.70
AP2-20	1737.13	27119.75	199.70	64149.70	1420.13	1816.69	2208.55
AP3-20	10322.30	29914.36	325.46	312637.62	8425.69	13859.88	15262.95
AP4-20	20027.35	35715.96	1422.19	645983.66	16910.86	30145.85	32519.12
zero correction							
SRM614-19	602.20	28357.96	1214.39	5348.37	688.36	1119.49	1038.03
SRM612-19	18974.03	30981.29	54687.21	49632.70	18638.66	26997.43	35823.70
SRM610-19	104532.63	13948.24	323813.93	273683.31	139391.46	197455.44	289035.64
AP1-19	557.00	32363.26	267.78	30777.79	263.04	236.32	104.30
AP2-19	3522.66	41150.07	417.62	150346.39	2701.10	4438.78	3910.76
AP3-19	23158.85	33677.03	675.34	773309.28	15579.29	26779.87	30142.15
AP4-19	35671.48	38649.66	2793.76	1212984.08	24912.70	45731.22	50623.30
34HP60-102-1	87.52	25727.26	187.74	897632.91	36066.84	34377.15	14659.70
34HP60-102-2	51.64	15732.61	62.82	411668.69	15961.09	23793.65	9197.31
34HP60-102-3	35.92	9501.53	48.30	328459.19	5537.63	10410.14	3203.64
34HP60-102-4	16.32	7415.12	51.58	107339.75	2815.42	3692.74	1816.47
34HP60-102-5	39.28	10022.82	75.86	225381.17	14406.52	8422.01	7362.06
34HP60-102-6	117.80	22910.97	174.46	616330.97	41519.27	20649.63	16619.91
34HP60-102-7	28.08	13541.64	34.70	159589.23	7287.40	4165.42	3696.16
34HP60-102-8	79.20	16280.81	63.70	350022.34	27478.91	16041.21	13116.65
34HP60-102-9	112.72	18400.18	113.42	444680.75	42111.52	24823.82	19392.37
34HP60-102-10	411.16	48507.31	107.54	945156.84	26902.59	12732.19	8576.87
34HP60-102-11	256.88	46679.34	71.82	807171.78	20033.07	9016.29	6042.09
34HP60-102-12	794.64	54437.43	102.66	1100325.78	26637.95	13210.55	8129.27
34HP60-102-13	208.12	56146.08	62.74	1369790.18	52296.57	26170.19	15396.19
34HP60-102-14	223.16	57152.69	105.10	1336065.38	43552.04	23786.97	13031.77
34HP60-102-15	174.20	52540.34	39.50	1126090.38	32895.74	18031.78	10045.44

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	102.88	32959.98	123.34	624581.53	7047.92	12867.43	3274.52
34HP60-102-17	85.72	33772.67	13.38	609441.66	5868.35	11322.38	2657.08
34HP60-102-18	38.12	22647.97	6.34	291674.94	1791.37	3665.14	812.90
SRM614-20	373.76	40825.63	678.30	2673.47	397.92	582.12	711.82
SRM612-20	15451.13	43111.25	45601.84	29796.95	20426.47	28009.80	37520.95
SRM610-20	118675.43	14113.88	298670.77	235429.95	168265.50	234810.17	320467.26
AP1-20	434.48	34580.47	295.82	22834.31	72.92	44.12	31.70
AP2-20	1737.13	27119.75	199.70	64149.70	1420.13	1816.69	2208.55
AP3-20	10322.30	29914.36	325.46	312637.62	8425.69	13859.88	15262.95
AP4-20	20027.35	35715.96	1422.19	645983.66	16910.86	30145.85	32519.12

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-19	0.000254	0.011967	0.000512	0.002257	0.000290	0.000472	0.000438
SRM612-19	0.010079	0.016458	0.029050	0.026365	0.009901	0.014341	0.019030
SRM610-19	0.108747	0.014511	0.336870	0.284718	0.145012	0.205417	0.300690
AP1-19	0.000048	0.002794	0.000023	0.002657	0.000023	0.000020	0.000009
AP2-19	0.000217	0.002535	0.000026	0.009261	0.000166	0.000273	0.000241
AP3-19	0.001119	0.001627	0.000033	0.037355	0.000753	0.001294	0.001456
AP4-19	0.001741	0.001887	0.000136	0.059209	0.001216	0.002232	0.002471
34HP60-102-1	0.000007	0.002145	0.000016	0.074831	0.003007	0.002866	0.001222
34HP60-102-2	0.000006	0.001960	0.000008	0.051288	0.001989	0.002964	0.001146
34HP60-102-3	0.000006	0.001647	0.000008	0.056952	0.000960	0.001805	0.000555
34HP60-102-4	0.000004	0.001948	0.000014	0.028192	0.000739	0.000970	0.000477
34HP60-102-5	0.000007	0.001782	0.000013	0.040077	0.002562	0.001498	0.001309
34HP60-102-6	0.000010	0.001943	0.000015	0.052265	0.003521	0.001751	0.001409
34HP60-102-7	0.000007	0.003238	0.000008	0.038159	0.001742	0.000996	0.000884
34HP60-102-8	0.000014	0.002815	0.000011	0.060515	0.004751	0.002773	0.002268
34HP60-102-9	0.000017	0.002767	0.000017	0.066865	0.006332	0.003733	0.002916
34HP60-102-10	0.000036	0.004190	0.000009	0.081640	0.002324	0.001100	0.000741
34HP60-102-11	0.000024	0.004405	0.000007	0.076176	0.001891	0.000851	0.000570
34HP60-102-12	0.000069	0.004750	0.000009	0.096009	0.002324	0.001153	0.000709
34HP60-102-13	0.000017	0.004458	0.000005	0.108754	0.004152	0.002078	0.001222
34HP60-102-14	0.000017	0.004459	0.000008	0.104236	0.003398	0.001856	0.001017
34HP60-102-15	0.000015	0.004411	0.000003	0.094536	0.002762	0.001514	0.000843
34HP60-102-16	0.000012	0.003949	0.000015	0.074825	0.000844	0.001542	0.000392
34HP60-102-17	0.000010	0.003841	0.000002	0.069320	0.000667	0.001288	0.000302
34HP60-102-18	0.000006	0.003413	0.000001	0.043957	0.000270	0.000552	0.000123
SRM614-20	0.000259	0.028303	0.000470	0.001853	0.000276	0.000404	0.000493
SRM612-20	0.010360	0.028907	0.030577	0.019979	0.013696	0.018781	0.025158
SRM610-20	0.150374	0.017884	0.378448	0.298315	0.213210	0.297529	0.406066
AP1-20	0.000043	0.003386	0.000029	0.002236	0.000007	0.000004	0.000003
AP2-20	0.000160	0.002494	0.000018	0.005898	0.000131	0.000167	0.000203
AP3-20	0.000736	0.002134	0.000023	0.022306	0.000601	0.000989	0.001089
AP4-20	0.001281	0.002285	0.000091	0.041329	0.001082	0.001929	0.002081

standardize signal averages AP							
AP1	0.000045	0.003090	0.000026	0.002447	0.000015	0.000012	0.000006
AP2	0.000188	0.002514	0.000022	0.007580	0.000148	0.000220	0.000222
AP3	0.000928	0.001881	0.000028	0.029830	0.000677	0.001141	0.001272
AP4	0.001511	0.002086	0.000114	0.050269	0.001149	0.002080	0.002276

linest from std sig ave							
	0.010844	0.059948	0.017426	0.005496	0.012263	0.006924	0.006299

standardize signal averages SRM							
srm614-2	0.000257	0.020135	0.000491	0.002055	0.000283	0.000438	0.000466
srm612-2	0.010220	0.022682	0.029814	0.023172	0.011799	0.016561	0.022094
srm610-2	0.129561	0.016197	0.357659	0.291517	0.179111	0.251473	0.353378

linest from std sig ave							
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Appendix A. Raw trace element datasheets from laser ablation.

	0.033230	0.000000	0.011797	0.016976	0.029801	0.020790	0.014203
concentration data							
SRM614-19	0.24	61.52	0.77	1.06	0.31	0.28	0.24
SRM612-19	9.37	84.61	43.41	12.43	10.41	8.52	10.28
SRM610-19	101.14	74.60	503.44	134.20	152.50	121.98	162.44
AP1-19	0.21	66.82	0.16	5.83	0.11	0.06	0.02
AP2-19	0.94	60.62	0.18	20.30	0.81	0.76	0.61
AP3-19	4.84	38.91	0.23	81.90	3.68	3.57	3.66
AP4-19	7.53	45.12	0.95	129.81	5.95	6.17	6.21
34HP60-102-1	0.03	51.29	0.11	164.06	14.71	7.92	3.07
34HP60-102-2	0.03	46.88	0.05	112.45	9.73	8.19	2.88
34HP60-102-3	0.03	39.40	0.06	124.86	4.70	4.99	1.40
34HP60-102-4	0.02	46.58	0.09	61.81	3.62	2.68	1.20
34HP60-102-5	0.03	42.62	0.09	87.87	12.53	4.14	3.29
34HP60-102-6	0.04	46.46	0.10	114.59	17.22	4.84	3.54
34HP60-102-7	0.03	77.44	0.06	83.66	8.52	2.75	2.22
34HP60-102-8	0.06	67.32	0.08	132.67	23.24	7.66	5.70
34HP60-102-9	0.07	66.17	0.12	146.60	30.98	10.31	7.33
34HP60-102-10	0.15	100.20	0.06	178.99	11.37	3.04	1.86
34HP60-102-11	0.10	105.35	0.05	167.01	9.25	2.35	1.43
34HP60-102-12	0.30	113.60	0.06	210.49	11.37	3.18	1.78
34HP60-102-13	0.07	106.61	0.03	238.44	20.31	5.74	3.07
34HP60-102-14	0.08	106.64	0.06	228.53	16.62	5.13	2.55
34HP60-102-15	0.06	105.49	0.02	207.26	13.51	4.18	2.12
34HP60-102-16	0.05	94.43	0.10	164.05	4.13	4.26	0.99
34HP60-102-17	0.04	91.87	0.01	151.98	3.27	3.56	0.76
34HP60-102-18	0.02	81.63	0.01	96.37	1.32	1.53	0.31
SRM614-20	0.24	145.51	0.70	0.87	0.29	0.24	0.27
SRM612-20	9.64	148.62	45.70	9.42	14.40	11.15	13.59
SRM610-20	139.85	91.95	565.58	140.60	224.23	176.68	219.37
AP1-20	0.18	80.99	0.20	4.90	0.03	0.01	0.01
AP2-20	0.69	59.63	0.13	12.93	0.64	0.46	0.51
AP3-20	3.19	51.04	0.16	48.90	2.94	2.73	2.74
AP4-20	5.54	54.65	0.63	90.61	5.29	5.33	5.23
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-17	13.12	31808.62	114.08	275.56	2.96	12.16	8.32
SRM614-17	381.12	40570.83	1117.33	6417.84	333.64	708.84	583.44
SRM612-17	14482.68	38393.98	49395.84	71901.84	12088.11	19227.59	22522.37
SRM610-17	130670.38	39346.42	405551.75	308494.53	112501.79	167743.39	235136.08
AP1-17	870.24	49376.96	504.96	48537.75	516.88	1031.49	340.08
AP2-17	2909.70	50464.88	755.72	143303.81	2271.57	4070.82	3247.42
AP3-17	11573.23	48631.20	877.92	417483.53	8382.93	13644.24	14625.12
AP4-17	29469.25	55911.07	3506.10	1066147.90	20585.04	37353.01	40464.47
34HP60-24-1	76.68	42194.32	298.60	352823.09	5195.27	7790.00	2697.94
34HP60-24-2	46.72	45356.77	172.48	369553.75	3354.38	4824.23	1627.93
34HP60-24-3	54.12	49029.40	182.28	373188.91	4621.19	8052.53	2379.09
34HP60-24-4	104.72	57297.08	206.40	1473038.00	17185.46	16579.45	6577.56
34HP60-24-5	221.04	63776.60	333.80	3715741.50	49039.27	46868.39	17211.42
34HP60-24-6	211.80	64560.09	258.08	4006434.00	59960.14	54243.02	20349.48
34HP60-24-7	152.88	67897.54	238.44	2199953.50	13205.52	13068.63	4686.15
34HP60-24-8	166.36	72082.92	269.00	1995386.00	6860.24	4783.55	1631.89
34HP60-24-9	186.12	73236.06	213.32	2843246.50	10877.02	7819.96	2815.30
34HP60-24-10	194.52	67906.31	227.28	4037715.50	31878.62	30293.01	10532.14
34HP60-24-11	243.88	71184.44	199.08	4384393.00	35601.08	35215.36	11893.83
34HP60-24-12	235.28	74607.90	217.40	5372025.00	45362.30	45075.70	14710.32
SRM614-18	345.00	65579.77	679.56	5639.67	322.80	579.76	669.80
SRM612-18	15210.73	69557.03	48766.79	35066.88	20884.64	30488.41	39162.54
SRM610-18	119116.83	55967.80	293408.28	251713.45	176954.92	243216.73	339346.44
AP1-18	629.36	75458.83	471.76	27663.84	110.08	170.36	45.20
AP2-18	2017.53	76520.47	367.04	79492.20	1802.37	2343.29	2786.50
AP3-18	9811.86	73752.98	445.36	284246.84	8250.01	12685.83	14695.68
AP4-18	21879.52	78446.45	1775.61	728191.44	19126.83	34405.56	36622.69
blank-18	7.16	39399.98	96.76	492.68	7.04	29.00	16.60
blank average	10.14	35604.30	105.42	384.12	5.00	20.58	12.46
blank subtraction							

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	370.98	4966.53	1011.91	6033.71	328.64	688.26	570.98
SRM612-17	14472.54	2789.68	49290.42	71517.72	12083.11	19207.01	22509.91
SRM610-17	130660.24	3742.12	405446.33	308110.41	112496.79	167722.81	235123.62
AP1-17	860.10	13772.66	399.54	48153.63	511.88	1010.91	327.62
AP2-17	2899.56	14860.58	650.30	142919.69	2266.57	4050.24	3234.96
AP3-17	11563.08	13026.90	772.50	417099.41	8377.93	13623.66	14612.66
AP4-17	29459.11	20306.77	3400.68	1065763.78	20580.03	37332.43	40452.01
34HP60-24-1	66.54	6590.02	193.18	352438.97	5190.27	7769.42	2685.48
34HP60-24-2	36.58	9752.47	67.06	369169.63	3349.38	4803.65	1615.47
34HP60-24-3	43.98	13425.10	76.86	372804.79	4616.19	8031.95	2366.63
34HP60-24-4	94.58	21692.78	100.98	1472653.88	17180.46	16558.87	6565.10
34HP60-24-5	210.90	28172.30	228.38	3715357.38	49034.27	46847.81	17198.96
34HP60-24-6	201.66	28955.79	152.66	4006049.88	59955.14	54222.44	20337.01
34HP60-24-7	142.74	32293.24	133.02	2199569.38	13200.51	13048.05	4673.69
34HP60-24-8	156.22	36478.62	163.58	1995001.88	6855.24	4762.97	1619.43
34HP60-24-9	175.98	37631.76	107.90	2842862.38	10872.02	7799.38	2802.84
34HP60-24-10	184.38	32302.01	121.86	4037331.38	31873.62	30272.43	10519.68
34HP60-24-11	233.74	35580.14	93.66	4384008.88	35596.08	35194.78	11881.37
34HP60-24-12	225.14	39003.60	111.98	5371640.88	45357.30	45055.11	14697.86
SRM614-18	334.86	29975.47	574.14	5255.55	317.80	559.18	657.34
SRM612-18	15200.59	33952.73	48661.37	34682.76	20879.64	30467.83	39150.08
SRM610-18	119106.69	20363.50	293302.86	251329.33	176949.92	243196.15	339333.98
AP1-18	619.22	39854.53	366.34	27279.71	105.08	149.78	32.74
AP2-18	2007.39	40916.17	261.62	79108.08	1797.37	2322.71	2774.04
AP3-18	9801.72	38148.68	339.94	283862.72	8245.01	12665.25	14683.22
AP4-18	21869.38	42842.15	1670.19	727807.32	19121.83	34384.97	36610.23

zero correction

SRM614-17	370.98	4966.53	1011.91	6033.71	328.64	688.26	570.98
SRM612-17	14472.54	2789.68	49290.42	71517.72	12083.11	19207.01	22509.91
SRM610-17	130660.24	3742.12	405446.33	308110.41	112496.79	167722.81	235123.62
AP1-17	860.10	13772.66	399.54	48153.63	511.88	1010.91	327.62
AP2-17	2899.56	14860.58	650.30	142919.69	2266.57	4050.24	3234.96
AP3-17	11563.08	13026.90	772.50	417099.41	8377.93	13623.66	14612.66
AP4-17	29459.11	20306.77	3400.68	1065763.78	20580.03	37332.43	40452.01
34HP60-24-1	66.54	6590.02	193.18	352438.97	5190.27	7769.42	2685.48
34HP60-24-2	36.58	9752.47	67.06	369169.63	3349.38	4803.65	1615.47
34HP60-24-3	43.98	13425.10	76.86	372804.79	4616.19	8031.95	2366.63
34HP60-24-4	94.58	21692.78	100.98	1472653.88	17180.46	16558.87	6565.10
34HP60-24-5	210.90	28172.30	228.38	3715357.38	49034.27	46847.81	17198.96
34HP60-24-6	201.66	28955.79	152.66	4006049.88	59955.14	54222.44	20337.01
34HP60-24-7	142.74	32293.24	133.02	2199569.38	13200.51	13048.05	4673.69
34HP60-24-8	156.22	36478.62	163.58	1995001.88	6855.24	4762.97	1619.43
34HP60-24-9	175.98	37631.76	107.90	2842862.38	10872.02	7799.38	2802.84
34HP60-24-10	184.38	32302.01	121.86	4037331.38	31873.62	30272.43	10519.68
34HP60-24-11	233.74	35580.14	93.66	4384008.88	35596.08	35194.78	11881.37
34HP60-24-12	225.14	39003.60	111.98	5371640.88	45357.30	45055.11	14697.86
SRM614-18	334.86	29975.47	574.14	5255.55	317.80	559.18	657.34
SRM612-18	15200.59	33952.73	48661.37	34682.76	20879.64	30467.83	39150.08
SRM610-18	119106.69	20363.50	293302.86	251329.33	176949.92	243196.15	339333.98
AP1-18	619.22	39854.53	366.34	27279.71	105.08	149.78	32.74
AP2-18	2007.39	40916.17	261.62	79108.08	1797.37	2322.71	2774.04
AP3-18	9801.72	38148.68	339.94	283862.72	8245.01	12665.25	14683.22
AP4-18	21869.38	42842.15	1670.19	727807.32	19121.83	34384.97	36610.23

certified concentration

SRM614	0.73	0.68	3.10	0.72	0.79	0.75
SRM612	38.44	41.64	37.74	35.77	38.35	37.16
SRM610	368.50	360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-17	0.000172	0.002309	0.000470	0.002805	0.000153	0.000320	0.000265
SRM612-17	0.007389	0.001424	0.025164	0.036511	0.006169	0.009806	0.011492
SRM610-17	0.101217	0.002899	0.314083	0.238680	0.087147	0.129928	0.182141
AP1-17	0.000054	0.000863	0.000025	0.003019	0.000032	0.000063	0.000021

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000189	0.000968	0.000042	0.009312	0.000148	0.000264	0.000211
AP3-17	0.000697	0.000785	0.000047	0.025128	0.000505	0.000821	0.000880
AP4-17	0.001443	0.000995	0.000167	0.052206	0.001008	0.001829	0.001982
34HP60-24-1	0.000014	0.001373	0.000040	0.073446	0.001082	0.001619	0.000560
34HP60-24-2	0.000007	0.001879	0.000013	0.071116	0.000645	0.000925	0.000311
34HP60-24-3	0.000008	0.002383	0.000014	0.066187	0.000820	0.001426	0.000420
34HP60-24-4	0.000012	0.002660	0.000012	0.180604	0.002107	0.002031	0.000805
34HP60-24-5	0.000019	0.002499	0.000020	0.329549	0.004349	0.004155	0.001526
34HP60-24-6	0.000017	0.002493	0.000013	0.344970	0.005163	0.004669	0.001751
34HP60-24-7	0.000015	0.003317	0.000014	0.225903	0.001356	0.001340	0.000480
34HP60-24-8	0.000015	0.003580	0.000016	0.195807	0.000673	0.000467	0.000159
34HP60-24-9	0.000016	0.003320	0.000010	0.250815	0.000959	0.000688	0.000247
34HP60-24-10	0.000017	0.003039	0.000011	0.379890	0.002999	0.002848	0.000990
34HP60-24-11	0.000020	0.003027	0.000008	0.373009	0.003029	0.002995	0.001011
34HP60-24-12	0.000017	0.003021	0.000009	0.416042	0.003513	0.003490	0.001138
SRM614-18	0.000273	0.024414	0.000468	0.004281	0.000259	0.000455	0.000535
SRM612-18	0.010031	0.022405	0.032111	0.022887	0.013778	0.020106	0.025835
SRM610-18	0.146575	0.025060	0.360944	0.309290	0.217758	0.299282	0.417591
AP1-18	0.000055	0.003522	0.000032	0.002411	0.000009	0.000013	0.000003
AP2-18	0.000159	0.003233	0.000021	0.006251	0.000142	0.000184	0.000219
AP3-18	0.000703	0.002736	0.000024	0.020360	0.000591	0.000908	0.001053
AP4-18	0.001348	0.002641	0.000103	0.044864	0.001179	0.002120	0.002257

standardize signal averages AP

AP1	0.000054	0.002193	0.000029	0.002715	0.000021	0.000038	0.000012
AP2	0.000174	0.002101	0.000032	0.007782	0.000145	0.000224	0.000215
AP3	0.000700	0.001761	0.000035	0.022744	0.000548	0.000865	0.000967
AP4	0.001396	0.001818	0.000135	0.048535	0.001093	0.001974	0.002119

linest from std sig ave

0.012252	0.072817	0.014770	0.005921	0.013335	0.007573	0.007017
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standardize signal averages SRM

srM614-2	0.000223	0.013362	0.000469	0.003543	0.000206	0.000388	0.000400
srM612-2	0.008710	0.011915	0.028638	0.029699	0.009974	0.014956	0.018663
srM610-2	0.123896	0.013979	0.337513	0.273985	0.152452	0.214605	0.299866

linest from std sig ave

0.034763	0.000000	0.012500	0.018010	0.035013	0.024357	0.016738
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concentration data

SRM614-17	0.18	14.42	0.60	1.42	0.17	0.21	0.16
SRM612-17	7.76	8.89	31.87	18.54	7.05	6.37	6.92
SRM610-17	106.35	18.10	397.84	121.19	99.66	84.39	109.61
AP1-17	0.26	25.08	0.15	7.13	0.17	0.19	0.06
AP2-17	0.92	28.13	0.25	21.99	0.79	0.80	0.59
AP3-17	3.40	22.80	0.27	59.35	2.69	2.48	2.46
AP4-17	7.05	28.90	0.98	123.31	5.36	5.52	5.55
34HP60-24-1	0.07	39.89	0.24	173.47	5.75	4.89	1.57
34HP60-24-2	0.03	54.57	0.08	167.97	3.43	2.80	0.87
34HP60-24-3	0.04	69.24	0.08	156.33	4.36	4.31	1.18
34HP60-24-4	0.06	77.28	0.07	426.57	11.21	6.14	2.25
34HP60-24-5	0.09	72.59	0.12	778.37	23.14	12.55	4.27
34HP60-24-6	0.08	72.43	0.08	814.79	27.47	14.11	4.90
34HP60-24-7	0.07	96.35	0.08	533.57	7.21	4.05	1.34
34HP60-24-8	0.07	104.01	0.09	462.48	3.58	1.41	0.44
34HP60-24-9	0.08	96.45	0.06	592.41	5.10	2.08	0.69
34HP60-24-10	0.08	88.29	0.07	897.27	15.95	8.61	2.77
34HP60-24-11	0.10	87.94	0.05	881.02	16.11	9.05	2.83
34HP60-24-12	0.09	87.76	0.05	982.66	18.69	10.54	3.19
SRM614-18	0.29	152.47	0.59	2.17	0.30	0.30	0.32
SRM612-18	10.54	139.92	40.68	11.62	15.76	13.06	15.55
SRM610-18	154.01	156.50	457.20	157.05	249.03	194.38	251.30
AP1-18	0.27	102.30	0.19	5.69	0.05	0.04	0.01
AP2-18	0.78	93.92	0.12	14.76	0.76	0.55	0.61
AP3-18	3.44	79.49	0.14	48.09	3.15	2.74	2.95
AP4-18	6.59	76.72	0.61	105.97	6.27	6.40	6.32

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

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Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-15	17.20	15098.41	104.52	207.32	2.72	13.88	13.68
SRM614-15	541.24	43742.97	1412.77	6114.03	476.12	808.60	903.17
SRM612-15	31656.38	48059.39	98211.27	70460.08	24215.06	36557.13	46291.50
SRM610-15	296034.66	37877.65	756960.88	532344.69	242732.33	385052.94	514864.09
AP1-15	563.20	50187.65	648.36	29785.49	93.08	81.52	50.24
AP2-15	2101.41	62310.39	602.44	74148.26	1364.69	1643.29	2223.97
AP3-15	9785.54	72857.69	861.92	431969.91	9191.97	15292.89	18116.38
AP4-15	13659.04	75574.59	1523.97	586348.19	13566.72	20764.16	25819.79
34BV166-1	22.40	36006.56	264.72	117552.70	553.12	660.08	210.80
34BV166-2	23.28	35572.36	293.12	93170.97	447.68	579.16	196.20
34BV166-3	24.44	35361.28	243.52	79957.61	316.56	368.84	111.84
34BV166-4	12.32	34138.35	253.60	108915.66	728.88	1421.73	379.12
34BV166-5	28.12	34868.20	248.32	129868.45	758.96	1001.33	273.72
34BV166-6	27.60	37780.17	239.52	203301.50	713.80	787.28	286.04
SRM614-16	434.16	70776.84	1021.37	3041.78	478.96	706.72	832.08
SRM612-16	22950.73	86461.13	73067.45	47141.27	30909.01	43670.93	57689.81
SRM610-16	155185.91	56341.20	406104.94	340422.56	237234.33	322187.56	461374.50
AP1-16	488.40	71473.24	653.28	28482.28	74.64	94.28	38.12
AP2-16	1689.37	79284.88	540.72	63432.36	1479.21	1778.13	2296.61
AP3-16	7271.48	89970.95	655.20	330545.31	8996.69	14385.56	16578.57
AP4-16	9387.33	90611.27	1147.85	424921.63	12421.55	17882.74	21656.68
blank-16	13.44	25163.46	248.44	48.12	6.60	30.28	16.28
blank average	15.32	20130.93	176.48	127.72	4.66	22.08	14.98
blank subtraction							
SRM614-15	525.92	23612.04	1236.29	5986.31	471.46	786.52	888.19
SRM612-15	31641.06	27928.46	98034.79	70332.36	24210.40	36535.04	46276.52
SRM610-15	296019.34	17746.72	756784.40	532216.97	242727.67	385030.86	514849.11
AP1-15	547.88	30056.71	471.88	29657.77	88.42	59.44	35.26
AP2-15	2086.09	42179.46	425.96	74020.54	1360.03	1621.21	2208.99
AP3-15	9770.22	52726.76	685.44	431842.19	9187.31	15270.81	18101.40
AP4-15	13643.72	55443.65	1347.49	586220.47	13562.06	20742.08	25804.80
34BV166-1	7.08	15875.63	88.24	117424.98	548.46	638.00	195.82
34BV166-2	7.96	15441.43	116.64	93043.25	443.02	557.08	181.22
34BV166-3	9.12	15230.35	67.04	79829.89	311.90	346.76	96.86
34BV166-4	-3.00	14007.42	77.12	108787.94	724.22	1399.65	364.14
34BV166-5	12.80	14737.26	71.84	129740.73	754.30	979.25	258.74
34BV166-6	12.28	17649.24	63.04	203173.78	709.14	765.20	271.06
SRM614-16	418.84	50645.90	844.88	2914.06	474.30	684.64	817.10
SRM612-16	22935.41	66330.19	72890.97	47013.55	30904.35	43648.85	57674.82
SRM610-16	155170.59	36210.26	405928.46	340294.84	237229.67	322165.48	461359.52
AP1-16	473.08	51342.31	476.80	28354.56	69.98	72.20	23.14
AP2-16	1674.05	59153.95	364.24	63304.63	1474.55	1756.05	2281.63
AP3-16	7256.16	69840.01	478.72	330417.59	8992.03	14363.48	16563.59
AP4-16	9372.01	70480.34	971.37	424793.91	12416.89	17860.66	21641.70
zero correction							
SRM614-15	525.92	23612.04	1236.29	5986.31	471.46	786.52	888.19
SRM612-15	31641.06	27928.46	98034.79	70332.36	24210.40	36535.04	46276.52
SRM610-15	296019.34	17746.72	756784.40	532216.97	242727.67	385030.86	514849.11
AP1-15	547.88	30056.71	471.88	29657.77	88.42	59.44	35.26
AP2-15	2086.09	42179.46	425.96	74020.54	1360.03	1621.21	2208.99
AP3-15	9770.22	52726.76	685.44	431842.19	9187.31	15270.81	18101.40
AP4-15	13643.72	55443.65	1347.49	586220.47	13562.06	20742.08	25804.80
34BV166-1	7.08	15875.63	88.24	117424.98	548.46	638.00	195.82
34BV166-2	7.96	15441.43	116.64	93043.25	443.02	557.08	181.22
34BV166-3	9.12	15230.35	67.04	79829.89	311.90	346.76	96.86
34BV166-4	0.00	14007.42	77.12	108787.94	724.22	1399.65	364.14
34BV166-5	12.80	14737.26	71.84	129740.73	754.30	979.25	258.74
34BV166-6	12.28	17649.24	63.04	203173.78	709.14	765.20	271.06
SRM614-16	418.84	50645.90	844.88	2914.06	474.30	684.64	817.10
SRM612-16	22935.41	66330.19	72890.97	47013.55	30904.35	43648.85	57674.82
SRM610-16	155170.59	36210.26	405928.46	340294.84	237229.67	322165.48	461359.52
AP1-16	473.08	51342.31	476.80	28354.56	69.98	72.20	23.14
AP2-16	1674.05	59153.95	364.24	63304.63	1474.55	1756.05	2281.63
AP3-16	7256.16	69840.01	478.72	330417.59	8992.03	14363.48	16563.59
AP4-16	9372.01	70480.34	971.37	424793.91	12416.89	17860.66	21641.70
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-15	0.000185	0.008291	0.000434	0.002102	0.000166	0.000276	0.000312
SRM612-15	0.010370	0.009153	0.032129	0.023050	0.007934	0.011974	0.015166
SRM610-15	0.159000	0.009532	0.406490	0.285868	0.130376	0.206811	0.276539
AP1-15	0.000041	0.002239	0.000035	0.002210	0.000007	0.000004	0.000003
AP2-15	0.000147	0.002976	0.000030	0.005222	0.000096	0.000114	0.000156
AP3-15	0.000523	0.002823	0.000037	0.023123	0.000492	0.000818	0.000969
AP4-15	0.000804	0.003267	0.000079	0.034541	0.000799	0.001222	0.001520
34BV166-1	0.000002	0.003817	0.000021	0.028236	0.000132	0.000153	0.000047
34BV166-2	0.000002	0.004354	0.000033	0.026235	0.000125	0.000157	0.000051
34BV166-3	0.000003	0.004689	0.000021	0.024578	0.000096	0.000107	0.000030
34BV166-4	0.000000	0.004811	0.000026	0.037361	0.000249	0.000481	0.000125
34BV166-5	0.000004	0.004793	0.000023	0.042196	0.000245	0.000318	0.000084
34BV166-6	0.000003	0.004160	0.000015	0.047894	0.000167	0.000180	0.000064
SRM614-16	0.000243	0.029414	0.000491	0.001692	0.000275	0.000398	0.000475
SRM612-16	0.009902	0.028637	0.031470	0.020298	0.013343	0.018845	0.024901
SRM610-16	0.139205	0.032485	0.364163	0.305282	0.212821	0.289018	0.413891
AP1-16	0.000039	0.004285	0.000040	0.002367	0.000006	0.000006	0.000002
AP2-16	0.000140	0.004937	0.000030	0.005284	0.000123	0.000147	0.000190
AP3-16	0.000445	0.004286	0.000029	0.020276	0.000552	0.000881	0.001016
AP4-16	0.000645	0.004851	0.000067	0.029240	0.000855	0.001229	0.001490
standardize signal averages AP							
AP1	0.000040	0.003262	0.000037	0.002288	0.000006	0.000005	0.000002
AP2	0.000143	0.003957	0.000030	0.005253	0.000110	0.000130	0.000173
AP3	0.000484	0.003554	0.000033	0.021699	0.000522	0.000850	0.000993
AP4	0.000725	0.004059	0.000073	0.031890	0.000827	0.001226	0.001505
linest from std sig ave							
	0.022069	0.038152	0.025829	0.008360	0.016715	0.010987	0.009096
standardize signal averages SRM							
srM614-2	0.000214	0.018853	0.000462	0.001897	0.000221	0.000337	0.000393
srM612-2	0.010136	0.018895	0.031799	0.021674	0.010639	0.015409	0.020033
srM610-2	0.149103	0.021008	0.385326	0.295575	0.171599	0.247914	0.345215
linest from std sig ave							
	0.028888	0.000000	0.010950	0.016749	0.031111	0.021092	0.014541
concentration data							
SRM614-15	0.35	27.13	0.96	1.51	0.24	0.26	0.24
SRM612-15	19.63	29.95	71.17	16.53	11.37	11.28	11.83
SRM610-15	300.95	31.19	900.45	204.97	186.89	194.87	215.73
AP1-15	0.36	34.08	0.36	7.37	0.04	0.02	0.01
AP2-15	1.30	45.29	0.31	17.42	0.64	0.50	0.57
AP3-15	4.61	42.97	0.38	77.12	3.28	3.58	3.52
AP4-15	7.08	49.72	0.82	115.20	5.33	5.36	5.52
34BV166-1	0.01	58.10	0.22	94.17	0.88	0.67	0.17
34BV166-2	0.02	66.27	0.34	87.50	0.83	0.69	0.19
34BV166-3	0.02	71.37	0.21	81.97	0.64	0.47	0.11
34BV166-4	0.00	73.22	0.27	124.61	1.66	2.11	0.45
34BV166-5	0.04	72.95	0.24	140.73	1.64	1.40	0.31
34BV166-6	0.03	63.32	0.15	159.74	1.11	0.79	0.23
SRM614-16	0.46	96.24	1.09	1.21	0.39	0.37	0.37
SRM612-16	18.74	93.70	69.71	14.55	19.13	17.76	19.43
SRM610-16	263.48	106.29	806.69	218.89	305.08	272.33	322.88
AP1-16	0.35	65.22	0.41	7.89	0.04	0.03	0.01
AP2-16	1.23	75.15	0.31	17.62	0.82	0.64	0.69
AP3-16	3.92	65.23	0.30	67.62	3.68	3.86	3.69
AP4-16	5.68	73.84	0.69	97.52	5.70	5.39	5.41
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-13	15.24	14452.64	76.68	133.16	8.56	17.16	10.56
SRM614-13	557.72	41072.75	1499.41	4131.74	466.76	727.96	900.41
SRM612-13	23335.29	45102.65	85306.36	48877.36	25497.86	37204.09	50554.52
SRM610-13	167471.42	36611.57	486776.00	347807.81	185279.52	265167.28	382715.03
AP1-13	672.24	52064.85	1089.41	41029.87	220.00	326.88	285.52
AP2-13	2327.49	58437.41	763.96	99415.16	1807.33	2555.69	3170.10
AP3-13	8379.77	68865.11	939.45	369783.28	8347.37	13187.68	15995.81
AP4-13	12502.59	70312.23	1629.89	555110.50	13178.03	20617.68	25394.18
W3-1	74.08	40010.55	384.44	212637.44	628.52	1084.49	258.00
W3-2	43.76	41884.96	274.96	223620.42	648.20	1068.01	243.36
W3-3	53.16	42681.92	313.08	209229.45	664.44	1177.65	321.92
W3-4	71.84	38004.65	301.96	265018.94	662.32	1023.65	236.00
W3-5	61.20	39114.46	227.48	323963.53	718.04	1145.53	267.40
W3-6	50.12	40246.03	216.44	323913.53	773.00	974.01	250.68
W3-7	79.48	39231.14	290.12	226132.19	688.36	1514.73	361.96
W3-8	45.64	41762.16	238.44	254405.52	772.56	1542.73	346.08
W3-9	54.48	43101.32	227.08	262410.47	923.73	1560.33	394.16
W3-10	97.64	53322.10	293.56	948588.00	2891.66	5234.51	1232.49
W3-11	112.52	55492.56	313.68	817359.88	2775.66	5409.43	1146.53
W3-12	50.36	53847.86	261.48	621137.38	1821.33	3488.62	799.80
SRM614-14	631.72	80455.57	1385.81	3808.18	664.80	969.73	1210.93
SRM612-14	28557.60	83511.87	84917.28	49568.48	36163.13	52731.94	66562.45
SRM610-14	153547.58	51868.73	352652.03	282742.66	217159.66	304502.72	410384.50
AP1-14	474.96	70244.68	637.36	30624.93	76.96	104.00	56.12
AP2-14	1702.37	73999.70	463.48	72253.37	1635.85	2137.97	2648.73
AP3-14	7786.40	84436.03	620.04	311217.72	8788.73	13912.60	15793.21
AP4-14	10649.62	83511.59	1151.89	458128.53	13361.88	20741.92	23786.65
blank-14	17.80	26331.71	169.88	171.16	4.64	44.20	17.48
blank average	16.52	20392.17	123.28	152.16	6.60	30.68	14.02
blank subtraction							
SRM614-13	541.20	20680.58	1376.13	3979.58	460.16	697.28	886.39
SRM612-13	23318.77	24710.48	85183.08	48725.19	25491.26	37173.41	50540.50
SRM610-13	167454.90	16219.39	486652.72	347655.65	185272.92	265136.60	382701.01
AP1-13	655.72	31672.68	966.13	40877.71	213.40	296.20	271.50
AP2-13	2310.97	38045.24	640.68	99263.00	1800.73	2525.01	3156.08
AP3-13	8363.25	48472.93	816.16	369631.12	8340.77	13156.99	15981.79
AP4-13	12486.07	49920.06	1506.61	554958.34	13171.43	20587.00	25380.16
W3-1	57.56	19618.37	261.16	212485.28	621.92	1053.81	243.98
W3-2	27.24	21492.78	151.68	223468.26	641.60	1037.33	229.34
W3-3	36.64	22289.75	189.80	209077.29	657.84	1146.97	307.90
W3-4	55.32	17612.48	178.68	264866.78	655.72	992.97	221.98
W3-5	44.68	18722.29	104.20	323811.37	711.44	1114.85	253.38
W3-6	33.60	19853.85	93.16	323761.37	766.40	943.33	236.66
W3-7	62.96	18838.97	166.84	225980.03	681.76	1484.05	347.94
W3-8	29.12	21369.98	115.16	254253.36	765.96	1512.05	332.06
W3-9	37.96	22709.15	103.80	262258.31	917.13	1529.65	380.14
W3-10	81.12	32929.93	170.28	948435.84	2885.06	5203.83	1218.47
W3-11	96.00	35100.38	190.40	817207.72	2769.06	5378.75	1132.51
W3-12	33.84	33455.69	138.20	620985.22	1814.73	3457.94	785.78
SRM614-14	615.20	60063.40	1262.53	3656.02	658.20	939.05	1196.91
SRM612-14	28541.08	63119.69	84794.00	49416.32	36156.52	52701.26	66548.43
SRM610-14	153531.06	31476.56	352528.75	282590.50	217153.06	304472.04	410370.48
AP1-14	458.44	49852.51	514.08	30472.77	70.36	73.32	42.10
AP2-14	1685.85	53607.52	340.20	72101.21	1629.25	2107.29	2634.71
AP3-14	7769.88	64043.86	496.76	311065.56	8782.13	13881.92	15779.19
AP4-14	10633.10	63119.41	1028.61	457976.37	13355.27	20711.24	23772.63
zero correction							
SRM614-13	541.20	20680.58	1376.13	3979.58	460.16	697.28	886.39
SRM612-13	23318.77	24710.48	85183.08	48725.19	25491.26	37173.41	50540.50
SRM610-13	167454.90	16219.39	486652.72	347655.65	185272.92	265136.60	382701.01
AP1-13	655.72	31672.68	966.13	40877.71	213.40	296.20	271.50
AP2-13	2310.97	38045.24	640.68	99263.00	1800.73	2525.01	3156.08
AP3-13	8363.25	48472.93	816.16	369631.12	8340.77	13156.99	15981.79
AP4-13	12486.07	49920.06	1506.61	554958.34	13171.43	20587.00	25380.16
W3-1	57.56	19618.37	261.16	212485.28	621.92	1053.81	243.98
W3-2	27.24	21492.78	151.68	223468.26	641.60	1037.33	229.34
W3-3	36.64	22289.75	189.80	209077.29	657.84	1146.97	307.90
W3-4	55.32	17612.48	178.68	264866.78	655.72	992.97	221.98
W3-5	44.68	18722.29	104.20	323811.37	711.44	1114.85	253.38
W3-6	33.60	19853.85	93.16	323761.37	766.40	943.33	236.66
W3-7	62.96	18838.97	166.84	225980.03	681.76	1484.05	347.94
W3-8	29.12	21369.98	115.16	254253.36	765.96	1512.05	332.06
W3-9	37.96	22709.15	103.80	262258.31	917.13	1529.65	380.14

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	81.12	32929.93	170.28	948435.84	2885.06	5203.83	1218.47
W3-11	96.00	35100.38	190.40	817207.72	2769.06	5378.75	1132.51
W3-12	33.84	33455.69	138.20	620985.22	1814.73	3457.94	785.78
SRM614-14	615.20	60063.40	1262.53	3656.02	658.20	939.05	1196.91
SRM612-14	28541.08	63119.69	84794.00	49416.32	36156.52	52701.26	66548.43
SRM610-14	153531.06	31476.56	352528.75	282590.50	217153.06	304472.04	410370.48
AP1-14	458.44	49852.51	514.08	30472.77	70.36	73.32	42.10
AP2-14	1685.85	53607.52	340.20	72101.21	1629.25	2107.29	2634.71
AP3-14	7769.88	64043.86	496.76	311065.56	8782.13	13881.92	15779.19
AP4-14	10633.10	63119.41	1028.61	457976.37	13355.27	20711.24	23772.63

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-13	0.000186	0.007096	0.000472	0.001365	0.000158	0.000239	0.000304
SRM612-13	0.008007	0.008485	0.029249	0.016730	0.008753	0.012764	0.017354
SRM610-13	0.141480	0.013704	0.411167	0.293730	0.156535	0.224010	0.323339
AP1-13	0.000042	0.002025	0.000062	0.002614	0.000014	0.000019	0.000017
AP2-13	0.000141	0.002323	0.000039	0.006062	0.000110	0.000154	0.000193
AP3-13	0.000484	0.002802	0.000047	0.021370	0.000482	0.000761	0.000924
AP4-13	0.000714	0.002855	0.000086	0.031738	0.000753	0.001177	0.001451
W3-1	0.000010	0.003255	0.000043	0.035253	0.000103	0.000175	0.000040
W3-2	0.000004	0.003326	0.000023	0.034584	0.000099	0.000161	0.000035
W3-3	0.000006	0.003554	0.000030	0.033334	0.000105	0.000183	0.000049
W3-4	0.000010	0.003048	0.000031	0.045843	0.000113	0.000172	0.000038
W3-5	0.000007	0.002971	0.000017	0.051390	0.000113	0.000177	0.000040
W3-6	0.000005	0.003094	0.000015	0.050451	0.000119	0.000147	0.000037
W3-7	0.000012	0.003578	0.000032	0.042920	0.000129	0.000282	0.000066
W3-8	0.000005	0.003556	0.000019	0.042306	0.000127	0.000252	0.000055
W3-9	0.000006	0.003647	0.000017	0.042118	0.000147	0.000246	0.000061
W3-10	0.000009	0.003764	0.000019	0.108411	0.000330	0.000595	0.000139
W3-11	0.000011	0.003998	0.000022	0.093086	0.000315	0.000613	0.000129
W3-12	0.000004	0.003747	0.000015	0.069555	0.000203	0.000387	0.000088
SRM614-14	0.000261	0.025447	0.000535	0.001549	0.000279	0.000398	0.000507
SRM612-14	0.011379	0.025165	0.033807	0.019702	0.014415	0.021012	0.026532
SRM610-14	0.164512	0.033728	0.377742	0.302802	0.232684	0.326248	0.439721
AP1-14	0.000036	0.003887	0.000040	0.002376	0.000005	0.000006	0.000003
AP2-14	0.000126	0.004005	0.000025	0.005386	0.000122	0.000157	0.000197
AP3-14	0.000534	0.004400	0.000034	0.021372	0.000603	0.000954	0.001084
AP4-14	0.000723	0.004294	0.000070	0.031159	0.000909	0.001409	0.001617

standardize signal averages AP							
AP1	0.000039	0.002956	0.000051	0.002495	0.000010	0.000012	0.000010
AP2	0.000134	0.003164	0.000032	0.005724	0.000116	0.000156	0.000195
AP3	0.000509	0.003601	0.000041	0.021371	0.000543	0.000857	0.001004
AP4	0.000719	0.003575	0.000078	0.031449	0.000831	0.001293	0.001534

linest from std sig ave							
	0.021843	0.042036	0.022827	0.008478	0.016450	0.010572	0.008942

standardize signal averages SRM							
srM614-2	0.000223	0.016271	0.000504	0.001457	0.000218	0.000319	0.000406
srM612-2	0.009693	0.016825	0.031528	0.018216	0.011584	0.016888	0.021943
srM610-2	0.152996	0.023716	0.394454	0.298266	0.194609	0.275129	0.381530

linest from std sig ave							
	0.028156	0.000000	0.010698	0.016608	0.027436	0.019006	0.013157

concentration data							
SRM614-13	0.35	25.58	0.92	0.99	0.22	0.22	0.23
SRM612-13	15.00	30.59	57.26	12.17	12.35	11.57	13.31
SRM610-13	265.04	49.40	804.95	213.58	220.83	203.11	247.97

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.37	33.96	0.56	8.84	0.09	0.08	0.06
AP2-13	1.23	38.96	0.36	20.50	0.72	0.65	0.69
AP3-13	4.21	47.00	0.43	72.28	3.16	3.21	3.30
AP4-13	6.22	47.88	0.78	107.35	4.94	4.97	5.18
W3-1	0.08	54.58	0.39	119.24	0.68	0.74	0.14
W3-2	0.04	55.78	0.21	116.97	0.65	0.68	0.13
W3-3	0.05	59.59	0.28	112.74	0.69	0.77	0.18
W3-4	0.08	51.12	0.28	155.05	0.74	0.72	0.14
W3-5	0.06	49.83	0.15	173.82	0.74	0.75	0.14
W3-6	0.05	51.88	0.13	170.64	0.78	0.62	0.13
W3-7	0.10	60.00	0.29	145.17	0.85	1.19	0.24
W3-8	0.04	59.63	0.17	143.09	0.84	1.06	0.20
W3-9	0.05	61.16	0.15	142.46	0.97	1.04	0.22
W3-10	0.08	63.12	0.18	366.68	2.16	2.51	0.50
W3-11	0.10	67.05	0.20	314.84	2.07	2.58	0.46
W3-12	0.03	62.84	0.14	235.26	1.33	1.63	0.31
SRM614-14	0.49	91.74	1.05	1.13	0.39	0.36	0.39
SRM612-14	21.32	90.72	66.18	14.33	20.34	19.05	20.35
SRM610-14	308.18	121.59	739.51	220.17	328.26	295.80	337.23
AP1-14	0.31	65.19	0.37	8.04	0.04	0.02	0.01
AP2-14	1.10	67.16	0.23	18.22	0.80	0.66	0.70
AP3-14	4.65	73.79	0.31	72.29	3.96	4.02	3.87
AP4-14	6.30	72.02	0.64	105.39	5.96	5.94	5.77

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-11	44.64	20022.11	169.64	1611.65	13.88	51.64	37.08
SRM614-11	718.48	59700.94	1901.89	7155.80	830.68	1175.09	1615.37
SRM612-11	26528.07	59959.86	90868.56	159628.69	36964.13	51884.77	71557.32
SRM610-11	164659.64	40454.07	490588.56	457033.72	258699.81	359613.66	520542.34
AP1-11	1079.21	57631.56	975.21	280035.31	730.64	1962.73	604.52
AP2-11	2868.58	63410.68	987.33	381021.75	3199.62	5441.55	4994.07
AP3-11	17114.98	64693.36	1259.49	823291.31	15236.89	28009.52	28970.44
AP4-11	13963.96	70062.04	1811.01	643468.06	15765.09	25025.10	28821.72
W1-1	58.92	43590.52	280.20	1973566.10	2552.53	1751.65	607.32
W1-2	50.08	40908.19	245.44	1272589.30	1650.21	1229.85	405.48
W1-3	33.04	37598.21	223.40	928508.13	1333.93	832.04	276.24
W1-4	138.60	50278.97	366.40	3613196.30	4597.15	3494.90	1092.73
W1-5	74.76	49329.60	249.48	3205556.30	3962.10	1829.81	822.40
W1-6	60.52	50685.32	236.36	2959302.00	3612.74	1647.77	737.72
W1-7	138.80	53534.10	493.00	4642438.50	6056.51	5279.91	1589.77
W1-8	75.12	54284.38	278.04	4227081.50	5178.63	2793.98	1112.65
W1-9	96.88	55743.47	297.44	4253519.50	5140.39	3248.46	1150.53
W1-10	135.24	60666.66	394.80	4882131.00	6243.84	4458.46	1448.49
W1-11	105.84	64198.04	239.92	4843404.50	5769.55	2687.74	1222.33
W1-12	87.72	61091.94	224.52	4713078.50	5533.67	2836.26	1234.77
W1-13	105.36	55256.83	290.16	3335365.80	4245.42	2844.74	1039.45
W1-14	66.20	57222.92	178.52	3293404.50	3895.98	1781.33	797.16
W1-15	50.60	56042.91	187.60	3390770.00	4046.94	1711.29	814.08
W1-16	99.00	48670.43	280.96	2116360.50	2907.94	2045.17	723.52
W1-17	42.76	50160.40	158.60	2009698.30	2771.82	1293.37	568.68
W1-18	51.24	50260.60	133.32	1929599.60	2512.13	1056.41	539.76
SRM614-12	671.88	84026.23	1368.77	4549.87	786.84	1168.49	1376.69
SRM612-12	24516.14	86030.24	72008.96	45077.57	38785.14	53686.54	65642.73
SRM610-12	159204.70	52209.81	382808.47	312199.84	282918.16	381109.03	494424.75
AP1-12	586.20	64728.88	554.64	35660.36	108.44	133.68	55.44
AP2-12	1792.61	68983.91	365.08	72932.85	1875.45	2493.77	2981.86
AP3-12	9152.49	74313.14	648.80	320796.09	9604.93	15949.05	16665.45
AP4-12	13974.60	74134.06	1318.85	513001.06	16873.30	27663.52	28807.40
blank-12	23.32	23760.93	92.24	525.76	12.76	42.24	17.20
blank average	33.98	21891.52	130.94	1068.71	13.32	46.94	27.14

blank subtraction

SRM614-11	684.50	37809.41	1770.95	6087.09	817.36	1128.15	1588.23
SRM612-11	26494.09	38068.34	90737.61	158559.98	36950.81	51837.83	71530.18
SRM610-11	164625.66	18562.54	490457.62	455965.01	258686.49	359566.72	520515.20
AP1-11	1045.23	35740.04	844.26	278966.60	717.32	1915.79	577.38
AP2-11	2834.60	41519.15	856.38	379953.04	3186.30	5394.61	4966.93
AP3-11	17081.00	42801.84	1128.55	822222.60	15223.57	27962.58	28943.30

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	13929.98	48170.52	1680.07	642399.35	15751.77	24978.16	28794.58
W1-1	24.94	21699.00	149.26	1972497.39	2539.21	1704.71	580.18
W1-2	16.10	19016.67	114.50	1271520.59	1636.89	1182.91	378.34
W1-3	-0.94	15706.69	92.46	927439.42	1320.61	785.10	249.10
W1-4	104.62	28387.44	235.46	3612127.59	4583.83	3447.96	1065.59
W1-5	40.78	27438.07	118.54	3204487.59	3948.78	1782.87	795.26
W1-6	26.54	28793.80	105.42	2958233.29	3599.42	1600.83	710.58
W1-7	104.82	31642.58	362.06	4641369.79	6043.19	5232.97	1562.63
W1-8	41.14	32392.86	147.10	4226012.79	5165.31	2747.04	1085.51
W1-9	62.90	33851.95	166.50	4252450.79	5127.07	3201.52	1123.39
W1-10	101.26	38775.14	263.86	4881062.29	6230.51	4411.52	1421.35
W1-11	71.86	42306.52	108.98	4842335.79	5756.23	2640.79	1195.19
W1-12	53.74	39200.42	93.58	4712009.79	5520.35	2789.32	1207.63
W1-13	71.38	33365.31	159.22	3334297.09	4232.10	2797.80	1012.31
W1-14	32.22	35331.40	47.58	3292335.79	3882.66	1734.39	770.02
W1-15	16.62	34151.39	56.66	3389701.29	4033.62	1664.35	786.94
W1-16	65.02	26778.91	150.02	2115291.79	2894.62	1998.23	696.38
W1-17	8.78	28268.88	27.66	2008629.59	2758.50	1246.43	541.54
W1-18	17.26	28369.08	2.38	1928530.89	2498.81	1009.47	512.62
SRM614-12	637.90	62134.71	1237.83	3481.16	773.52	1121.55	1349.55
SRM612-12	24482.16	64138.72	71878.02	44008.87	38771.82	53639.60	65615.59
SRM610-12	159170.72	30318.29	382677.53	311131.13	282904.84	381062.09	494397.61
AP1-12	552.22	42837.36	423.70	34591.65	95.12	86.74	28.30
AP2-12	1758.63	47092.38	234.14	71864.15	1862.13	2446.83	2954.72
AP3-12	9118.51	52421.62	517.86	319727.38	9591.61	15902.11	16638.31
AP4-12	13940.62	52242.53	1187.91	511932.35	16859.97	27616.58	28780.26

zero correction

SRM614-11	684.50	37809.41	1770.95	6087.09	817.36	1128.15	1588.23
SRM612-11	26494.09	38068.34	90737.61	158559.98	36950.81	51837.83	71530.18
SRM610-11	164625.66	18562.54	490457.62	455965.01	258686.49	359566.72	520515.20
AP1-11	1045.23	35740.04	844.26	278966.60	717.32	1915.79	577.38
AP2-11	2834.60	41519.15	856.38	379953.04	3186.30	5394.61	4966.93
AP3-11	17081.00	42801.84	1128.55	822222.60	15223.57	27962.58	28943.30
AP4-11	13929.98	48170.52	1680.07	642399.35	15751.77	24978.16	28794.58
W1-1	24.94	21699.00	149.26	1972497.39	2539.21	1704.71	580.18
W1-2	16.10	19016.67	114.50	1271520.59	1636.89	1182.91	378.34
W1-3	0.00	15706.69	92.46	927439.42	1320.61	785.10	249.10
W1-4	104.62	28387.44	235.46	3612127.59	4583.83	3447.96	1065.59
W1-5	40.78	27438.07	118.54	3204487.59	3948.78	1782.87	795.26
W1-6	26.54	28793.80	105.42	2958233.29	3599.42	1600.83	710.58
W1-7	104.82	31642.58	362.06	4641369.79	6043.19	5232.97	1562.63
W1-8	41.14	32392.86	147.10	4226012.79	5165.31	2747.04	1085.51
W1-9	62.90	33851.95	166.50	4252450.79	5127.07	3201.52	1123.39
W1-10	101.26	38775.14	263.86	4881062.29	6230.51	4411.52	1421.35
W1-11	71.86	42306.52	108.98	4842335.79	5756.23	2640.79	1195.19
W1-12	53.74	39200.42	93.58	4712009.79	5520.35	2789.32	1207.63
W1-13	71.38	33365.31	159.22	3334297.09	4232.10	2797.80	1012.31
W1-14	32.22	35331.40	47.58	3292335.79	3882.66	1734.39	770.02
W1-15	16.62	34151.39	56.66	3389701.29	4033.62	1664.35	786.94
W1-16	65.02	26778.91	150.02	2115291.79	2894.62	1998.23	696.38
W1-17	8.78	28268.88	27.66	2008629.59	2758.50	1246.43	541.54
W1-18	17.26	28369.08	2.38	1928530.89	2498.81	1009.47	512.62
SRM614-12	637.90	62134.71	1237.83	3481.16	773.52	1121.55	1349.55
SRM612-12	24482.16	64138.72	71878.02	44008.87	38771.82	53639.60	65615.59
SRM610-12	159170.72	30318.29	382677.53	311131.13	282904.84	381062.09	494397.61
AP1-12	552.22	42837.36	423.70	34591.65	95.12	86.74	28.30
AP2-12	1758.63	47092.38	234.14	71864.15	1862.13	2446.83	2954.72
AP3-12	9118.51	52421.62	517.86	319727.38	9591.61	15902.11	16638.31
AP4-12	13940.62	52242.53	1187.91	511932.35	16859.97	27616.58	28780.26

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000196	0.010821	0.000507	0.001742	0.000234	0.000323	0.000455
SRM612-11	0.008632	0.012403	0.029564	0.051661	0.012039	0.016890	0.023306
SRM610-11	0.123851	0.013965	0.368982	0.343032	0.194615	0.270510	0.391595
AP1-11	0.000057	0.001946	0.000046	0.015188	0.000039	0.000104	0.000031
AP2-11	0.000161	0.002363	0.000049	0.021624	0.000181	0.000307	0.000283
AP3-11	0.000925	0.002317	0.000061	0.044517	0.000824	0.001514	0.001567
AP4-11	0.000858	0.002968	0.000104	0.039580	0.000971	0.001539	0.001774
W1-1	0.000002	0.001675	0.000012	0.152239	0.000196	0.000132	0.000045
W1-2	0.000002	0.001853	0.000011	0.123892	0.000159	0.000115	0.000037
W1-3	0.000000	0.001855	0.000011	0.109520	0.000156	0.000093	0.000029
W1-4	0.000006	0.001555	0.000013	0.197837	0.000251	0.000189	0.000058
W1-5	0.000002	0.001653	0.000007	0.192997	0.000238	0.000107	0.000048
W1-6	0.000002	0.001708	0.000006	0.175483	0.000214	0.000095	0.000042
W1-7	0.000006	0.001711	0.000020	0.250962	0.000327	0.000283	0.000084
W1-8	0.000002	0.001882	0.000009	0.245492	0.000300	0.000160	0.000063
W1-9	0.000004	0.001939	0.000010	0.243550	0.000294	0.000183	0.000064
W1-10	0.000005	0.001880	0.000013	0.236686	0.000302	0.000214	0.000069
W1-11	0.000003	0.002027	0.000005	0.232061	0.000276	0.000127	0.000057
W1-12	0.000003	0.002017	0.000005	0.242506	0.000284	0.000144	0.000062
W1-13	0.000004	0.001778	0.000008	0.177673	0.000226	0.000149	0.000054
W1-14	0.000002	0.001814	0.000002	0.169046	0.000199	0.000089	0.000040
W1-15	0.000001	0.001810	0.000003	0.179665	0.000214	0.000088	0.000042
W1-16	0.000005	0.001938	0.000011	0.153089	0.000209	0.000145	0.000050
W1-17	0.000001	0.002046	0.000002	0.145400	0.000200	0.000090	0.000039
W1-18	0.000001	0.002111	0.000000	0.143478	0.000186	0.000075	0.000038
SRM614-12	0.000277	0.026975	0.000537	0.001511	0.000336	0.000487	0.000586
SRM612-12	0.011112	0.029111	0.032624	0.019975	0.017598	0.024346	0.029781
SRM610-12	0.162099	0.030876	0.389719	0.316856	0.288110	0.388074	0.503495
AP1-12	0.000042	0.003280	0.000032	0.002649	0.000007	0.000007	0.000002
AP2-12	0.000144	0.003855	0.000019	0.005882	0.000152	0.000200	0.000242
AP3-12	0.000698	0.004015	0.000040	0.024489	0.000735	0.001218	0.001274
AP4-12	0.001022	0.003829	0.000087	0.037519	0.001236	0.002024	0.002109
standardize signal averages AP							
AP1	0.000050	0.002613	0.000039	0.008918	0.000023	0.000055	0.000017
AP2	0.000153	0.003109	0.000034	0.013753	0.000167	0.000254	0.000262
AP3	0.000812	0.003166	0.000050	0.034503	0.000779	0.001366	0.001421
AP4	0.000940	0.003398	0.000095	0.038549	0.001103	0.001781	0.001942
linest from std sig ave							
	0.015371	0.045579	0.019897	0.006037	0.012049	0.007253	0.006788
standardize signal averages SRM							
srm614-2	0.000236	0.018898	0.000522	0.001627	0.000285	0.000405	0.000520
srm612-2	0.009872	0.020757	0.031094	0.035818	0.014818	0.020618	0.026544
srm610-2	0.142975	0.022421	0.379350	0.329944	0.241363	0.329292	0.447545
linest from std sig ave							
	0.030125	0.000000	0.011123	0.014956	0.022119	0.015879	0.011216
concentration data							
SRM614-11	0.26	42.30	0.86	0.90	0.24	0.20	0.26
SRM612-11	11.38	48.48	50.45	26.75	12.44	10.51	13.57
SRM610-11	163.27	54.59	629.64	177.60	201.11	168.26	227.96
AP1-11	0.35	35.38	0.36	36.58	0.19	0.30	0.09
AP2-11	0.99	42.97	0.39	52.08	0.87	0.89	0.77
AP3-11	5.67	42.14	0.49	107.21	3.96	4.38	4.24
AP4-11	5.26	53.97	0.82	95.32	4.67	4.45	4.80
W1-1	0.01	30.45	0.09	366.65	0.94	0.38	0.12
W1-2	0.01	33.69	0.09	298.38	0.77	0.33	0.10
W1-3	0.00	33.73	0.09	263.76	0.75	0.27	0.08
W1-4	0.04	28.27	0.10	476.46	1.21	0.55	0.16
W1-5	0.02	30.05	0.06	464.81	1.14	0.31	0.13
W1-6	0.01	31.06	0.05	422.63	1.03	0.27	0.11
W1-7	0.03	31.11	0.16	604.41	1.57	0.82	0.23
W1-8	0.01	34.22	0.07	591.23	1.44	0.46	0.17
W1-9	0.02	35.25	0.08	586.56	1.41	0.53	0.17
W1-10	0.03	34.19	0.10	570.02	1.45	0.62	0.19
W1-11	0.02	36.87	0.04	558.89	1.33	0.37	0.16
W1-12	0.02	36.68	0.04	584.04	1.37	0.42	0.17
W1-13	0.02	32.33	0.07	427.90	1.08	0.43	0.15
W1-14	0.01	32.99	0.02	407.12	0.96	0.26	0.11
W1-15	0.01	32.91	0.02	432.70	1.03	0.26	0.11
W1-16	0.03	35.24	0.09	368.69	1.01	0.42	0.14
W1-17	0.00	37.21	0.02	350.18	0.96	0.26	0.11
W1-18	0.01	38.38	0.00	345.55	0.89	0.22	0.10

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.37	105.44	0.92	0.78	0.35	0.30	0.34
SRM612-12	14.65	113.79	55.67	10.34	18.18	15.14	17.34
SRM610-12	213.69	120.69	665.03	164.05	297.73	241.38	293.10
AP1-12	0.26	59.64	0.26	6.38	0.04	0.02	0.01
AP2-12	0.88	70.09	0.15	14.17	0.73	0.58	0.65
AP3-12	4.28	73.01	0.31	58.98	3.53	3.52	3.45
AP4-12	6.27	69.62	0.69	90.36	5.94	5.86	5.71

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-9	9.48	18292.02	104.32	29.72	5.24	13.24	12.68
SRM614-9	608.52	40524.23	1344.21	5025.95	591.12	858.48	1153.53
SRM612-9	26732.67	47954.59	92514.68	74424.42	35856.08	50575.52	69713.91
SRM610-9	140776.39	39859.70	477258.88	422018.34	253158.98	338120.00	511304.31
AP1-9	1051.77	55495.40	1117.05	90278.91	397.48	483.48	462.44
AP2-9	3087.34	62922.91	923.65	165619.61	2938.30	4016.50	4899.07
AP3-9	11571.15	67676.86	1012.01	503742.47	12045.23	19888.87	22599.49
AP4-9	17111.66	69597.95	2141.49	729298.69	18883.03	29518.17	35491.84
T2-1	209.84	54249.47	384.64	5058242.00	5586.63	2066.93	1187.65
T2-2	81.36	53967.50	353.92	4745255.50	5281.07	1931.21	1133.57
T2-3	90.08	55623.67	239.28	3734019.50	4323.14	1597.09	894.81
T2-4	74.64	43299.13	281.44	5007058.50	5661.91	2002.09	1168.37
T2-5	53.56	40998.55	220.88	4158897.80	4607.47	1703.53	922.61
T2-6	54.44	39900.82	207.72	3561172.00	4127.94	1451.65	813.72
T2-7	83.72	50990.25	289.68	2640266.50	3269.42	1275.57	722.00
T2-8	70.16	53023.06	224.52	3074959.30	3687.38	1301.49	749.88
T2-9	57.96	53215.02	222.44	2491299.30	3156.46	1137.29	621.56
T2-10	93.44	43413.32	209.16	196494.67	481.84	333.16	178.56
T2-11	51.64	45865.90	128.64	209028.94	434.68	253.00	112.88
T2-12	31.04	47491.63	139.76	215272.61	394.60	213.12	122.68
T2-13	199.00	46064.02	403.76	158683.56	428.60	407.80	237.72
T2-14	54.24	47985.47	153.40	156635.69	352.44	248.40	110.20
T2-15	54.08	49591.24	187.44	171200.08	371.56	236.32	111.28
T2-16	178.28	53277.74	536.32	207102.38	503.08	534.80	310.60
T2-17	67.64	57086.24	215.16	208143.94	481.80	298.64	151.92
T2-18	62.92	59628.02	144.68	230218.27	474.80	311.60	177.08
SRM614-10	502.24	63995.60	911.53	3491.02	635.32	886.89	1052.49
SRM612-10	23895.85	74070.50	68015.18	43744.00	36702.41	50896.25	63265.56
SRM610-10	151280.69	50179.04	400073.38	322597.22	283393.31	380020.53	504112.59
AP1-10	639.60	68331.66	466.64	34346.51	85.52	96.48	48.64
AP2-10	2042.81	72377.09	386.64	85071.40	2283.45	2861.70	3485.78
AP3-10	8261.17	78152.92	540.64	333790.59	10471.58	16832.33	17968.74
AP4-10	13868.72	75719.95	1338.29	522775.75	16375.93	26540.15	28533.60
blank-10	38.36	22835.49	120.52	336.68	4.84	51.56	22.80
blank average	23.92	20563.76	112.42	183.20	5.04	32.40	17.74

blank subtraction							
SRM614-9	584.60	19960.47	1231.79	4842.75	586.08	826.08	1135.79
SRM612-9	26708.75	27390.83	92402.26	74241.22	35851.04	50543.12	69696.17
SRM610-9	140752.47	19295.95	477146.46	421835.14	253153.94	338087.60	511286.57
AP1-9	1027.85	34931.64	1004.63	90095.70	392.44	451.08	444.70
AP2-9	3063.42	42359.16	811.22	165436.41	2933.26	3984.10	4881.33
AP3-9	11547.23	47113.10	899.59	503559.27	12040.19	19856.47	22581.75
AP4-9	17087.74	49034.20	2029.07	729115.49	18877.99	29485.77	35474.10
T2-1	185.92	33685.71	272.22	5058058.80	5581.59	2034.53	1169.91
T2-2	57.44	33403.75	241.50	4745072.30	5276.03	1898.81	1115.83
T2-3	66.16	35059.92	126.86	3733836.30	4318.10	1564.69	877.06
T2-4	50.72	22735.37	169.02	5006875.30	5656.87	1969.69	1150.63
T2-5	29.64	20434.80	108.46	4158714.60	4602.43	1671.13	904.87
T2-6	30.52	19337.07	95.30	3560988.80	4122.90	1419.25	795.98
T2-7	59.80	30426.49	177.26	2640083.30	3264.38	1243.17	704.26
T2-8	46.24	32459.30	112.10	3074776.10	3682.34	1269.09	732.14
T2-9	34.04	32651.26	110.02	2491116.10	3151.42	1104.89	603.82
T2-10	69.52	22849.57	96.74	196311.47	476.80	300.76	160.82
T2-11	27.72	25302.14	16.22	208845.74	429.64	220.60	95.14
T2-12	7.12	26927.87	27.34	215089.41	389.56	180.72	104.94
T2-13	175.08	25500.26	291.34	158500.36	423.56	375.40	219.98
T2-14	30.32	27421.71	40.98	156452.49	347.40	216.00	92.46
T2-15	30.16	29027.48	75.02	171016.88	366.52	203.92	93.54

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	154.36	32713.98	423.90	206919.18	498.04	502.40	292.86
T2-17	43.72	36522.49	102.74	207960.74	476.76	266.24	134.18
T2-18	39.00	39064.26	32.26	230035.07	469.76	279.20	159.34
SRM614-10	478.32	43431.85	799.10	3307.82	630.28	854.48	1034.75
SRM612-10	23871.93	53506.74	67902.76	43560.80	36697.37	50863.85	63247.81
SRM610-10	151256.77	29615.29	399960.96	322414.02	283388.27	379988.13	504094.85
AP1-10	615.68	47767.91	354.22	34163.31	80.48	64.08	30.90
AP2-10	2018.89	51813.33	274.22	84888.20	2278.41	2829.30	3468.04
AP3-10	8237.25	57589.17	428.22	333607.39	10466.54	16799.93	17951.00
AP4-10	13844.80	55156.19	1225.87	522592.55	16370.89	26507.75	28515.86
zero correction							
SRM614-9	584.60	19960.47	1231.79	4842.75	586.08	826.08	1135.79
SRM612-9	26708.75	27390.83	92402.26	74241.22	35851.04	50543.12	69696.17
SRM610-9	140752.47	19295.95	477146.46	421835.14	253153.94	338087.60	511286.57
AP1-9	1027.85	34931.64	1004.63	90095.70	392.44	451.08	444.70
AP2-9	3063.42	42359.16	811.22	165436.41	2933.26	3984.10	4881.33
AP3-9	11547.23	47113.10	899.59	503559.27	12040.19	19856.47	22581.75
AP4-9	17087.74	49034.20	2029.07	729115.49	18877.99	29485.77	35474.10
T2-1	185.92	33685.71	272.22	5058058.80	5581.59	2034.53	1169.91
T2-2	57.44	33403.75	241.50	4745072.30	5276.03	1898.81	1115.83
T2-3	66.16	35059.92	126.86	3733836.30	4318.10	1564.69	877.06
T2-4	50.72	22735.37	169.02	5006875.30	5656.87	1969.69	1150.63
T2-5	29.64	20434.80	108.46	4158714.60	4602.43	1671.13	904.87
T2-6	30.52	19337.07	95.30	3560988.80	4122.90	1419.25	795.98
T2-7	59.80	30426.49	177.26	2640083.30	3264.38	1243.17	704.26
T2-8	46.24	32459.30	112.10	3074776.10	3682.34	1269.09	732.14
T2-9	34.04	32651.26	110.02	2491116.10	3151.42	1104.89	603.82
T2-10	69.52	22849.57	96.74	196311.47	476.80	300.76	160.82
T2-11	27.72	25302.14	16.22	208845.74	429.64	220.60	95.14
T2-12	7.12	26927.87	27.34	215089.41	389.56	180.72	104.94
T2-13	175.08	25500.26	291.34	158500.36	423.56	375.40	219.98
T2-14	30.32	27421.71	40.98	156452.49	347.40	216.00	92.46
T2-15	30.16	29027.48	75.02	171016.88	366.52	203.92	93.54
T2-16	154.36	32713.98	423.90	206919.18	498.04	502.40	292.86
T2-17	43.72	36522.49	102.74	207960.74	476.76	266.24	134.18
T2-18	39.00	39064.26	32.26	230035.07	469.76	279.20	159.34
SRM614-10	478.32	43431.85	799.10	3307.82	630.28	854.48	1034.75
SRM612-10	23871.93	53506.74	67902.76	43560.80	36697.37	50863.85	63247.81
SRM610-10	151256.77	29615.29	399960.96	322414.02	283388.27	379988.13	504094.85
AP1-10	615.68	47767.91	354.22	34163.31	80.48	64.08	30.90
AP2-10	2018.89	51813.33	274.22	84888.20	2278.41	2829.30	3468.04
AP3-10	8237.25	57589.17	428.22	333607.39	10466.54	16799.93	17951.00
AP4-10	13844.80	55156.19	1225.87	522592.55	16370.89	26507.75	28515.86
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-9	0.000218	0.007435	0.000459	0.001804	0.000218	0.000308	0.000423
SRM612-9	0.008827	0.009053	0.030539	0.024537	0.011849	0.016705	0.023035
SRM610-9	0.106012	0.014533	0.359376	0.317717	0.190670	0.254640	0.385089
AP1-9	0.000056	0.001906	0.000055	0.004916	0.000021	0.000025	0.000024
AP2-9	0.000165	0.002280	0.000044	0.008905	0.000158	0.000214	0.000263
AP3-9	0.000626	0.002554	0.000049	0.027294	0.000653	0.001076	0.001224
AP4-9	0.000921	0.002643	0.000109	0.039306	0.001018	0.001590	0.001912
T2-1	0.000008	0.001524	0.000012	0.228865	0.000253	0.000092	0.000053
T2-2	0.000003	0.001718	0.000012	0.244035	0.000271	0.000098	0.000057
T2-3	0.000004	0.002152	0.000008	0.229214	0.000265	0.000096	0.000054
T2-4	0.000003	0.001282	0.000010	0.282258	0.000319	0.000111	0.000065
T2-5	0.000002	0.001286	0.000007	0.261794	0.000290	0.000105	0.000057
T2-6	0.000002	0.001373	0.000007	0.252812	0.000293	0.000101	0.000057
T2-7	0.000004	0.001854	0.000011	0.160874	0.000199	0.000076	0.000043

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000003	0.001928	0.000007	0.182673	0.000219	0.000075	0.000043
T2-9	0.000002	0.002011	0.000007	0.153399	0.000194	0.000068	0.000037
T2-10	0.000009	0.003036	0.000013	0.026083	0.000063	0.000040	0.000021
T2-11	0.000003	0.002946	0.000002	0.024319	0.000050	0.000026	0.000011
T2-12	0.000001	0.002922	0.000003	0.023341	0.000042	0.000020	0.000011
T2-13	0.000018	0.002567	0.000029	0.015957	0.000043	0.000038	0.000022
T2-14	0.000003	0.002553	0.000004	0.014567	0.000032	0.000020	0.000009
T2-15	0.000003	0.002532	0.000007	0.014920	0.000032	0.000018	0.000008
T2-16	0.000011	0.002293	0.000030	0.014501	0.000035	0.000035	0.000021
T2-17	0.000003	0.002322	0.000007	0.013221	0.000030	0.000017	0.000009
T2-18	0.000002	0.002294	0.000002	0.013507	0.000028	0.000016	0.000009
SRM614-10	0.000256	0.023273	0.000428	0.001773	0.000338	0.000458	0.000554
SRM612-10	0.011229	0.025168	0.031940	0.020490	0.017261	0.023925	0.029750
SRM610-10	0.146568	0.028697	0.387564	0.312420	0.274604	0.368210	0.488470
AP1-10	0.000045	0.003463	0.000026	0.002477	0.000006	0.000005	0.000002
AP2-10	0.000142	0.003633	0.000019	0.005952	0.000160	0.000198	0.000243
AP3-10	0.000590	0.004122	0.000031	0.023881	0.000749	0.001203	0.001285
AP4-10	0.000983	0.003918	0.000087	0.037122	0.001163	0.001883	0.002026
standardize signal averages AP							
AP1	0.000050	0.002684	0.000040	0.003696	0.000014	0.000015	0.000013
AP2	0.000153	0.002956	0.000031	0.007428	0.000159	0.000206	0.000253
AP3	0.000608	0.003338	0.000040	0.025587	0.000701	0.001139	0.001254
AP4	0.000952	0.003281	0.000098	0.038214	0.001090	0.001736	0.001969
linest from std sig ave							
	0.017044	0.045394	0.019952	0.007004	0.012594	0.007901	0.007027
standardize signal averages SRM							
srm614-2	0.000237	0.015354	0.000444	0.001788	0.000278	0.000383	0.000489
srm612-2	0.010028	0.017110	0.031239	0.022513	0.014555	0.020315	0.026392
srm610-2	0.126290	0.021615	0.373470	0.315068	0.232637	0.311425	0.436780
linest from std sig ave							
	0.034090	0.000000	0.011297	0.015715	0.022948	0.016788	0.011492
concentration data							
SRM614-9	0.32	28.95	0.79	1.08	0.24	0.21	0.25
SRM612-9	12.90	35.24	52.26	14.74	12.80	11.32	13.88
SRM610-9	154.96	56.58	614.94	190.85	205.95	172.54	232.07
AP1-9	0.38	34.51	0.44	13.74	0.11	0.08	0.07
AP2-9	1.12	41.29	0.35	24.88	0.79	0.68	0.74
AP3-9	4.26	46.25	0.39	76.27	3.28	3.39	3.43
AP4-9	6.26	47.87	0.87	109.83	5.11	5.01	5.36
T2-1	0.06	27.60	0.10	639.50	1.27	0.29	0.15
T2-2	0.02	31.11	0.10	681.89	1.36	0.31	0.16
T2-3	0.03	38.98	0.06	640.47	1.33	0.30	0.15
T2-4	0.02	23.21	0.08	788.69	1.60	0.35	0.18
T2-5	0.01	23.30	0.05	731.51	1.46	0.33	0.16
T2-6	0.01	24.86	0.05	706.41	1.47	0.32	0.16
T2-7	0.02	33.58	0.09	449.52	1.00	0.24	0.12
T2-8	0.02	34.92	0.05	510.43	1.10	0.24	0.12
T2-9	0.01	36.41	0.05	428.63	0.98	0.21	0.10
T2-10	0.06	54.98	0.10	72.88	0.32	0.13	0.06
T2-11	0.02	53.36	0.02	67.95	0.25	0.08	0.03
T2-12	0.01	52.92	0.02	65.22	0.21	0.06	0.03
T2-13	0.12	46.49	0.23	44.59	0.21	0.12	0.06
T2-14	0.02	46.24	0.03	40.70	0.16	0.06	0.02
T2-15	0.02	45.86	0.05	41.69	0.16	0.06	0.02
T2-16	0.07	41.52	0.24	40.52	0.18	0.11	0.06
T2-17	0.02	42.05	0.05	36.94	0.15	0.05	0.02
T2-18	0.02	41.54	0.02	37.74	0.14	0.05	0.03
SRM614-10	0.37	90.61	0.73	1.06	0.36	0.31	0.33
SRM612-10	16.41	97.98	54.65	12.31	18.64	16.21	17.93
SRM610-10	214.24	111.72	663.17	187.67	296.61	249.50	294.37
AP1-10	0.30	62.71	0.20	6.92	0.03	0.01	0.01
AP2-10	0.96	65.79	0.15	16.63	0.80	0.63	0.68
AP3-10	4.01	74.65	0.24	66.73	3.76	3.79	3.60
AP4-10	6.69	70.95	0.69	103.73	5.84	5.93	5.68
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-1	12.64	38765.18	66.40	419.24	6.16	20.04	7.36
SRM614-1	448.44	53970.90	1527.33	7719.68	375.88	472.52	640.32
SRM612-1	17656.34	54809.07	82389.42	90049.59	13685.96	18943.91	26839.23
SRM610-1	99878.81	53641.50	382339.44	353685.75	85284.52	113583.32	181173.22
AP1-1	368.40	52703.22	462.04	28671.76	137.12	249.24	122.56
AP2-1	2135.37	58303.37	884.25	122161.41	1385.05	2351.25	2169.37
AP3-1	18681.15	63614.12	853.72	738991.31	10672.66	18715.39	21689.52
AP4-1	9727.57	64032.44	1508.37	418935.47	6762.72	9952.10	13063.95
41LU1-REDO-1	196.40	55503.47	242.52	137523.89	777.16	2326.73	336.80
41LU1-REDO-2	183.20	58158.89	182.56	135163.20	327.60	316.56	109.36
41LU1-REDO-3	165.84	61045.70	149.56	143652.61	363.28	234.24	102.48
41LU1-REDO-4	102.56	58814.61	198.36	101172.77	280.12	298.68	115.28
41LU1-REDO-5	141.76	60324.86	128.00	169951.16	305.60	220.00	74.48
41LU1-REDO-6	95.56	59936.54	130.40	106110.20	219.88	150.52	65.60
41LU1-REDO-7	110.20	60416.46	179.04	88930.98	225.28	258.20	96.80
41LU1REDO-8	81.72	61108.66	128.20	90819.03	221.64	159.36	68.36
41LU1-REDO-9	110.76	60683.70	117.08	87945.73	207.64	155.84	66.24
41LU1REDO-10	135.08	62626.19	159.24	109996.26	381.08	662.80	121.20
41LU1-REDO-11	114.92	62337.03	130.48	106602.20	285.60	678.00	74.36
41LU1REDO-12	89.08	60825.38	91.84	87204.33	221.00	451.04	71.76
41LU1-REDO-13	91.96	58781.93	118.32	74343.42	324.84	593.48	128.76
41LU1-REDO-14	101.16	61160.91	96.04	78733.73	298.64	485.48	107.44
41LU1-REDO-15	96.08	62848.63	112.84	87678.34	320.92	378.20	111.36
SRM614-2	571.96	88397.30	1413.13	6346.44	530.60	720.20	788.44
SRM612-2	22450.69	89904.15	77854.44	47765.55	20636.40	28985.00	40168.39
SRM610-2	141172.72	77831.84	395914.22	303599.31	143067.28	190149.67	291088.03
AP1-2	377.32	73470.93	364.08	20336.43	69.00	67.76	33.24
AP2-2	1955.81	78869.77	318.08	83801.43	1285.97	1784.25	2080.57
AP3-2	12719.91	88911.86	476.16	452465.94	9112.33	15750.13	17930.78
AP4-2	9789.82	89214.10	1105.81	374315.44	8124.13	11651.47	14772.32
blank-2	12.20	63242.76	88.36	135.64	4.36	17.80	6.60
blank average	12.42	51003.97	77.38	277.44	5.26	18.92	6.98
blank subtraction							
SRM614-1	436.02	2966.93	1449.95	7442.24	370.62	453.60	633.34
SRM612-1	17643.92	3805.10	82312.04	89772.14	13680.70	18924.99	26832.25
SRM610-1	99866.38	2637.53	382262.06	353408.31	85279.26	113564.40	181166.24
AP1-1	355.98	1699.25	384.66	28394.32	131.86	230.32	115.58
AP2-1	2122.95	7299.40	806.86	121883.97	1379.79	2332.33	2162.39
AP3-1	18668.72	12610.15	776.34	738713.87	10667.40	18696.46	21682.54
AP4-1	9715.15	13028.47	1430.99	418658.03	6757.46	9933.18	13056.97
41LU1-REDO-1	183.98	4499.50	165.14	137246.45	771.90	2307.81	329.82
41LU1-REDO-2	170.78	7154.92	105.18	134885.76	322.34	297.64	102.38
41LU1-REDO-3	153.42	10041.73	72.18	143375.17	358.02	215.32	95.50
41LU1-REDO-4	90.14	7810.64	120.98	100895.33	274.86	279.76	108.30
41LU1-REDO-5	129.34	9320.89	50.62	169673.72	300.34	201.08	67.50
41LU1-REDO-6	83.14	8932.57	53.02	105832.76	214.62	131.60	58.62
41LU1-REDO-7	97.78	9412.49	101.66	88653.54	220.02	239.28	89.82
41LU1REDO-8	69.30	10104.70	50.82	90541.59	216.38	140.44	61.38
41LU1-REDO-9	98.34	9679.73	39.70	87668.29	202.38	136.92	59.26
41LU1REDO-10	122.66	11622.22	81.86	109718.82	375.82	643.88	114.22
41LU1-REDO-11	102.50	11333.06	53.10	106324.76	280.34	659.08	67.38
41LU1REDO-12	76.66	9821.41	14.46	86926.89	215.74	432.12	64.78
41LU1-REDO-13	79.54	7777.96	40.94	74065.98	319.58	574.56	121.78
41LU1-REDO-14	88.74	10156.94	18.66	78456.29	293.38	466.56	100.46
41LU1-REDO-15	83.66	11844.66	35.46	87400.89	315.66	359.28	104.38
SRM614-2	559.54	37393.33	1335.75	6068.99	525.34	701.28	781.46
SRM612-2	22438.27	38900.18	77777.06	47488.11	20631.14	28966.08	40161.41
SRM610-2	141160.30	26827.87	395836.84	303321.87	143062.02	190130.75	291081.05
AP1-2	364.90	22466.96	286.70	20058.99	63.74	48.84	26.26
AP2-2	1943.39	27865.80	240.70	83523.99	1280.71	1765.33	2073.59
AP3-2	12707.49	37907.89	398.78	452188.50	9107.07	15731.21	17923.80
AP4-2	9777.40	38210.13	1028.43	374038.00	8118.87	11632.55	14765.34
zero correction							
SRM614-1	436.02	2966.93	1449.95	7442.24	370.62	453.60	633.34
SRM612-1	17643.92	3805.10	82312.04	89772.14	13680.70	18924.99	26832.25
SRM610-1	99866.38	2637.53	382262.06	353408.31	85279.26	113564.40	181166.24
AP1-1	355.98	1699.25	384.66	28394.32	131.86	230.32	115.58
AP2-1	2122.95	7299.40	806.86	121883.97	1379.79	2332.33	2162.39
AP3-1	18668.72	12610.15	776.34	738713.87	10667.40	18696.46	21682.54
AP4-1	9715.15	13028.47	1430.99	418658.03	6757.46	9933.18	13056.97
41LU1-REDO-1	183.98	4499.50	165.14	137246.45	771.90	2307.81	329.82
41LU1-REDO-2	170.78	7154.92	105.18	134885.76	322.34	297.64	102.38
41LU1-REDO-3	153.42	10041.73	72.18	143375.17	358.02	215.32	95.50

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	90.14	7810.64	120.98	100895.33	274.86	279.76	108.30
41LU1-REDO-5	129.34	9320.89	50.62	169673.72	300.34	201.08	67.50
41LU1-REDO-6	83.14	8932.57	53.02	105832.76	214.62	131.60	58.62
41LU1-REDO-7	97.78	9412.49	101.66	88653.54	220.02	239.28	89.82
41LU1REDO-8	69.30	10104.70	50.82	90541.59	216.38	140.44	61.38
41LU1-REDO-9	98.34	9679.73	39.70	87668.29	202.38	136.92	59.26
41LU1REDO-10	122.66	11622.22	81.86	109718.82	375.82	643.88	114.22
41LU1-REDO-11	102.50	11333.06	53.10	106324.76	280.34	659.08	67.38
41LU1REDO-12	76.66	9821.41	14.46	86926.89	215.74	432.12	64.78
41LU1-REDO-13	79.54	7777.96	40.94	74065.98	319.58	574.56	121.78
41LU1-REDO-14	88.74	10156.94	18.66	78456.29	293.38	466.56	100.46
41LU1-REDO-15	83.66	11844.66	35.46	87400.89	315.66	359.28	104.38
SRM614-2	559.54	37393.33	1335.75	6068.99	525.34	701.28	781.46
SRM612-2	22438.27	38900.18	77777.06	47488.11	20631.14	28966.08	40161.41
SRM610-2	141160.30	26827.87	395836.84	303321.87	143062.02	190130.75	291081.05
AP1-2	364.90	22466.96	286.70	20058.99	63.74	48.84	26.26
AP2-2	1943.39	27865.80	240.70	83523.99	1280.71	1765.33	2073.59
AP3-2	12707.49	37907.89	398.78	452188.50	9107.07	15731.21	17923.80
AP4-2	9777.40	38210.13	1028.43	374038.00	8118.87	11632.55	14765.34

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-1	0.000136	0.000924	0.000451	0.002317	0.000115	0.000141	0.000197
SRM612-1	0.005948	0.001283	0.027748	0.030263	0.004612	0.006380	0.009045
SRM610-1	0.069464	0.001835	0.265888	0.245818	0.059317	0.078991	0.126013
AP1-1	0.000039	0.000187	0.000042	0.003120	0.000014	0.000025	0.000013
AP2-1	0.000140	0.000480	0.000053	0.008015	0.000091	0.000153	0.000142
AP3-1	0.000852	0.000575	0.000035	0.033695	0.000487	0.000853	0.000989
AP4-1	0.000650	0.000871	0.000096	0.028002	0.000452	0.000664	0.000873
41LU1-REDO-1	0.000033	0.000802	0.000029	0.024466	0.000138	0.000411	0.000059
41LU1-REDO-2	0.000025	0.001053	0.000015	0.019850	0.000047	0.000044	0.000015
41LU1-REDO-3	0.000019	0.001261	0.000009	0.018011	0.000045	0.000027	0.000012
41LU1-REDO-4	0.000018	0.001582	0.000024	0.020432	0.000056	0.000057	0.000022
41LU1-REDO-5	0.000022	0.001581	0.000009	0.028787	0.000051	0.000034	0.000011
41LU1-REDO-6	0.000015	0.001665	0.000010	0.019729	0.000040	0.000025	0.000011
41LU1-REDO-7	0.000024	0.002305	0.000025	0.021709	0.000054	0.000059	0.000022
41LU1REDO-8	0.000016	0.002306	0.000012	0.020666	0.000049	0.000032	0.000014
41LU1-REDO-9	0.000023	0.002285	0.000009	0.020696	0.000048	0.000032	0.000014
41LU1REDO-10	0.000026	0.002454	0.000017	0.023170	0.000079	0.000136	0.000024
41LU1-REDO-11	0.000022	0.002459	0.000012	0.023068	0.000061	0.000143	0.000015
41LU1REDO-12	0.000018	0.002330	0.000003	0.020623	0.000051	0.000103	0.000015
41LU1-REDO-13	0.000018	0.001806	0.000010	0.017197	0.000074	0.000133	0.000028
41LU1-REDO-14	0.000019	0.002118	0.000004	0.016359	0.000061	0.000097	0.000021
41LU1-REDO-15	0.000014	0.001973	0.000006	0.014556	0.000053	0.000060	0.000017
SRM614-2	0.000193	0.012875	0.000460	0.002090	0.000181	0.000241	0.000269
SRM612-2	0.007937	0.013760	0.027513	0.016798	0.007298	0.010246	0.014207
SRM610-2	0.104502	0.019861	0.293040	0.224550	0.105909	0.140755	0.215489
AP1-2	0.000037	0.002247	0.000029	0.002006	0.000006	0.000005	0.000003
AP2-2	0.000122	0.001749	0.000015	0.005242	0.000080	0.000111	0.000130
AP3-2	0.000586	0.001748	0.000018	0.020856	0.000420	0.000726	0.000827
AP4-2	0.000597	0.002333	0.000063	0.022840	0.000496	0.000710	0.000902

standardize signal averages AP							
AP1	0.000038	0.001217	0.000035	0.002563	0.000010	0.000015	0.000008
AP2	0.000131	0.001114	0.000034	0.006629	0.000086	0.000132	0.000136
AP3	0.000719	0.001162	0.000027	0.027275	0.000453	0.000789	0.000908
AP4	0.000623	0.001602	0.000079	0.025421	0.000474	0.000687	0.000887

linest from std sig ave							
	0.019490	0.114422	0.024551	0.008466	0.024224	0.014855	0.012478

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srm614-2	0.000164	0.006900	0.000456	0.002204	0.000148	0.000191	0.000233
srm612-2	0.006943	0.007522	0.027630	0.023530	0.005955	0.008313	0.011626
srm610-2	0.086983	0.010848	0.279464	0.235184	0.082613	0.109873	0.170751

linest from std sig ave							
	0.049494	0.000000	0.015082	0.021003	0.064586	0.047558	0.029386

concentration data							
SRM614-1	0.23	9.07	0.95	1.68	0.24	0.18	0.21
SRM612-1	9.94	12.59	58.42	21.97	9.58	8.13	9.68
SRM610-1	116.11	18.00	559.84	178.48	123.23	100.64	134.86
AP1-1	0.30	8.52	0.41	10.54	0.14	0.15	0.06
AP2-1	1.09	21.91	0.52	27.07	0.88	0.91	0.71
AP3-1	6.62	26.26	0.35	113.80	4.70	5.05	4.92
AP4-1	5.05	39.78	0.94	94.57	4.37	3.94	4.35
41LU1-REDO-1	0.25	36.61	0.29	82.63	1.33	2.44	0.29
41LU1-REDO-2	0.20	48.06	0.15	67.04	0.46	0.26	0.08
41LU1-REDO-3	0.15	57.58	0.09	60.83	0.43	0.16	0.06
41LU1-REDO-4	0.14	72.20	0.24	69.01	0.54	0.34	0.11
41LU1-REDO-5	0.17	72.19	0.08	97.23	0.49	0.20	0.06
41LU1-REDO-6	0.12	76.01	0.10	66.63	0.39	0.15	0.05
41LU1-REDO-7	0.19	105.21	0.24	73.32	0.52	0.35	0.11
41LU1REDO-8	0.12	105.28	0.11	69.80	0.48	0.19	0.07
41LU1-REDO-9	0.18	104.31	0.09	69.90	0.46	0.19	0.07
41LU1REDO-10	0.20	112.03	0.17	78.25	0.77	0.81	0.12
41LU1-REDO-11	0.17	112.24	0.11	77.91	0.59	0.85	0.07
41LU1REDO-12	0.14	106.36	0.03	69.65	0.49	0.61	0.08
41LU1-REDO-13	0.14	82.44	0.09	58.08	0.72	0.79	0.14
41LU1-REDO-14	0.14	96.67	0.04	55.25	0.59	0.58	0.10
41LU1-REDO-15	0.11	90.04	0.06	49.16	0.51	0.35	0.09
SRM614-2	0.32	126.35	0.97	1.52	0.38	0.31	0.29
SRM612-2	13.27	135.03	57.93	12.20	15.16	13.05	15.20
SRM610-2	174.67	194.90	617.01	163.04	220.03	179.32	230.61
AP1-2	0.28	102.59	0.28	6.78	0.06	0.03	0.01
AP2-2	0.95	79.83	0.15	17.70	0.78	0.66	0.65
AP3-2	4.56	79.81	0.18	70.44	4.06	4.30	4.12
AP4-2	4.64	106.50	0.62	77.14	4.79	4.21	4.49

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-17	11.28	24319.50	114.12	1858.41	68.72	156.08	31.16
SRM614-17	293.36	37738.33	980.97	2939.26	224.60	421.12	382.04
SRM612-17	18138.98	43418.61	82607.23	36509.52	12686.75	20691.72	26051.83
SRM610-17	106330.23	35873.04	374393.38	249042.48	91927.36	123156.34	193181.97
AP1-17	491.48	43648.29	651.80	38256.70	1021.25	6860.84	743.28
AP2-17	1627.97	43485.41	588.76	86915.57	1616.41	5319.67	1895.41
AP3-17	5610.11	46729.58	961.97	270694.72	5398.31	11413.06	7294.68
AP4-17	5946.67	45591.66	955.41	247405.31	5180.43	9245.29	9238.61
41LU1-1	271.48	38435.70	248.20	151367.94	18768.03	52999.78	10556.18
41LU1-2	279.44	40402.31	315.28	193553.02	37942.25	122508.80	20521.56
41LU1-3	196.80	37927.73	194.24	108724.30	11218.58	29847.37	6226.00
41LU1-4	348.00	41156.71	158.24	338632.59	72123.84	230565.02	33861.87
41LU1-5	287.20	39089.14	130.12	180425.45	31178.90	98297.71	15742.01
41LU1-6	335.28	38891.74	150.20	198375.19	36349.21	117685.42	17667.86
41LU1-7	1572.57	104789.51	246.60	4404122.00	750670.31	2570753.80	306231.66
41LU1-8	944.17	71677.48	152.40	1409082.00	174026.86	569473.38	67209.77
41LU1-9	1061.89	76242.75	126.68	1557729.60	204267.52	624397.94	79354.73
41LU1-10	1928.69	102260.49	209.04	3471338.00	366476.69	1815994.00	142656.69
41LU1-11	2560.57	160512.38	245.84	7164973.00	1188406.80	5196598.00	465540.59
41LU1-12	2446.73	147967.95	215.60	6033086.50	979745.75	4472890.50	380371.50
SRM614-18	407.76	74104.62	978.53	3034.94	319.40	695.48	582.40
SRM612-18	25668.18	80161.85	81983.50	39347.46	20355.36	32270.78	39887.98
SRM610-18	176792.16	71749.36	441421.00	350900.09	194201.89	262583.16	395548.84
AP1-18	545.40	74399.38	447.28	33231.07	153.32	228.44	53.80
AP2-18	1687.41	72595.93	308.64	72778.25	1200.97	1704.29	1955.97
AP3-18	7262.92	77480.67	350.64	216693.86	5309.19	8593.73	9836.34
AP4-18	5585.63	79556.09	630.88	249787.28	6452.00	9073.89	11619.95
blank-18	16.52	38227.18	47.80	711.72	17.96	51.40	13.64

Appendix A. Raw trace element datasheets from laser ablation.

blank average	13.90	31273.34	80.96	1285.07	43.34	103.74	22.40
blank subtraction							
SRM614-17	279.46	6465.00	900.01	1654.19	181.26	317.38	359.64
SRM612-17	18125.08	12145.27	82526.27	35224.46	12643.41	20587.98	26029.43
SRM610-17	106316.33	4599.71	374312.42	247757.41	91884.02	123052.60	193159.57
AP1-17	477.58	12374.95	570.84	36971.63	977.91	6757.10	720.88
AP2-17	1614.07	12212.07	507.80	85630.50	1573.07	5215.93	1873.01
AP3-17	5596.21	15456.25	881.00	269409.65	5354.97	11309.32	7272.28
AP4-17	5932.77	14318.32	874.44	246120.24	5137.09	9141.55	9216.21
41LU1-1	257.58	7162.36	167.24	150082.87	18724.68	52896.04	10533.78
41LU1-2	265.54	9128.97	234.32	192267.95	37898.91	122405.06	20499.15
41LU1-3	182.90	6654.40	113.28	107439.23	11175.24	29743.63	6203.59
41LU1-4	334.10	9883.37	77.28	337347.52	72080.50	230461.28	33839.47
41LU1-5	273.30	7815.80	49.16	179140.38	31135.56	98193.97	15719.61
41LU1-6	321.38	7618.40	69.24	197090.12	36305.87	117581.68	17645.46
41LU1-7	1558.67	73516.17	165.64	4402836.93	750626.97	2570650.06	306209.26
41LU1-8	930.27	40404.15	71.44	1407796.93	173983.52	569369.64	67187.37
41LU1-9	1047.99	44969.41	45.72	1556444.53	204224.18	624294.20	79332.33
41LU1-10	1914.79	70987.15	128.08	3470052.93	366433.35	1815890.26	142634.29
41LU1-11	2546.67	129239.04	164.88	7163687.93	1188363.46	5196494.26	465518.19
41LU1-12	2432.83	116694.61	134.64	6031801.43	979702.41	4472786.76	380349.10
SRM614-18	393.86	42831.28	897.57	1749.87	276.06	591.74	560.00
SRM612-18	25654.28	48888.52	81902.54	38062.39	20312.01	32167.04	39865.58
SRM610-18	176778.26	40476.02	441340.04	349615.02	194158.55	262479.42	395526.44
AP1-18	531.50	43126.04	366.32	31946.00	109.98	124.70	31.40
AP2-18	1673.51	41322.59	227.68	71493.18	1157.63	1600.55	1933.57
AP3-18	7249.02	46207.34	269.68	215408.79	5265.85	8489.99	9813.93
AP4-18	5571.73	48282.75	549.92	248502.21	6408.66	8970.15	11597.54
zero correction							
SRM614-17	279.46	6465.00	900.01	1654.19	181.26	317.38	359.64
SRM612-17	18125.08	12145.27	82526.27	35224.46	12643.41	20587.98	26029.43
SRM610-17	106316.33	4599.71	374312.42	247757.41	91884.02	123052.60	193159.57
AP1-17	477.58	12374.95	570.84	36971.63	977.91	6757.10	720.88
AP2-17	1614.07	12212.07	507.80	85630.50	1573.07	5215.93	1873.01
AP3-17	5596.21	15456.25	881.00	269409.65	5354.97	11309.32	7272.28
AP4-17	5932.77	14318.32	874.44	246120.24	5137.09	9141.55	9216.21
41LU1-1	257.58	7162.36	167.24	150082.87	18724.68	52896.04	10533.78
41LU1-2	265.54	9128.97	234.32	192267.95	37898.91	122405.06	20499.15
41LU1-3	182.90	6654.40	113.28	107439.23	11175.24	29743.63	6203.59
41LU1-4	334.10	9883.37	77.28	337347.52	72080.50	230461.28	33839.47
41LU1-5	273.30	7815.80	49.16	179140.38	31135.56	98193.97	15719.61
41LU1-6	321.38	7618.40	69.24	197090.12	36305.87	117581.68	17645.46
41LU1-7	1558.67	73516.17	165.64	4402836.93	750626.97	2570650.06	306209.26
41LU1-8	930.27	40404.15	71.44	1407796.93	173983.52	569369.64	67187.37
41LU1-9	1047.99	44969.41	45.72	1556444.53	204224.18	624294.20	79332.33
41LU1-10	1914.79	70987.15	128.08	3470052.93	366433.35	1815890.26	142634.29
41LU1-11	2546.67	129239.04	164.88	7163687.93	1188363.46	5196494.26	465518.19
41LU1-12	2432.83	116694.61	134.64	6031801.43	979702.41	4472786.76	380349.10
SRM614-18	393.86	42831.28	897.57	1749.87	276.06	591.74	560.00
SRM612-18	25654.28	48888.52	81902.54	38062.39	20312.01	32167.04	39865.58
SRM610-18	176778.26	40476.02	441340.04	349615.02	194158.55	262479.42	395526.44
AP1-18	531.50	43126.04	366.32	31946.00	109.98	124.70	31.40
AP2-18	1673.51	41322.59	227.68	71493.18	1157.63	1600.55	1933.57
AP3-18	7249.02	46207.34	269.68	215408.79	5265.85	8489.99	9813.93
AP4-18	5571.73	48282.75	549.92	248502.21	6408.66	8970.15	11597.54
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-17	0.000148	0.003418	0.000476	0.000875	0.000096	0.000168	0.000190

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.007484	0.005015	0.034074	0.014544	0.005220	0.008500	0.010747
SRM610-17	0.090017	0.003895	0.316927	0.209774	0.077797	0.104188	0.163547
AP1-17	0.000036	0.000930	0.000043	0.002779	0.000073	0.000508	0.000054
AP2-17	0.000128	0.000970	0.000040	0.006805	0.000125	0.000415	0.000149
AP3-17	0.000484	0.001337	0.000076	0.023313	0.000463	0.000979	0.000629
AP4-17	0.000546	0.001317	0.000080	0.022632	0.000472	0.000841	0.000847
41LU1-1	0.000039	0.001075	0.000025	0.022516	0.002809	0.007936	0.001580
41LU1-2	0.000042	0.001432	0.000037	0.030161	0.005945	0.019202	0.003216
41LU1-3	0.000034	0.001241	0.000021	0.020029	0.002083	0.005545	0.001156
41LU1-4	0.000061	0.001791	0.000014	0.061131	0.013062	0.041762	0.006132
41LU1-5	0.000063	0.001814	0.000011	0.041580	0.007227	0.022792	0.003649
41LU1-6	0.000082	0.001935	0.000018	0.050067	0.009223	0.029870	0.004483
41LU1-7	0.000106	0.005018	0.000011	0.300554	0.051241	0.175482	0.020903
41LU1-8	0.000089	0.003880	0.000007	0.135187	0.016707	0.054675	0.006452
41LU1-9	0.000100	0.004301	0.000004	0.148863	0.019533	0.059710	0.007588
41LU1-10	0.000130	0.004838	0.000009	0.236488	0.024973	0.123755	0.009721
41LU1-11	0.000127	0.006422	0.000008	0.355979	0.059052	0.258225	0.023133
41LU1-12	0.000128	0.006157	0.000007	0.318236	0.051689	0.235983	0.020067
SRM614-18	0.000232	0.025192	0.000528	0.001029	0.000162	0.000348	0.000329
SRM612-18	0.011619	0.022141	0.037093	0.017238	0.009199	0.014568	0.018055
SRM610-18	0.134134	0.030712	0.334874	0.265276	0.147321	0.199161	0.300112
AP1-18	0.000036	0.002888	0.000025	0.002139	0.000007	0.000008	0.000002
AP2-18	0.000123	0.003027	0.000017	0.005237	0.000085	0.000117	0.000142
AP3-18	0.000542	0.003458	0.000020	0.016120	0.000394	0.000635	0.000734
AP4-18	0.000451	0.003904	0.000044	0.020094	0.000518	0.000725	0.000938

standardize signal averages AP

AP1	0.000036	0.001909	0.000034	0.002459	0.000040	0.000258	0.000028
AP2	0.000125	0.001999	0.000029	0.006021	0.000105	0.000266	0.000145
AP3	0.000513	0.002398	0.000048	0.019717	0.000429	0.000807	0.000682
AP4	0.000498	0.002610	0.000062	0.021363	0.000495	0.000783	0.000893

linest from std sig ave

0.026239	0.062869	0.026865	0.010947	0.024328	0.013128	0.014479
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standardize signal averages SRM

srm614-2	0.000190	0.014305	0.000502	0.000952	0.000129	0.000258	0.000260
srm612-2	0.009551	0.013578	0.035583	0.015891	0.007210	0.011534	0.014401
srm610-2	0.112075	0.017303	0.325901	0.237525	0.112559	0.151674	0.231830

linest from std sig ave

0.038400	0.000000	0.012921	0.020850	0.047425	0.034450	0.021650
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concentration data

SRM614-17	0.33	18.43	1.10	0.82	0.20	0.19	0.24
SRM612-17	16.84	27.04	78.51	13.65	10.89	9.57	13.35
SRM610-17	202.57	21.00	730.20	196.94	162.32	117.31	203.08
AP1-17	0.38	23.33	0.46	12.13	0.71	2.66	0.31
AP2-17	1.34	24.34	0.43	29.72	1.21	2.17	0.86
AP3-17	5.07	33.54	0.82	101.81	4.50	5.13	3.63
AP4-17	5.71	33.02	0.86	98.83	4.58	4.40	4.90
41LU1-1	0.40	26.95	0.27	98.33	27.26	41.56	9.13
41LU1-2	0.44	35.92	0.39	131.71	57.70	100.56	18.57
41LU1-3	0.36	31.11	0.23	87.46	20.22	29.04	6.68
41LU1-4	0.63	44.92	0.15	266.96	126.77	218.72	35.42
41LU1-5	0.66	45.50	0.12	181.58	70.14	119.37	21.07
41LU1-6	0.85	48.54	0.19	218.64	89.51	156.44	25.89
41LU1-7	1.11	125.87	0.12	1312.51	497.30	919.05	120.74
41LU1-8	0.94	97.31	0.07	590.36	162.15	286.35	37.27
41LU1-9	1.05	107.87	0.05	650.08	189.57	312.72	43.83
41LU1-10	1.37	121.34	0.09	1032.74	242.37	648.14	56.15
41LU1-11	1.32	161.07	0.09	1554.55	573.12	1352.40	133.62
41LU1-12	1.34	154.41	0.08	1389.73	501.65	1235.91	115.91
SRM614-18	0.52	135.83	1.22	0.97	0.34	0.39	0.41
SRM612-18	26.15	119.38	85.46	16.18	19.19	16.40	22.42
SRM610-18	301.85	165.59	771.55	249.04	307.38	224.24	372.66
AP1-18	0.37	72.43	0.26	9.34	0.07	0.04	0.01
AP2-18	1.28	75.91	0.18	22.87	0.82	0.61	0.82
AP3-18	5.68	86.73	0.22	70.40	3.82	3.33	4.24
AP4-18	4.72	97.92	0.48	87.75	5.03	3.80	5.42

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-19	37.32	19674.35	217.92	2265.01	35.20	628.08	52.20
SRM614-19	448.36	34761.84	1051.61	8957.17	561.00	1097.09	959.09
SRM612-19	19897.83	39802.47	61606.19	107366.36	25139.18	36885.01	45759.46
SRM610-19	134517.11	40992.39	362579.84	333281.69	201803.22	295190.19	396364.06
AP1-19	496.92	51834.85	685.80	65589.73	660.72	800.68	181.52
AP2-19	1668.25	51307.65	665.68	102371.18	2153.13	3141.22	2760.58
AP3-19	4941.43	64057.08	592.44	237762.30	6946.84	9827.14	11051.78
AP4-19	5726.95	65442.61	877.48	300949.47	9973.90	13216.52	15602.45
THEO-1	80.52	51111.13	659.96	1317870.80	6572.32	7010.96	1343.25
THEO-2	94.92	58756.85	713.64	1708117.10	8697.21	7913.28	1611.77
THEO-2	94.60	62981.15	590.60	696428.44	3038.22	3616.78	770.64
THEO-3	863.56	95273.17	850.56	1629644.40	13034.31	12556.27	2763.42
THEO-4	221.76	111552.84	1344.89	2552639.50	21680.88	37032.21	6018.39
THEO-5	143.96	90014.51	451.32	1340235.30	14007.44	16103.57	4105.10
THEO-6	215.72	109104.30	1085.45	1073433.50	41095.11	78158.60	15139.93
THEO-7	213.68	96466.95	883.92	1077548.50	29594.05	71112.81	12292.63
THEO-8	151.56	89428.10	301.40	1037039.80	9806.34	18600.51	3752.46
THEO-9	160.32	96934.47	444.60	1649893.10	31380.74	83526.19	13503.40
THEO-10	207.08	105362.27	234.28	957046.81	26224.23	44210.89	11505.71
THEO-11	246.44	132376.63	591.00	1018454.00	25351.82	44455.61	10156.58
THEO-12	241.84	140612.75	1075.33	1153922.60	25330.14	44408.01	9435.97
THEO-13	199.16	102765.34	669.16	17265078.00	58186.09	28678.88	9267.01
THEO-14	213.84	101300.49	711.28	12985100.00	64572.84	30464.05	9373.29
THEO-15	287.96	112610.23	1823.17	36081800.00	250780.58	79992.69	25218.90
THEO-16	286.56	136767.61	797.44	1046409.40	37883.13	54015.63	14461.24
THEO-17	342.48	156891.05	749.44	1003061.60	48769.27	73619.30	18602.11
THEO-18	271.64	135547.64	520.32	2188895.30	60483.38	73854.09	20601.08
SRM614-20	487.80	93876.13	908.69	5535.91	486.04	832.44	824.52
SRM612-20	17835.62	93380.69	44880.09	30615.29	22333.73	32048.22	39298.58
SRM610-20	129728.85	85478.36	288076.41	238840.09	199638.69	279478.84	364231.69
AP1-20	404.32	90941.79	655.12	26001.11	93.92	132.04	50.64
AP2-20	1195.65	83653.47	520.76	45286.90	1123.21	1677.17	1808.17
AP3-20	6316.96	92280.44	456.32	225369.23	7326.60	12209.07	12998.59
AP4-20	4837.35	95183.90	668.08	209862.55	8124.29	10841.66	13074.63
blank-20	11.68	76692.15	153.00	2848.62	17.60	55.24	22.48
blank average	24.50	48183.25	185.46	2556.81	26.40	341.66	37.34
blank subtraction							
SRM614-19	423.86	-13421.41	866.14	6400.36	534.60	755.42	921.75
SRM612-19	19873.33	-8380.78	61420.73	104809.55	25112.78	36543.35	45722.12
SRM610-19	134492.61	-7190.86	362394.38	330724.88	201776.82	294848.53	396326.72
AP1-19	472.42	3651.60	500.34	63032.91	634.32	459.02	144.18
AP2-19	1643.75	3124.40	480.22	99814.37	2126.73	2799.56	2723.24
AP3-19	4916.93	15873.83	406.98	235205.49	6920.44	9485.47	11014.44
AP4-19	5702.45	17259.36	692.02	298392.66	9947.50	12874.85	15565.11
THEO-1	56.02	2927.88	474.50	1315313.99	6545.92	6669.30	1305.91
THEO-2	70.42	10573.60	528.18	1705560.29	8670.81	7571.62	1574.43
THEO-2	70.10	14797.90	405.14	693871.63	3011.82	3275.12	733.30
THEO-3	839.06	47089.92	665.10	1627087.59	13007.91	12214.61	2726.08
THEO-4	197.26	63369.59	1159.43	2550082.69	21654.48	36690.55	5981.05
THEO-5	119.46	41831.26	265.86	1337678.49	13981.04	15761.91	4067.76
THEO-6	191.22	60921.05	899.99	1070876.69	41068.71	77816.94	15102.58
THEO-7	189.18	48283.70	698.46	1074991.69	29567.65	70771.14	12255.29
THEO-8	127.06	41244.85	115.94	1034482.99	9779.93	18258.84	3715.12
THEO-9	135.82	48751.22	259.14	1647336.29	31354.34	83184.53	13466.06
THEO-10	182.58	57179.02	48.82	954490.00	26197.83	43869.23	11468.36
THEO-11	221.94	84193.38	405.54	1015897.19	25325.42	44113.95	10119.24
THEO-12	217.34	92429.50	889.86	1151365.79	25303.74	44066.35	9398.63
THEO-13	174.66	54582.09	483.70	17262521.19	58159.69	28337.22	9229.67
THEO-14	189.34	53117.24	525.82	12982543.19	64546.44	30122.39	9335.95
THEO-15	263.46	64426.98	1637.71	36079243.19	250754.18	79651.03	25181.56
THEO-16	262.06	88584.36	611.98	1043852.59	37856.73	53673.96	14423.90
THEO-17	317.98	108707.80	563.98	1000504.79	48742.87	73277.64	18564.76
THEO-18	247.14	87364.39	334.86	2186338.49	60456.98	73512.43	20563.74
SRM614-20	463.30	45692.88	723.22	2979.10	459.64	490.78	787.18
SRM612-20	17811.12	45197.44	44694.63	28058.48	22307.33	31706.56	39261.24
SRM610-20	129704.35	37295.11	287890.95	236283.28	199612.29	279137.18	364194.35
AP1-20	379.82	42758.54	469.66	23444.29	67.52	-209.62	13.30
AP2-20	1171.15	35470.22	335.30	42730.08	1096.81	1335.51	1770.83
AP3-20	6292.46	44097.19	270.86	222812.42	7300.20	11867.41	12961.25
AP4-20	4812.85	47000.65	482.62	207305.74	8097.89	10500.00	13037.29
zero correction							
SRM614-19	423.86	0.00	866.14	6400.36	534.60	755.42	921.75

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	19873.33	0.00	61420.73	104809.55	25112.78	36543.35	45722.12
SRM610-19	134492.61	0.00	362394.38	330724.88	201776.82	294848.53	396326.72
AP1-19	472.42	3651.60	500.34	63032.91	634.32	459.02	144.18
AP2-19	1643.75	3124.40	480.22	99814.37	2126.73	2799.56	2723.24
AP3-19	4916.93	15873.83	406.98	235205.49	6920.44	9485.47	11014.44
AP4-19	5702.45	17259.36	692.02	298392.66	9947.50	12874.85	15565.11
THEO-1	56.02	2927.88	474.50	1315313.99	6545.92	6669.30	1305.91
THEO-2	70.42	10573.60	528.18	1705560.29	8670.81	7571.62	1574.43
THEO-2	70.10	14797.90	405.14	693871.63	3011.82	3275.12	733.30
THEO-3	839.06	47089.92	665.10	1627087.59	13007.91	12214.61	2726.08
THEO-4	197.26	63369.59	1159.43	2550082.69	21654.48	36690.55	5981.05
THEO-5	119.46	41831.26	265.86	1337678.49	13981.04	15761.91	4067.76
THEO-6	191.22	60921.05	899.99	1070876.69	41068.71	77816.94	15102.58
THEO-7	189.18	48283.70	698.46	1074991.69	29567.65	70771.14	12255.29
THEO-8	127.06	41244.85	115.94	1034482.99	9779.93	18258.84	3715.12
THEO-9	135.82	48751.22	259.14	1647336.29	31354.34	83184.53	13466.06
THEO-10	182.58	57179.02	48.82	954490.00	26197.83	43869.23	11468.36
THEO-11	221.94	84193.38	405.54	1015897.19	25325.42	44113.95	10119.24
THEO-12	217.34	92429.50	889.86	1151365.79	25303.74	44066.35	9398.63
THEO-13	174.66	54582.09	483.70	17262521.19	58159.69	28337.22	9229.67
THEO-14	189.34	53117.24	525.82	12982543.19	64546.44	30122.39	9335.95
THEO-15	263.46	64426.98	1637.71	36079243.19	250754.18	79651.03	25181.56
THEO-16	262.06	88584.36	611.98	1043852.59	37856.73	53673.96	14423.90
THEO-17	317.98	108707.80	563.98	1000504.79	48742.87	73277.64	18564.76
THEO-18	247.14	87364.39	334.86	2186338.49	60456.98	73512.43	20563.74
SRM614-20	463.30	45692.88	723.22	2979.10	459.64	490.78	787.18
SRM612-20	17811.12	45197.44	44694.63	28058.48	22307.33	31706.56	39261.24
SRM610-20	129704.35	37295.11	287890.95	236283.28	199612.29	279137.18	364194.35
AP1-20	379.82	42758.54	469.66	23444.29	67.52	0.00	13.30
AP2-20	1171.15	35470.22	335.30	42730.08	1096.81	1335.51	1770.83
AP3-20	6292.46	44097.19	270.86	222812.42	7300.20	11867.41	12961.25
AP4-20	4812.85	47000.65	482.62	207305.74	8097.89	10500.00	13037.29

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-19	0.000236	0.000000	0.000482	0.003562	0.000298	0.000420	0.000513
SRM612-19	0.011077	0.000000	0.034235	0.058419	0.013997	0.020369	0.025485
SRM610-19	0.145540	0.000000	0.392163	0.357892	0.218352	0.319069	0.428883
AP1-19	0.000037	0.000288	0.000039	0.004973	0.000050	0.000036	0.000011
AP2-19	0.000171	0.000326	0.000050	0.010400	0.000222	0.000292	0.000284
AP3-19	0.000368	0.001187	0.000030	0.017586	0.000517	0.000709	0.000824
AP4-19	0.000442	0.001338	0.000054	0.023125	0.000771	0.000998	0.001206
THEO-1	0.000012	0.000640	0.000104	0.287325	0.001430	0.001457	0.000285
THEO-2	0.000011	0.001668	0.000083	0.269094	0.001368	0.001195	0.000248
THEO-2	0.000009	0.001955	0.000054	0.091684	0.000398	0.000433	0.000097
THEO-3	0.000148	0.008309	0.000117	0.287105	0.002295	0.002155	0.000481
THEO-4	0.000032	0.010244	0.000187	0.412248	0.003501	0.005931	0.000967
THEO-5	0.000015	0.005373	0.000034	0.171817	0.001796	0.002025	0.000522
THEO-6	0.000037	0.011782	0.000174	0.207110	0.007943	0.015050	0.002921
THEO-7	0.000029	0.007382	0.000107	0.164348	0.004520	0.010820	0.001874
THEO-8	0.000023	0.007545	0.000021	0.189237	0.001789	0.003340	0.000680
THEO-9	0.000021	0.007573	0.000040	0.255894	0.004871	0.012922	0.002092
THEO-10	0.000026	0.008124	0.000007	0.135617	0.003722	0.006233	0.001629
THEO-11	0.000033	0.012686	0.000061	0.153076	0.003816	0.006647	0.001525
THEO-12	0.000041	0.017389	0.000167	0.216608	0.004760	0.008290	0.001768
THEO-13	0.000029	0.009099	0.000081	2.877660	0.009695	0.004724	0.001539
THEO-14	0.000034	0.009534	0.000094	2.330292	0.011586	0.005407	0.001676
THEO-15	0.000046	0.011180	0.000284	6.260621	0.043512	0.013821	0.004370
THEO-16	0.000049	0.016524	0.000114	0.194713	0.007062	0.010012	0.002691
THEO-17	0.000046	0.015566	0.000081	0.143259	0.006979	0.010492	0.002658
THEO-18	0.000036	0.012846	0.000049	0.321479	0.008890	0.010809	0.003024

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000309	0.030438	0.000482	0.001984	0.000306	0.000327	0.000524
SRM612-20	0.012955	0.032873	0.032508	0.020408	0.016225	0.023061	0.028556
SRM610-20	0.168136	0.048346	0.373193	0.306294	0.258758	0.361846	0.472105
AP1-20	0.000035	0.003983	0.000044	0.002184	0.000006	0.000000	0.000001
AP2-20	0.000151	0.004567	0.000043	0.005502	0.000141	0.000172	0.000228
AP3-20	0.000503	0.003526	0.000022	0.017816	0.000584	0.000949	0.001036
AP4-20	0.000446	0.004354	0.000045	0.019202	0.000750	0.000973	0.001208

standardize signal averages AP

AP1	0.000036	0.002135	0.000042	0.003579	0.000028	0.000018	0.000006
AP2	0.000161	0.002446	0.000047	0.007951	0.000181	0.000232	0.000256
AP3	0.000435	0.002356	0.000026	0.017701	0.000551	0.000829	0.000930
AP4	0.000444	0.002846	0.000049	0.021163	0.000760	0.000985	0.001207

linest from std sig ave

	0.029927	0.058255	0.029609	0.011352	0.017123	0.012461	0.010622
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standardize signal averages SRM

srm614-2	0.000272	0.015219	0.000482	0.002773	0.000302	0.000374	0.000519
srm612-2	0.012016	0.016437	0.033371	0.039413	0.015111	0.021715	0.027020
srm610-2	0.156838	0.024173	0.382678	0.332093	0.238555	0.340457	0.450494

linest from std sig ave

	0.027454	0.000000	0.011023	0.014839	0.022378	0.015358	0.011142
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concentration data

SRM614-19	0.61	0.00	1.22	3.47	0.44	0.45	0.47
SRM612-19	28.43	0.00	86.93	56.88	20.56	21.77	23.22
SRM610-19	373.54	0.00	995.83	348.43	320.66	340.98	390.71
AP1-19	0.45	6.70	0.47	22.52	0.34	0.18	0.05
AP2-19	2.04	7.57	0.59	47.10	1.51	1.45	1.20
AP3-19	4.39	27.58	0.36	79.64	3.53	3.53	3.49
AP4-19	5.28	31.09	0.63	104.72	5.27	4.96	5.11
THEO-1	0.15	14.86	1.22	1301.20	9.77	7.24	1.21
THEO-2	0.13	38.77	0.98	1218.64	9.35	5.94	1.05
THEO-2	0.11	45.44	0.63	415.20	2.72	2.15	0.41
THEO-3	1.77	193.11	1.39	1300.20	15.68	10.71	2.04
THEO-4	0.38	238.08	2.21	1866.93	23.91	29.49	4.10
THEO-5	0.18	124.87	0.40	778.10	12.27	10.06	2.21
THEO-6	0.44	273.82	2.06	937.93	54.26	74.81	12.38
THEO-7	0.35	171.55	1.26	744.28	30.88	53.79	7.94
THEO-8	0.28	175.35	0.25	856.99	12.22	16.60	2.88
THEO-9	0.25	176.00	0.48	1158.86	33.27	64.23	8.86
THEO-10	0.31	188.81	0.08	614.17	25.43	30.99	6.90
THEO-11	0.40	294.83	0.72	693.23	26.07	33.04	6.46
THEO-12	0.49	404.12	1.98	980.95	32.52	41.21	7.49
THEO-13	0.35	211.46	0.95	13031.97	66.23	23.48	6.52
THEO-14	0.41	221.58	1.11	10553.12	79.14	26.88	7.10
THEO-15	0.55	259.82	3.36	28352.27	297.23	68.71	18.52
THEO-16	0.58	384.02	1.35	881.79	48.24	49.77	11.40
THEO-17	0.54	361.75	0.95	648.77	47.68	52.16	11.26
THEO-18	0.43	298.54	0.58	1455.87	60.73	53.73	12.81
SRM614-20	0.79	152.07	1.22	1.93	0.45	0.35	0.48
SRM612-20	33.25	164.24	82.55	19.87	23.83	24.64	26.01
SRM610-20	431.54	241.54	947.66	298.20	380.00	386.70	430.08
AP1-20	0.42	92.56	0.52	9.89	0.04	0.00	0.01
AP2-20	1.80	106.15	0.51	24.92	0.96	0.85	0.97
AP3-20	6.01	81.95	0.26	80.68	3.99	4.72	4.39
AP4-20	5.32	101.18	0.53	86.96	5.12	4.83	5.12

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-15	12.12	33492.59	77.68	152.00	9.16	17.04	11.00
SRM614-15	311.04	50452.97	741.36	4746.59	315.72	505.28	517.32
SRM612-15	16418.33	52980.90	46097.46	38149.66	14300.52	21044.12	28075.92
SRM610-15	112203.07	51702.61	310472.09	230333.22	126749.67	179929.94	260336.78
AP1-15	581.56	63714.44	933.65	31184.90	184.32	424.76	171.48
AP2-15	1906.69	68883.91	892.09	85381.36	1702.53	2428.81	2455.81
AP3-15	8196.57	80155.17	717.48	349669.38	8550.45	14592.12	16230.29

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	8064.00	81966.14	1242.45	372589.09	9821.30	13825.92	17811.18
LA3324-2-1	44.88	47616.23	302.60	134850.16	1656.17	3964.58	849.76
LA3324-2-2	39.92	49621.80	291.08	170561.08	2355.09	3832.78	1015.13
LA3324-2-3	74.84	51402.61	246.08	239173.73	7868.36	13199.23	3379.98
LA3324-2-4	77.12	58657.49	273.40	218553.19	1689.77	3289.58	870.80
LA3324-2-5	49.76	60207.46	224.72	220762.88	1753.85	2931.10	835.04
LA3324-2-6	63.68	59817.90	217.36	223357.58	3953.82	8235.77	2026.97
LA3324-2-7	137.84	58356.29	245.60	332344.75	20416.52	40400.67	9519.93
LA3324-2-8	78.28	60386.18	234.72	262057.52	12501.95	24303.90	5742.79
LA3324-2-9	100.64	60200.90	239.28	263721.09	15632.09	30528.17	7365.44
LA3324-2-10	140.32	62116.23	228.40	393725.31	6595.88	16558.09	2676.34
LA3324-2-11	129.92	64942.77	231.76	535862.06	7279.08	17232.22	2679.74
LA3324-2-12	437.96	87357.61	269.72	2439931.00	62844.39	151188.92	21204.28
SRM614-16	416.52	81657.26	832.04	2811.58	405.92	618.56	699.20
SRM612-16	17173.82	78817.77	42322.04	31912.06	20206.83	28644.60	36663.97
SRM610-16	139048.66	68451.10	303246.34	245108.78	183806.64	257007.25	351793.47
AP1-16	467.20	80075.61	599.68	24893.14	89.24	102.28	34.56
AP2-16	1735.09	82646.51	538.00	62318.31	1503.05	1778.05	2288.09
AP3-16	8179.69	91464.16	562.12	323590.22	9837.29	16362.41	17807.42
AP4-16	7866.20	90584.47	917.21	355636.41	11208.30	16261.65	18902.51
blank-16	11.32	44003.13	145.96	213.56	9.80	63.48	18.20
blank average	11.72	38747.86	111.82	182.78	9.48	40.26	14.60

blank subtraction							
SRM614-15	299.32	11705.11	629.54	4563.81	306.24	465.02	502.72
SRM612-15	16406.61	14233.04	45985.64	37966.87	14291.04	21003.86	28061.32
SRM610-15	112191.35	12954.75	310360.27	230150.44	126740.19	179889.68	260322.18
AP1-15	569.84	24966.58	821.82	31002.11	174.84	384.50	156.88
AP2-15	1894.97	30136.05	780.26	85198.58	1693.05	2388.55	2441.21
AP3-15	8184.85	41407.31	605.66	349486.60	8540.97	14551.86	16215.69
AP4-15	8052.28	43218.28	1130.63	372406.31	9811.82	13785.66	17796.58
LA3324-2-1	33.16	8868.37	190.78	134667.38	1646.69	3924.32	835.16
LA3324-2-2	28.20	10873.94	179.26	170378.30	2345.61	3792.52	1000.53
LA3324-2-3	63.12	12654.75	134.26	238990.95	7858.88	13158.97	3365.38
LA3324-2-4	65.40	19909.63	161.58	218370.41	1680.29	3249.32	856.20
LA3324-2-5	38.04	21459.60	112.90	220580.10	1744.37	2890.84	820.44
LA3324-2-6	51.96	21070.04	105.54	223174.80	3944.34	8195.51	2012.37
LA3324-2-7	126.12	19608.43	133.78	332161.97	20407.04	40360.41	9505.33
LA3324-2-8	66.56	21638.32	122.90	261874.74	12492.47	24263.64	5728.19
LA3324-2-9	88.92	21453.04	127.46	263538.31	15622.61	30487.91	7350.84
LA3324-2-10	128.60	23368.37	116.58	393542.53	6586.40	16517.83	2661.73
LA3324-2-11	118.20	26194.91	119.94	535679.28	7269.60	17191.96	2665.14
LA3324-2-12	426.24	48609.75	157.90	2439748.22	62834.91	151148.66	21189.68
SRM614-16	404.80	42909.40	720.22	2628.79	396.44	578.30	684.60
SRM612-16	17162.10	40069.91	42210.22	31729.28	20197.35	28604.34	36649.36
SRM610-16	139036.94	29703.24	303134.52	244926.00	183797.16	256966.99	351778.87
AP1-16	455.48	41327.75	487.86	24710.36	79.76	62.02	19.96
AP2-16	1723.37	43898.65	426.18	62135.53	1493.57	1737.79	2273.49
AP3-16	8167.97	52716.30	450.30	323407.44	9827.81	16322.15	17792.82
AP4-16	7854.48	51836.61	805.38	355453.63	11198.82	16221.39	18887.91

zero correction							
SRM614-15	299.32	11705.11	629.54	4563.81	306.24	465.02	502.72
SRM612-15	16406.61	14233.04	45985.64	37966.87	14291.04	21003.86	28061.32
SRM610-15	112191.35	12954.75	310360.27	230150.44	126740.19	179889.68	260322.18
AP1-15	569.84	24966.58	821.82	31002.11	174.84	384.50	156.88
AP2-15	1894.97	30136.05	780.26	85198.58	1693.05	2388.55	2441.21
AP3-15	8184.85	41407.31	605.66	349486.60	8540.97	14551.86	16215.69
AP4-15	8052.28	43218.28	1130.63	372406.31	9811.82	13785.66	17796.58
LA3324-2-1	33.16	8868.37	190.78	134667.38	1646.69	3924.32	835.16
LA3324-2-2	28.20	10873.94	179.26	170378.30	2345.61	3792.52	1000.53
LA3324-2-3	63.12	12654.75	134.26	238990.95	7858.88	13158.97	3365.38
LA3324-2-4	65.40	19909.63	161.58	218370.41	1680.29	3249.32	856.20
LA3324-2-5	38.04	21459.60	112.90	220580.10	1744.37	2890.84	820.44
LA3324-2-6	51.96	21070.04	105.54	223174.80	3944.34	8195.51	2012.37
LA3324-2-7	126.12	19608.43	133.78	332161.97	20407.04	40360.41	9505.33
LA3324-2-8	66.56	21638.32	122.90	261874.74	12492.47	24263.64	5728.19
LA3324-2-9	88.92	21453.04	127.46	263538.31	15622.61	30487.91	7350.84
LA3324-2-10	128.60	23368.37	116.58	393542.53	6586.40	16517.83	2661.73
LA3324-2-11	118.20	26194.91	119.94	535679.28	7269.60	17191.96	2665.14
LA3324-2-12	426.24	48609.75	157.90	2439748.22	62834.91	151148.66	21189.68
SRM614-16	404.80	42909.40	720.22	2628.79	396.44	578.30	684.60
SRM612-16	17162.10	40069.91	42210.22	31729.28	20197.35	28604.34	36649.36
SRM610-16	139036.94	29703.24	303134.52	244926.00	183797.16	256966.99	351778.87
AP1-16	455.48	41327.75	487.86	24710.36	79.76	62.02	19.96
AP2-16	1723.37	43898.65	426.18	62135.53	1493.57	1737.79	2273.49
AP3-16	8167.97	52716.30	450.30	323407.44	9827.81	16322.15	17792.82
AP4-16	7854.48	51836.61	805.38	355453.63	11198.82	16221.39	18887.91

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration							
SRM614	0.73	0.68	3.10	0.72	0.79	0.75	
SRM612	38.44	41.64	37.74	35.77	38.35	37.16	
SRM610	368.50	360.90	424.10	457.40	447.80	429.80	
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-15	0.000220	0.008604	0.000463	0.003355	0.000225	0.000342	0.000370
SRM612-15	0.011442	0.009927	0.032072	0.026479	0.009967	0.014649	0.019571
SRM610-15	0.144540	0.016690	0.399848	0.296511	0.163284	0.231758	0.335382
AP1-15	0.000049	0.002165	0.000071	0.002689	0.000015	0.000033	0.000014
AP2-15	0.000154	0.002448	0.000063	0.006919	0.000138	0.000194	0.000198
AP3-15	0.000491	0.002482	0.000036	0.020945	0.000512	0.000872	0.000972
AP4-15	0.000534	0.002865	0.000075	0.024691	0.000651	0.000914	0.001180
LA3324-2-1	0.000009	0.002311	0.000050	0.035090	0.000429	0.001023	0.000218
LA3324-2-2	0.000006	0.002332	0.000038	0.036532	0.000503	0.000813	0.000215
LA3324-2-3	0.000012	0.002401	0.000025	0.045340	0.001491	0.002496	0.000638
LA3324-2-4	0.000009	0.002810	0.000023	0.030817	0.000237	0.000459	0.000121
LA3324-2-5	0.000005	0.002960	0.000016	0.030429	0.000241	0.000399	0.000113
LA3324-2-6	0.000007	0.002920	0.000015	0.030930	0.000547	0.001136	0.000279
LA3324-2-7	0.000026	0.004095	0.000028	0.069372	0.004262	0.008429	0.001985
LA3324-2-8	0.000012	0.004038	0.000023	0.048866	0.002331	0.004528	0.001069
LA3324-2-9	0.000016	0.003915	0.000023	0.048097	0.002851	0.005564	0.001342
LA3324-2-10	0.000023	0.004253	0.000021	0.071621	0.001199	0.003006	0.000484
LA3324-2-11	0.000017	0.003863	0.000018	0.078996	0.001072	0.002535	0.000393
LA3324-2-12	0.000044	0.005010	0.000016	0.251430	0.006475	0.015577	0.002184
SRM614-16	0.000300	0.031756	0.000533	0.001945	0.000293	0.000428	0.000507
SRM612-16	0.012136	0.028335	0.029848	0.022437	0.014282	0.020227	0.025916
SRM610-16	0.167851	0.035859	0.365956	0.295684	0.221887	0.310221	0.424681
AP1-16	0.000042	0.003826	0.000045	0.002288	0.000007	0.000006	0.000002
AP2-16	0.000149	0.003802	0.000037	0.005382	0.000129	0.000151	0.000197
AP3-16	0.000515	0.003322	0.000028	0.020382	0.000619	0.001029	0.001121
AP4-16	0.000541	0.003570	0.000055	0.024477	0.000771	0.001117	0.001301

standardize signal averages AP							
AP1	0.000046	0.002996	0.000058	0.002488	0.000011	0.000020	0.000008
AP2	0.000152	0.003125	0.000050	0.006151	0.000133	0.000172	0.000198
AP3	0.000503	0.002902	0.000032	0.020664	0.000566	0.000950	0.001047
AP4	0.000537	0.003218	0.000065	0.024584	0.000711	0.001016	0.001240

linest from std sig ave							
	0.025649	0.046956	0.023372	0.009976	0.017757	0.011502	0.009961

standardize signal averages SRM							
srm614-2	0.000260	0.020180	0.000498	0.002650	0.000259	0.000385	0.000438
srm612-2	0.011789	0.019131	0.030960	0.024458	0.012125	0.017438	0.022743
srm610-2	0.156195	0.026274	0.382902	0.296097	0.192585	0.270989	0.380031

linest from std sig ave							
	0.027568	0.000000	0.011021	0.016709	0.027720	0.019294	0.013208

concentration data							
SRM614-15	0.48	34.65	0.93	2.87	0.34	0.34	0.32
SRM612-15	25.17	39.98	64.29	22.65	15.18	14.45	16.72
SRM610-15	317.95	67.21	801.48	253.68	248.67	228.61	286.52
AP1-15	0.51	40.56	0.66	10.70	0.11	0.15	0.05
AP2-15	1.57	45.85	0.59	27.54	0.97	0.89	0.79
AP3-15	5.02	46.49	0.34	83.35	3.63	4.00	3.86
AP4-15	5.46	53.68	0.70	98.26	4.61	4.19	4.69
LA3324-2-1	0.09	43.29	0.46	139.65	3.04	4.69	0.86
LA3324-2-2	0.06	43.68	0.36	145.39	3.56	3.73	0.85
LA3324-2-3	0.12	44.97	0.24	180.44	10.56	11.45	2.54
LA3324-2-4	0.09	52.63	0.21	122.64	1.68	2.10	0.48
LA3324-2-5	0.05	55.45	0.15	121.10	1.70	1.83	0.45
LA3324-2-6	0.07	54.70	0.14	123.09	3.87	5.21	1.11

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	0.27	76.71	0.26	276.08	30.19	38.68	7.89
LA3324-2-8	0.13	75.64	0.21	194.47	16.51	20.77	4.25
LA3324-2-9	0.17	73.34	0.22	191.41	20.20	25.53	5.33
LA3324-2-10	0.24	79.67	0.20	285.03	8.49	13.79	1.93
LA3324-2-11	0.18	72.36	0.16	314.38	7.59	11.63	1.56
LA3324-2-12	0.45	93.84	0.15	1000.62	45.87	71.47	8.68
SRM614-16	0.66	127.89	1.07	1.66	0.45	0.42	0.43
SRM612-16	26.70	114.11	59.83	19.20	21.75	19.95	22.14
SRM610-16	369.22	144.41	733.54	252.97	337.91	306.01	362.81
AP1-16	0.43	71.67	0.42	9.10	0.05	0.03	0.01
AP2-16	1.53	71.22	0.34	21.42	0.92	0.69	0.78
AP3-16	5.27	62.24	0.26	81.12	4.39	4.72	4.46
AP4-16	5.53	66.87	0.52	97.41	5.46	5.13	5.17

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-13	7.20	39920.11	86.00	23.48	6.24	15.80	10.16
SRM614-13	414.92	61413.91	992.97	5489.35	500.60	578.40	724.72
SRM612-13	17424.22	67830.18	53134.62	33307.67	20180.83	27813.16	38841.70
SRM610-13	134333.23	60564.26	341002.72	287011.91	171804.22	239743.83	350756.09
AP1-13	753.16	78968.88	692.44	50986.61	301.92	730.52	211.08
AP2-13	1754.33	78140.96	618.44	79292.45	1631.41	2342.89	2507.05
AP3-13	6028.95	95511.34	609.76	286745.22	7961.52	11857.51	14182.76
AP4-13	13272.72	90086.23	1405.65	549368.81	13613.40	21721.00	25119.66
LA3324-1-1	391.24	84880.08	424.24	659629.31	4532.59	9247.69	1749.89
LA3324-1-2	236.84	79407.60	291.36	477808.66	2790.74	5118.87	933.85
LA3324-1-3	225.68	74752.02	245.00	380974.72	2421.69	4628.83	829.00
LA3324-1-4	560.04	111543.95	387.32	3133139.00	13567.12	26302.47	5080.35
LA3324-1-5	381.92	107001.00	265.56	2197406.00	7692.08	13924.92	2552.97
LA3324-1-6	472.60	111360.91	277.84	2500672.30	10181.70	20438.68	3631.06
LA3324-1-7	569.64	114220.00	195.80	2160703.50	8387.81	17857.90	2710.82
LA3324-1-8	846.24	138965.47	271.28	2722960.80	13380.84	31432.46	4504.91
LA3324-1-9	972.69	162486.72	436.56	2704069.80	17882.58	42913.24	6337.68
LA3324-1-10	140.56	81006.86	222.08	347469.03	9950.54	25879.27	4198.14
LA3324-1-11	61.08	73881.06	180.68	178432.44	5180.39	11637.23	2269.73
LA3324-1-12	68.76	74124.18	195.20	182762.06	6152.15	13674.56	2695.22
LA3324-1-13	95.00	92276.12	281.88	468092.25	6166.19	15629.53	2670.14
LA3324-1-14	80.68	84475.64	175.88	301471.34	6783.84	17964.90	3203.34
LA3324-1-15	68.52	80629.09	202.88	309882.28	6162.55	16299.29	2787.70
LA3324-1-16	72.84	75551.59	166.68	331125.75	3251.50	8324.41	1508.41
LA3324-1-17	69.72	79910.69	176.96	378498.94	3538.22	8953.29	1573.21
LA3324-1-18	75.12	79657.77	145.64	365061.25	3663.62	9582.21	1663.65
SRM614-14	446.04	81912.38	786.88	2595.17	462.60	707.44	766.56
SRM612-14	17337.06	83315.07	43339.32	29866.29	23108.65	32373.34	39874.15
SRM610-14	143154.61	70838.56	300503.72	259162.42	223478.70	306374.53	405326.75
AP1-14	540.84	82435.10	572.16	29825.21	76.40	91.52	42.40
AP2-14	1293.65	76801.07	418.60	50489.45	1360.33	1679.13	2133.01
AP3-14	5609.59	91381.88	462.32	236536.97	8028.61	12061.23	13386.12
AP4-14	7884.52	85997.28	784.32	323670.91	10687.10	15515.21	17855.54
blank-14	18.36	47624.43	120.96	363.68	12.24	52.60	18.16
blank average	12.78	43772.27	103.48	193.58	9.24	34.20	14.16

blank subtraction							
SRM614-13	402.14	17641.64	889.48	5295.77	491.36	544.20	710.56
SRM612-13	17411.44	24057.91	53031.14	33114.09	20171.59	27778.96	38827.54
SRM610-13	134320.45	16791.99	340899.24	286818.33	171794.98	239709.63	350741.93
AP1-13	740.38	35196.62	588.96	50793.02	292.68	696.32	196.92
AP2-13	1741.55	34368.69	514.96	79098.86	1622.17	2308.69	2492.89
AP3-13	6016.17	51739.07	506.28	286551.64	7952.28	11823.31	14168.60
AP4-13	13259.93	46313.96	1302.17	549175.23	13604.16	21686.80	25105.50
LA3324-1-1	378.46	41107.81	320.76	659435.73	4523.35	9213.49	1735.73
LA3324-1-2	224.06	35635.33	187.88	477615.08	2781.50	5084.67	919.69
LA3324-1-3	212.90	30979.75	141.52	380781.14	2412.45	4594.63	814.84
LA3324-1-4	547.26	67771.68	283.84	3132945.42	13557.88	26268.27	5066.19
LA3324-1-5	369.14	63228.73	162.08	2197212.42	7682.84	13890.72	2538.81
LA3324-1-6	459.82	67588.64	174.36	2500478.72	10172.46	20404.48	3616.90
LA3324-1-7	556.86	70447.73	92.32	2160509.92	8378.57	17823.70	2696.66
LA3324-1-8	833.46	95193.20	167.80	2722767.22	13371.59	31398.26	4490.75
LA3324-1-9	959.91	118714.45	333.08	2703876.22	17873.34	42879.04	6323.52

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	127.78	37234.59	118.60	347275.45	9941.30	25845.07	4183.98
LA3324-1-11	48.30	30108.79	77.20	178238.86	5171.15	11603.03	2255.57
LA3324-1-12	55.98	30351.91	91.72	182568.48	6142.91	13640.36	2681.06
LA3324-1-13	82.22	48503.85	178.40	467898.67	6156.95	15595.33	2655.97
LA3324-1-14	67.90	40703.37	72.40	301277.76	6774.60	17930.70	3189.18
LA3324-1-15	55.74	36856.83	99.40	309688.70	6153.31	16265.09	2773.54
LA3324-1-16	60.06	31779.32	63.20	330932.17	3242.26	8290.21	1494.25
LA3324-1-17	56.94	36138.42	73.48	378305.36	3528.98	8919.09	1559.05
LA3324-1-18	62.34	35885.50	42.16	364867.67	3654.38	9548.01	1649.49
SRM614-14	433.26	38140.12	683.40	2401.59	453.36	673.24	752.40
SRM612-14	17324.28	39542.80	43235.84	29672.71	23099.41	32339.14	39859.98
SRM610-14	143141.83	27066.30	300400.24	258968.84	223469.46	306340.33	405312.59
AP1-14	528.06	38662.83	468.68	29631.63	67.16	57.32	28.24
AP2-14	1280.87	33028.80	315.12	50295.86	1351.09	1644.93	2118.85
AP3-14	5596.81	47609.61	358.84	236343.39	8019.36	12027.03	13371.95
AP4-14	7871.74	42225.01	680.84	323477.33	10677.86	15481.01	17841.38

zero correction

SRM614-13	402.14	17641.64	889.48	5295.77	491.36	544.20	710.56
SRM612-13	17411.44	24057.91	53031.14	33114.09	20171.59	27778.96	38827.54
SRM610-13	134320.45	16791.99	340899.24	286818.33	171794.98	239709.63	350741.93
AP1-13	740.38	35196.62	588.96	50793.02	292.68	696.32	196.92
AP2-13	1741.55	34368.69	514.96	79098.86	1622.17	2308.69	2492.89
AP3-13	6016.17	51739.07	506.28	286551.64	7952.28	11823.31	14168.60
AP4-13	13259.93	46313.96	1302.17	549175.23	13604.16	21686.80	25105.50
LA3324-1-1	378.46	41107.81	320.76	659435.73	4523.35	9213.49	1735.73
LA3324-1-2	224.06	35635.33	187.88	477615.08	2781.50	5084.67	919.69
LA3324-1-3	212.90	30979.75	141.52	380781.14	2412.45	4594.63	814.84
LA3324-1-4	547.26	67771.68	283.84	3132945.42	13557.88	26268.27	5066.19
LA3324-1-5	369.14	63228.73	162.08	2197212.42	7682.84	13890.72	2538.81
LA3324-1-6	459.82	67588.64	174.36	2500478.72	10172.46	20404.48	3616.90
LA3324-1-7	556.86	70447.73	92.32	2160509.92	8378.57	17823.70	2696.66
LA3324-1-8	833.46	95193.20	167.80	2722767.22	13371.59	31398.26	4490.75
LA3324-1-9	959.91	118714.45	333.08	2703876.22	17873.34	42879.04	6323.52
LA3324-1-10	127.78	37234.59	118.60	347275.45	9941.30	25845.07	4183.98
LA3324-1-11	48.30	30108.79	77.20	178238.86	5171.15	11603.03	2255.57
LA3324-1-12	55.98	30351.91	91.72	182568.48	6142.91	13640.36	2681.06
LA3324-1-13	82.22	48503.85	178.40	467898.67	6156.95	15595.33	2655.97
LA3324-1-14	67.90	40703.37	72.40	301277.76	6774.60	17930.70	3189.18
LA3324-1-15	55.74	36856.83	99.40	309688.70	6153.31	16265.09	2773.54
LA3324-1-16	60.06	31779.32	63.20	330932.17	3242.26	8290.21	1494.25
LA3324-1-17	56.94	36138.42	73.48	378305.36	3528.98	8919.09	1559.05
LA3324-1-18	62.34	35885.50	42.16	364867.67	3654.38	9548.01	1649.49
SRM614-14	433.26	38140.12	683.40	2401.59	453.36	673.24	752.40
SRM612-14	17324.28	39542.80	43235.84	29672.71	23099.41	32339.14	39859.98
SRM610-14	143141.83	27066.30	300400.24	258968.84	223469.46	306340.33	405312.59
AP1-14	528.06	38662.83	468.68	29631.63	67.16	57.32	28.24
AP2-14	1280.87	33028.80	315.12	50295.86	1351.09	1644.93	2118.85
AP3-14	5596.81	47609.61	358.84	236343.39	8019.36	12027.03	13371.95
AP4-14	7871.74	42225.01	680.84	323477.33	10677.86	15481.01	17841.38

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-13	0.000208	0.009110	0.000459	0.002735	0.000254	0.000281	0.000367
SRM612-13	0.010073	0.013918	0.030679	0.019157	0.011669	0.016070	0.022462
SRM610-13	0.139226	0.017405	0.353349	0.297293	0.178069	0.248464	0.363551
AP1-13	0.000049	0.002349	0.000039	0.003390	0.000020	0.000046	0.000013
AP2-13	0.000144	0.002832	0.000042	0.006519	0.000134	0.000190	0.000205
AP3-13	0.000335	0.002881	0.000028	0.015956	0.000443	0.000658	0.000789
AP4-13	0.000834	0.002912	0.000082	0.034528	0.000855	0.001364	0.001578
LA3324-1-1	0.000046	0.004994	0.000039	0.080108	0.000549	0.001119	0.000211

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000032	0.005077	0.000027	0.068048	0.000396	0.000724	0.000131
LA3324-1-3	0.000037	0.005336	0.000024	0.065588	0.000416	0.000791	0.000140
LA3324-1-4	0.000047	0.005843	0.000024	0.270126	0.001169	0.002265	0.000437
LA3324-1-5	0.000038	0.006469	0.000017	0.224801	0.000786	0.001421	0.000260
LA3324-1-6	0.000043	0.006333	0.000016	0.234278	0.000953	0.001912	0.000339
LA3324-1-7	0.000050	0.006314	0.000008	0.193630	0.000751	0.001597	0.000242
LA3324-1-8	0.000066	0.007488	0.000013	0.214188	0.001052	0.002470	0.000353
LA3324-1-9	0.000078	0.009597	0.000027	0.218575	0.001445	0.003466	0.000511
LA3324-1-10	0.000022	0.006554	0.000021	0.061126	0.001750	0.004549	0.000736
LA3324-1-11	0.000010	0.006125	0.000016	0.036259	0.001052	0.002360	0.000459
LA3324-1-12	0.000011	0.006063	0.000018	0.036472	0.001227	0.002725	0.000536
LA3324-1-13	0.000011	0.006755	0.000025	0.065163	0.000857	0.002172	0.000370
LA3324-1-14	0.000009	0.005634	0.000010	0.041704	0.000938	0.002482	0.000441
LA3324-1-15	0.000008	0.005176	0.000014	0.043491	0.000864	0.002284	0.000389
LA3324-1-16	0.000009	0.004987	0.000010	0.051927	0.000509	0.001301	0.000234
LA3324-1-17	0.000008	0.005054	0.000010	0.052908	0.000494	0.001247	0.000218
LA3324-1-18	0.000009	0.004929	0.000006	0.050112	0.000502	0.001311	0.000227
SRM614-14	0.000328	0.028852	0.000517	0.001817	0.000343	0.000509	0.000569
SRM612-14	0.012807	0.029233	0.031963	0.021936	0.017077	0.023907	0.029467
SRM610-14	0.174820	0.033056	0.366881	0.316280	0.272925	0.374136	0.495011
AP1-14	0.000042	0.003104	0.000038	0.002379	0.000005	0.000005	0.000002
AP2-14	0.000136	0.003498	0.000033	0.005327	0.000143	0.000174	0.000224
AP3-14	0.000384	0.003265	0.000025	0.016208	0.000550	0.000825	0.000917
AP4-14	0.000629	0.003376	0.000054	0.025865	0.000854	0.001238	0.001427

standardize signal averages AP

AP1	0.000046	0.002727	0.000038	0.002884	0.000012	0.000026	0.000008
AP2	0.000140	0.003165	0.000038	0.005923	0.000138	0.000182	0.000215
AP3	0.000359	0.003073	0.000026	0.016082	0.000496	0.000742	0.000853
AP4	0.000732	0.003144	0.000068	0.030197	0.000855	0.001301	0.001503

linest from std sig ave

	0.023417	0.046374	0.026900	0.009335	0.016503	0.010958	0.009492
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standardize signal averages SRM

srM614-2	0.000268	0.018981	0.000488	0.002276	0.000298	0.000395	0.000468
srM612-2	0.011440	0.021575	0.031321	0.020546	0.014373	0.019989	0.025964
srM610-2	0.157023	0.025231	0.360115	0.306787	0.225497	0.311300	0.429281

linest from std sig ave

	0.027426	0.000000	0.011714	0.016142	0.023673	0.016796	0.011692
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concentration data

SRM614-13	0.42	36.23	1.06	2.19	0.36	0.26	0.30
SRM612-13	20.23	55.35	70.78	15.34	16.52	15.10	18.28
SRM610-13	279.61	69.22	815.19	238.02	252.03	233.51	295.94
AP1-13	0.46	43.46	0.42	12.62	0.13	0.20	0.05
AP2-13	1.34	52.40	0.46	24.28	0.88	0.83	0.78
AP3-13	3.13	53.30	0.30	59.42	2.92	2.88	2.99
AP4-13	7.79	53.87	0.88	128.59	5.63	5.96	5.98
LA3324-1-1	0.43	92.39	0.42	298.34	3.62	4.89	0.80
LA3324-1-2	0.30	93.93	0.29	253.42	2.61	3.17	0.50
LA3324-1-3	0.34	98.72	0.26	244.26	2.74	3.46	0.53
LA3324-1-4	0.44	108.10	0.26	1006.00	7.70	9.90	1.65
LA3324-1-5	0.35	119.68	0.18	837.20	5.18	6.21	0.98
LA3324-1-6	0.40	117.16	0.18	872.49	6.27	8.36	1.28
LA3324-1-7	0.47	116.81	0.09	721.11	4.94	6.98	0.92
LA3324-1-8	0.61	138.54	0.14	797.67	6.93	10.80	1.34
LA3324-1-9	0.72	177.54	0.29	814.01	9.51	15.15	1.94
LA3324-1-10	0.21	121.25	0.22	227.64	11.52	19.89	2.79
LA3324-1-11	0.09	113.31	0.17	135.03	6.93	10.32	1.74
LA3324-1-12	0.10	112.18	0.20	135.83	8.08	11.91	2.03
LA3324-1-13	0.11	124.97	0.27	242.68	5.65	9.49	1.40
LA3324-1-14	0.09	104.24	0.11	155.31	6.17	10.85	1.67
LA3324-1-15	0.07	95.76	0.15	161.97	5.69	9.99	1.47
LA3324-1-16	0.09	92.25	0.11	193.38	3.35	5.69	0.89
LA3324-1-17	0.07	93.50	0.11	197.04	3.25	5.45	0.83
LA3324-1-18	0.08	91.18	0.06	186.62	3.30	5.73	0.86
SRM614-14	0.66	114.75	1.19	1.45	0.49	0.48	0.46
SRM612-14	25.72	116.26	73.74	17.56	24.17	22.47	23.99
SRM610-14	351.09	131.47	846.41	253.22	386.29	351.62	402.95
AP1-14	0.40	57.43	0.40	8.86	0.04	0.02	0.01
AP2-14	1.27	64.72	0.36	19.84	0.94	0.76	0.85
AP3-14	3.59	60.40	0.26	60.36	3.62	3.61	3.47
AP4-14	5.88	62.46	0.58	96.32	5.62	5.41	5.40

certified concentration

SRM614	0.73	0.68	3.10	0.72	0.79	0.75	
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-11	14.44	15004.77	81.84	1226.33	33.28	17.08	10.00
SRM614-11	290.84	29132.20	962.89	3324.54	193.28	304.28	387.00
SRM612-11	13056.71	31516.74	54075.50	31368.26	10587.26	15573.41	21886.76
SRM610-11	88475.54	28217.24	320108.41	218086.91	81159.82	110406.90	173271.30
AP1-11	496.32	37703.93	625.80	31538.38	378.32	467.40	185.48
AP2-11	1229.69	36261.61	461.48	54504.55	885.69	1300.61	1439.21
AP3-11	4974.51	41086.87	408.84	219187.75	4308.98	6858.92	8015.00
AP4-11	6468.36	43167.88	937.49	290270.75	5718.07	8202.73	10656.94
M17-24-141-1	27.76	21510.44	212.08	34208.55	1158.85	1711.57	1046.13
M17-24-141-2	22.76	23322.89	154.08	37150.37	1153.85	1360.97	950.53
M17-24-141-3	39.80	24706.70	163.52	40857.87	1331.53	1555.05	1121.97
M17-24-141-4	34.96	25763.27	164.28	49387.84	1874.49	2096.41	1576.97
M17-24-141-5	26.92	26066.19	136.80	46955.95	1956.21	1772.73	1536.49
M17-24-141-6	31.00	27221.43	143.68	46128.38	1611.05	1529.81	1228.21
M17-24-141-7	42.80	27866.92	181.44	51632.21	1342.89	1956.57	948.49
M17-24-141-8	22.60	28631.68	109.60	45421.10	1037.89	976.61	735.40
M17-24-141-9	27.08	29278.29	113.28	48335.51	1249.05	1268.77	882.00
M17-24-141-10	127.12	34275.99	293.48	107124.60	10922.54	13329.20	6720.84
M17-24-141-11	198.52	38069.18	160.20	153915.83	27993.04	30923.38	16955.10
M17-24-141-12	333.48	40316.35	202.00	200219.73	52540.30	55842.83	30370.45
M17-24-141-13	1307.01	58639.73	1109.57	766760.63	101748.81	111647.83	44721.97
M17-24-141-14	1248.21	61041.98	754.24	655969.88	11855.95	128910.09	49679.16
M17-24-141-15	1231.53	62134.63	467.80	706870.13	118846.63	138137.73	53651.34
M17-24-141-16	1330.65	59908.62	1061.41	717456.81	13874.28	16391.57	4898.31
M17-24-141-17	1191.33	58821.01	262.72	748513.31	10443.70	12706.35	3440.42
M17-24-141-18	1142.05	58765.17	352.00	762140.31	7574.48	11594.55	2958.98
SRM614-12	366.88	60574.70	704.04	2386.49	311.80	515.76	605.92
SRM612-12	19772.55	68927.51	59314.13	35151.56	18862.51	26556.59	37279.61
SRM610-12	149489.92	56656.12	377233.94	290292.88	157113.84	219605.03	326423.47
AP1-12	449.96	67243.54	349.28	27693.84	105.36	71.32	26.76
AP2-12	1572.05	64743.24	248.48	62808.15	1121.49	1440.57	1944.77
AP3-12	6262.12	74943.95	342.68	263463.00	6333.16	9801.94	11959.55
AP4-12	10727.42	75262.27	1029.69	466116.47	10289.94	15291.09	19215.19
blank-12	10.08	23981.18	62.60	140.72	4.28	25.32	13.68
blank average	12.26	19492.97	72.22	683.52	18.78	21.20	11.84

	Sb	I	Cs	Ba	La	Ce	Pr
blank subtraction							
SRM614-11	278.58	9639.23	890.66	2641.01	174.50	283.08	375.16
SRM612-11	13044.45	12023.77	54003.28	30684.73	10568.48	15552.21	21874.92
SRM610-11	88463.28	8724.27	320036.19	217403.39	81141.04	110385.70	173259.46
AP1-11	484.06	18210.96	553.58	30854.85	359.54	446.20	173.64
AP2-11	1217.43	16768.63	389.26	53821.02	866.90	1279.41	1427.37
AP3-11	4962.25	21593.90	336.62	218504.23	4290.20	6837.72	8003.16
AP4-11	6456.10	23674.91	865.26	289587.23	5699.29	8181.53	10645.10
M17-24-141-1	15.50	2017.47	139.86	33525.03	1140.07	1690.37	1034.29
M17-24-141-2	10.50	3829.92	81.86	36466.84	1135.07	1339.77	938.69
M17-24-141-3	27.54	5213.73	91.30	40174.35	1312.75	1533.85	1110.13
M17-24-141-4	22.70	6270.30	92.06	48704.32	1855.71	2075.21	1565.13
M17-24-141-5	14.66	6573.22	64.58	46272.42	1937.43	1751.53	1524.65
M17-24-141-6	18.74	7728.46	71.46	45444.86	1592.27	1508.61	1216.37
M17-24-141-7	30.54	8373.95	109.22	50948.69	1324.11	1935.37	936.65
M17-24-141-8	10.34	9138.71	37.38	44737.57	1019.11	955.41	723.56
M17-24-141-9	14.82	9785.31	41.06	47651.99	1230.27	1247.57	870.16
M17-24-141-10	114.86	14783.02	221.26	106441.08	10903.76	13307.99	6709.00
M17-24-141-11	186.26	18576.21	87.98	153232.31	27974.26	30902.17	16943.26
M17-24-141-12	321.22	20823.38	129.78	199536.21	52521.52	55821.63	30358.61
M17-24-141-13	1294.75	39146.76	1037.35	766077.11	101730.03	111626.63	44710.13
M17-24-141-14	1235.95	41549.01	682.02	655286.36	111837.17	128888.89	49667.32
M17-24-141-15	1219.27	42641.66	395.58	706186.61	118827.85	138116.53	53639.50
M17-24-141-16	1318.39	40415.65	989.19	716773.29	13855.50	16370.37	4886.47
M17-24-141-17	1179.07	39328.04	190.50	747829.79	10424.92	12685.15	3428.58
M17-24-141-18	1129.79	39272.20	279.78	761456.79	7555.70	11573.34	2947.14
SRM614-12	354.62	41081.73	631.82	1702.97	293.02	494.56	594.08
SRM612-12	19760.29	49434.54	59241.91	34468.04	18843.73	26535.39	37267.77
SRM610-12	149477.66	37163.15	377161.72	289609.36	157095.06	219583.83	326411.63
AP1-12	437.70	47750.57	277.06	27010.31	86.58	50.12	14.92
AP2-12	1559.79	45250.27	176.26	62124.63	1102.71	1419.37	1932.93
AP3-12	6249.86	55450.97	270.46	262779.48	6314.38	9780.74	11947.71
AP4-12	10715.16	55769.30	957.47	465432.95	10271.16	15269.89	19203.35

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-11	278.58	9639.23	890.66	2641.01	174.50	283.08	375.16
SRM612-11	13044.45	12023.77	54003.28	30684.73	10568.48	15552.21	21874.92
SRM610-11	88463.28	8724.27	320036.19	217403.39	81141.04	110385.70	173259.46
AP1-11	484.06	18210.96	553.58	30854.85	359.54	446.20	173.64
AP2-11	1217.43	16768.63	389.26	53821.02	866.90	1279.41	1427.37
AP3-11	4962.25	21593.90	336.62	218504.23	4290.20	6837.72	8003.16
AP4-11	6456.10	23674.91	865.26	289587.23	5699.29	8181.53	10645.10
M17-24-141-1	15.50	2017.47	139.86	33525.03	1140.07	1690.37	1034.29
M17-24-141-2	10.50	3829.92	81.86	36466.84	1135.07	1339.77	938.69
M17-24-141-3	27.54	5213.73	91.30	40174.35	1312.75	1533.85	1110.13
M17-24-141-4	22.70	6270.30	92.06	48704.32	1855.71	2075.21	1565.13
M17-24-141-5	14.66	6573.22	64.58	46272.42	1937.43	1751.53	1524.65
M17-24-141-6	18.74	7728.46	71.46	45444.86	1592.27	1508.61	1216.37
M17-24-141-7	30.54	8373.95	109.22	50948.69	1324.11	1935.37	936.65
M17-24-141-8	10.34	9138.71	37.38	44737.57	1019.11	955.41	723.56
M17-24-141-9	14.82	9785.31	41.06	47651.99	1230.27	1247.57	870.16
M17-24-141-10	114.86	14783.02	221.26	106441.08	10903.76	13307.99	6709.00
M17-24-141-11	186.26	18576.21	87.98	153232.31	27974.26	30902.17	16943.26
M17-24-141-12	321.22	20823.38	129.78	199536.21	52521.52	55821.63	30358.61
M17-24-141-13	1294.75	39146.76	1037.35	766077.11	101730.03	111626.63	44710.13
M17-24-141-14	1235.95	41549.01	682.02	655286.36	111837.17	128888.89	49667.32
M17-24-141-15	1219.27	42641.66	395.58	706186.61	118827.85	138116.53	53639.50
M17-24-141-16	1318.39	40415.65	989.19	716773.29	13855.50	16370.37	4886.47
M17-24-141-17	1179.07	39328.04	190.50	747829.79	10424.92	12685.15	3428.58
M17-24-141-18	1129.79	39272.20	279.78	761456.79	7555.70	11573.34	2947.14
SRM614-12	354.62	41081.73	631.82	1702.97	293.02	494.56	594.08
SRM612-12	19760.29	49434.54	59241.91	34468.04	18843.73	26535.39	37267.77
SRM610-12	149477.66	37163.15	377161.72	289609.36	157095.06	219583.83	326411.63
AP1-12	437.70	47750.57	277.06	27010.31	86.58	50.12	14.92
AP2-12	1559.79	45250.27	176.26	62124.63	1102.71	1419.37	1932.93
AP3-12	6249.86	55450.97	270.46	262779.48	6314.38	9780.74	11947.71
AP4-12	10715.16	55769.30	957.47	465432.95	10271.16	15269.89	19203.35
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-11	0.000150	0.005181	0.000479	0.001420	0.000094	0.000152	0.000202
SRM612-11	0.006745	0.006217	0.027924	0.015867	0.005465	0.008042	0.011311
SRM610-11	0.086547	0.008535	0.313102	0.212693	0.079383	0.107994	0.169506
AP1-11	0.000042	0.001588	0.000048	0.002690	0.000031	0.000039	0.000015
AP2-11	0.000113	0.001562	0.000036	0.005013	0.000081	0.000119	0.000133
AP3-11	0.000349	0.001517	0.000024	0.015352	0.000301	0.000480	0.000562
AP4-11	0.000475	0.001743	0.000064	0.021323	0.000420	0.000602	0.000784
M17-24-141-1	0.000007	0.000918	0.000064	0.015261	0.000519	0.000769	0.000471
M17-24-141-2	0.000004	0.001565	0.000033	0.014905	0.000464	0.000548	0.000384
M17-24-141-3	0.000010	0.001941	0.000034	0.014953	0.000489	0.000571	0.000413
M17-24-141-4	0.000007	0.001860	0.000027	0.014448	0.000551	0.000616	0.000464
M17-24-141-5	0.000005	0.002059	0.000020	0.014492	0.000607	0.000549	0.000477
M17-24-141-6	0.000006	0.002452	0.000023	0.014419	0.000505	0.000479	0.000386
M17-24-141-7	0.000010	0.002837	0.000037	0.017262	0.000449	0.000656	0.000317
M17-24-141-8	0.000004	0.003224	0.000013	0.015781	0.000359	0.000337	0.000255
M17-24-141-9	0.000005	0.003228	0.000014	0.015720	0.000406	0.000412	0.000287
M17-24-141-10	0.000025	0.003182	0.000048	0.022911	0.002347	0.002865	0.001444
M17-24-141-11	0.000029	0.002906	0.000014	0.023973	0.004376	0.004835	0.002651
M17-24-141-12	0.000043	0.002813	0.000018	0.026952	0.007094	0.007540	0.004101
M17-24-141-13	0.000077	0.002340	0.000062	0.045795	0.006081	0.006673	0.002673
M17-24-141-14	0.000074	0.002471	0.000041	0.038976	0.006652	0.007666	0.002954
M17-24-141-15	0.000072	0.002513	0.000023	0.041618	0.007003	0.008140	0.003161
M17-24-141-16	0.000074	0.002263	0.000055	0.040139	0.000776	0.000917	0.000274
M17-24-141-17	0.000064	0.002139	0.000010	0.040672	0.000567	0.000690	0.000186

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000061	0.002116	0.000015	0.041034	0.000407	0.000624	0.000159
SRM614-12	0.000241	0.027904	0.000429	0.001157	0.000199	0.000336	0.000404
SRM612-12	0.010456	0.026158	0.031347	0.018238	0.009971	0.014041	0.019720
SRM610-12	0.148282	0.036866	0.374144	0.287292	0.155838	0.217827	0.323800
AP1-12	0.000036	0.003960	0.000023	0.002240	0.000007	0.000004	0.000001
AP2-12	0.000128	0.003716	0.000014	0.005101	0.000091	0.000117	0.000159
AP3-12	0.000377	0.003345	0.000016	0.015852	0.000381	0.000590	0.000721
AP4-12	0.000664	0.003454	0.000059	0.028822	0.000636	0.000946	0.001189

standardize signal averages AP

AP1	0.000039	0.002774	0.000036	0.002465	0.000019	0.000022	0.000008
AP2	0.000121	0.002639	0.000025	0.005057	0.000086	0.000118	0.000146
AP3	0.000363	0.002431	0.000020	0.015602	0.000341	0.000535	0.000642
AP4	0.000569	0.002598	0.000062	0.025073	0.000528	0.000774	0.000987

linest from std sig ave

	0.028446	0.055300	0.030635	0.010883	0.025915	0.017374	0.013922
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standardize signal averages SRM

srm614-2	0.000195	0.016543	0.000454	0.001288	0.000146	0.000244	0.000303
srm612-2	0.008601	0.016188	0.029636	0.017053	0.007718	0.011041	0.015516
srm610-2	0.117414	0.022701	0.343623	0.249993	0.117611	0.162911	0.246653

linest from std sig ave

	0.036677	0.000000	0.012277	0.019809	0.045384	0.032089	0.020348
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concentration data

SRM614-11	0.37	24.57	1.26	1.33	0.21	0.23	0.24
SRM612-11	16.46	29.49	73.37	14.81	12.15	11.98	13.51
SRM610-11	211.14	40.48	822.64	198.53	176.43	160.92	202.38
AP1-11	0.48	35.02	0.59	11.68	0.32	0.27	0.08
AP2-11	1.29	34.46	0.44	21.77	0.83	0.83	0.74
AP3-11	3.96	33.47	0.29	66.66	3.12	3.33	3.12
AP4-11	5.39	38.46	0.78	92.58	4.34	4.18	4.35
M17-24-141-1	0.08	20.26	0.78	66.26	5.37	5.33	2.61
M17-24-141-2	0.05	34.53	0.41	64.72	4.80	3.80	2.13
M17-24-141-3	0.12	42.81	0.42	64.92	5.05	3.96	2.29
M17-24-141-4	0.08	41.04	0.33	62.73	5.69	4.27	2.58
M17-24-141-5	0.05	45.42	0.25	62.92	6.27	3.80	2.65
M17-24-141-6	0.07	54.09	0.28	62.60	5.22	3.32	2.14
M17-24-141-7	0.12	62.59	0.45	74.95	4.64	4.55	1.76
M17-24-141-8	0.04	71.11	0.16	68.52	3.72	2.34	1.42
M17-24-141-9	0.06	71.22	0.17	68.25	4.20	2.85	1.59
M17-24-141-10	0.28	70.20	0.58	99.48	24.26	19.85	8.02
M17-24-141-11	0.33	64.11	0.17	104.08	45.24	33.51	14.72
M17-24-141-12	0.49	62.05	0.21	117.02	73.34	52.26	22.77
M17-24-141-13	0.88	51.63	0.76	198.83	62.87	46.25	14.84
M17-24-141-14	0.83	54.52	0.50	169.23	68.77	53.14	16.41
M17-24-141-15	0.82	55.44	0.28	180.70	72.40	56.42	17.56
M17-24-141-16	0.84	49.93	0.68	174.28	8.02	6.35	1.52
M17-24-141-17	0.73	47.19	0.13	176.59	5.86	4.78	1.04
M17-24-141-18	0.69	46.69	0.18	178.16	4.21	4.32	0.88
SRM614-12	0.59	132.34	1.13	1.08	0.44	0.50	0.48
SRM612-12	25.51	124.06	82.36	17.02	22.16	20.92	23.54
SRM610-12	361.75	174.84	983.02	268.16	346.35	324.58	386.60
AP1-12	0.41	87.37	0.28	9.73	0.07	0.03	0.01
AP2-12	1.45	81.97	0.18	22.15	0.94	0.81	0.88
AP3-12	4.28	73.80	0.20	68.83	3.94	4.09	4.00
AP4-12	7.53	76.19	0.72	125.14	6.58	6.55	6.60

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-9	11.28	14670.68	113.56	55.36	8.28	12.64	13.16
SRM614-9	499.12	47734.15	1182.85	7676.36	589.84	768.28	926.37
SRM612-9	16468.73	45825.66	51953.09	59013.69	21063.64	29419.17	40226.75
SRM610-9	148999.95	38928.02	376882.19	328067.81	188183.22	267849.91	388175.63
AP1-9	585.40	55572.51	787.80	51479.01	511.92	488.56	187.16
AP2-9	1885.61	55328.19	638.08	83476.31	1746.37	2440.25	2810.94
AP3-9	6023.19	67113.41	611.72	308925.38	8497.81	12222.75	14990.69

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	13501.24	64671.09	1496.97	560385.63	14102.16	22446.17	26074.43
M17-24-97-1	314.16	44298.33	942.01	322153.56	123457.66	55022.67	69738.91
M17-24-97-2	281.08	41509.99	436.12	202110.42	100305.92	44056.57	55299.43
M17-24-97-3	311.40	42403.16	407.84	238937.19	107056.28	45996.54	55245.71
M17-24-97-4	253.64	35930.20	1083.25	210150.27	1869.33	4513.43	647.80
M17-24-97-5	205.40	37915.73	346.68	143422.28	489.28	677.00	141.80
M17-24-97-6	225.60	37955.49	425.28	164164.44	820.16	1283.89	238.60
M17-24-97-7	143.52	35553.40	690.56	176837.52	1212.77	2269.33	309.44
M17-24-97-8	143.52	35520.92	484.20	109015.61	480.56	1103.21	174.36
M17-24-97-9	126.44	37249.89	332.88	132073.03	502.28	665.92	132.32
M17-24-97-10	155.20	35769.84	589.24	499147.34	4333.98	2853.26	507.52
M17-24-97-11	142.44	37839.97	376.68	301916.38	1995.41	1457.89	267.56
M17-24-97-12	156.64	38150.25	413.60	392771.19	2312.45	1709.97	338.20
M17-24-97-13	246.40	38309.98	2047.01	591104.31	5082.27	8498.21	1240.13
M17-24-97-14	143.00	38682.54	691.28	334746.44	1746.77	2365.61	373.40
M17-24-97-15	141.08	38370.02	533.44	305278.59	1559.97	1616.41	287.40
M17-24-97-16	261.16	43316.52	1541.73	1002270.10	7911.72	8018.25	1337.97
M17-24-97-17	164.24	44392.57	665.84	301189.19	1667.53	3107.18	497.20
M17-24-97-18	233.28	46188.22	1071.25	468487.38	3240.06	5706.99	873.60
SRM614-10	541.64	86080.60	1200.41	6007.95	757.00	989.97	1117.69
SRM612-10	18316.82	72352.45	43016.28	30662.33	23942.18	33562.03	41308.71
SRM610-10	142775.72	56232.64	290854.44	260002.42	230873.66	314088.25	414674.34
AP1-10	481.76	68862.83	607.76	25813.23	84.44	86.84	46.08
AP2-10	1390.09	67999.55	470.44	58518.81	1501.81	1930.69	2360.05
AP3-10	6516.16	75262.22	454.44	279088.50	8545.65	14244.32	14903.92
AP4-10	12031.71	73483.81	1120.69	464732.38	14314.64	22803.97	24346.06
blank-10	14.92	25303.30	145.80	563.04	17.52	64.64	18.84
blank average	13.10	19986.99	129.68	309.20	12.90	38.64	16.00
blank subtraction							
SRM614-9	486.02	27747.16	1053.17	7367.16	576.94	729.64	910.37
SRM612-9	16455.63	25838.66	51823.41	58704.49	21050.74	29380.53	40210.75
SRM610-9	148986.85	18941.03	376752.51	327758.61	188170.32	267811.27	388159.63
AP1-9	572.30	35585.52	658.12	51169.81	499.02	449.92	171.16
AP2-9	1872.51	35341.20	508.40	83167.11	1733.47	2401.61	2794.94
AP3-9	6010.09	47126.42	482.04	308616.18	8484.91	12184.11	14974.68
AP4-9	13488.14	44684.09	1367.29	560076.43	14089.26	22407.53	26058.43
M17-24-97-1	301.06	24311.34	812.32	321844.36	123444.76	54984.03	69722.91
M17-24-97-2	267.98	21523.00	306.44	201801.22	100293.02	44017.93	55913.43
M17-24-97-3	298.30	22416.17	278.16	238627.99	107043.38	45957.90	55229.71
M17-24-97-4	240.54	15943.21	953.57	209841.07	1856.43	4474.79	631.80
M17-24-97-5	192.30	17928.74	217.00	143113.08	476.38	638.36	125.80
M17-24-97-6	212.50	17968.50	295.60	163855.24	807.26	1245.25	222.60
M17-24-97-7	130.42	15566.41	560.88	176528.32	1199.87	2230.69	293.44
M17-24-97-8	130.42	15533.93	354.52	108706.41	467.66	1064.57	158.36
M17-24-97-9	113.34	17262.90	203.20	131763.83	489.38	627.28	116.32
M17-24-97-10	142.10	15782.85	459.56	498838.14	4321.08	2814.62	491.52
M17-24-97-11	129.34	17852.98	247.00	301607.18	1982.51	1419.25	251.56
M17-24-97-12	143.54	18163.26	283.92	392461.99	2299.55	1671.33	322.20
M17-24-97-13	233.30	18322.98	1917.33	590795.11	5069.37	8459.57	1224.13
M17-24-97-14	129.90	18695.55	561.60	334437.24	1733.87	2326.97	357.40
M17-24-97-15	127.98	18383.02	403.76	304969.39	1547.07	1577.77	271.40
M17-24-97-16	248.06	23329.53	1412.05	1001960.90	7898.82	7979.61	1321.97
M17-24-97-17	151.14	24405.58	536.16	300879.99	1654.63	3068.54	481.20
M17-24-97-18	220.18	26201.23	941.57	468178.18	3227.16	5668.35	857.60
SRM614-10	528.54	66093.61	1070.73	5698.75	744.10	951.33	1101.69
SRM612-10	18303.72	52365.45	42886.60	30353.13	23929.28	33523.39	41292.71
SRM610-10	142762.62	36245.64	290724.76	259693.22	230860.76	314049.61	414658.34
AP1-10	468.66	48875.84	478.08	25504.02	71.54	48.20	30.08
AP2-10	1376.99	48012.55	340.76	58209.61	1488.91	1892.05	2344.05
AP3-10	6503.06	55275.23	324.76	278779.30	8532.75	14205.68	14887.92
AP4-10	12018.61	53496.82	991.01	464423.18	14301.74	22765.33	24330.06
zero correction							
SRM614-9	486.02	27747.16	1053.17	7367.16	576.94	729.64	910.37
SRM612-9	16455.63	25838.66	51823.41	58704.49	21050.74	29380.53	40210.75
SRM610-9	148986.85	18941.03	376752.51	327758.61	188170.32	267811.27	388159.63
AP1-9	572.30	35585.52	658.12	51169.81	499.02	449.92	171.16
AP2-9	1872.51	35341.20	508.40	83167.11	1733.47	2401.61	2794.94
AP3-9	6010.09	47126.42	482.04	308616.18	8484.91	12184.11	14974.68
AP4-9	13488.14	44684.09	1367.29	560076.43	14089.26	22407.53	26058.43
M17-24-97-1	301.06	24311.34	812.32	321844.36	123444.76	54984.03	69722.91
M17-24-97-2	267.98	21523.00	306.44	201801.22	100293.02	44017.93	55913.43
M17-24-97-3	298.30	22416.17	278.16	238627.99	107043.38	45957.90	55229.71
M17-24-97-4	240.54	15943.21	953.57	209841.07	1856.43	4474.79	631.80
M17-24-97-5	192.30	17928.74	217.00	143113.08	476.38	638.36	125.80
M17-24-97-6	212.50	17968.50	295.60	163855.24	807.26	1245.25	222.60
M17-24-97-7	130.42	15566.41	560.88	176528.32	1199.87	2230.69	293.44

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	130.42	15533.93	354.52	108706.41	467.66	1064.57	158.36
M17-24-97-9	113.34	17262.90	203.20	131763.83	489.38	627.28	116.32
M17-24-97-10	142.10	15782.85	459.56	498838.14	4321.08	2814.62	491.52
M17-24-97-11	129.34	17852.98	247.00	301607.18	1982.51	1419.25	251.56
M17-24-97-12	143.54	18163.26	283.92	392461.99	2299.55	1671.33	322.20
M17-24-97-13	233.30	18322.98	1917.33	590795.11	5069.37	8459.57	1224.13
M17-24-97-14	129.90	18695.55	561.60	334437.24	1733.87	2326.97	357.40
M17-24-97-15	127.98	18383.02	403.76	304969.39	1547.07	1577.77	271.40
M17-24-97-16	248.06	23329.53	1412.05	1001960.90	7898.82	7979.61	1321.97
M17-24-97-17	151.14	24405.58	536.16	300879.99	1654.63	3068.54	481.20
M17-24-97-18	220.18	26201.23	941.57	468178.18	3227.16	5668.35	857.60
SRM614-10	528.54	66093.61	1070.73	5698.75	744.10	951.33	1101.69
SRM612-10	18303.72	52365.45	42886.60	30353.13	23929.28	33523.39	41292.71
SRM610-10	142762.62	36245.64	290724.76	259693.22	230860.76	314049.61	414658.34
AP1-10	468.66	48875.84	478.08	25504.02	71.54	48.20	30.08
AP2-10	1376.99	48012.55	340.76	58209.61	1488.91	1892.05	2344.05
AP3-10	6503.06	55275.23	324.76	278779.30	8532.75	14205.68	14887.92
AP4-10	12018.61	53496.82	991.01	464423.18	14301.74	22765.33	24330.06

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-9	0.000207	0.011803	0.000448	0.003134	0.000245	0.000310	0.000387
SRM612-9	0.009097	0.014283	0.028648	0.032452	0.011637	0.016241	0.022228
SRM610-9	0.148446	0.018872	0.375384	0.326568	0.187487	0.266839	0.386750
AP1-9	0.000045	0.002795	0.000052	0.004019	0.000039	0.000035	0.000013
AP2-9	0.000140	0.002634	0.000038	0.006200	0.000129	0.000179	0.000208
AP3-9	0.000336	0.002637	0.000027	0.017270	0.000475	0.000682	0.000838
AP4-9	0.000831	0.002753	0.000084	0.034510	0.000868	0.001381	0.001606
M17-24-97-1	0.000040	0.003238	0.000108	0.042864	0.016441	0.007323	0.009286
M17-24-97-2	0.000039	0.003107	0.000044	0.029133	0.014479	0.006355	0.008072
M17-24-97-3	0.000039	0.002913	0.000036	0.031007	0.013909	0.005972	0.007176
M17-24-97-4	0.000045	0.002959	0.000177	0.038943	0.000345	0.000830	0.000117
M17-24-97-5	0.000036	0.003310	0.000040	0.026421	0.000088	0.000118	0.000023
M17-24-97-6	0.000037	0.003128	0.000051	0.028528	0.000141	0.000217	0.000039
M17-24-97-7	0.000026	0.003143	0.000113	0.035647	0.000242	0.000450	0.000059
M17-24-97-8	0.000029	0.003403	0.000078	0.023812	0.000102	0.000233	0.000035
M17-24-97-9	0.000022	0.003337	0.000039	0.025471	0.000095	0.000121	0.000022
M17-24-97-10	0.000035	0.003918	0.000114	0.123833	0.001073	0.000699	0.000122
M17-24-97-11	0.000028	0.003848	0.000053	0.065005	0.000427	0.000306	0.000054
M17-24-97-12	0.000029	0.003664	0.000057	0.079160	0.000464	0.000337	0.000065
M17-24-97-13	0.000054	0.004206	0.000440	0.135601	0.001164	0.001942	0.000281
M17-24-97-14	0.000027	0.003956	0.000119	0.070759	0.000367	0.000492	0.000076
M17-24-97-15	0.000027	0.003944	0.000087	0.065425	0.000332	0.000338	0.000058
M17-24-97-16	0.000046	0.004337	0.000263	0.186275	0.001468	0.001483	0.000246
M17-24-97-17	0.000026	0.004120	0.000091	0.050797	0.000279	0.000518	0.000081
M17-24-97-18	0.000037	0.004367	0.000157	0.078038	0.000538	0.000945	0.000143
SRM614-10	0.000267	0.033434	0.000542	0.002883	0.000376	0.000481	0.000557
SRM612-10	0.013403	0.038344	0.031403	0.022226	0.017522	0.024547	0.030236
SRM610-10	0.177960	0.045182	0.362402	0.323720	0.287779	0.391478	0.516891
AP1-10	0.000045	0.004699	0.000046	0.002452	0.000007	0.000005	0.000003
AP2-10	0.000127	0.004443	0.000032	0.005387	0.000138	0.000175	0.000217
AP3-10	0.000445	0.003782	0.000022	0.019072	0.000584	0.000972	0.001019
AP4-10	0.000875	0.003894	0.000072	0.033808	0.001041	0.001657	0.001771

standardize signal averages AP

AP1	0.000045	0.003747	0.000049	0.003236	0.000023	0.000020	0.000008
AP2	0.000134	0.003539	0.000035	0.005793	0.000134	0.000177	0.000213
AP3	0.000391	0.003209	0.000025	0.018171	0.000529	0.000827	0.000928
AP4	0.000853	0.003324	0.000078	0.034159	0.000955	0.001519	0.001688

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.020304	0.041644	0.023633	0.008267	0.014961	0.009496	0.008517
standardize signal averages SRM							
srms614-2	0.000237	0.022619	0.000495	0.003008	0.000311	0.000396	0.000472
srms612-2	0.011250	0.026314	0.030025	0.027339	0.014579	0.020394	0.026232
srms610-2	0.163203	0.032027	0.368893	0.325144	0.237633	0.329158	0.451821
linest from std sig ave							
	0.026391	0.000000	0.011439	0.015215	0.022467	0.015886	0.011110
concentration data							
SRM614-9	0.36	42.15	0.91	2.22	0.31	0.25	0.28
SRM612-9	15.84	51.01	58.06	23.01	14.93	13.23	16.24
SRM610-9	258.49	67.40	760.83	231.53	240.57	217.32	282.50
AP1-9	0.36	46.43	0.49	13.25	0.23	0.13	0.05
AP2-9	1.13	43.77	0.36	20.45	0.77	0.68	0.71
AP3-9	2.72	43.81	0.25	56.95	2.83	2.58	2.85
AP4-9	6.73	45.74	0.79	113.81	5.18	5.23	5.46
M17-24-97-1	0.32	53.79	1.02	141.36	98.13	27.74	31.55
M17-24-97-2	0.31	51.62	0.42	96.08	86.42	24.07	27.43
M17-24-97-3	0.31	48.39	0.34	102.26	83.02	22.62	24.38
M17-24-97-4	0.36	49.15	1.67	128.43	2.06	3.15	0.40
M17-24-97-5	0.29	54.99	0.38	87.13	0.52	0.45	0.08
M17-24-97-6	0.30	51.97	0.49	94.08	0.84	0.82	0.13
M17-24-97-7	0.21	52.22	1.07	117.56	1.45	1.71	0.20
M17-24-97-8	0.23	56.53	0.73	78.53	0.61	0.88	0.12
M17-24-97-9	0.18	55.44	0.37	84.00	0.56	0.46	0.08
M17-24-97-10	0.29	65.09	1.08	408.38	6.40	2.65	0.41
M17-24-97-11	0.23	63.92	0.50	214.38	2.55	1.16	0.18
M17-24-97-12	0.23	60.86	0.54	261.06	2.77	1.28	0.22
M17-24-97-13	0.43	69.87	4.15	447.19	6.94	7.36	0.95
M17-24-97-14	0.22	65.71	1.12	233.35	2.19	1.87	0.26
M17-24-97-15	0.22	65.52	0.82	215.76	1.98	1.28	0.20
M17-24-97-16	0.37	72.05	2.47	614.30	8.76	5.62	0.84
M17-24-97-17	0.21	68.45	0.85	167.52	1.67	1.96	0.28
M17-24-97-18	0.30	72.55	1.48	257.36	3.21	3.58	0.49
SRM614-10	0.47	119.41	1.10	2.04	0.48	0.39	0.41
SRM612-10	23.34	136.94	63.65	15.76	22.48	19.99	22.09
SRM610-10	309.89	161.37	734.52	229.51	369.25	318.82	377.56
AP1-10	0.36	78.07	0.43	8.09	0.04	0.02	0.01
AP2-10	1.03	73.81	0.30	17.76	0.82	0.66	0.74
AP3-10	3.60	62.82	0.21	62.90	3.48	3.68	3.46
AP4-10	7.09	64.70	0.68	111.49	6.21	6.28	6.02
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-7	7.72	12467.07	97.76	583.00	2.80	7.20	9.96
SRM614-7	305.76	28492.04	996.89	6105.87	315.72	286.80	449.32
SRM612-7	11040.78	31335.38	49376.24	38355.06	9647.21	13271.84	19303.55
SRM610-7	72486.13	25328.98	264463.88	210542.06	70070.03	93133.60	147427.98
AP1-7	388.08	35240.64	551.96	24995.70	154.24	303.48	107.20
AP2-7	1553.53	36502.48	481.04	62882.72	973.09	1331.37	1580.05
AP3-7	8120.33	39274.30	531.12	336933.97	6023.15	9876.82	11660.47
AP4-7	9484.81	42439.52	1181.49	366682.81	7070.84	10634.42	13163.79
34HP45-837-1	43.36	23664.49	174.56	113134.71	5595.95	19483.03	3024.94
34HP45-837-2	59.36	24209.30	150.96	123830.30	7042.92	23033.09	3728.78
34HP45-837-3	47.44	24470.70	162.36	102705.42	6049.43	22481.45	3619.06
34HP45-837-4	81.12	37415.21	180.20	260316.50	13161.11	59440.50	7673.44
34HP45-837-5	100.16	36541.81	147.32	239321.80	8699.89	34446.27	4672.31
34HP45-837-6	134.28	36681.89	191.44	216822.25	9155.57	35559.52	5153.23
34HP45-837-7	314.96	39702.58	249.72	528499.19	12841.43	42318.16	6898.12
34HP45-837-8	146.84	41872.36	164.04	405505.25	17217.94	60368.58	9948.30
34HP45-837-9	112.76	40799.95	182.20	313049.63	21215.40	82006.79	13910.28
34HP45-837-10	111.00	38557.18	185.56	295528.16	1174.89	2285.93	455.92
34HP45-837-11	72.00	39910.82	126.92	307671.00	1102.29	1407.89	342.48
34HP45-837-12	73.52	42209.36	139.40	364802.56	1313.89	1830.89	420.48
34HP45-837-13	177.64	38579.54	423.00	504603.66	1757.49	6109.91	739.08
34HP45-837-14	80.36	39606.10	207.88	323201.81	837.56	2200.49	298.92
34HP45-837-15	87.96	41799.60	237.68	343390.69	843.92	2064.45	344.20

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	464.40	77445.48	1110.81	5439.67	485.48	679.52	922.77
SRM612-8	18145.78	83529.59	55209.11	35278.80	21172.20	29678.01	41152.83
SRM610-8	162543.11	66603.58	422974.34	348676.72	213134.92	294118.22	437917.31
AP1-8	571.16	81884.66	576.32	34794.23	267.72	176.24	53.56
AP2-8	2366.01	79830.37	412.80	92493.40	1761.05	2355.25	3097.70
AP3-8	11249.66	82923.95	515.16	438072.44	10404.70	17296.10	19842.15
AP4-8	13437.16	84816.16	1247.45	528657.00	13201.48	20097.99	24157.82
blank-8	11.08	25861.91	88.12	179.24	8.88	19.76	12.48
blank average	9.40	19164.49	92.94	381.12	5.84	13.48	11.22

blank subtraction							
SRM614-7	296.36	9327.55	903.95	5724.75	309.88	273.32	438.10
SRM612-7	11031.38	12170.89	49283.30	37973.93	9641.37	13258.35	19292.33
SRM610-7	72476.72	6164.49	264370.94	210160.94	70064.19	93120.12	147416.76
AP1-7	378.68	16076.15	459.02	24614.58	148.40	290.00	95.98
AP2-7	1544.13	17338.00	388.10	62501.59	967.25	1317.89	1568.83
AP3-7	8110.93	20109.81	438.18	336552.85	6017.31	9863.34	11649.25
AP4-7	9475.41	23275.03	1088.55	366301.69	7065.00	10620.94	13152.57
34HP45-837-1	33.96	4500.01	81.62	112753.59	5590.11	19469.55	3013.72
34HP45-837-2	49.96	5044.81	58.02	123449.18	7037.08	23019.61	3717.56
34HP45-837-3	38.04	5306.21	69.42	102324.30	6043.59	22467.97	3607.84
34HP45-837-4	71.72	18250.72	87.26	259935.38	13155.27	59427.02	7662.22
34HP45-837-5	90.76	17377.32	54.38	238940.68	8694.05	34432.79	4661.09
34HP45-837-6	124.88	17517.40	98.50	216441.13	9149.73	35546.04	5142.01
34HP45-837-7	305.56	20538.09	156.78	528118.07	12835.59	42304.68	6886.90
34HP45-837-8	137.44	22707.87	71.10	405124.13	17212.10	60355.10	9937.08
34HP45-837-9	103.36	21635.46	89.26	312668.51	21209.56	81993.31	13899.06
34HP45-837-10	101.60	19392.69	92.62	295147.04	1169.05	2272.45	444.70
34HP45-837-11	62.60	20746.34	33.98	307289.88	1096.45	1394.41	331.26
34HP45-837-12	64.12	23044.87	46.46	364421.44	1308.05	1817.41	409.26
34HP45-837-13	168.24	19415.05	330.06	504222.54	1751.65	6096.43	727.86
34HP45-837-14	70.96	20441.61	114.94	322820.69	831.72	2187.01	287.70
34HP45-837-15	78.56	22635.11	144.74	343009.57	838.08	2050.97	332.98
SRM614-8	455.00	58280.99	1017.87	5058.55	479.64	666.04	911.55
SRM612-8	18136.38	64365.11	55116.17	34897.67	21166.36	29664.53	41141.61
SRM610-8	162533.71	47439.09	422881.40	348295.60	213129.08	294104.74	437906.09
AP1-8	561.76	62720.18	483.38	34413.11	261.88	162.76	42.34
AP2-8	2356.61	60665.88	319.86	92112.28	1755.21	2341.77	3086.48
AP3-8	11240.26	63759.46	422.22	437691.32	10398.86	17282.62	19830.93
AP4-8	13427.75	65651.67	1154.51	528275.88	13195.63	20084.51	24146.60

zero correction							
SRM614-7	296.36	9327.55	903.95	5724.75	309.88	273.32	438.10
SRM612-7	11031.38	12170.89	49283.30	37973.93	9641.37	13258.35	19292.33
SRM610-7	72476.72	6164.49	264370.94	210160.94	70064.19	93120.12	147416.76
AP1-7	378.68	16076.15	459.02	24614.58	148.40	290.00	95.98
AP2-7	1544.13	17338.00	388.10	62501.59	967.25	1317.89	1568.83
AP3-7	8110.93	20109.81	438.18	336552.85	6017.31	9863.34	11649.25
AP4-7	9475.41	23275.03	1088.55	366301.69	7065.00	10620.94	13152.57
34HP45-837-1	33.96	4500.01	81.62	112753.59	5590.11	19469.55	3013.72
34HP45-837-2	49.96	5044.81	58.02	123449.18	7037.08	23019.61	3717.56
34HP45-837-3	38.04	5306.21	69.42	102324.30	6043.59	22467.97	3607.84
34HP45-837-4	71.72	18250.72	87.26	259935.38	13155.27	59427.02	7662.22
34HP45-837-5	90.76	17377.32	54.38	238940.68	8694.05	34432.79	4661.09
34HP45-837-6	124.88	17517.40	98.50	216441.13	9149.73	35546.04	5142.01
34HP45-837-7	305.56	20538.09	156.78	528118.07	12835.59	42304.68	6886.90
34HP45-837-8	137.44	22707.87	71.10	405124.13	17212.10	60355.10	9937.08
34HP45-837-9	103.36	21635.46	89.26	312668.51	21209.56	81993.31	13899.06
34HP45-837-10	101.60	19392.69	92.62	295147.04	1169.05	2272.45	444.70
34HP45-837-11	62.60	20746.34	33.98	307289.88	1096.45	1394.41	331.26
34HP45-837-12	64.12	23044.87	46.46	364421.44	1308.05	1817.41	409.26
34HP45-837-13	168.24	19415.05	330.06	504222.54	1751.65	6096.43	727.86
34HP45-837-14	70.96	20441.61	114.94	322820.69	831.72	2187.01	287.70
34HP45-837-15	78.56	22635.11	144.74	343009.57	838.08	2050.97	332.98
SRM614-8	455.00	58280.99	1017.87	5058.55	479.64	666.04	911.55
SRM612-8	18136.38	64365.11	55116.17	34897.67	21166.36	29664.53	41141.61
SRM610-8	162533.71	47439.09	422881.40	348295.60	213129.08	294104.74	437906.09
AP1-8	561.76	62720.18	483.38	34413.11	261.88	162.76	42.34
AP2-8	2356.61	60665.88	319.86	92112.28	1755.21	2341.77	3086.48
AP3-8	11240.26	63759.46	422.22	437691.32	10398.86	17282.62	19830.93
AP4-8	13427.75	65651.67	1154.51	528275.88	13195.63	20084.51	24146.60

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-7	0.000134	0.004203	0.000407	0.002580	0.000140	0.000123	0.000197
SRM612-7	0.005934	0.006547	0.026510	0.020426	0.005186	0.007132	0.010377
SRM610-7	0.074853	0.006367	0.273041	0.217053	0.072362	0.096174	0.152251
AP1-7	0.000036	0.001542	0.000044	0.002361	0.000014	0.000028	0.000009
AP2-7	0.000128	0.001438	0.000032	0.005183	0.000080	0.000109	0.000130
AP3-7	0.000493	0.001222	0.000027	0.020448	0.000366	0.000599	0.000708
AP4-7	0.000655	0.001608	0.000075	0.025314	0.000488	0.000734	0.000909
34HP45-837-1	0.000008	0.001104	0.000020	0.027665	0.001372	0.004777	0.000739
34HP45-837-2	0.000013	0.001269	0.000015	0.031055	0.001770	0.005791	0.000935
34HP45-837-3	0.000011	0.001602	0.000021	0.030900	0.001825	0.006785	0.001090
34HP45-837-4	0.000008	0.001983	0.000009	0.028240	0.001429	0.006456	0.000832
34HP45-837-5	0.000011	0.002037	0.000006	0.028011	0.001019	0.004037	0.000546
34HP45-837-6	0.000016	0.002210	0.000012	0.027311	0.001155	0.004485	0.000649
34HP45-837-7	0.000039	0.002593	0.000020	0.066676	0.001621	0.005341	0.000869
34HP45-837-8	0.000017	0.002832	0.000009	0.050534	0.002147	0.007528	0.001240
34HP45-837-9	0.000016	0.003355	0.000014	0.048487	0.003289	0.012715	0.002155
34HP45-837-10	0.000021	0.003992	0.000019	0.060750	0.000241	0.000468	0.000092
34HP45-837-11	0.000012	0.003906	0.000006	0.057850	0.000206	0.000263	0.000062
34HP45-837-12	0.000011	0.004031	0.000008	0.063745	0.000229	0.000318	0.000072
34HP45-837-13	0.000047	0.005376	0.000091	0.139622	0.000485	0.001688	0.000202
34HP45-837-14	0.000019	0.005545	0.000031	0.087569	0.000226	0.000593	0.000078
34HP45-837-15	0.000020	0.005663	0.000036	0.085815	0.000210	0.000513	0.000083
SRM614-8	0.000254	0.032533	0.000568	0.002824	0.000268	0.000372	0.000509
SRM612-8	0.011113	0.039438	0.033771	0.021383	0.012969	0.018176	0.025208
SRM610-8	0.164137	0.047907	0.427052	0.351730	0.215231	0.297005	0.442225
AP1-8	0.000042	0.004725	0.000036	0.002593	0.000020	0.000012	0.000003
AP2-8	0.000151	0.003892	0.000021	0.005909	0.000113	0.000150	0.000198
AP3-8	0.000577	0.003274	0.000022	0.022475	0.000534	0.000887	0.001018
AP4-8	0.000796	0.003890	0.000068	0.031305	0.000782	0.001190	0.001431

standardize signal averages AP							
AP1	0.000039	0.003134	0.000040	0.002477	0.000017	0.000020	0.000006
AP2	0.000140	0.002665	0.000026	0.005546	0.000096	0.000130	0.000164
AP3	0.000535	0.002248	0.000024	0.021461	0.000450	0.000743	0.000863
AP4	0.000725	0.002749	0.000072	0.028309	0.000635	0.000962	0.001170

linest from std sig ave							
	0.021319	0.054421	0.026483	0.009071	0.020906	0.013394	0.011227

standardize signal averages SRM							
srm614-2	0.000194	0.018368	0.000488	0.002702	0.000204	0.000247	0.000353
srm612-2	0.008523	0.022992	0.030140	0.020904	0.009078	0.012654	0.017793
srm610-2	0.119495	0.027137	0.350046	0.284392	0.143796	0.196590	0.297238

linest from std sig ave							
	0.036042	0.000000	0.012052	0.017407	0.037124	0.026596	0.016887

concentration data							
SRM614-7	0.24	19.62	0.93	2.01	0.25	0.14	0.19
SRM612-7	10.85	30.56	60.21	15.89	9.30	8.19	9.99
SRM610-7	136.86	29.72	620.15	168.85	129.74	110.48	146.59
AP1-7	0.31	33.48	0.47	8.55	0.12	0.15	0.04
AP2-7	1.09	31.21	0.34	18.75	0.67	0.58	0.58
AP3-7	4.19	26.53	0.28	73.99	3.05	3.20	3.17
AP4-7	5.57	34.92	0.79	91.60	4.07	3.92	4.07
34HP45-837-1	0.07	23.97	0.21	100.11	11.44	25.53	3.31
34HP45-837-2	0.11	27.55	0.15	112.38	14.76	30.94	4.19
34HP45-837-3	0.10	34.79	0.22	111.82	15.22	36.25	4.88
34HP45-837-4	0.07	43.05	0.10	102.19	11.92	34.50	3.73
34HP45-837-5	0.09	44.23	0.07	101.36	8.50	21.57	2.45
34HP45-837-6	0.13	47.99	0.13	98.83	9.63	23.97	2.91
34HP45-837-7	0.33	56.30	0.21	241.28	13.52	28.54	3.89
34HP45-837-8	0.15	61.50	0.09	182.86	17.91	40.23	5.55
34HP45-837-9	0.14	72.84	0.15	175.46	27.43	67.94	9.65
34HP45-837-10	0.18	86.66	0.20	219.83	2.01	2.50	0.41

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	0.10	84.79	0.07	209.33	1.72	1.40	0.28
34HP45-837-12	0.10	87.52	0.09	230.67	1.91	1.70	0.32
34HP45-837-13	0.40	116.72	0.97	505.24	4.05	9.02	0.90
34HP45-837-14	0.16	120.39	0.33	316.88	1.88	3.17	0.35
34HP45-837-15	0.17	122.95	0.38	310.53	1.75	2.74	0.37
SRM614-8	0.46	151.84	1.29	2.20	0.48	0.43	0.49
SRM612-8	20.32	184.07	76.70	16.63	23.25	20.88	24.27
SRM610-8	300.11	223.60	969.95	273.62	385.90	341.17	425.79
AP1-8	0.36	102.59	0.38	9.38	0.16	0.07	0.01
AP2-8	1.29	84.49	0.22	21.38	0.94	0.80	0.89
AP3-8	4.91	71.08	0.23	81.33	4.45	4.74	4.56
AP4-8	6.77	84.46	0.72	113.28	6.52	6.36	6.41

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-5	22.08	19915.91	152.80	960.41	5.04	21.88	10.60
SRM614-5	251.04	33400.43	712.32	16429.29	434.48	293.84	317.68
SRM612-5	11692.75	36592.05	44802.85	372784.03	14574.96	15040.33	20264.07
SRM610-5	87773.97	31073.73	308138.38	438407.06	88174.98	118826.55	180282.58
AP1-5	615.04	40212.27	644.12	101757.62	895.49	546.84	176.88
AP2-5	1964.93	42421.56	649.56	187356.30	2404.97	2144.13	1986.49
AP3-5	8708.29	43760.41	560.08	482038.25	8727.69	12195.75	13625.56
AP4-5	7724.96	50140.36	1013.61	376290.72	7726.00	10066.58	13200.40
34HP45-718-1	263.44	34775.16	992.97	1869103.40	12370.95	13333.91	3598.10
34HP45-718-2	253.60	41960.48	528.84	1769888.00	19343.87	27489.80	7974.92
34HP45-718-3	193.36	48005.95	1301.09	2697150.50	25983.55	39279.26	8892.05
34HP45-718-4	1068.09	56539.68	580.12	12586118.00	98672.79	195004.66	32994.47
34HP45-718-5	1317.29	53776.86	419.48	8758694.00	62781.15	110123.77	20861.44
34HP45-718-6	1554.33	55157.67	765.64	8534189.00	59554.54	112135.59	20111.07
34HP45-718-7	1695.01	59204.18	985.65	13001460.00	80432.49	119547.47	23364.13
34HP45-718-8	2079.45	63455.48	637.44	14908902.00	94034.21	126798.99	24989.06
34HP45-718-9	1824.49	68325.91	948.41	22643686.00	148093.44	191499.64	41497.95
34HP45-718-10	1498.13	67783.34	1537.21	18416998.00	161679.67	91206.88	21300.48
34HP45-718-11	1267.25	74003.26	1050.37	21337612.00	189418.75	95975.30	20929.56
34HP45-718-12	1331.77	73511.38	1138.17	13494644.00	90349.23	69594.23	14235.12
34HP45-718-13	1264.01	83628.23	12369.35	86822392.00	2459235.00	678801.00	153439.14
34HP45-718-14	932.01	80307.01	8657.29	73835064.00	1725137.80	429365.53	101706.85
34HP45-718-15	634.00	81665.70	3964.58	48796420.00	350056.47	116169.41	32614.62
34HP45-718-16	552.56	67926.66	848.40	5808467.00	15626.69	17324.74	3473.02
34HP45-718-17	486.20	72120.48	260.92	6757052.50	10117.42	10233.98	2400.41
34HP45-718-18	399.20	72704.97	259.60	5905109.50	9674.09	11810.91	2459.45
SRM614-6	355.96	73732.81	625.80	32582.14	693.36	678.56	626.64
SRM612-6	17332.90	78904.41	46211.06	75143.91	19785.07	27687.20	36608.65
SRM610-6	166035.17	62301.35	406871.78	338142.38	204565.39	297224.22	425916.91
AP1-6	683.72	75292.06	423.20	41507.15	244.32	158.56	72.28
AP2-6	2289.57	77011.67	318.16	98575.36	1766.53	2143.61	2688.86
AP3-6	12029.63	77268.88	464.00	496744.25	11553.75	19860.19	22063.65
AP4-6	8299.61	84102.99	813.44	421833.94	11245.78	15165.45	19848.31
blank-6	15.08	27210.51	69.72	8329.77	101.52	66.40	19.64
blank average	18.58	23563.21	111.26	4645.09	53.28	44.14	15.12

blank subtraction							
SRM614-5	232.46	9837.22	601.06	11784.21	381.20	249.70	302.56
SRM612-5	11674.17	13028.83	44691.59	368138.94	14521.68	14996.18	20248.95
SRM610-5	87755.39	7510.52	308027.12	433761.97	88121.70	118782.41	180267.46
AP1-5	596.46	16649.05	532.86	97112.53	842.20	502.70	161.76
AP2-5	1946.35	18858.35	538.30	182711.21	2351.69	2099.99	1971.37
AP3-5	8689.71	20197.19	448.82	477393.16	8674.41	12151.61	13160.44
AP4-5	7706.38	26577.15	902.35	371645.63	7672.72	10022.44	13185.27
34HP45-718-1	244.86	11211.94	881.70	1864458.31	12317.67	13289.77	3582.98
34HP45-718-2	235.02	18397.26	417.58	1765242.91	19290.59	27445.65	7959.80
34HP45-718-3	174.78	24442.74	1189.83	2692505.41	25930.27	39235.12	8876.93
34HP45-718-4	1049.51	32976.47	468.86	12581472.91	98619.51	194960.52	32979.34
34HP45-718-5	1298.71	30213.65	308.22	8754048.91	62727.87	110079.63	20846.32
34HP45-718-6	1535.75	31594.46	654.38	8529543.91	59501.25	112091.45	20095.95
34HP45-718-7	1676.43	35640.96	874.38	12996814.91	80379.21	119503.33	23349.01
34HP45-718-8	2060.87	39892.26	526.18	14904256.91	93980.93	126754.85	24973.94
34HP45-718-9	1805.91	44762.69	837.14	22639040.91	148040.16	191455.50	41482.83
34HP45-718-10	1479.55	44220.13	1425.95	18412352.91	161626.39	91162.73	21285.36

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	1248.67	50440.05	939.11	21332966.91	189365.47	95931.16	20914.44
34HP45-718-12	1313.19	49948.16	1026.91	13489998.91	90295.95	69550.09	14220.00
34HP45-718-13	1245.43	60065.02	12258.09	86817746.91	2459181.72	678756.86	153424.02
34HP45-718-14	913.43	56743.80	8546.03	73830418.91	1725084.52	429321.39	101691.73
34HP45-718-15	615.42	58102.48	3853.32	48791774.91	350003.19	116125.27	32599.50
34HP45-718-16	533.98	44363.45	737.14	5803821.91	15573.41	17280.60	3457.90
34HP45-718-17	467.62	48557.27	149.66	6752407.41	10064.14	10189.84	2385.29
34HP45-718-18	380.62	49141.76	148.34	5900464.41	9620.81	11766.77	2444.33
SRM614-6	337.38	50169.60	514.54	27937.06	640.08	634.42	611.52
SRM612-6	17314.32	55341.19	46099.80	70498.82	19731.79	27643.05	36593.52
SRM610-6	166016.59	38738.14	406760.52	333497.29	204512.11	297180.08	425901.79
AP1-6	665.14	51728.85	311.94	36862.07	191.04	114.42	57.16
AP2-6	2270.99	53448.46	206.90	93930.27	1713.25	2099.47	2673.74
AP3-6	12011.05	53705.66	352.74	492099.16	11500.46	19816.05	22048.52
AP4-6	8281.03	60539.78	702.18	417188.85	11192.50	15121.30	19833.19

zero correction

SRM614-5	232.46	9837.22	601.06	11784.21	381.20	249.70	302.56
SRM612-5	11674.17	13028.83	44691.59	368138.94	14521.68	14996.18	20248.95
SRM610-5	87755.39	7510.52	308027.12	433761.97	88121.70	118782.41	180267.46
AP1-5	596.46	16649.05	532.86	97112.53	842.20	502.70	161.76
AP2-5	1946.35	18858.35	538.30	182711.21	2351.69	2099.99	1971.37
AP3-5	8689.71	20197.19	448.82	477393.16	8674.41	12151.61	13610.44
AP4-5	7706.38	26577.15	902.35	371645.63	7672.72	10022.44	13185.27
34HP45-718-1	244.86	11211.94	881.70	1864458.31	12317.67	13289.77	3582.98
34HP45-718-2	235.02	18397.26	417.58	1765242.91	19290.59	27445.65	7959.80
34HP45-718-3	174.78	24442.74	1189.83	2692505.41	25930.27	39235.12	8876.93
34HP45-718-4	1049.51	32976.47	468.86	12581472.91	98619.51	194960.52	32979.34
34HP45-718-5	1298.71	30213.65	308.22	8754048.91	62727.87	110079.63	20846.32
34HP45-718-6	1535.75	31594.46	654.38	8529543.91	59501.25	112091.45	20095.95
34HP45-718-7	1676.43	35640.96	874.38	12996814.91	80379.21	119503.33	23349.01
34HP45-718-8	2060.87	39892.26	526.18	14904256.91	93980.93	126754.85	24973.94
34HP45-718-9	1805.91	44762.69	837.14	22639040.91	148040.16	191455.50	41482.83
34HP45-718-10	1479.55	44220.13	1425.95	18412352.91	161626.39	91162.73	21285.36
34HP45-718-11	1248.67	50440.05	939.11	21332966.91	189365.47	95931.16	20914.44
34HP45-718-12	1313.19	49948.16	1026.91	13489998.91	90295.95	69550.09	14220.00
34HP45-718-13	1245.43	60065.02	12258.09	86817746.91	2459181.72	678756.86	153424.02
34HP45-718-14	913.43	56743.80	8546.03	73830418.91	1725084.52	429321.39	101691.73
34HP45-718-15	615.42	58102.48	3853.32	48791774.91	350003.19	116125.27	32599.50
34HP45-718-16	533.98	44363.45	737.14	5803821.91	15573.41	17280.60	3457.90
34HP45-718-17	467.62	48557.27	149.66	6752407.41	10064.14	10189.84	2385.29
34HP45-718-18	380.62	49141.76	148.34	5900464.41	9620.81	11766.77	2444.33
SRM614-6	337.38	50169.60	514.54	27937.06	640.08	634.42	611.52
SRM612-6	17314.32	55341.19	46099.80	70498.82	19731.79	27643.05	36593.52
SRM610-6	166016.59	38738.14	406760.52	333497.29	204512.11	297180.08	425901.79
AP1-6	665.14	51728.85	311.94	36862.07	191.04	114.42	57.16
AP2-6	2270.99	53448.46	206.90	93930.27	1713.25	2099.47	2673.74
AP3-6	12011.05	53705.66	352.74	492099.16	11500.46	19816.05	22048.52
AP4-6	8281.03	60539.78	702.18	417188.85	11192.50	15121.30	19833.19

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-5	0.000155	0.006545	0.000400	0.007840	0.000254	0.000166	0.000201
SRM612-5	0.006726	0.007506	0.025747	0.212090	0.008366	0.008640	0.011666
SRM610-5	0.082380	0.007050	0.289160	0.407193	0.082724	0.111507	0.169226
AP1-5	0.000046	0.001270	0.000041	0.007409	0.000064	0.000038	0.000012
AP2-5	0.000138	0.001334	0.000038	0.012928	0.000166	0.000149	0.000139
AP3-5	0.000505	0.001173	0.000026	0.027735	0.000504	0.000706	0.000791
AP4-5	0.000463	0.001598	0.000054	0.022340	0.000461	0.000602	0.000793
34HP45-718-1	0.000029	0.001325	0.000104	0.220357	0.001456	0.001571	0.000423
34HP45-718-2	0.000018	0.001448	0.000033	0.138950	0.001518	0.002160	0.000627

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000012	0.001631	0.000079	0.179620	0.001730	0.002617	0.000592
34HP45-718-4	0.000050	0.001557	0.000022	0.594055	0.004656	0.009205	0.001557
34HP45-718-5	0.000079	0.001832	0.000019	0.530812	0.003804	0.006675	0.001264
34HP45-718-6	0.000098	0.002007	0.000042	0.541714	0.003779	0.007119	0.001276
34HP45-718-7	0.000097	0.002067	0.000051	0.753812	0.004662	0.006931	0.001354
34HP45-718-8	0.000113	0.002191	0.000029	0.818570	0.005162	0.006962	0.001372
34HP45-718-9	0.000095	0.002346	0.000044	1.186304	0.007757	0.010032	0.002174
34HP45-718-10	0.000093	0.002786	0.000090	1.159944	0.010182	0.005743	0.001341
34HP45-718-11	0.000074	0.002972	0.000055	1.256902	0.011157	0.005652	0.001232
34HP45-718-12	0.000072	0.002746	0.000056	0.741543	0.004964	0.003823	0.000782
34HP45-718-13	0.000078	0.003779	0.000771	5.461658	0.154706	0.042700	0.009652
34HP45-718-14	0.000057	0.003511	0.000529	4.568695	0.106750	0.026567	0.006293
34HP45-718-15	0.000034	0.003254	0.000216	2.732918	0.019604	0.006504	0.001826
34HP45-718-16	0.000034	0.002783	0.000046	0.364110	0.000977	0.001084	0.000217
34HP45-718-17	0.000025	0.002607	0.000008	0.362592	0.000540	0.000547	0.000128
34HP45-718-18	0.000023	0.002920	0.000009	0.350617	0.000572	0.000699	0.000145
SRM614-6	0.000278	0.041314	0.000424	0.023006	0.000527	0.000522	0.000504
SRM612-6	0.011479	0.036690	0.030563	0.046740	0.013082	0.018327	0.024261
SRM610-6	0.165699	0.038664	0.405983	0.332860	0.204121	0.296612	0.425088
AP1-6	0.000048	0.003701	0.000022	0.002637	0.000014	0.000008	0.000004
AP2-6	0.000149	0.003515	0.000014	0.006177	0.000113	0.000138	0.000176
AP3-6	0.000644	0.002880	0.000019	0.026385	0.000617	0.001062	0.001182
AP4-6	0.000487	0.003563	0.000041	0.024551	0.000659	0.000890	0.001167

standardize signal averages AP

AP1	0.000047	0.002486	0.000031	0.005023	0.000039	0.000023	0.000008
AP2	0.000144	0.002425	0.000026	0.009553	0.000140	0.000143	0.000158
AP3	0.000574	0.002026	0.000022	0.027060	0.000560	0.000884	0.000986
AP4	0.000475	0.002580	0.000048	0.023446	0.000560	0.000746	0.000980

linest from std sig ave

0.024629	0.061530	0.036937	0.008585	0.019777	0.013366	0.011415
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standardize signal averages SRM

srm614-2	0.000216	0.023929	0.000412	0.015423	0.000390	0.000344	0.000352
srm612-2	0.009102	0.022098	0.028155	0.129415	0.010724	0.013483	0.017963
srm610-2	0.124040	0.022857	0.347572	0.370027	0.143423	0.204059	0.297157

linest from std sig ave

0.034718	0.000000	0.012141	0.012263	0.037195	0.025620	0.016891
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concentration data

SRM614-5	0.33	34.54	1.27	5.77	0.43	0.19	0.20
SRM612-5	14.21	39.61	81.56	156.15	14.19	9.90	11.42
SRM610-5	174.01	37.21	916.02	299.80	140.31	127.82	165.67
AP1-5	0.45	31.18	0.60	25.37	0.51	0.20	0.06
AP2-5	1.35	32.75	0.56	44.27	1.31	0.79	0.64
AP3-5	4.96	28.80	0.38	94.99	3.98	3.76	3.60
AP4-5	4.55	39.22	0.80	76.51	3.64	3.21	3.61
34HP45-718-1	0.28	32.53	1.54	754.67	11.49	8.37	1.93
34HP45-718-2	0.18	35.55	0.48	475.87	11.98	11.52	2.85
34HP45-718-3	0.11	40.03	1.17	615.15	13.65	13.96	2.70
34HP45-718-4	0.49	38.22	0.33	2034.48	36.74	49.08	7.09
34HP45-718-5	0.77	44.97	0.28	1817.89	30.01	35.59	5.76
34HP45-718-6	0.96	49.25	0.61	1855.23	29.81	37.96	5.81
34HP45-718-7	0.96	50.74	0.75	2581.61	36.78	36.96	6.17
34HP45-718-8	1.11	53.78	0.43	2803.39	40.72	37.12	6.25
34HP45-718-9	0.93	57.58	0.65	4062.78	61.20	53.49	9.90
34HP45-718-10	0.92	68.38	1.32	3972.51	80.33	30.62	6.11
34HP45-718-11	0.72	72.95	0.82	4304.56	88.02	30.14	5.61
34HP45-718-12	0.71	67.40	0.83	2539.59	39.16	20.39	3.56
34HP45-718-13	0.77	92.75	11.36	18704.77	1220.57	227.68	43.95
34HP45-718-14	0.56	86.19	7.79	15646.60	842.21	141.65	28.66
34HP45-718-15	0.34	79.88	3.18	9359.54	154.67	34.68	8.31
34HP45-718-16	0.33	68.32	0.68	1246.98	7.71	5.78	0.99
34HP45-718-17	0.25	64.00	0.12	1241.78	4.26	2.92	0.58
34HP45-718-18	0.22	71.68	0.13	1200.77	4.51	3.73	0.66
SRM614-6	0.59	218.01	1.34	16.94	0.89	0.60	0.49
SRM612-6	24.25	193.61	96.82	34.41	22.19	21.01	23.75
SRM610-6	350.00	204.03	1286.10	245.07	346.21	340.00	416.15
AP1-6	0.47	90.85	0.33	9.03	0.11	0.04	0.02
AP2-6	1.47	86.28	0.20	21.16	0.89	0.74	0.80
AP3-6	6.33	70.68	0.28	90.36	4.86	5.67	5.38
AP4-6	4.79	87.45	0.61	84.08	5.20	4.74	5.31

certified concentration

SRM614	0.73	0.68	3.10	0.72	0.79	0.75
SRM612	38.44	41.64	37.74	35.77	38.35	37.16

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-3	11.16	14372.52	86.80	717.96	8.92	18.52	10.96
SRM614-3	363.04	30662.53	1049.33	7924.52	415.80	634.68	586.32
SRM612-3	16974.62	33230.27	66431.73	129436.77	14232.40	20211.99	27526.15
SRM610-3	83515.95	29684.61	308643.41	334231.88	92454.13	125278.91	196465.39
AP1-3	827.36	39227.86	773.68	124854.74	1282.89	952.09	380.96
AP2-3	2519.97	41901.72	754.04	181700.63	2459.97	2752.10	2700.42
AP3-3	20907.44	44026.41	918.45	813929.69	14143.96	24568.30	27243.47
AP4-3	10631.54	46885.94	1374.49	553154.81	10319.30	14604.04	18373.86
34HP45-856-1	880.32	43994.25	451.76	6841697.00	16711.90	15713.81	3548.74
34HP45-856-2	712.24	46505.18	441.56	7858548.00	20977.36	16480.49	3936.82
34HP45-856-3	971.49	47754.55	519.60	11964040.00	30494.13	15856.97	4541.99
34HP45-856-4	1361.25	56777.64	1233.81	5513239.00	13110.07	14962.32	3204.38
34HP45-856-5	1809.05	65542.77	1348.33	5100182.00	12213.75	19307.95	3638.94
34HP45-856-6	1731.13	66380.25	1275.89	11506421.00	36158.96	23984.41	5671.63
34HP45-856-7	1187.49	64133.80	1821.17	5642271.00	15938.01	19347.27	3942.82
34HP45-856-8	1489.01	69649.52	1859.53	5182414.00	14307.04	24401.94	4539.11
34HP45-856-9	1573.29	71350.48	1854.37	6474503.50	18749.31	27407.43	5075.07
34HP45-856-10	525.44	61808.55	424.48	4480609.00	8401.89	7323.68	1776.41
34HP45-856-11	621.12	64965.93	369.00	4734586.00	8925.77	7326.20	2062.73
34HP45-856-12	810.56	69488.79	854.24	5070845.00	10453.86	13096.83	2877.10
34HP45-856-13	658.92	65877.81	365.76	4293663.00	6434.48	6709.72	1804.73
34HP45-856-14	568.08	68069.91	344.88	3580514.00	6542.76	6933.68	1660.01
34HP45-856-15	372.76	63983.00	198.80	2458339.80	4313.94	5195.79	1114.65
34HP45-856-16	166.08	58345.17	384.80	682014.75	5260.35	16345.01	2388.05
34HP45-856-17	135.88	57234.04	195.84	574449.50	2947.58	8253.29	1245.37
34HP45-856-18	106.80	53596.50	246.56	498910.75	3270.74	8094.61	1388.93
SRM614-4	437.68	76131.98	821.72	6029.03	404.08	667.76	757.36
SRM612-4	21168.44	85014.88	63404.20	50419.48	25959.95	36987.13	49182.48
SRM610-4	195980.34	68492.66	539831.94	428479.81	271387.84	393644.78	559186.69
AP1-4	755.76	81900.18	518.20	41873.20	167.64	184.36	77.76
AP2-4	2821.14	82708.95	385.24	108927.73	2057.89	2672.94	3403.38
AP3-4	23083.65	82287.87	654.68	842413.63	18833.07	36078.84	37641.85
AP4-4	17560.46	87028.57	1561.81	799199.88	18395.22	29408.37	34349.88
blank-4	28.04	28008.92	133.04	876.56	14.16	38.32	24.16
blank average	19.60	21190.72	109.92	797.26	11.54	28.42	17.56

blank subtraction							
SRM614-3	343.44	9471.81	939.41	7127.26	404.26	606.26	568.76
SRM612-3	16955.01	12039.55	66321.81	128639.51	14220.86	20183.57	27508.59
SRM610-3	83496.35	8493.89	308533.49	333434.62	92442.58	125250.49	196447.83
AP1-3	807.76	18037.14	663.76	124057.48	1271.35	923.67	363.40
AP2-3	2500.37	20711.00	644.12	180903.37	2448.43	2723.68	2682.85
AP3-3	20887.84	22835.69	808.52	813132.43	14132.42	24539.88	27225.91
AP4-3	10611.94	25695.22	1264.57	552357.55	10307.76	14575.62	18356.30
34HP45-856-1	860.72	22803.53	341.84	6840899.74	16700.35	15685.39	3531.18
34HP45-856-2	692.64	25314.46	331.64	7857750.74	20965.82	16452.07	3919.26
34HP45-856-3	951.89	26563.83	409.68	11963242.74	30482.59	15828.55	4524.43
34HP45-856-4	1341.65	35586.92	1123.89	5512441.74	13098.53	14933.90	3186.82
34HP45-856-5	1789.45	44352.05	1238.41	5099384.74	12202.21	19279.53	3621.38
34HP45-856-6	1711.53	45189.53	1165.97	11505623.74	36147.42	23955.99	5654.07
34HP45-856-7	1167.89	42943.08	1711.25	5641473.74	15926.47	19318.85	3925.26
34HP45-856-8	1469.41	48458.80	1749.61	5181616.74	14295.50	24373.52	4521.55
34HP45-856-9	1553.69	50159.76	1744.45	6473706.24	18737.76	27379.01	5057.51
34HP45-856-10	505.84	40617.83	314.56	4479811.74	8390.35	7295.26	1758.85
34HP45-856-11	601.52	43775.21	259.08	4733788.74	8914.23	7297.78	2045.17
34HP45-856-12	790.96	48298.07	744.32	5070047.74	10442.32	13068.41	2859.54
34HP45-856-13	639.32	44687.09	255.84	4292865.74	6422.94	6681.30	1787.17
34HP45-856-14	548.48	46879.19	234.96	3579716.74	6531.22	6905.26	1642.45
34HP45-856-15	353.16	42792.28	88.88	2457542.54	4302.40	5167.37	1097.09
34HP45-856-16	146.48	37154.45	274.88	681217.49	5248.81	16316.59	2370.49
34HP45-856-17	116.28	36043.32	85.92	573652.24	2936.04	8224.87	1227.81
34HP45-856-18	87.20	32405.78	136.64	498113.49	3259.20	8066.19	1371.37
SRM614-4	418.08	54941.26	711.80	5231.77	392.54	639.34	739.80
SRM612-4	21148.84	63824.16	63294.27	49622.22	25948.40	36958.71	49164.92
SRM610-4	195960.74	47301.94	539722.02	427682.55	271376.30	393616.36	559169.13
AP1-4	736.16	60709.46	408.28	41075.93	156.10	155.94	60.20
AP2-4	2801.54	61518.23	275.32	108130.47	2046.35	2644.51	3385.82
AP3-4	23064.05	61097.15	544.76	841616.37	18821.53	36050.42	37624.29
AP4-4	17540.86	65837.85	1451.89	798402.62	18383.68	29379.94	34332.31

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-3	343.44	9471.81	939.41	7127.26	404.26	606.26	568.76
SRM612-3	16955.01	12039.55	66321.81	128639.51	14220.86	20183.57	27508.59
SRM610-3	83496.35	8493.89	308533.49	333434.62	92442.58	125250.49	196447.83
AP1-3	807.76	18037.14	663.76	124057.48	1271.35	923.67	363.40
AP2-3	2500.37	20711.00	644.12	180903.37	2448.43	2723.68	2682.85
AP3-3	20887.84	22835.69	808.52	813132.43	14132.42	24539.88	27225.91
AP4-3	10611.94	25695.22	1264.57	552357.55	10307.76	14575.62	18356.30
34HP45-856-1	860.72	22803.53	341.84	6840899.74	16700.35	15685.39	3531.18
34HP45-856-2	692.64	25314.46	331.64	7857750.74	20965.82	16452.07	3919.26
34HP45-856-3	951.89	26563.83	409.68	11963242.74	30482.59	15828.55	4524.43
34HP45-856-4	1341.65	35586.92	1123.89	5512441.74	13098.53	14933.90	3186.82
34HP45-856-5	1789.45	44352.05	1238.41	5099384.74	12202.21	19279.53	3621.38
34HP45-856-6	1711.53	45189.53	1165.97	11505623.74	36147.42	23955.99	5654.07
34HP45-856-7	1167.89	42943.08	1711.25	5641473.74	15926.47	19318.85	3925.26
34HP45-856-8	1469.41	48458.80	1749.61	5181616.74	14295.50	24373.52	4521.55
34HP45-856-9	1553.69	50159.76	1744.45	6473706.24	18737.76	27379.01	5057.51
34HP45-856-10	505.84	40617.83	314.56	4479811.74	8390.35	7295.26	1758.85
34HP45-856-11	601.52	43775.21	259.08	4733788.74	8914.23	7297.78	2045.17
34HP45-856-12	790.96	48298.07	744.32	5070047.74	10442.32	13068.41	2859.54
34HP45-856-13	639.32	44687.09	255.84	4292865.74	6422.94	6681.30	1787.17
34HP45-856-14	548.48	46879.19	234.96	3579716.74	6531.22	6905.26	1642.45
34HP45-856-15	353.16	42792.28	88.88	2457542.54	4302.40	5167.37	1097.09
34HP45-856-16	146.48	37154.45	274.88	681217.49	5248.81	16316.59	2370.49
34HP45-856-17	116.28	36043.32	85.92	573652.24	2936.04	8224.87	1227.81
34HP45-856-18	87.20	32405.78	136.64	498113.49	3259.20	8066.19	1371.37
SRM614-4	418.08	54941.26	711.80	5231.77	392.54	639.34	739.80
SRM612-4	21148.84	63824.16	63294.27	49622.22	25948.40	36958.71	49164.92
SRM610-4	195960.74	47301.94	539722.02	427682.55	271376.30	393616.36	559169.13
AP1-4	736.16	60709.46	408.28	41075.93	156.10	155.94	60.20
AP2-4	2801.54	61518.23	275.32	108130.47	2046.35	2644.51	3385.82
AP3-4	23064.05	61097.15	544.76	841616.37	18821.53	36050.42	37624.29
AP4-4	17540.86	65837.85	1451.89	798402.62	18383.68	29379.94	34332.31

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-3	0.000145	0.003998	0.000397	0.003009	0.000171	0.000256	0.000240
SRM612-3	0.006861	0.004872	0.026836	0.052052	0.005754	0.008167	0.011131
SRM610-3	0.060373	0.006142	0.223088	0.241094	0.066842	0.090564	0.142044
AP1-3	0.000053	0.001189	0.000044	0.008174	0.000084	0.000061	0.000024
AP2-3	0.000154	0.001272	0.000040	0.011108	0.000150	0.000167	0.000165
AP3-3	0.000936	0.001023	0.000036	0.036441	0.000633	0.001100	0.001220
AP4-3	0.000564	0.001365	0.000067	0.029338	0.000547	0.000774	0.000975
34HP45-856-1	0.000051	0.001341	0.000020	0.402275	0.000982	0.000922	0.000208
34HP45-856-2	0.000042	0.001542	0.000020	0.478577	0.001277	0.001002	0.000239
34HP45-856-3	0.000063	0.001757	0.000027	0.791180	0.002016	0.001047	0.000299
34HP45-856-4	0.000106	0.002799	0.000088	0.433644	0.001030	0.001175	0.000251
34HP45-856-5	0.000124	0.003079	0.000086	0.353994	0.000847	0.001338	0.000251
34HP45-856-6	0.000109	0.002887	0.000074	0.735073	0.002309	0.001531	0.000361
34HP45-856-7	0.000086	0.003180	0.000127	0.417793	0.001179	0.001431	0.000291
34HP45-856-8	0.000106	0.003489	0.000126	0.373043	0.001029	0.001755	0.000326
34HP45-856-9	0.000116	0.003732	0.000130	0.481627	0.001394	0.002037	0.000376
34HP45-856-10	0.000034	0.002732	0.000021	0.301284	0.000564	0.000491	0.000118
34HP45-856-11	0.000040	0.002885	0.000017	0.311970	0.000587	0.000481	0.000135
34HP45-856-12	0.000052	0.003165	0.000049	0.332252	0.000684	0.000856	0.000187
34HP45-856-13	0.000041	0.002844	0.000016	0.273221	0.000409	0.000425	0.000114
34HP45-856-14	0.000038	0.003256	0.000016	0.248631	0.000454	0.000480	0.000114
34HP45-856-15	0.000028	0.003415	0.000007	0.196100	0.000343	0.000412	0.000088
34HP45-856-16	0.000016	0.003939	0.000029	0.072220	0.000556	0.001730	0.000251
34HP45-856-17	0.000012	0.003746	0.000009	0.059614	0.000305	0.000855	0.000128
34HP45-856-18	0.000011	0.004117	0.000017	0.063280	0.000414	0.001025	0.000174

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000281	0.036972	0.000479	0.003521	0.000264	0.000430	0.000498
SRM612-4	0.011218	0.033854	0.033572	0.026321	0.013764	0.019604	0.026078
SRM610-4	0.158256	0.038201	0.435875	0.345393	0.219161	0.317881	0.451580
AP1-4	0.000048	0.003932	0.000026	0.002661	0.000010	0.000010	0.000004
AP2-4	0.000167	0.003659	0.000016	0.006432	0.000122	0.000157	0.000201
AP3-4	0.000998	0.002643	0.000024	0.036408	0.000814	0.001560	0.001628
AP4-4	0.000852	0.003196	0.000070	0.038761	0.000893	0.001426	0.001667

standardize signal averages AP

AP1	0.000050	0.002560	0.000035	0.005418	0.000047	0.000035	0.000014
AP2	0.000160	0.002465	0.000028	0.008770	0.000136	0.000162	0.000183
AP3	0.000967	0.001833	0.000030	0.036425	0.000724	0.001330	0.001424
AP4	0.000708	0.002281	0.000069	0.034050	0.000720	0.001100	0.001321

linest from std sig ave

0.015077	0.063715	0.027579	0.006327	0.015433	0.008941	0.008099
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standardize signal averages SRM

srm614-2	0.000213	0.020485	0.000438	0.003265	0.000217	0.000343	0.000369
srm612-2	0.009039	0.019363	0.030204	0.039186	0.009759	0.013885	0.018604
srm610-2	0.109315	0.022171	0.329482	0.293243	0.143001	0.204222	0.296812

linest from std sig ave

0.039376	0.000000	0.012799	0.016764	0.037321	0.025598	0.016909
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concentration data

SRM614-3	0.19	21.85	0.94	1.63	0.23	0.20	0.17
SRM612-3	8.87	26.62	63.48	28.24	7.62	6.26	7.73
SRM610-3	78.06	33.56	527.67	130.82	88.47	69.44	98.67
AP1-3	0.32	30.21	0.48	20.63	0.52	0.22	0.08
AP2-3	0.92	32.33	0.44	28.04	0.93	0.60	0.53
AP3-3	5.63	26.01	0.40	91.98	3.90	3.92	3.94
AP4-3	3.39	34.69	0.74	74.05	3.37	2.76	3.15
34HP45-856-1	0.30	34.08	0.22	1015.36	6.05	3.29	0.67
34HP45-856-2	0.25	39.19	0.22	1207.95	7.86	3.57	0.77
34HP45-856-3	0.38	44.65	0.30	1996.97	12.41	3.73	0.97
34HP45-856-4	0.63	71.16	0.97	1094.54	6.34	4.19	0.81
34HP45-856-5	0.75	78.26	0.95	893.50	5.22	4.77	0.81
34HP45-856-6	0.66	73.38	0.82	1855.36	14.22	5.46	1.17
34HP45-856-7	0.52	80.84	1.39	1054.53	7.26	5.10	0.94
34HP45-856-8	0.64	88.68	1.39	941.58	6.34	6.26	1.05
34HP45-856-9	0.70	94.86	1.43	1215.65	8.58	7.27	1.22
34HP45-856-10	0.20	69.44	0.23	760.45	3.47	1.75	0.38
34HP45-856-11	0.24	73.33	0.19	787.42	3.62	1.72	0.44
34HP45-856-12	0.31	80.45	0.54	838.62	4.21	3.05	0.61
34HP45-856-13	0.24	72.29	0.18	689.62	2.52	1.52	0.37
34HP45-856-14	0.23	82.76	0.18	627.56	2.79	1.71	0.37
34HP45-856-15	0.17	86.79	0.08	494.97	2.11	1.47	0.28
34HP45-856-16	0.09	100.12	0.32	182.29	3.43	6.17	0.81
34HP45-856-17	0.07	95.21	0.10	150.47	1.88	3.05	0.41
34HP45-856-18	0.07	104.64	0.19	159.72	2.55	3.65	0.56
SRM614-4	0.36	202.03	1.13	1.91	0.35	0.33	0.35
SRM612-4	14.51	184.99	79.41	14.28	18.22	15.03	18.11
SRM610-4	204.63	208.74	1030.97	187.42	290.07	243.75	313.67
AP1-4	0.06	21.49	0.06	1.44	0.01	0.01	0.00
AP2-4	0.22	19.99	0.04	3.49	0.16	0.12	0.14
AP3-4	1.29	14.44	0.06	19.76	1.08	1.20	1.13
AP4-4	5.12	81.25	0.78	97.84	5.49	5.09	5.39

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

raw data

	Sb	I	Cs	Ba	La	Ce	Pr
blank-1	16.56	17976.46	59.88	123.76	5.20	14.12	6.92
SRM614-1	363.00	39684.11	904.45	3010.18	264.24	375.80	538.76
SRM612-1	16857.38	44138.61	60794.26	51935.09	15472.33	22243.56	31998.10
SRM610-1	170301.44	39469.42	502788.88	367535.75	157720.02	225948.83	335445.22
AP1-1	673.56	47848.23	552.52	41513.36	167.96	304.92	123.08
AP2-1	2162.37	50721.00	609.12	106655.44	1884.49	2595.49	2809.22
AP3-1	10769.98	56151.00	807.44	449151.09	9225.65	15518.69	17723.38
AP4-1	16266.21	59372.38	1655.77	661323.50	14939.32	22919.65	27834.00

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	181.12	46704.98	295.76	496457.72	2789.66	5395.47	913.25
34HP45-695-2	97.32	45455.50	281.36	416569.50	2352.97	4612.51	737.12
34HP45-695-3	137.48	50750.00	283.00	466861.91	2788.46	9474.17	924.73
34HP45-695-4	237.40	79311.56	1161.73	3820936.30	9036.21	14828.00	2744.98
34HP45-695-5	157.84	78914.84	1008.97	3559665.50	7848.00	12034.87	2277.77
34HP45-695-6	232.60	81287.46	1613.85	3179358.80	8714.97	13887.80	2572.73
34HP45-695-7	310.64	77329.56	675.60	3162258.50	7463.88	10561.82	2258.17
34HP45-695-8	272.88	79716.97	1731.57	3031076.00	6500.28	8998.77	1814.21
34HP45-695-9	240.72	86106.73	808.32	3149340.00	7664.16	11980.15	2410.37
34HP45-695-10	174.00	81527.50	678.76	1693084.50	5720.11	8260.73	1511.41
34HP45-695-11	141.56	76328.51	491.72	1005384.90	4248.54	8710.21	1453.29
34HP45-695-12	148.04	76881.59	907.97	868364.25	5247.07	11165.54	1940.69
34HP45-695-13	272.08	85071.08	994.65	1439857.50	6515.80	11686.03	1904.77
34HP45-695-14	148.32	80673.13	349.16	976655.19	3640.58	6484.04	1060.49
34HP45-695-15	243.48	85073.00	840.20	1494141.00	4833.31	9344.33	1601.61
34HP45-695-16	307.68	69983.20	512.80	2528528.80	28884.00	14444.44	2951.10
34HP45-695-17	159.32	68119.02	237.44	1417500.80	12209.79	8567.09	1621.93
34HP45-695-18	220.04	68227.06	300.92	1589278.40	14136.88	9926.94	1908.49
SRM614-2	473.36	88739.26	814.04	3466.02	490.64	680.24	878.40
SRM612-2	23125.61	97996.07	56847.72	39687.54	27126.23	37878.17	50284.00
SRM610-2	230495.30	76873.71	487954.25	397288.78	292589.69	408790.50	575026.50
AP1-2	772.92	90429.59	473.40	37271.61	95.56	121.24	58.32
AP2-2	2496.13	85827.72	401.16	94501.17	2015.65	2543.69	3333.98
AP3-2	11724.03	93370.64	472.48	461609.31	12398.15	20473.52	22812.93
AP4-2	20125.99	95866.34	1554.17	784648.75	21302.60	33991.51	38709.62
blank-2	11.56	30596.45	98.96	1056.21	8.68	29.72	12.80
blank average	14.06	24286.46	79.42	589.98	6.94	21.92	9.86
blank subtraction							
SRM614-1	348.94	15397.65	825.02	2420.19	257.30	353.88	528.90
SRM612-1	16843.31	19852.15	60714.84	51345.11	15465.39	22221.64	31988.24
SRM610-1	170287.38	15182.97	502709.46	366945.77	157713.08	225926.91	335435.36
AP1-1	659.50	23561.77	473.10	40923.37	161.02	283.00	113.22
AP2-1	2148.31	26434.55	529.70	106065.46	1877.55	2573.57	2799.36
AP3-1	10755.92	31864.54	728.02	448561.11	9218.71	15496.77	17713.52
AP4-1	16252.15	35085.92	1576.35	660733.52	14932.38	22897.73	27824.14
34HP45-695-1	167.06	22418.53	216.34	495867.74	2782.72	5373.55	903.39
34HP45-695-2	83.26	21169.04	201.94	415979.52	2346.03	4590.59	727.26
34HP45-695-3	123.42	26463.55	203.58	466271.93	2781.52	9452.25	914.87
34HP45-695-4	223.34	55025.11	1082.31	3820346.32	9029.27	14806.08	2735.12
34HP45-695-5	143.78	54628.39	929.55	3559075.52	7841.06	12012.95	2267.91
34HP45-695-6	218.54	57001.00	1534.43	3178768.82	8708.03	13865.88	2562.87
34HP45-695-7	296.58	53043.10	596.18	3161668.52	7456.94	10539.90	2248.31
34HP45-695-8	258.82	55430.51	1652.15	3030486.02	6493.34	8976.85	1804.35
34HP45-695-9	226.66	61820.27	728.90	3148750.02	7657.22	11958.23	2400.51
34HP45-695-10	159.94	57241.04	599.34	1692494.52	5713.17	8238.81	1501.55
34HP45-695-11	127.50	52042.05	412.30	1004794.92	4241.60	8688.29	1443.43
34HP45-695-12	133.98	52595.14	828.54	867774.27	5240.13	11143.62	1930.83
34HP45-695-13	258.02	60784.62	915.23	1439267.52	6508.86	11664.10	1894.91
34HP45-695-14	134.26	56386.68	269.74	976065.21	3633.64	6462.12	1050.63
34HP45-695-15	229.42	60786.54	760.78	1493551.02	4826.37	9322.41	1951.75
34HP45-695-16	293.62	45696.74	433.38	2527938.82	28877.06	14422.52	2941.24
34HP45-695-17	145.26	43832.57	158.02	1416910.82	12202.85	8545.17	1612.07
34HP45-695-18	205.98	43940.61	221.50	1588688.42	14129.94	9905.02	1898.63
SRM614-2	459.30	64452.80	734.62	2876.04	483.70	658.32	868.54
SRM612-2	23111.55	73709.61	56768.30	39097.56	27119.29	37856.25	50274.14
SRM610-2	230481.24	52587.25	487874.83	396698.80	292582.75	408768.58	575016.64
AP1-2	758.86	66143.13	393.98	36681.63	88.62	99.32	48.46
AP2-2	2482.07	61541.26	321.74	93911.19	2008.71	2521.77	3324.12
AP3-2	11709.97	69084.18	393.06	461019.33	12391.21	20451.60	22803.07
AP4-2	20111.93	71579.88	1474.75	784058.77	21295.66	33969.59	38699.76
zero correction							
SRM614-1	348.94	15397.65	825.02	2420.19	257.30	353.88	528.90
SRM612-1	16843.31	19852.15	60714.84	51345.11	15465.39	22221.64	31988.24
SRM610-1	170287.38	15182.97	502709.46	366945.77	157713.08	225926.91	335435.36
AP1-1	659.50	23561.77	473.10	40923.37	161.02	283.00	113.22
AP2-1	2148.31	26434.55	529.70	106065.46	1877.55	2573.57	2799.36
AP3-1	10755.92	31864.54	728.02	448561.11	9218.71	15496.77	17713.52
AP4-1	16252.15	35085.92	1576.35	660733.52	14932.38	22897.73	27824.14
34HP45-695-1	167.06	22418.53	216.34	495867.74	2782.72	5373.55	903.39
34HP45-695-2	83.26	21169.04	201.94	415979.52	2346.03	4590.59	727.26
34HP45-695-3	123.42	26463.55	203.58	466271.93	2781.52	9452.25	914.87
34HP45-695-4	223.34	55025.11	1082.31	3820346.32	9029.27	14806.08	2735.12
34HP45-695-5	143.78	54628.39	929.55	3559075.52	7841.06	12012.95	2267.91
34HP45-695-6	218.54	57001.00	1534.43	3178768.82	8708.03	13865.88	2562.87
34HP45-695-7	296.58	53043.10	596.18	3161668.52	7456.94	10539.90	2248.31
34HP45-695-8	258.82	55430.51	1652.15	3030486.02	6493.34	8976.85	1804.35

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	226.66	61820.27	728.90	3148750.02	7657.22	11958.23	2400.51
34HP45-695-10	159.94	57241.04	599.34	1692494.52	5713.17	8238.81	1501.55
34HP45-695-11	127.50	52042.05	412.30	1004794.92	4241.60	8688.29	1443.43
34HP45-695-12	133.98	52595.14	828.54	867774.27	5240.13	11143.62	1930.83
34HP45-695-13	258.02	60784.62	915.23	1439267.52	6508.86	11664.10	1894.91
34HP45-695-14	134.26	56386.68	269.74	976065.21	3633.64	6462.12	1050.63
34HP45-695-15	229.42	60786.54	760.78	1493551.02	4826.37	9322.41	1591.75
34HP45-695-16	293.62	45696.74	433.38	2527938.82	28877.06	14422.52	2941.24
34HP45-695-17	145.26	43832.57	158.02	1416910.82	12202.85	8545.17	1612.07
34HP45-695-18	205.98	43940.61	221.50	1588688.42	14129.94	9905.02	1898.63
SRM614-2	459.30	64452.80	734.62	2876.04	483.70	658.32	868.54
SRM612-2	23111.55	73709.61	56768.30	39097.56	27119.29	37856.25	50274.14
SRM610-2	230481.24	52587.25	487874.83	396698.80	292582.75	408768.58	575016.64
AP1-2	758.86	66143.13	393.98	36681.63	88.62	99.32	48.46
AP2-2	2482.07	61541.26	321.74	93911.19	2008.71	2521.77	3324.12
AP3-2	11709.97	69084.18	393.06	461019.33	12391.21	20451.60	22803.07
AP4-2	20111.93	71579.88	1474.75	784058.77	21295.66	33969.59	38699.76

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-1	0.000171	0.007549	0.000405	0.001187	0.000126	0.000174	0.000259
SRM612-1	0.007298	0.008601	0.026306	0.022247	0.006701	0.009628	0.013860
SRM610-1	0.110912	0.009889	0.327427	0.239001	0.102722	0.147152	0.218477
AP1-1	0.000042	0.001484	0.000030	0.002577	0.000010	0.000018	0.000007
AP2-1	0.000121	0.001490	0.000030	0.005977	0.000106	0.000145	0.000158
AP3-1	0.000481	0.001424	0.000033	0.020049	0.000412	0.000693	0.000792
AP4-1	0.000719	0.001552	0.000070	0.029227	0.000661	0.001013	0.001231
34HP45-695-1	0.000015	0.002032	0.000020	0.044942	0.000252	0.000487	0.000082
34HP45-695-2	0.000010	0.002550	0.000024	0.050118	0.000283	0.000553	0.000088
34HP45-695-3	0.000014	0.003054	0.000023	0.053801	0.000321	0.001091	0.000106
34HP45-695-4	0.000013	0.003292	0.000065	0.228592	0.000540	0.000886	0.000164
34HP45-695-5	0.000010	0.003705	0.000063	0.241406	0.000532	0.000815	0.000154
34HP45-695-6	0.000018	0.004739	0.000128	0.264263	0.000724	0.001153	0.000213
34HP45-695-7	0.000019	0.003454	0.000039	0.205860	0.000486	0.000686	0.000146
34HP45-695-8	0.000017	0.003648	0.000109	0.199435	0.000427	0.000591	0.000119
34HP45-695-9	0.000014	0.003865	0.000046	0.196841	0.000479	0.000748	0.000150
34HP45-695-10	0.000012	0.004387	0.000046	0.129709	0.000438	0.000631	0.000115
34HP45-695-11	0.000010	0.004087	0.000032	0.078908	0.000333	0.000682	0.000113
34HP45-695-12	0.000012	0.004723	0.000074	0.077919	0.000471	0.001001	0.000173
34HP45-695-13	0.000019	0.004488	0.000068	0.106269	0.000481	0.000861	0.000140
34HP45-695-14	0.000011	0.004427	0.000021	0.076640	0.000285	0.000507	0.000082
34HP45-695-15	0.000018	0.004720	0.000059	0.115972	0.000375	0.000724	0.000124
34HP45-695-16	0.000024	0.003721	0.000035	0.205824	0.002351	0.001174	0.000239
34HP45-695-17	0.000012	0.003734	0.000013	0.120714	0.001040	0.000728	0.000137
34HP45-695-18	0.000017	0.003524	0.000018	0.127401	0.001133	0.000794	0.000152
SRM614-2	0.000292	0.040973	0.000467	0.001828	0.000307	0.000418	0.000552
SRM612-2	0.013173	0.042012	0.032356	0.022284	0.015457	0.021577	0.028654
SRM610-2	0.198933	0.045389	0.421094	0.342398	0.252534	0.352816	0.496307
AP1-2	0.000054	0.004684	0.000028	0.002598	0.000006	0.000007	0.000003
AP2-2	0.000166	0.004125	0.000022	0.006295	0.000135	0.000169	0.000223
AP3-2	0.000619	0.003655	0.000021	0.024389	0.000656	0.001082	0.001206
AP4-2	0.000996	0.003545	0.000073	0.038835	0.001055	0.001683	0.001917

standardize signal averages AP							
AP1	0.000048	0.003084	0.000029	0.002587	0.000008	0.000012	0.000005
AP2	0.000144	0.002807	0.000026	0.006136	0.000120	0.000157	0.000190
AP3	0.000550	0.002539	0.000027	0.022219	0.000534	0.000887	0.000999
AP4	0.000858	0.002549	0.000071	0.034031	0.000858	0.001348	0.001574

linest from std sig ave							
	0.018898	0.052297	0.027574	0.007927	0.016173	0.010168	0.008803

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.000232	0.024261	0.000436	0.001507	0.000217	0.000296	0.000406
srM612-2	0.010235	0.025306	0.029331	0.022265	0.011079	0.015602	0.021257
srM610-2	0.154922	0.027639	0.374260	0.290699	0.177628	0.249984	0.357392

linest from std sig ave							
	0.027804	0.000000	0.011276	0.017027	0.030055	0.020917	0.014045

concentration data							
SRM614-1	0.28	33.86	0.96	0.81	0.17	0.15	0.20
SRM612-1	11.83	38.58	62.21	15.12	9.29	8.40	10.46
SRM610-1	179.76	44.35	774.32	162.48	142.48	128.33	164.95
AP1-1	0.31	30.96	0.33	8.15	0.07	0.07	0.03
AP2-1	0.91	31.08	0.33	18.90	0.68	0.59	0.55
AP3-1	3.62	29.71	0.36	63.40	2.66	2.81	2.78
AP4-1	5.42	32.38	0.77	92.43	4.26	4.11	4.32
34HP45-695-1	0.11	42.39	0.22	142.12	1.63	1.98	0.29
34HP45-695-2	0.08	53.21	0.27	158.49	1.82	2.24	0.31
34HP45-695-3	0.11	63.71	0.26	170.14	2.07	4.42	0.37
34HP45-695-4	0.10	68.69	0.71	722.89	3.49	3.59	0.57
34HP45-695-5	0.07	77.30	0.69	763.41	3.43	3.31	0.54
34HP45-695-6	0.14	98.86	1.40	835.69	4.67	4.68	0.75
34HP45-695-7	0.15	72.05	0.43	651.00	3.13	2.78	0.51
34HP45-695-8	0.13	76.11	1.20	630.68	2.76	2.40	0.42
34HP45-695-9	0.11	80.63	0.50	622.48	3.09	3.03	0.53
34HP45-695-10	0.09	91.52	0.51	410.19	2.83	2.56	0.40
34HP45-695-11	0.08	85.27	0.36	249.53	2.15	2.77	0.40
34HP45-695-12	0.09	98.53	0.82	246.41	3.04	4.06	0.61
34HP45-695-13	0.14	93.63	0.74	336.06	3.10	3.49	0.49
34HP45-695-14	0.08	92.37	0.23	242.36	1.84	2.06	0.29
34HP45-695-15	0.13	98.47	0.65	366.74	2.42	2.94	0.43
34HP45-695-16	0.18	77.62	0.39	650.89	15.17	4.76	0.84
34HP45-695-17	0.09	77.91	0.15	381.74	6.71	2.95	0.48
34HP45-695-18	0.12	73.52	0.20	402.89	7.31	3.22	0.53
SRM614-2	0.47	183.77	1.10	1.24	0.43	0.36	0.42
SRM612-2	21.35	188.43	76.52	15.15	21.44	18.82	21.63
SRM610-2	322.42	203.58	995.82	232.78	350.28	307.68	374.71
AP1-2	0.41	97.72	0.31	8.21	0.04	0.03	0.01
AP2-2	1.25	86.06	0.24	19.91	0.87	0.69	0.78
AP3-2	4.67	76.25	0.23	77.13	4.23	4.39	4.24
AP4-2	7.51	73.97	0.80	122.81	6.81	6.83	6.73

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-1	59.72	28958.16	195.00	256.44	11.32	23.32	22.68
SRM614-1	1246.93	88471.14	2806.38	15215.65	1472.77	2478.85	2433.33
SRM612-1	9200.89	69253.19	39833.54	39015.18	20412.64	30870.77	38069.13
SRM610-1	134200.92	66361.70	201247.22	241844.08	157716.81	231048.34	307311.50
AP1-1	3876.78	89253.14	1587.09	80782.13	810.16	2039.85	1295.57
AP2-1	4242.26	83294.39	1174.89	147353.47	3326.50	5400.51	5514.79
AP3-1	14425.48	106286.80	816.72	540354.38	14535.12	26283.91	26474.15
AP4-1	30909.89	117798.22	2134.09	895327.63	26061.27	44740.97	48316.63
MZ1-1	587.80	89154.06	592.80	243339.84	1503.57	4070.82	862.00
MZ1-2	156.20	80604.25	552.84	193470.09	1255.97	3375.74	471.72
MZ1-3	119.92	75675.39	346.48	146980.11	1287.57	3462.38	704.48
MZ1-4	191.40	77401.35	931.09	206484.34	1187.25	3611.70	544.36
MZ1-5	165.04	75372.87	698.36	184076.88	1107.45	2892.90	559.32
MZ1-6	134.64	71885.52	593.40	125153.38	622.92	2734.58	278.00
MZ1-7	109.80	78735.28	1380.93	128671.08	705.48	2772.18	287.44
MZ1-8	116.64	78925.09	1201.05	154939.19	753.76	2135.29	269.28
MZ1-9	123.80	77692.52	1114.81	124594.58	534.64	1737.69	216.32
MZ1-10	140.00	70112.12	968.61	111950.15	681.96	1937.93	351.92
MZ1-11	103.00	72489.29	1005.17	84066.03	464.76	1469.85	188.80
MZ1-12	92.88	73856.77	1078.85	83026.83	453.36	1688.81	186.32
MZ1-13	173.20	80394.38	1890.45	133681.80	2129.57	12699.79	1029.25
MZ1-14	173.20	86072.24	2827.14	170451.80	2303.97	17123.82	987.33
MZ1-15	151.76	84704.95	2546.41	163005.92	2173.09	14839.92	997.97
MZ1-16	497.48	82860.31	1490.53	94394.45	642.36	1816.29	269.12

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	95.76	84187.59	1198.13	94106.65	498.12	1496.69	232.32
MZ1-18	150.36	96944.59	1670.69	663269.69	1483.81	2640.65	449.88
MZ1-19	178.92	102712.34	697.72	1655651.00	2484.73	1849.61	583.80
MZ1-20	125.40	96461.31	623.04	1598010.60	2814.26	2051.53	646.64
MZ1-21	100.64	100573.57	992.05	1615397.90	2555.41	1885.29	659.76
srm614-2	939.53	110943.19	1842.21	5849.95	1105.97	1935.49	1946.41
srm612-2	8902.01	66045.49	33235.51	19382.31	15751.05	24653.50	26985.07
srm610-2	84466.12	64627.16	214647.89	191053.64	166069.38	246297.22	288027.69
AP1-2	655.96	82731.66	300.64	27835.20	110.72	171.88	95.08
AP2-2	1512.09	78451.24	264.48	59517.70	1643.09	2204.25	2584.89
AP3-2	9158.49	90704.83	315.44	301268.44	10010.82	17421.18	17360.50
AP4-2	19598.27	102197.30	1292.33	543047.50	19179.59	32589.10	32601.74
blank-2	43.44	32274.82	96.92	175.20	8.04	39.56	17.68
blank ave	51.58	30616.49	145.96	215.82	9.68	31.44	20.18

blank subtraction							
SRM614-1	1195.35	57854.65	2660.41	14999.82	1463.09	2447.41	2413.15
SRM612-1	9149.31	38636.70	39687.58	38799.36	20402.95	30839.33	38048.95
SRM610-1	134149.34	35745.20	201101.26	241628.26	157707.13	231016.90	307291.32
AP1-1	3825.20	58636.65	1441.13	80566.31	800.48	2008.41	1275.39
AP2-1	4190.68	52677.90	1028.93	147137.65	3316.82	5369.07	5494.61
AP3-1	14373.90	75670.31	670.76	540138.56	14525.44	26252.47	26453.97
AP4-1	30858.31	87181.73	1988.13	895111.81	26051.59	44709.53	48296.45
MZ1-1	536.22	58537.57	446.84	243124.02	1493.89	4039.38	841.82
MZ1-2	104.62	49987.76	406.88	193254.27	1246.29	3344.30	451.54
MZ1-3	68.34	45058.90	200.52	146764.29	1277.89	3430.94	684.30
MZ1-4	139.82	46784.86	785.12	206268.52	1177.57	3580.26	524.18
MZ1-5	113.46	44756.38	552.40	183861.06	1097.77	2861.46	539.14
MZ1-6	83.06	41269.03	447.44	124937.56	613.24	2703.14	257.82
MZ1-7	58.22	48118.79	1234.97	128455.26	695.80	2740.74	267.26
MZ1-8	65.06	48308.59	1055.09	154723.37	744.08	2103.85	249.10
MZ1-9	72.22	47076.02	968.85	124378.76	524.96	1706.25	196.14
MZ1-10	88.42	39495.63	822.64	111734.33	672.28	1906.49	331.74
MZ1-11	51.42	41872.80	859.20	83850.21	455.08	1438.41	168.62
MZ1-12	41.30	43240.28	932.89	82811.01	443.68	1657.37	166.14
MZ1-13	121.62	49777.88	1744.49	133465.98	2119.89	12668.35	1009.07
MZ1-14	121.62	55455.75	2681.17	170235.98	2294.29	17092.38	967.15
MZ1-15	100.18	54088.46	2400.45	162790.10	2163.41	14808.48	977.79
MZ1-16	445.90	52243.81	1344.57	94178.63	632.68	1784.85	248.94
MZ1-17	44.18	53571.10	1052.17	93890.83	488.44	1465.25	212.14
MZ1-18	98.78	66328.09	1524.73	663053.87	1474.13	2609.21	429.70
MZ1-19	127.34	72095.85	551.76	1655435.18	2475.05	1818.17	563.62
MZ1-20	73.82	65844.81	477.08	1597794.78	2804.58	2020.09	626.46
MZ1-21	49.06	69957.08	846.08	1615182.08	2545.73	1853.85	639.58
srm614-2	887.94	80326.70	1696.25	5634.13	1096.29	1904.05	1926.23
srm612-2	8850.43	35429.00	33089.55	19166.49	15741.37	24622.06	26964.89
srm610-2	84414.54	34010.67	214501.93	190837.82	166059.70	246265.78	288007.51
AP1-2	604.38	52115.17	154.68	27619.38	101.04	140.44	74.90
AP2-2	1460.51	47834.75	118.52	59301.87	1633.41	2172.81	2564.71
AP3-2	9106.91	60088.34	169.48	301052.62	10001.14	17389.74	17340.32
AP4-2	19546.69	71580.81	1146.37	542831.68	19169.91	32557.66	32581.56

zero correction							
SRM614-1	1195.35	57854.65	2660.41	14999.82	1463.09	2447.41	2413.15
SRM612-1	9149.31	38636.70	39687.58	38799.36	20402.95	30839.33	38048.95
SRM610-1	134149.34	35745.20	201101.26	241628.26	157707.13	231016.90	307291.32
AP1-1	3825.20	58636.65	1441.13	80566.31	800.48	2008.41	1275.39
AP2-1	4190.68	52677.90	1028.93	147137.65	3316.82	5369.07	5494.61
AP3-1	14373.90	75670.31	670.76	540138.56	14525.44	26252.47	26453.97
AP4-1	30858.31	87181.73	1988.13	895111.81	26051.59	44709.53	48296.45
MZ1-1	536.22	58537.57	446.84	243124.02	1493.89	4039.38	841.82
MZ1-2	104.62	49987.76	406.88	193254.27	1246.29	3344.30	451.54
MZ1-3	68.34	45058.90	200.52	146764.29	1277.89	3430.94	684.30
MZ1-4	139.82	46784.86	785.12	206268.52	1177.57	3580.26	524.18
MZ1-5	113.46	44756.38	552.40	183861.06	1097.77	2861.46	539.14
MZ1-6	83.06	41269.03	447.44	124937.56	613.24	2703.14	257.82
MZ1-7	58.22	48118.79	1234.97	128455.26	695.80	2740.74	267.26
MZ1-8	65.06	48308.59	1055.09	154723.37	744.08	2103.85	249.10
MZ1-9	72.22	47076.02	968.85	124378.76	524.96	1706.25	196.14
MZ1-10	88.42	39495.63	822.64	111734.33	672.28	1906.49	331.74
MZ1-11	51.42	41872.80	859.20	83850.21	455.08	1438.41	168.62
MZ1-12	41.30	43240.28	932.89	82811.01	443.68	1657.37	166.14
MZ1-13	121.62	49777.88	1744.49	133465.98	2119.89	12668.35	1009.07
MZ1-14	121.62	55455.75	2681.17	170235.98	2294.29	17092.38	967.15
MZ1-15	100.18	54088.46	2400.45	162790.10	2163.41	14808.48	977.79
MZ1-16	445.90	52243.81	1344.57	94178.63	632.68	1784.85	248.94
MZ1-17	44.18	53571.10	1052.17	93890.83	488.44	1465.25	212.14
MZ1-18	98.78	66328.09	1524.73	663053.87	1474.13	2609.21	429.70

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	127.34	72095.85	551.76	1655435.18	2475.05	1818.17	563.62
MZ1-20	73.82	65844.81	477.08	1597794.78	2804.58	2020.09	626.46
MZ1-21	49.06	69957.08	846.08	1615182.08	2545.73	1853.85	639.58
srm614-2	887.94	80326.70	1696.25	5634.13	1096.29	1904.05	1926.23
srm612-2	8850.43	35429.00	33089.55	19166.49	15741.37	24622.06	26964.89
srm610-2	84414.54	34010.67	214501.93	190837.82	166059.70	246265.78	288007.51
AP1-2	604.38	52115.17	154.68	27619.38	101.04	140.44	74.90
AP2-2	1460.51	47834.75	118.52	59301.87	1633.41	2172.81	2564.71
AP3-2	9106.91	60088.34	169.48	301052.62	10001.14	17389.74	17340.32
AP4-2	19546.69	71580.81	1146.37	542831.68	19169.91	32557.66	32581.56

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-1	0.000267	0.012906	0.000593	0.003346	0.000326	0.000546	0.000538
SRM612-1	0.007162	0.030246	0.031069	0.030373	0.015972	0.024142	0.029786
SRM610-1	0.195326	0.052046	0.292811	0.351819	0.229627	0.336369	0.447427
AP1-1	0.000222	0.003410	0.000084	0.004685	0.000047	0.000117	0.000074
AP2-1	0.000289	0.003639	0.000071	0.010163	0.000229	0.000371	0.000380
AP3-1	0.000763	0.004018	0.000036	0.028680	0.000771	0.001394	0.001405
AP4-1	0.001796	0.005075	0.000116	0.052103	0.001516	0.002602	0.002811
MZ1-1	0.000046	0.005032	0.000038	0.020900	0.000128	0.000347	0.000072
MZ1-2	0.000010	0.004879	0.000040	0.018861	0.000122	0.000326	0.000044
MZ1-3	0.000008	0.005048	0.000022	0.016441	0.000143	0.000384	0.000077
MZ1-4	0.000013	0.004454	0.000075	0.019637	0.000112	0.000341	0.000050
MZ1-5	0.000011	0.004465	0.000055	0.018344	0.000110	0.000285	0.000054
MZ1-6	0.000010	0.004757	0.000052	0.014402	0.000071	0.000312	0.000030
MZ1-7	0.000005	0.004060	0.000104	0.010837	0.000059	0.000231	0.000023
MZ1-8	0.000005	0.003829	0.000084	0.012265	0.000059	0.000167	0.000020
MZ1-9	0.000006	0.004228	0.000087	0.011171	0.000047	0.000153	0.000018
MZ1-10	0.000011	0.004964	0.000103	0.014042	0.000084	0.000240	0.000042
MZ1-11	0.000006	0.005040	0.000103	0.010092	0.000055	0.000173	0.000020
MZ1-12	0.000005	0.005152	0.000111	0.009866	0.000053	0.000197	0.000020
MZ1-13	0.000012	0.005089	0.000178	0.013644	0.000217	0.001295	0.000103
MZ1-14	0.000010	0.004629	0.000224	0.014211	0.000192	0.001427	0.000081
MZ1-15	0.000008	0.004497	0.000200	0.013535	0.000180	0.001231	0.000081
MZ1-16	0.000057	0.006638	0.000171	0.011965	0.000080	0.000227	0.000032
MZ1-17	0.000005	0.005813	0.000114	0.010189	0.000053	0.000159	0.000023
MZ1-18	0.000007	0.004953	0.000114	0.049515	0.000110	0.000195	0.000032
MZ1-19	0.000007	0.003980	0.000030	0.091376	0.000137	0.000100	0.000031
MZ1-20	0.000004	0.003663	0.000027	0.088881	0.000156	0.000112	0.000035
MZ1-21	0.000003	0.003693	0.000045	0.085268	0.000134	0.000098	0.000034
srm614-2	0.000315	0.028497	0.000602	0.001999	0.000389	0.000675	0.000683
srm612-2	0.011551	0.046240	0.043187	0.025015	0.020545	0.032136	0.035193
srm610-2	0.153213	0.061730	0.389322	0.346372	0.301399	0.446974	0.522735
AP1-2	0.000064	0.005476	0.000016	0.002902	0.000011	0.000015	0.000008
AP2-2	0.000180	0.005889	0.000015	0.007301	0.000201	0.000267	0.000316
AP3-2	0.000731	0.004826	0.000014	0.024181	0.000803	0.001397	0.001393
AP4-2	0.001571	0.005753	0.000092	0.043625	0.001541	0.002617	0.002618

standardize signal averages AP							
AP1	0.000143	0.004443	0.000050	0.003794	0.000029	0.000066	0.000041
AP2	0.000235	0.004764	0.000043	0.008732	0.000215	0.000319	0.000348
AP3	0.000747	0.004422	0.000025	0.026431	0.000787	0.001395	0.001399
AP4	0.001684	0.005414	0.000104	0.047864	0.001529	0.002609	0.002715

linest from std sig ave							
	0.010318	0.030299	0.018672	0.005858	0.009487	0.005545	0.005366

standardize signal averages SRM							
srm614-2	0.000291	0.020701	0.000598	0.002672	0.000358	0.000611	0.000611
srm612-2	0.009357	0.038243	0.037128	0.027694	0.018259	0.028139	0.032490

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	0.174270	0.056888	0.341066	0.349095	0.265513	0.391671	0.485081
linest from std sig ave							
	0.024722	0.000000	0.012347	0.014176	0.020100	0.013344	0.010345
concentration data							
SRM614-1	0.24	33.54	0.95	1.68	0.27	0.26	0.25
SRM612-1	6.34	78.60	49.75	15.26	12.99	11.48	13.71
SRM610-1	172.84	135.24	468.89	176.75	186.83	159.97	205.91
AP1-1	0.92	41.22	0.62	10.95	0.18	0.26	0.16
AP2-1	1.19	43.98	0.53	23.75	0.87	0.82	0.81
AP3-1	3.14	48.57	0.27	67.02	2.92	3.08	3.01
AP4-1	7.39	61.34	0.86	121.76	5.74	5.76	6.02
MZ1-1	0.19	60.83	0.29	48.84	0.49	0.77	0.15
MZ1-2	0.04	58.97	0.30	44.08	0.46	0.72	0.09
MZ1-3	0.03	61.01	0.17	38.42	0.54	0.85	0.16
MZ1-4	0.05	53.84	0.56	45.89	0.42	0.75	0.11
MZ1-5	0.05	53.98	0.41	42.87	0.41	0.63	0.12
MZ1-6	0.04	57.50	0.38	33.66	0.27	0.69	0.06
MZ1-7	0.02	49.07	0.78	25.33	0.22	0.51	0.05
MZ1-8	0.02	46.29	0.62	28.66	0.22	0.37	0.04
MZ1-9	0.03	51.11	0.65	26.11	0.18	0.34	0.04
MZ1-10	0.05	60.00	0.77	32.81	0.32	0.53	0.09
MZ1-11	0.03	60.92	0.77	23.58	0.21	0.38	0.04
MZ1-12	0.02	62.27	0.83	23.06	0.20	0.44	0.04
MZ1-13	0.05	61.51	1.33	31.88	0.82	2.86	0.22
MZ1-14	0.04	55.96	1.67	33.21	0.72	3.16	0.17
MZ1-15	0.03	54.36	1.49	31.63	0.68	2.72	0.17
MZ1-16	0.23	80.23	1.27	27.96	0.30	0.50	0.07
MZ1-17	0.02	70.27	0.85	23.81	0.20	0.35	0.05
MZ1-18	0.03	59.87	0.85	115.71	0.42	0.43	0.07
MZ1-19	0.03	48.10	0.23	213.54	0.52	0.22	0.07
MZ1-20	0.02	44.27	0.20	207.71	0.59	0.25	0.07
MZ1-21	0.01	44.64	0.33	199.26	0.51	0.22	0.07
srm614-2	0.28	74.05	0.96	1.00	0.32	0.32	0.31
srm612-2	10.22	120.16	69.16	12.57	16.72	15.28	16.20
srm610-2	135.57	160.41	623.44	174.01	245.22	212.57	240.57
AP1-2	0.26	66.19	0.12	6.78	0.04	0.03	0.02
AP2-2	0.74	71.18	0.11	17.06	0.76	0.59	0.68
AP3-2	3.01	58.34	0.10	56.51	3.04	3.09	2.98
AP4-2	6.47	69.53	0.69	101.95	5.83	5.79	5.61
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-5	27.64	14638.00	87.36	31.08	6.72	30.80	33.60
SRM614-5	591.56	68486.07	1076.65	3797.34	483.12	1039.69	877.16
SRM612-5	24730.86	69722.79	73885.02	39255.94	29429.25	47477.11	52378.50
SRM610-5	115716.61	57378.88	274153.91	246057.98	214899.97	293883.94	375982.91
AP1-5	561.32	64483.60	455.08	22625.25	207.68	430.32	110.88
AP2-5	1662.73	68521.38	382.16	60249.58	1427.81	2013.49	2141.93
AP3-5	5105.87	64521.65	420.36	142701.41	5426.07	9488.65	9491.05
AP4-5	8303.01	65362.37	837.60	301808.34	11000.82	17275.86	18414.54
MZ2-1b	57.68	50643.61	265.20	60931.98	154.60	149.76	58.68
MZ2-2b	53.68	50468.45	241.44	76740.16	285.04	612.56	130.24
MZ2-3b	39.92	48625.43	245.60	54014.98	195.20	293.76	66.96
MZ2-4b	46.32	53915.90	226.64	30335.97	159.12	403.28	64.60
MZ2-5b	38.32	54540.23	226.92	81284.34	314.04	672.12	134.36
MZ2-6b	36.24	51257.29	240.96	69340.23	186.16	183.08	53.16
MZ2-7b	55.16	55027.47	314.84	36100.13	638.52	2360.45	278.84
MZ2-8b	33.32	57017.64	256.40	35756.28	511.68	1621.53	208.04
MZ2-9b	32.04	55049.83	201.88	30104.17	184.44	488.52	78.96
MZ2-10b	62.72	50656.09	299.84	24151.26	257.16	909.49	135.12
MZ2-11b	60.80	50577.65	277.88	24584.46	240.52	690.80	115.96
MZ2-12b	44.92	49199.60	238.12	18930.59	284.20	787.04	97.80
MZ2-13b	38.84	50710.93	337.44	40523.15	377.56	1123.61	164.04
MZ2-14b	62.76	52081.45	486.92	54036.11	397.80	1043.93	136.56
MZ2-15b	58.00	54206.34	362.28	67690.50	925.65	3042.98	339.20
srm614-6	371.24	50545.32	801.84	2311.29	409.44	658.60	649.36
srm612-6	19093.11	55267.63	53949.38	27314.59	23271.21	37293.69	39162.54

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	98914.56	49481.96	208410.25	194277.45	192815.73	254513.36	313226.25
AP1-6	406.12	55868.04	352.96	16742.54	57.80	100.24	31.24
AP2-6	1174.77	58067.05	325.16	43797.05	1149.33	1447.05	1693.61
AP3-6	4086.94	57320.40	346.76	121596.60	4911.03	8425.01	8442.89
AP4-6	8071.73	57586.13	743.32	271003.53	10440.74	16404.85	17544.30
blank-6	25.44	29357.93	153.44	60.04	7.88	51.96	16.52
blank ave	26.54	21997.96	120.40	45.56	7.30	41.38	25.06
blank subtraction							
SRM614-5	565.02	46488.11	956.25	3751.78	475.82	998.31	852.10
SRM612-5	24704.32	47724.83	73764.62	39210.38	29421.95	47435.72	52353.44
SRM610-5	115690.07	35380.92	274033.51	246012.42	214892.67	293842.56	375957.85
AP1-5	534.78	42485.64	334.68	22579.69	200.38	388.94	85.82
AP2-5	1636.19	46523.42	261.76	60204.02	1420.51	1972.11	2116.87
AP3-5	5079.33	42523.68	299.96	142655.85	5418.77	9447.27	9465.99
AP4-5	8276.47	43364.40	717.20	301762.78	10993.52	17234.48	18389.48
MZ2-1b	31.14	28645.64	144.80	60886.42	147.30	108.38	33.62
MZ2-2b	27.14	28470.48	121.04	76694.60	277.74	571.18	105.18
MZ2-3b	13.38	26627.47	125.20	53969.42	187.90	252.38	41.90
MZ2-4b	19.78	31917.94	106.24	30290.41	151.82	361.90	39.54
MZ2-5b	11.78	32542.26	106.52	81238.78	306.74	630.74	109.30
MZ2-6b	9.70	29259.33	120.56	69294.67	178.86	141.70	28.10
MZ2-7b	28.62	33029.51	194.44	36054.56	631.22	2319.07	253.78
MZ2-8b	6.78	35019.68	136.00	35710.72	504.38	1580.15	182.98
MZ2-9b	5.50	33051.87	81.48	30058.61	177.14	447.14	53.90
MZ2-10b	36.18	28658.12	179.44	24105.70	249.86	868.10	110.06
MZ2-11b	34.26	28579.68	157.48	24538.90	233.22	649.42	90.90
MZ2-12b	18.38	27201.63	117.72	18885.03	276.90	745.66	72.74
MZ2-13b	12.30	28712.96	217.04	40477.59	370.26	1082.23	138.98
MZ2-14b	36.22	30083.49	366.52	53990.54	390.50	1002.55	111.50
MZ2-15b	31.46	32208.38	241.88	67644.94	918.35	3001.60	314.14
srm614-6	344.70	28547.36	681.44	2265.73	402.14	617.22	624.30
srm612-6	19066.57	33269.67	53828.98	27269.03	23263.91	37252.31	39137.48
srm610-6	98888.01	27483.99	208289.85	194231.89	192808.43	254471.98	313201.19
AP1-6	379.58	33870.07	232.56	16696.97	50.50	58.86	6.18
AP2-6	1148.23	36069.08	204.76	43751.49	1142.03	1405.67	1668.55
AP3-6	4060.40	35322.44	226.36	121551.04	4903.73	8383.63	8417.83
AP4-6	8045.19	35588.16	622.92	270957.97	10433.44	16363.47	17519.24
zero correction							
SRM614-5	565.02	46488.11	956.25	3751.78	475.82	998.31	852.10
SRM612-5	24704.32	47724.83	73764.62	39210.38	29421.95	47435.72	52353.44
SRM610-5	115690.07	35380.92	274033.51	246012.42	214892.67	293842.56	375957.85
AP1-5	534.78	42485.64	334.68	22579.69	200.38	388.94	85.82
AP2-5	1636.19	46523.42	261.76	60204.02	1420.51	1972.11	2116.87
AP3-5	5079.33	42523.68	299.96	142655.85	5418.77	9447.27	9465.99
AP4-5	8276.47	43364.40	717.20	301762.78	10993.52	17234.48	18389.48
MZ2-1b	31.14	28645.64	144.80	60886.42	147.30	108.38	33.62
MZ2-2b	27.14	28470.48	121.04	76694.60	277.74	571.18	105.18
MZ2-3b	13.38	26627.47	125.20	53969.42	187.90	252.38	41.90
MZ2-4b	19.78	31917.94	106.24	30290.41	151.82	361.90	39.54
MZ2-5b	11.78	32542.26	106.52	81238.78	306.74	630.74	109.30
MZ2-6b	9.70	29259.33	120.56	69294.67	178.86	141.70	28.10
MZ2-7b	28.62	33029.51	194.44	36054.56	631.22	2319.07	253.78
MZ2-8b	6.78	35019.68	136.00	35710.72	504.38	1580.15	182.98
MZ2-9b	5.50	33051.87	81.48	30058.61	177.14	447.14	53.90
MZ2-10b	36.18	28658.12	179.44	24105.70	249.86	868.10	110.06
MZ2-11b	34.26	28579.68	157.48	24538.90	233.22	649.42	90.90
MZ2-12b	18.38	27201.63	117.72	18885.03	276.90	745.66	72.74
MZ2-13b	12.30	28712.96	217.04	40477.59	370.26	1082.23	138.98
MZ2-14b	36.22	30083.49	366.52	53990.54	390.50	1002.55	111.50
MZ2-15b	31.46	32208.38	241.88	67644.94	918.35	3001.60	314.14
srm614-6	344.70	28547.36	681.44	2265.73	402.14	617.22	624.30
srm612-6	19066.57	33269.67	53828.98	27269.03	23263.91	37252.31	39137.48
srm610-6	98888.01	27483.99	208289.85	194231.89	192808.43	254471.98	313201.19
AP1-6	379.58	33870.07	232.56	16696.97	50.50	58.86	6.18
AP2-6	1148.23	36069.08	204.76	43751.49	1142.03	1405.67	1668.55
AP3-6	4060.40	35322.44	226.36	121551.04	4903.73	8383.63	8417.83
AP4-6	8045.19	35588.16	622.92	270957.97	10433.44	16363.47	17519.24
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-5	0.000473	0.038879	0.000800	0.003138	0.000398	0.000835	0.000713
SRM612-5	0.016619	0.032106	0.049624	0.026378	0.019793	0.031911	0.035220
SRM610-5	0.172441	0.052737	0.408460	0.366693	0.320308	0.437986	0.560383
AP1-5	0.000073	0.005823	0.000046	0.003095	0.000027	0.000053	0.000012
AP2-5	0.000209	0.005941	0.000033	0.007688	0.000181	0.000252	0.000270
AP3-5	0.000748	0.006265	0.000044	0.021018	0.000798	0.001392	0.001395
AP4-5	0.000816	0.004278	0.000071	0.029767	0.001084	0.001700	0.001814
MZ2-1b	0.000009	0.008503	0.000043	0.018074	0.000044	0.000032	0.000010
MZ2-2b	0.000007	0.007629	0.000032	0.020552	0.000074	0.000153	0.000028
MZ2-3b	0.000004	0.008000	0.000038	0.016214	0.000056	0.000076	0.000013
MZ2-4b	0.000004	0.006982	0.000023	0.006626	0.000033	0.000079	0.000009
MZ2-5b	0.000003	0.006935	0.000023	0.017312	0.000065	0.000134	0.000023
MZ2-6b	0.000002	0.007203	0.000030	0.017058	0.000044	0.000035	0.000007
MZ2-7b	0.000006	0.006378	0.000038	0.006963	0.000122	0.000448	0.000049
MZ2-8b	0.000001	0.006706	0.000026	0.006838	0.000097	0.000303	0.000035
MZ2-9b	0.000001	0.007210	0.000018	0.006557	0.000039	0.000098	0.000012
MZ2-10b	0.000009	0.007048	0.000044	0.005928	0.000061	0.000213	0.000027
MZ2-11b	0.000009	0.007648	0.000042	0.006567	0.000062	0.000174	0.000024
MZ2-12b	0.000006	0.008468	0.000037	0.005879	0.000086	0.000232	0.000023
MZ2-13b	0.000003	0.006106	0.000046	0.008608	0.000079	0.000230	0.000030
MZ2-14b	0.000007	0.005450	0.000066	0.009780	0.000071	0.000182	0.000020
MZ2-15b	0.000005	0.005403	0.000041	0.011349	0.000154	0.000504	0.000053
srM614-6	0.000380	0.031504	0.000752	0.002500	0.000444	0.000681	0.000689
srM612-6	0.017661	0.030818	0.049862	0.025259	0.021549	0.034507	0.036253
srM610-6	0.178815	0.049698	0.376641	0.351221	0.348647	0.460151	0.566348
AP1-6	0.000068	0.006024	0.000041	0.002970	0.000009	0.000010	0.000001
AP2-6	0.000185	0.005826	0.000033	0.007067	0.000184	0.000227	0.000270
AP3-6	0.000677	0.005886	0.000038	0.020255	0.000817	0.001397	0.001403
AP4-6	0.000891	0.003942	0.000069	0.030014	0.001156	0.001813	0.001941
standardize signal averages AP							
AP1	0.000070	0.005924	0.000044	0.003032	0.000018	0.000032	0.000006
AP2	0.000197	0.005884	0.000033	0.007378	0.000183	0.000239	0.000270
AP3	0.000712	0.006076	0.000041	0.020636	0.000808	0.001394	0.001399
AP4	0.000854	0.004110	0.000070	0.029890	0.001120	0.001756	0.001877
linest from std sig ave							
	0.017163	0.024301	0.025130	0.008832	0.011766	0.007249	0.006967
standardize signal averages SRM							
srM614-2	0.000426	0.035192	0.000776	0.002819	0.000421	0.000758	0.000701
srM612-2	0.017140	0.031462	0.049743	0.025819	0.020671	0.033209	0.035736
srM610-2	0.175628	0.051218	0.392551	0.358957	0.334477	0.449068	0.563365
linest from std sig ave							
	0.981740	1.046965	1.039849	1.021557	0.957636	0.975244	0.994669
concentration data							
SRM614-5	0.70	81.03	1.72	2.38	0.40	0.52	0.43
SRM612-5	24.46	66.91	106.95	19.98	19.97	19.84	21.04
SRM610-5	253.82	109.91	880.32	277.74	323.22	272.28	334.85
AP1-5	0.50	56.45	0.46	10.90	0.13	0.15	0.03
AP2-5	1.43	57.60	0.34	27.09	0.85	0.73	0.75
AP3-5	5.12	60.74	0.44	74.05	3.75	4.03	3.88
AP4-5	5.59	41.47	0.71	104.88	5.09	4.92	5.04
MZ2-1b	0.06	82.44	0.43	63.68	0.21	0.09	0.03
MZ2-2b	0.05	73.96	0.33	72.41	0.35	0.44	0.08
MZ2-3b	0.03	77.55	0.38	57.12	0.26	0.22	0.03
MZ2-4b	0.03	67.68	0.23	23.34	0.16	0.23	0.02
MZ2-5b	0.02	67.23	0.23	60.99	0.31	0.39	0.06
MZ2-6b	0.02	69.82	0.30	60.10	0.21	0.10	0.02
MZ2-7b	0.04	61.83	0.38	24.53	0.57	1.30	0.14
MZ2-8b	0.01	65.01	0.26	24.09	0.45	0.88	0.10
MZ2-9b	0.01	69.90	0.18	23.10	0.18	0.28	0.03
MZ2-10b	0.06	68.32	0.44	20.89	0.29	0.62	0.08
MZ2-11b	0.06	74.15	0.42	23.14	0.29	0.50	0.07
MZ2-12b	0.04	82.09	0.37	20.71	0.40	0.67	0.06

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	0.02	59.19	0.46	30.33	0.37	0.67	0.08
MZ2-14b	0.04	52.83	0.67	34.46	0.33	0.53	0.06
MZ2-15b	0.04	52.38	0.41	39.98	0.72	1.46	0.15
srm614-6	0.56	65.66	1.62	1.89	0.45	0.42	0.41
srm612-6	26.00	64.23	107.46	19.13	21.75	21.45	21.66
srm610-6	263.20	103.58	811.74	266.02	351.82	286.06	338.41
AP1-6	0.46	58.40	0.41	10.46	0.04	0.03	0.00
AP2-6	1.27	56.48	0.33	24.90	0.87	0.66	0.75
AP3-6	4.63	57.06	0.38	71.36	3.84	4.04	3.90
AP4-6	6.10	38.22	0.69	105.74	5.42	5.24	5.39

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-7	13.80	16222.73	78.56	174.92	5.40	19.68	17.96
SRM614-7	545.64	52277.38	1441.61	4416.26	544.16	785.04	1008.73
SRM612-7	25624.39	55976.20	80397.25	61376.66	28800.52	41266.51	56154.56
SRM610-7	262948.97	48012.63	544582.50	512098.66	298742.44	422806.84	618076.19
AP1-7	647.00	61478.95	859.20	55799.75	236.00	320.60	291.04
AP2-7	2173.73	67259.90	1079.97	134064.72	2110.13	2804.86	3651.30
AP3-7	7835.88	75568.34	787.00	404864.16	9863.62	15042.53	18365.18
AP4-7	10837.94	76495.27	1155.01	471951.13	14047.12	19440.39	25161.22
T1-1	96.76	52601.98	2054.89	2259790.80	2864.26	1359.77	657.96
T1-2	43.76	47000.70	878.92	1223214.00	1652.81	652.76	364.44
T1-3	35.84	44708.89	385.96	501908.44	822.96	324.64	189.08
T1-4	66.96	57241.60	6251.16	172646.94	407.44	261.60	149.00
T1-5	34.44	60426.50	5375.03	182274.52	388.52	227.84	116.80
T1-6	57.48	63049.16	5061.31	187653.73	429.64	282.24	184.72
T1-7	100.76	58849.37	737.56	149207.11	367.16	290.20	183.84
T1-8	40.44	59182.05	260.68	154032.78	307.60	167.88	79.84
T1-9	32.76	62576.47	304.36	153134.73	372.72	187.60	106.56
T1-10	68.44	64863.89	770.56	170775.67	357.52	326.40	166.28
T1-11	31.04	67715.31	405.48	168355.47	405.76	196.08	94.28
T1-12	23.28	68085.06	313.60	171418.48	348.96	165.68	84.44
T1-13	76.56	68350.91	260.04	282016.34	570.68	325.08	190.92
T1-14	38.60	69614.51	139.36	302148.69	554.04	253.68	129.04
T1-15	21.52	68698.27	369.44	290153.94	599.60	257.68	146.60
T1-16	63.64	64894.25	308.80	295575.19	608.48	307.88	143.20
T1-17	44.80	71010.20	225.52	339593.47	666.16	409.48	171.76
T1-18	41.12	70271.84	233.84	341659.63	580.68	288.92	158.88
SRM614-8	535.04	75459.10	1009.37	3088.26	519.60	860.64	972.53
SRM612-8	24962.10	79275.77	59428.73	40688.95	33309.67	47332.43	58400.85
SRM610-8	228921.89	60589.66	381340.63	380193.66	337758.94	456543.16	608223.81
AP1-8	453.28	70024.35	550.96	27853.56	105.72	130.64	90.52
AP2-8	1668.41	75335.59	434.56	74483.06	2090.09	2457.85	3156.02
AP3-8	7799.32	76945.95	540.32	351629.13	10834.42	17358.30	18640.95
AP4-8	9750.93	78198.80	1010.97	368140.00	13657.04	19550.03	22320.01
blank-8	16.64	21795.08	76.24	100.88	6.88	35.64	15.88
blank average	15.22	19008.91	77.40	137.90	6.14	27.66	16.92

blank subtraction							
SRM614-7	530.42	33268.47	1364.21	4278.36	538.02	757.38	991.81
SRM612-7	25609.16	36967.29	80319.85	61238.76	28794.38	41238.85	56137.63
SRM610-7	262933.75	29003.72	544505.10	511960.76	298736.30	422779.18	618059.27
AP1-7	631.78	42470.04	781.80	55661.85	229.86	292.94	274.12
AP2-7	2158.51	48250.99	1002.57	133926.82	2103.99	2777.20	3634.38
AP3-7	7820.66	56559.44	709.60	404726.26	9857.48	15014.86	18348.26
AP4-7	10822.72	57486.37	1077.61	471813.23	14040.98	19412.73	25144.30
T1-1	81.54	33593.07	1977.49	2259652.90	2858.12	1332.11	641.04
T1-2	28.54	27991.80	801.52	1223076.10	1646.67	625.10	347.52
T1-3	20.62	25699.98	308.56	501770.54	816.82	296.98	172.16
T1-4	51.74	38232.70	6173.75	172509.04	401.30	233.94	132.08
T1-5	19.22	41417.59	5297.63	182136.62	382.38	200.18	99.88
T1-6	42.26	44040.25	4983.91	187515.83	423.50	254.58	167.80
T1-7	85.54	39840.46	660.16	149069.21	361.02	262.54	166.92
T1-8	25.22	40173.14	183.28	153894.88	301.46	140.22	62.92
T1-9	17.54	43567.57	226.96	152996.83	366.58	159.94	89.64
T1-10	53.22	45854.98	693.16	170637.77	351.38	298.74	149.36
T1-11	15.82	48706.40	328.08	168217.57	399.62	168.42	77.36
T1-12	8.06	49076.16	236.20	171280.58	342.82	138.02	67.52

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	61.34	49342.00	182.64	281878.44	564.54	297.42	174.00
T1-14	23.38	50605.60	61.96	302010.79	547.90	226.02	112.12
T1-15	6.30	49689.36	292.04	290016.04	593.46	230.02	129.68
T1-16	48.42	45885.34	231.40	295437.29	602.34	280.22	126.28
T1-17	29.58	52001.30	148.12	339455.57	660.02	381.82	154.84
T1-18	25.90	51262.93	156.44	341521.73	574.54	261.26	141.96
SRM614-8	519.82	56450.20	931.97	2950.36	513.46	832.98	955.61
SRM612-8	24946.88	60266.86	59351.33	40551.05	33303.53	47304.77	58383.93
SRM610-8	228906.67	41580.75	381263.23	380055.76	337752.80	456515.50	608206.89
AP1-8	438.06	51015.45	473.56	27715.66	99.58	102.98	73.60
AP2-8	1653.19	56326.68	357.16	74345.16	2083.95	2430.19	3139.10
AP3-8	7784.10	57937.05	462.92	351491.23	10828.28	17330.64	18624.02
AP4-8	9735.71	59189.89	933.57	368002.10	13650.90	19522.37	22303.09
zero correction							
SRM614-7	530.42	33268.47	1364.21	4278.36	538.02	757.38	991.81
SRM612-7	25609.16	36967.29	80319.85	61238.76	28794.38	41238.85	56137.63
SRM610-7	262933.75	29003.72	544505.10	511960.76	298736.30	422779.18	618059.27
AP1-7	631.78	42470.04	781.80	55661.85	229.86	292.94	274.12
AP2-7	2158.51	48250.99	1002.57	133926.82	2103.99	2777.20	3634.38
AP3-7	7820.66	56559.44	709.60	404726.26	9857.48	15014.86	18348.26
AP4-7	10822.72	57486.37	1077.61	471813.23	14040.98	19412.73	25144.30
T1-1	81.54	33593.07	1977.49	2259652.90	2858.12	1332.11	641.04
T1-2	28.54	27991.80	801.52	1223076.10	1646.67	625.10	347.52
T1-3	20.62	25699.98	308.56	501770.54	816.82	296.98	172.16
T1-4	51.74	38232.70	6173.75	172509.04	401.30	233.94	132.08
T1-5	19.22	41417.59	5297.63	182136.62	382.38	200.18	99.88
T1-6	42.26	44040.25	4983.91	187515.83	423.50	254.58	167.80
T1-7	85.54	39840.46	660.16	149069.21	361.02	262.54	166.92
T1-8	25.22	40173.14	183.28	153894.88	301.46	140.22	62.92
T1-9	17.54	43567.57	226.96	152996.83	366.58	159.94	89.64
T1-10	53.22	45854.98	693.16	170637.77	351.38	298.74	149.36
T1-11	15.82	48706.40	328.08	168217.57	399.62	168.42	77.36
T1-12	8.06	49076.16	236.20	171280.58	342.82	138.02	67.52
T1-13	61.34	49342.00	182.64	281878.44	564.54	297.42	174.00
T1-14	23.38	50605.60	61.96	302010.79	547.90	226.02	112.12
T1-15	6.30	49689.36	292.04	290016.04	593.46	230.02	129.68
T1-16	48.42	45885.34	231.40	295437.29	602.34	280.22	126.28
T1-17	29.58	52001.30	148.12	339455.57	660.02	381.82	154.84
T1-18	25.90	51262.93	156.44	341521.73	574.54	261.26	141.96
SRM614-8	519.82	56450.20	931.97	2950.36	513.46	832.98	955.61
SRM612-8	24946.88	60266.86	59351.33	40551.05	33303.53	47304.77	58383.93
SRM610-8	228906.67	41580.75	381263.23	380055.76	337752.80	456515.50	608206.89
AP1-8	438.06	51015.45	473.56	27715.66	99.58	102.98	73.60
AP2-8	1653.19	56326.68	357.16	74345.16	2083.95	2430.19	3139.10
AP3-8	7784.10	57937.05	462.92	351491.23	10828.28	17330.64	18624.02
AP4-8	9735.71	59189.89	933.57	368002.10	13650.90	19522.37	22303.09
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014
standardized signal							
SRM614-7	0.000187	0.011721	0.000481	0.001507	0.000190	0.000267	0.000349
SRM612-7	0.009313	0.013443	0.029208	0.022269	0.010471	0.014996	0.020414
SRM610-7	0.159116	0.017552	0.329510	0.309815	0.180782	0.255847	0.374022
AP1-7	0.000039	0.002622	0.000048	0.003437	0.000014	0.000018	0.000017
AP2-7	0.000127	0.002850	0.000059	0.007910	0.000124	0.000164	0.000215
AP3-7	0.000382	0.002761	0.000035	0.019760	0.000481	0.000733	0.000896
AP4-7	0.000622	0.003306	0.000062	0.027137	0.000808	0.001117	0.001446
T1-1	0.000005	0.002239	0.000132	0.150636	0.000191	0.000089	0.000043
T1-2	0.000003	0.002487	0.000071	0.108675	0.000146	0.000056	0.000031
T1-3	0.000002	0.003010	0.000036	0.058769	0.000096	0.000035	0.000020
T1-4	0.000004	0.002701	0.000436	0.012187	0.000028	0.000017	0.000009

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000001	0.002825	0.000361	0.012425	0.000026	0.000014	0.000007
T1-6	0.000003	0.002893	0.000327	0.012319	0.000028	0.000017	0.000011
T1-7	0.000008	0.003584	0.000059	0.013412	0.000032	0.000024	0.000015
T1-8	0.000002	0.003808	0.000017	0.014589	0.000029	0.000013	0.000006
T1-9	0.000001	0.003608	0.000019	0.012669	0.000030	0.000013	0.000007
T1-10	0.000005	0.003946	0.000060	0.014686	0.000030	0.000026	0.000013
T1-11	0.000001	0.003942	0.000027	0.013614	0.000032	0.000014	0.000006
T1-12	0.000001	0.003963	0.000019	0.013832	0.000028	0.000011	0.000005
T1-13	0.000005	0.003685	0.000014	0.021051	0.000042	0.000022	0.000013
T1-14	0.000002	0.003547	0.000004	0.021169	0.000038	0.000016	0.000008
T1-15	0.000000	0.003704	0.000022	0.021619	0.000044	0.000017	0.000010
T1-16	0.000004	0.003934	0.000020	0.025331	0.000052	0.000024	0.000011
T1-17	0.000002	0.003784	0.000011	0.024701	0.000048	0.000028	0.000011
T1-18	0.000002	0.003809	0.000012	0.025379	0.000043	0.000019	0.000011
SRM614-8	0.000294	0.031918	0.000527	0.001668	0.000290	0.000471	0.000540
SRM612-8	0.012961	0.031311	0.030836	0.021068	0.017303	0.024577	0.030333
SRM610-8	0.194962	0.035415	0.324726	0.323698	0.287668	0.388819	0.518016
AP1-8	0.000037	0.004359	0.000040	0.002368	0.000009	0.000009	0.000006
AP2-8	0.000124	0.004227	0.000027	0.005579	0.000156	0.000182	0.000236
AP3-8	0.000481	0.003580	0.000029	0.021721	0.000669	0.001071	0.001151
AP4-8	0.000729	0.004432	0.000070	0.027553	0.001022	0.001462	0.001670
standardize signal averages AP							
AP1	0.000038	0.003491	0.000044	0.002903	0.000011	0.000013	0.000012
AP2	0.000126	0.003538	0.000043	0.006745	0.000140	0.000173	0.000225
AP3	0.000431	0.003171	0.000032	0.020740	0.000575	0.000902	0.001023
AP4	0.000676	0.003869	0.000066	0.027345	0.000915	0.001289	0.001558
linest from std sig ave							
	0.024001	0.041325	0.025898	0.009352	0.015102	0.010402	0.008789
standardize signal averages SRM							
srm614-2	0.000240	0.021820	0.000504	0.001588	0.000240	0.000369	0.000445
srm612-2	0.011137	0.022377	0.030022	0.021669	0.013887	0.019787	0.025374
srm610-2	0.177039	0.026483	0.327118	0.316757	0.234225	0.322333	0.446019
linest from std sig ave							
	0.024333	0.000000	0.012892	0.015633	0.022795	0.016223	0.011255
concentration data							
SRM614-7	0.38	41.54	1.07	1.21	0.25	0.24	0.26
SRM612-7	19.17	47.64	64.87	17.86	13.56	13.38	15.39
SRM610-7	327.52	62.21	731.87	248.49	234.15	228.25	281.92
AP1-7	0.37	43.23	0.50	12.82	0.09	0.08	0.06
AP2-7	1.22	46.98	0.61	29.51	0.75	0.68	0.75
AP3-7	3.66	45.52	0.36	73.72	2.90	3.04	3.14
AP4-7	5.96	54.51	0.64	101.24	4.87	4.63	5.07
T1-1	0.05	36.92	1.36	562.00	1.15	0.37	0.15
T1-2	0.02	41.00	0.74	405.45	0.88	0.23	0.11
T1-3	0.02	49.62	0.37	219.26	0.58	0.14	0.07
T1-4	0.03	44.53	4.51	45.47	0.17	0.07	0.03
T1-5	0.01	46.58	3.73	46.36	0.16	0.06	0.02
T1-6	0.03	47.70	3.38	45.96	0.17	0.07	0.04
T1-7	0.07	59.09	0.61	50.04	0.20	0.10	0.05
T1-8	0.02	62.78	0.18	54.43	0.17	0.06	0.02
T1-9	0.01	59.48	0.19	47.27	0.18	0.05	0.03
T1-10	0.04	65.06	0.62	54.79	0.18	0.11	0.05
T1-11	0.01	64.99	0.27	50.79	0.19	0.06	0.02
T1-12	0.01	65.34	0.20	51.61	0.17	0.05	0.02
T1-13	0.04	60.75	0.14	78.54	0.25	0.09	0.05
T1-14	0.02	58.48	0.04	78.98	0.23	0.07	0.03
T1-15	0.00	61.07	0.22	80.66	0.27	0.07	0.03
T1-16	0.04	64.86	0.20	94.50	0.31	0.10	0.04
T1-17	0.02	62.38	0.11	92.15	0.29	0.12	0.04
T1-18	0.02	62.80	0.12	94.69	0.26	0.08	0.04
SRM614-8	0.61	113.12	1.17	1.34	0.38	0.42	0.41
SRM612-8	26.68	110.97	68.49	16.90	22.41	21.93	22.86
SRM610-8	401.31	125.52	721.25	259.62	372.58	346.88	390.45
AP1-8	0.36	71.86	0.42	8.84	0.05	0.04	0.02
AP2-8	1.19	69.69	0.28	20.82	0.94	0.76	0.83
AP3-8	4.61	59.02	0.30	81.04	4.03	4.44	4.04
AP4-8	6.98	73.06	0.72	102.80	6.16	6.07	5.85
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-5	39.28	18166.94	123.48	295.12	5.20	19.52	8.96
SRM614-5	790.96	51704.89	2167.05	6930.76	747.28	1219.49	1501.29
SRM612-5	29428.21	53865.06	106289.00	84582.80	34443.23	50828.32	68550.95
SRM610-5	174066.42	38135.25	556532.19	437315.63	228618.13	341803.50	474999.69
AP1-5	948.77	55091.39	968.77	86653.45	442.52	1063.21	512.84
AP2-5	2890.26	64404.04	1115.85	186400.45	2694.70	4014.50	4609.55
AP3-5	24996.82	67804.54	1509.69	1141014.30	19837.43	40081.27	40980.27
AP4-5	13348.64	65327.73	1515.41	593825.31	14571.16	22516.85	27163.71
TGP12-1	35.84	34130.39	203.00	48964.60	183.68	692.28	130.12
TGP12-2	22.80	33647.07	200.32	44371.29	128.28	587.84	80.88
TGP12-3	43.60	32850.34	192.80	41635.04	138.92	424.52	81.92
TGP12-4	161.28	36405.84	361.80	137512.06	408.16	956.97	231.04
TGP12-5	67.84	39375.74	199.64	302642.03	578.92	655.60	158.72
TGP12-6	144.44	48341.83	296.52	951357.25	1576.49	1170.81	397.28
TGP12-7	208.08	55522.27	330.52	2151880.30	3184.90	2488.05	914.69
TGP12-8	124.84	58849.65	195.28	1999049.90	2757.42	1604.89	652.12
TGP12-9	107.52	57928.65	237.08	2071717.90	2782.18	1300.85	617.60
TGP12-10	142.96	55151.27	304.60	1497864.90	2297.41	1471.77	566.52
TGP12-11	86.64	54530.63	195.20	1510961.00	2218.53	1084.81	488.64
TGP12-12	49.56	57032.08	162.44	1564125.30	2263.17	894.33	428.00
TGP12-13	46.00	42323.68	136.44	73479.25	186.24	212.08	74.72
TGP12-14	38.40	44196.29	118.36	77938.72	181.04	216.20	61.24
TGP12-15	39.48	44830.01	144.08	77168.23	172.20	202.56	80.24
TGP12-16	160.12	54738.75	294.88	227083.23	551.52	1017.69	215.92
TGP12-17	164.44	56079.07	356.04	228698.61	723.48	742.12	200.52
TGP12-18	130.44	55009.15	357.40	176628.55	409.36	463.04	158.08
SRM614-6	689.04	80077.93	1284.77	4221.06	706.68	1094.65	1243.73
SRM612-6	23981.41	78540.08	66917.30	42442.68	33557.67	47929.87	58854.57
SRM610-6	137153.17	51258.85	354873.28	283114.31	233674.03	326604.78	424988.88
AP1-6	568.76	68155.38	553.84	32795.59	92.96	113.52	56.84
AP2-6	2169.65	77437.95	451.24	88116.62	2268.41	2900.30	3427.58
AP3-6	16931.22	74646.94	813.04	688880.94	17708.06	32819.07	32257.34
AP4-6	11367.82	74840.86	1016.13	427354.06	13605.76	21149.28	23294.45
blank-6	13.64	23948.01	99.72	140.12	7.88	50.04	10.64
blank average	26.46	21057.48	111.60	217.62	6.54	34.78	9.80
blank subtraction							
SRM614-5	764.50	30647.41	2055.45	6713.14	740.74	1184.71	1491.49
SRM612-5	29401.74	32807.58	106177.40	84365.18	34436.69	50793.54	68541.14
SRM610-5	174039.96	17077.78	556420.59	437098.01	228611.59	341768.72	474989.89
AP1-5	922.31	34033.91	857.16	86435.82	435.98	1028.43	503.04
AP2-5	2863.80	43346.56	1004.25	186182.83	2688.16	3979.72	4599.75
AP3-5	24970.36	46747.06	1398.09	1140796.68	19830.89	40046.49	40970.47
AP4-5	13322.17	44270.25	1403.81	593607.69	14564.62	22482.07	27153.91
TGP12-1	9.38	13072.91	91.40	48746.98	177.14	657.50	120.32
TGP12-2	-3.66	12589.59	88.72	44153.67	121.74	553.06	71.08
TGP12-3	17.14	11792.87	81.20	41417.41	132.38	389.74	72.12
TGP12-4	134.82	15348.37	250.20	137294.44	401.62	922.19	221.24
TGP12-5	41.38	18318.26	88.04	302424.41	572.38	620.82	148.92
TGP12-6	117.98	27284.35	184.92	951139.63	1569.95	1136.03	387.48
TGP12-7	181.62	34464.79	218.92	2151662.68	3178.36	2453.27	904.89
TGP12-8	98.38	37792.17	83.68	1998832.28	2750.88	1570.11	642.32
TGP12-9	81.06	36871.17	125.48	2071500.28	2775.64	1266.07	607.80
TGP12-10	116.50	34093.79	193.00	1497647.28	2290.87	1436.99	556.72
TGP12-11	60.18	33473.15	83.60	1510743.38	2211.99	1050.03	478.84
TGP12-12	23.10	35974.60	50.84	1563907.68	2256.63	859.54	418.20
TGP12-13	19.54	21266.20	24.84	73261.63	179.70	177.30	64.92
TGP12-14	11.94	23138.81	6.76	77721.10	174.50	181.42	51.44
TGP12-15	13.02	23772.53	32.48	76950.61	165.66	167.78	70.44
TGP12-16	133.66	33681.27	183.28	226865.61	544.98	982.91	206.12
TGP12-17	137.98	35021.60	244.44	228480.99	716.94	707.34	190.72
TGP12-18	103.98	33951.67	245.80	176410.93	402.82	428.26	148.28
SRM614-6	662.58	59020.45	1173.17	4003.44	700.14	1059.87	1233.93
SRM612-6	23954.95	57482.60	66805.70	42225.06	33551.13	47895.09	58844.77
SRM610-6	137126.71	30201.37	354761.68	282896.69	233667.49	326570.00	424979.08
AP1-6	542.30	47097.90	442.24	32577.96	86.42	78.74	47.04
AP2-6	2143.19	56380.47	339.64	87899.00	2261.87	2865.52	3417.78
AP3-6	16904.75	53589.46	701.44	688663.32	17701.52	32784.29	32247.54
AP4-6	11341.36	53783.38	904.53	427136.44	13599.22	21114.50	23284.65
zero correction							
SRM614-5	764.50	30647.41	2055.45	6713.14	740.74	1184.71	1491.49

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	29401.74	32807.58	106177.40	84365.18	34436.69	50793.54	68541.14
SRM610-5	174039.96	17077.78	556420.59	437098.01	228611.59	341768.72	474989.89
AP1-5	922.31	34033.91	857.16	86435.82	435.98	1028.43	503.04
AP2-5	2863.80	43346.56	1004.25	186182.83	2688.16	3979.72	4599.75
AP3-5	24970.36	46747.06	1398.09	1140796.68	19830.89	40046.49	40970.47
AP4-5	13322.17	44270.25	1403.81	593607.69	14564.62	22482.07	27153.91
TGP12-1	9.38	13072.91	91.40	48746.98	177.14	657.50	120.32
TGP12-2	0.00	12589.59	88.72	44153.67	121.74	553.06	71.08
TGP12-3	17.14	11792.87	81.20	41417.41	132.38	389.74	72.12
TGP12-4	134.82	15348.37	250.20	137294.44	401.62	922.19	221.24
TGP12-5	41.38	18318.26	88.04	302424.41	572.38	620.82	148.92
TGP12-6	117.98	27284.35	184.92	951139.63	1569.95	1136.03	387.48
TGP12-7	181.62	34464.79	218.92	2151662.68	3178.36	2453.27	904.89
TGP12-8	98.38	37792.17	83.68	1998832.28	2750.88	1570.11	642.32
TGP12-9	81.06	36871.17	125.48	2071500.28	2775.64	1266.07	607.80
TGP12-10	116.50	34093.79	193.00	1497647.28	2290.87	1436.99	556.72
TGP12-11	60.18	33473.15	83.60	1510743.38	2211.99	1050.03	478.84
TGP12-12	23.10	35974.60	50.84	1563907.68	2256.63	859.54	418.20
TGP12-13	19.54	21266.20	24.84	73261.63	179.70	177.30	64.92
TGP12-14	11.94	23138.81	6.76	77721.10	174.50	181.42	51.44
TGP12-15	13.02	23772.53	32.48	76950.61	165.66	167.78	70.44
TGP12-16	133.66	33681.27	183.28	226865.61	544.98	982.91	206.12
TGP12-17	137.98	35021.60	244.44	228480.99	716.94	707.34	190.72
TGP12-18	103.98	33951.67	245.80	176410.93	402.82	428.26	148.28
SRM614-6	662.58	59020.45	1173.17	4003.44	700.14	1059.87	1233.93
SRM612-6	23954.95	57482.60	66805.70	42225.06	33551.13	47895.09	58844.77
SRM610-6	137126.71	30201.37	354761.68	282896.69	233667.49	326570.00	424979.08
AP1-6	542.30	47097.90	442.24	32577.96	86.42	78.74	47.04
AP2-6	2143.19	56380.47	339.64	87899.00	2261.87	2865.52	3417.78
AP3-6	16904.75	53589.46	701.44	688663.32	17701.52	32784.29	32247.54
AP4-6	11341.36	53783.38	904.53	427136.44	13599.22	21114.50	23284.65

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-5	0.000203	0.008143	0.000546	0.001784	0.000197	0.000315	0.000396
SRM612-5	0.009152	0.010212	0.033049	0.026259	0.010719	0.015810	0.021334
SRM610-5	0.122284	0.011999	0.390954	0.307115	0.160628	0.240135	0.333739
AP1-5	0.000055	0.002042	0.000051	0.005187	0.000026	0.000062	0.000030
AP2-5	0.000154	0.002324	0.000054	0.009980	0.000144	0.000213	0.000247
AP3-5	0.000963	0.001804	0.000054	0.044018	0.000765	0.001545	0.001581
AP4-5	0.000826	0.002744	0.000087	0.036793	0.000903	0.001393	0.001683
TGP12-1	0.000002	0.003064	0.000021	0.011426	0.000042	0.000154	0.000028
TGP12-2	0.000000	0.003117	0.000022	0.010933	0.000030	0.000137	0.000018
TGP12-3	0.000005	0.003283	0.000023	0.011531	0.000037	0.000109	0.000020
TGP12-4	0.000022	0.002464	0.000040	0.022045	0.000064	0.000148	0.000036
TGP12-5	0.000005	0.002268	0.000011	0.037441	0.000071	0.000077	0.000018
TGP12-6	0.000008	0.001737	0.000012	0.060538	0.000100	0.000072	0.000025
TGP12-7	0.000009	0.001792	0.000011	0.111891	0.000165	0.000128	0.000047
TGP12-8	0.000005	0.001994	0.000004	0.105469	0.000145	0.000083	0.000034
TGP12-9	0.000004	0.001988	0.000007	0.111687	0.000150	0.000068	0.000033
TGP12-10	0.000008	0.002444	0.000014	0.107345	0.000164	0.000103	0.000040
TGP12-11	0.000004	0.002376	0.000006	0.107244	0.000157	0.000075	0.000034
TGP12-12	0.000002	0.002596	0.000004	0.112864	0.000163	0.000062	0.000030
TGP12-13	0.000003	0.003166	0.000004	0.010907	0.000027	0.000026	0.000010
TGP12-14	0.000002	0.003358	0.000001	0.011279	0.000025	0.000026	0.000007
TGP12-15	0.000002	0.003353	0.000005	0.010853	0.000023	0.000024	0.000010
TGP12-16	0.000011	0.002680	0.000015	0.018050	0.000043	0.000078	0.000016
TGP12-17	0.000011	0.002878	0.000020	0.018777	0.000059	0.000058	0.000016
TGP12-18	0.000010	0.003133	0.000023	0.016281	0.000037	0.000040	0.000014
SRM614-6	0.000279	0.024823	0.000493	0.001684	0.000294	0.000446	0.000519
SRM612-6	0.011498	0.027592	0.032067	0.020268	0.016105	0.022990	0.028246

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.147827	0.032558	0.382445	0.304972	0.251901	0.352053	0.458141
AP1-6	0.000041	0.003579	0.000034	0.002475	0.000007	0.000006	0.000004
AP2-6	0.000145	0.003826	0.000023	0.005965	0.000153	0.000194	0.000232
AP3-6	0.000796	0.002523	0.000033	0.032429	0.000834	0.001544	0.001519
AP4-6	0.000838	0.003973	0.000067	0.031555	0.001005	0.001560	0.001720

standardize signal averages AP

AP1	0.000048	0.002811	0.000043	0.003831	0.000016	0.000034	0.000017
AP2	0.000149	0.003075	0.000038	0.007973	0.000149	0.000204	0.000239
AP3	0.000880	0.002164	0.000043	0.038223	0.000799	0.001544	0.001550
AP4	0.000832	0.003359	0.000077	0.034174	0.000954	0.001477	0.001702

linest from std sig ave

	0.015483	0.051260	0.023335	0.006141	0.012948	0.007391	0.006980
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standardize signal averages SRM

srm614-2	0.000241	0.016483	0.000520	0.001734	0.000246	0.000380	0.000458
srm612-2	0.010325	0.018902	0.032558	0.023264	0.013412	0.019400	0.024790
srm610-2	0.135056	0.022279	0.386699	0.306043	0.206264	0.296094	0.395940

linest from std sig ave

	0.031882	0.000000	0.010911	0.016174	0.025879	0.017657	0.012676
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concentration data

SRM614-5	0.27	35.80	1.09	0.94	0.22	0.20	0.24
SRM612-5	12.15	44.89	66.14	13.83	11.90	10.02	12.77
SRM610-5	162.37	52.75	782.40	161.74	178.38	152.22	199.80
AP1-5	0.34	41.77	0.48	12.71	0.14	0.18	0.08
AP2-5	0.95	47.51	0.50	24.45	0.74	0.63	0.69
AP3-5	5.95	36.89	0.50	107.83	3.95	4.56	4.40
AP4-5	5.10	56.11	0.81	90.13	4.66	4.11	4.69
TGP12-1	0.01	62.66	0.20	27.99	0.21	0.45	0.08
TGP12-2	0.00	63.75	0.20	26.78	0.16	0.40	0.05
TGP12-3	0.03	67.14	0.21	28.25	0.19	0.32	0.06
TGP12-4	0.13	50.40	0.37	54.00	0.33	0.44	0.10
TGP12-5	0.03	46.38	0.10	91.72	0.37	0.23	0.05
TGP12-6	0.05	35.51	0.11	148.30	0.52	0.21	0.07
TGP12-7	0.06	36.65	0.11	274.10	0.85	0.38	0.13
TGP12-8	0.03	40.78	0.04	258.37	0.75	0.24	0.09
TGP12-9	0.03	40.65	0.06	273.60	0.77	0.20	0.09
TGP12-10	0.05	49.97	0.13	262.96	0.85	0.30	0.11
TGP12-11	0.03	48.59	0.06	262.71	0.81	0.22	0.09
TGP12-12	0.01	53.09	0.03	276.48	0.84	0.18	0.08
TGP12-13	0.02	64.74	0.03	26.72	0.14	0.08	0.03
TGP12-14	0.01	68.67	0.01	27.63	0.13	0.08	0.02
TGP12-15	0.01	68.56	0.04	26.59	0.12	0.07	0.03
TGP12-16	0.07	54.80	0.14	44.22	0.22	0.23	0.05
TGP12-17	0.07	58.86	0.19	46.00	0.30	0.17	0.04
TGP12-18	0.06	64.08	0.21	39.88	0.19	0.12	0.04
SRM614-6	0.37	109.13	0.99	0.89	0.33	0.28	0.31
SRM612-6	15.27	121.30	64.17	10.67	17.88	14.57	16.91
SRM610-6	196.29	143.13	765.38	160.61	279.73	223.17	274.27
AP1-6	0.25	73.18	0.31	6.06	0.03	0.02	0.01
AP2-6	0.90	78.24	0.21	14.61	0.79	0.57	0.65
AP3-6	4.92	51.60	0.31	79.44	4.31	4.55	4.23
AP4-6	5.18	81.25	0.62	77.30	5.19	4.60	4.79

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr	
blank-1	73.16	21289.32	253.44		586.28	10.20	38.44	29.56
SRM614-1	841.68	64750.00	2151.81		10509.42	1081.01	1624.65	1990.05
SRM612-1	32845.79	71688.24	109169.70		79897.81	52273.22	72236.33	97631.39
SRM610-1	174930.30	50248.40	532117.50		471850.97	338178.22	475587.84	663275.75
AP1-1	1310.61	65555.09	1076.13		74037.94	438.80	813.28	661.64
AP2-1	4485.31	76829.63	1328.61		206724.17	4572.19	6343.12	7550.44
AP3-1	22387.85	72799.85	1389.53		979832.31	23586.37	41562.88	43623.29
AP4-1	31223.73	77576.52	2951.82		1357907.60	34156.03	59240.38	63520.00
TGP18-1	135.60	69880.31	239.60		431026.53	917.49	913.69	307.44
TGP18-2	58.08	65952.29	141.08		337383.00	697.56	609.44	205.12

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	86.76	65187.09	154.92	300035.59	642.36	599.84	168.96
TGP18-4	501.68	65164.29	408.60	1108071.00	2388.41	3350.30	706.48
TGP18-5	721.00	66741.45	316.24	1027541.90	2354.45	3435.70	738.08
TGP18-6	137.48	81215.46	132.24	620023.81	1177.53	898.21	270.88
TGP18-7	148.08	81654.70	334.92	832738.00	1456.17	977.49	386.84
TGP18-8	124.52	83506.43	120.64	856372.69	1405.61	1036.05	360.80
TGP18-9	147.92	84494.76	120.20	916722.25	1492.09	1257.61	401.88
TGP18-10	298.16	72691.57	198.36	1245769.30	2038.45	1812.69	577.88
TGP18-11	529.72	70716.60	179.68	1475379.00	2435.45	1926.93	615.84
TGP18-12	625.80	71352.48	221.76	1473755.80	2477.21	2404.33	629.12
SRM614-2	676.32	81398.09	1101.17	5226.75	693.56	1143.61	1145.29
SRM612-2	29915.97	96169.38	81109.58	55031.47	46649.90	63960.64	79988.49
SRM610-2	175349.98	60110.26	428528.78	353010.84	314225.81	438974.91	559468.00
AP1-2	736.32	78884.84	445.40	43377.24	124.12	181.72	90.72
AP2-2	3139.06	88400.02	358.60	124040.58	3427.54	4418.19	5382.67
AP3-2	20444.96	76924.75	861.76	800246.50	20481.64	38862.10	37420.93
AP4-2	30110.25	81907.78	2370.41	1209968.30	32578.42	58646.81	58706.85
blank-2	51.68	24345.02	84.92	341.64	6.64	35.72	21.08
blank ave	62.42	22817.17	169.18	463.96	8.42	37.08	25.32

blank subtraction

SRM614-1	779.26	41932.84	1982.63	10045.46	1072.59	1587.57	1964.73
SRM612-1	32783.36	48871.07	109000.52	79433.85	52264.79	72199.25	97606.07
SRM610-1	174867.88	27431.23	531948.32	471387.01	338169.80	475550.76	663250.43
AP1-1	1248.19	42737.92	906.95	73573.98	430.38	776.20	636.32
AP2-1	4422.88	54012.46	1159.43	206260.21	4563.77	6306.04	7525.12
AP3-1	22325.43	49982.68	1220.35	979368.35	23577.95	41525.79	43597.96
AP4-1	31161.31	54759.35	2782.64	1357443.64	34147.61	59203.29	63494.68
TGP18-1	73.18	47063.14	70.42	430562.57	909.07	876.60	282.12
TGP18-2	-4.34	43135.12	-28.10	336919.04	689.14	572.36	179.80
TGP18-3	24.34	42369.92	-14.26	299571.63	633.94	562.76	143.64
TGP18-4	439.26	42347.12	239.42	1107607.04	2379.99	3313.22	681.16
TGP18-5	658.58	43924.28	147.06	1027077.94	2346.03	3398.62	712.76
TGP18-6	75.06	58398.29	-36.94	619559.85	1169.11	861.12	245.56
TGP18-7	85.66	58837.53	165.74	832274.04	1447.75	940.41	361.52
TGP18-8	62.10	60689.26	-48.54	855908.73	1397.19	998.97	335.48
TGP18-9	85.50	61677.59	-48.98	916258.29	1483.67	1220.53	376.56
TGP18-10	235.74	49874.40	29.18	1245305.34	2030.03	1775.61	552.56
TGP18-11	467.30	47899.43	10.50	1474915.04	2427.03	1889.85	590.52
TGP18-12	563.38	48535.32	52.58	1473291.84	2468.79	2367.25	603.80
SRM614-2	613.90	58580.93	931.99	4762.79	685.14	1106.53	1119.97
SRM612-2	29853.55	73352.21	80940.40	54567.51	46641.48	63923.56	79963.17
SRM610-2	175287.56	37293.09	428359.60	352546.88	314217.39	438937.83	559442.68
AP1-2	673.90	56067.68	276.22	42913.28	115.70	144.64	65.40
AP2-2	3076.64	65582.85	189.42	123576.62	3419.12	4381.10	5357.35
AP3-2	20382.53	54107.58	692.58	799782.54	20473.21	38825.02	37395.61
AP4-2	30047.83	59090.61	2201.23	1209504.34	32570.00	58609.73	58681.53

zero correction

SRM614-1	779.26	41932.84	1982.63	10045.46	1072.59	1587.57	1964.73
SRM612-1	32783.36	48871.07	109000.52	79433.85	52264.79	72199.25	97606.07
SRM610-1	174867.88	27431.23	531948.32	471387.01	338169.80	475550.76	663250.43
AP1-1	1248.19	42737.92	906.95	73573.98	430.38	776.20	636.32
AP2-1	4422.88	54012.46	1159.43	206260.21	4563.77	6306.04	7525.12
AP3-1	22325.43	49982.68	1220.35	979368.35	23577.95	41525.79	43597.96
AP4-1	31161.31	54759.35	2782.64	1357443.64	34147.61	59203.29	63494.68
TGP18-1	73.18	47063.14	70.42	430562.57	909.07	876.60	282.12
TGP18-2	0.00	43135.12	0.00	336919.04	689.14	572.36	179.80
TGP18-3	24.34	42369.92	0.00	299571.63	633.94	562.76	143.64
TGP18-4	439.26	42347.12	239.42	1107607.04	2379.99	3313.22	681.16
TGP18-5	658.58	43924.28	147.06	1027077.94	2346.03	3398.62	712.76
TGP18-6	75.06	58398.29	0.00	619559.85	1169.11	861.12	245.56
TGP18-7	85.66	58837.53	165.74	832274.04	1447.75	940.41	361.52
TGP18-8	62.10	60689.26	0.00	855908.73	1397.19	998.97	335.48
TGP18-9	85.50	61677.59	0.00	916258.29	1483.67	1220.53	376.56
TGP18-10	235.74	49874.40	29.18	1245305.34	2030.03	1775.61	552.56
TGP18-11	467.30	47899.43	10.50	1474915.04	2427.03	1889.85	590.52
TGP18-12	563.38	48535.32	52.58	1473291.84	2468.79	2367.25	603.80
SRM614-2	613.90	58580.93	931.99	4762.79	685.14	1106.53	1119.97
SRM612-2	29853.55	73352.21	80940.40	54567.51	46641.48	63923.56	79963.17
SRM610-2	175287.56	37293.09	428359.60	352546.88	314217.39	438937.83	559442.68
AP1-2	673.90	56067.68	276.22	42913.28	115.70	144.64	65.40
AP2-2	3076.64	65582.85	189.42	123576.62	3419.12	4381.10	5357.35
AP3-2	20382.53	54107.58	692.58	799782.54	20473.21	38825.02	37395.61
AP4-2	30047.83	59090.61	2201.23	1209504.34	32570.00	58609.73	58681.53

certified concentration

SRM614	0.73	0.68	3.10	0.72	0.79	0.75
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.44	41.64	37.74	35.77	38.35	37.16
SRM610	368.50	360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-1	0.000197	0.010596	0.000501	0.002538	0.000271	0.000401	0.000496
SRM612-1	0.008955	0.013349	0.029773	0.021697	0.014276	0.019721	0.026661
SRM610-1	0.121667	0.019086	0.370111	0.327974	0.235286	0.330871	0.461466
AP1-1	0.000057	0.001946	0.000041	0.003350	0.000020	0.000035	0.000029
AP2-1	0.000186	0.002272	0.000049	0.008678	0.000192	0.000265	0.000317
AP3-1	0.000934	0.002090	0.000051	0.040954	0.000986	0.001736	0.001823
AP4-1	0.001398	0.002457	0.000125	0.060914	0.001532	0.002657	0.002849
TGP18-1	0.000003	0.002020	0.000003	0.018476	0.000039	0.000038	0.000012
TGP18-2	0.000000	0.002213	0.000000	0.017283	0.000035	0.000029	0.000009
TGP18-3	0.000001	0.002380	0.000000	0.016827	0.000036	0.000032	0.000008
TGP18-4	0.000014	0.001343	0.000008	0.035126	0.000075	0.000105	0.000022
TGP18-5	0.000022	0.001436	0.000005	0.033585	0.000077	0.000111	0.000023
TGP18-6	0.000003	0.002494	0.000000	0.026458	0.000050	0.000037	0.000010
TGP18-7	0.000003	0.002112	0.000006	0.029872	0.000052	0.000034	0.000013
TGP18-8	0.000002	0.002167	0.000000	0.030562	0.000050	0.000036	0.000012
TGP18-9	0.000003	0.002143	0.000000	0.031832	0.000052	0.000042	0.000013
TGP18-10	0.000008	0.001679	0.000001	0.041935	0.000068	0.000060	0.000019
TGP18-11	0.000015	0.001494	0.000000	0.045992	0.000076	0.000059	0.000018
TGP18-12	0.000017	0.001483	0.000002	0.045019	0.000075	0.000072	0.000018
SRM614-2	0.000330	0.031494	0.000501	0.002561	0.000368	0.000595	0.000602
SRM612-2	0.011907	0.029255	0.032282	0.021763	0.018602	0.025495	0.031892
SRM610-2	0.163830	0.034855	0.400360	0.329503	0.293679	0.410247	0.522875
AP1-2	0.000043	0.003555	0.000018	0.002721	0.000007	0.000009	0.000004
AP2-2	0.000171	0.003642	0.000011	0.006863	0.000190	0.000243	0.000298
AP3-2	0.001084	0.002878	0.000037	0.042537	0.001089	0.002065	0.001989
AP4-2	0.001653	0.003251	0.000121	0.066535	0.001792	0.003224	0.003228

standardize signal averages AP							
AP1	0.000050	0.002750	0.000029	0.003035	0.000013	0.000022	0.000017
AP2	0.000178	0.002957	0.000030	0.007770	0.000191	0.000254	0.000307
AP3	0.001009	0.002484	0.000044	0.041746	0.001037	0.001901	0.001906
AP4	0.001526	0.002854	0.000123	0.063724	0.001662	0.002940	0.003039

linest from std sig ave							
	0.010514	0.052106	0.016133	0.004225	0.008349	0.004689	0.004577

standardize signal averages SRM							
srm614-2	0.000263	0.021045	0.000501	0.002549	0.000320	0.000498	0.000549
srm612-2	0.010431	0.021302	0.031027	0.021730	0.016439	0.022608	0.029276
srm610-2	0.142748	0.026971	0.385235	0.328739	0.264483	0.370559	0.492171

linest from std sig ave							
	0.852349	0.629347	0.960731	0.997678	0.889529	0.892821	0.937519

concentration data							
SRM614-1	0.18	47.35	0.69	0.92	0.19	0.16	0.19
SRM612-1	8.07	59.65	41.19	7.86	10.22	7.93	10.47
SRM610-1	109.70	85.29	512.08	118.84	168.48	133.06	181.16
AP1-1	0.24	40.45	0.27	5.65	0.07	0.07	0.05
AP2-1	0.78	47.24	0.31	14.63	0.64	0.50	0.58
AP3-1	3.92	43.45	0.33	69.03	3.28	3.25	3.33
AP4-1	5.86	51.08	0.80	102.67	5.10	4.97	5.20
TGP18-1	0.01	41.98	0.02	31.14	0.13	0.07	0.02
TGP18-2	0.00	46.00	0.00	29.13	0.12	0.05	0.02
TGP18-3	0.01	49.47	0.00	28.36	0.12	0.06	0.01
TGP18-4	0.06	27.92	0.05	59.20	0.25	0.20	0.04
TGP18-5	0.09	29.86	0.03	56.61	0.26	0.21	0.04
TGP18-6	0.01	51.84	0.00	44.59	0.17	0.07	0.02
TGP18-7	0.01	43.90	0.04	50.35	0.17	0.06	0.02
TGP18-8	0.01	45.05	0.00	51.51	0.17	0.07	0.02
TGP18-9	0.01	44.54	0.00	53.65	0.17	0.08	0.02

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.03	34.91	0.01	70.68	0.23	0.11	0.03
TGP18-11	0.06	31.05	0.00	77.52	0.25	0.11	0.03
TGP18-12	0.07	30.83	0.01	75.88	0.25	0.14	0.03
SRM614-2	1.38	654.66	3.22	4.32	1.23	1.11	1.10
SRM612-2	10.74	130.73	44.66	7.89	13.32	10.25	12.52
SRM610-2	147.72	155.76	553.94	119.39	210.29	164.98	205.26
AP1-2	0.04	15.89	0.02	0.99	0.01	0.00	0.00
AP2-2	0.72	75.71	0.07	11.57	0.63	0.46	0.54
AP3-2	4.55	59.82	0.24	71.69	3.63	3.86	3.63
AP4-2	6.93	67.57	0.78	112.14	5.97	6.03	5.89

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
blank-7b	33	13048	83	32	12	20	23
SRM614-7b	597	60282	1076	3494	541	915	993
SRM612-7	24615	67120	72900	38407	29151	46833	51907
SRM610-7	125369	55953	268938	245064	217204	291216	375007
AP1-7	800	63996	439	27858	137	224	118
AP2-7	2003	63649	407	65939	1482	1930	2137
AP3-7	2701	61871	332	103312	4342	5948	6805
AP4-7	7315	63446	788	226764	7547	12357	12736
MZ3-1	62	48793	263	56360	658	1829	258
MZ3-2	62	48924	305	73669	481	1249	195
MZ3-3	59	47487	263	46668	427	1013	168
MZ3-4	131	59097	436	907002	1869	3302	542
MZ3-5	96	55305	418	572012	1254	2323	364
MZ3-6	103	59422	342	826058	1730	2738	548
MZ3-7	109	61112	275	1024407	2113	3618	644
MZ3-8	121	60027	277	962404	1943	2807	515
MZ3-9	83	59513	252	978351	1833	2267	498
srm614-8	456	48411	882	2936	487	732	747
srm612-8	18914	55403	52952	26772	22581	35883	38479
srm610-8	111940	49671	218591	206028	204939	265941	331539
AP1-8	448	54700	411	19557	69	169	39
AP2-8	1419	57975	337	48662	1258	1539	1845
AP3-8	2683	55591	281	104278	4612	6578	7128
AP4-8	6085	58251	565	184270	7760	11802	12417
blank-8	44	28064	233	144	7	47	19
blank ave	38	20556	158	88	9	34	21

blank subtraction

SRM614-7b	558.54	39725.62	917.37	3406.32	531.64	881.98	971.91
SRM612-7	24576.88	46564.19	72741.65	38319.36	29142.04	46799.64	51885.87
SRM610-7	125331.05	35397.16	268779.39	244975.79	217194.14	291182.69	374986.01
AP1-7	762.22	43440.36	280.56	27769.50	127.36	190.90	96.70
AP2-7	1965.19	43093.52	249.08	65851.35	1472.77	1896.91	2115.55
AP3-7	2663.19	41315.47	174.04	103223.68	4332.50	5914.25	6783.50
AP4-7	7276.42	42890.40	630.08	226675.81	7537.44	12323.33	12714.69
MZ3-1	24.22	28236.84	105.00	56271.62	648.12	1795.55	237.46
MZ3-2	23.98	28367.76	146.88	73580.59	471.08	1215.03	174.02
MZ3-3	21.10	26931.03	105.16	46579.52	417.48	979.71	147.46
MZ3-4	93.22	38541.34	278.24	906913.71	1859.09	3268.72	520.90
MZ3-5	57.58	34749.40	260.20	571923.78	1244.89	2289.31	343.10
MZ3-6	64.86	38866.22	183.88	825970.15	1720.49	2704.08	526.62
MZ3-7	71.18	40556.23	116.92	1024318.70	2103.21	3584.32	622.62
MZ3-8	82.34	39471.50	118.84	962315.84	1933.97	2773.88	493.58
MZ3-9	44.78	38956.90	93.72	978262.53	1823.21	2233.27	476.82
srm614-8	417.58	27854.96	723.92	2848.32	477.96	698.02	725.90
srm612-8	18875.89	34847.39	52793.42	26684.33	22571.65	35849.74	38457.52
srm610-8	111901.49	29115.20	218432.74	205939.54	204929.31	265907.72	331518.45
AP1-8	410.26	34144.55	252.72	19469.13	59.16	135.62	18.02
AP2-8	1380.83	37419.57	179.00	48573.53	1248.81	1505.95	1824.35
AP3-8	2645.19	35035.52	122.68	104189.92	4602.71	6544.02	7106.70
AP4-8	6046.73	37694.97	406.88	184182.13	7750.16	11768.05	12396.05

zero correction

SRM614-7b	558.54	39725.62	917.37	3406.32	531.64	881.98	971.91
SRM612-7	24576.88	46564.19	72741.65	38319.36	29142.04	46799.64	51885.87
SRM610-7	125331.05	35397.16	268779.39	244975.79	217194.14	291182.69	374986.01

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	762.22	43440.36	280.56	27769.50	127.36	190.90	96.70
AP2-7	1965.19	43093.52	249.08	65851.35	1472.77	1896.91	2115.55
AP3-7	2663.19	41315.47	174.04	103223.68	4332.50	5914.25	6783.50
AP4-7	7276.42	42890.40	630.08	226675.81	7537.44	12323.33	12714.69
MZ3-1	24.22	28236.84	105.00	56271.62	648.12	1795.55	237.46
MZ3-2	23.98	28367.76	146.88	73580.59	471.08	1215.03	174.02
MZ3-3	21.10	26931.03	105.16	46579.52	417.48	979.71	147.46
MZ3-4	93.22	38541.34	278.24	906913.71	1859.09	3268.72	520.90
MZ3-5	57.58	34749.40	260.20	571923.78	1244.89	2289.31	343.10
MZ3-6	64.86	38866.22	183.88	825970.15	1720.49	2704.08	526.62
MZ3-7	71.18	40556.23	116.92	1024318.70	2103.21	3584.32	622.62
MZ3-8	82.34	39471.50	118.84	962315.84	1933.97	2773.88	493.58
MZ3-9	44.78	38956.90	93.72	978262.53	1823.21	2233.27	476.82
srm614-8	417.58	27854.96	723.92	2848.32	477.96	698.02	725.90
srm612-8	18875.89	34847.39	52793.42	26684.33	22571.65	35849.74	38457.52
srm610-8	111901.49	29115.20	218432.74	205939.54	204929.31	265907.72	331518.45
AP1-8	410.26	34144.55	252.72	19469.13	59.16	135.62	18.02
AP2-8	1380.83	37419.57	179.00	48573.53	1248.81	1505.95	1824.35
AP3-8	2645.19	35035.52	122.68	104189.92	4602.71	6544.02	7106.70
AP4-8	6046.73	37694.97	406.88	184182.13	7750.16	11768.05	12396.05

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-7b	0.000394	0.028046	0.000648	0.002405	0.000375	0.000623	0.000686
SRM612-7	0.015926	0.030173	0.047136	0.024831	0.018884	0.030326	0.033622
SRM610-7	0.176656	0.049893	0.378849	0.345298	0.306139	0.410427	0.528549
AP1-7	0.000084	0.004797	0.000031	0.003067	0.000014	0.000021	0.000011
AP2-7	0.000234	0.005139	0.000030	0.007853	0.000176	0.000226	0.000252
AP3-7	0.000319	0.004943	0.000021	0.012349	0.000518	0.000708	0.000812
AP4-7	0.000931	0.005491	0.000081	0.029018	0.000965	0.001578	0.001628
MZ3-1	0.000005	0.006242	0.000023	0.012439	0.000143	0.000397	0.000052
MZ3-2	0.000005	0.006199	0.000032	0.016080	0.000103	0.000266	0.000038
MZ3-3	0.000005	0.006540	0.000026	0.011311	0.000101	0.000238	0.000036
MZ3-4	0.000007	0.002882	0.000021	0.067815	0.000139	0.000244	0.000039
MZ3-5	0.000006	0.003352	0.000025	0.055175	0.000120	0.000221	0.000033
MZ3-6	0.000005	0.003049	0.000014	0.064790	0.000135	0.000212	0.000041
MZ3-7	0.000006	0.003205	0.000009	0.080945	0.000166	0.000283	0.000049
MZ3-8	0.000007	0.003170	0.000010	0.077287	0.000155	0.000223	0.000040
MZ3-9	0.000004	0.003116	0.000007	0.078251	0.000146	0.000179	0.000038
srm614-8	0.000411	0.027437	0.000713	0.002806	0.000471	0.000688	0.000715
srm612-8	0.017250	0.031846	0.048247	0.024386	0.020628	0.032762	0.035145
srm610-8	0.179533	0.046712	0.350451	0.330407	0.328786	0.426619	0.531884
AP1-8	0.000058	0.004849	0.000036	0.002765	0.000008	0.000019	0.000003
AP2-8	0.000196	0.005302	0.000025	0.006882	0.000177	0.000213	0.000258
AP3-8	0.000342	0.004534	0.000016	0.013484	0.000596	0.000847	0.000920
AP4-8	0.000858	0.005348	0.000058	0.026129	0.001099	0.001669	0.001759

standardize signal averages AP

AP1	0.000071	0.004823	0.000033	0.002916	0.000011	0.000020	0.000007
AP2	0.000215	0.005221	0.000028	0.007368	0.000176	0.000220	0.000255
AP3	0.000330	0.004739	0.000018	0.012917	0.000557	0.000777	0.000866
AP4	0.000895	0.005419	0.000069	0.027573	0.001032	0.001624	0.001693

linest from std sig ave

	0.019528	0.028429	0.028105	0.010301	0.013881	0.009088	0.008604
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standardize signal averages SRM

srm614-2	0.000403	0.027741	0.000680	0.002605	0.000423	0.000655	0.000701
srm612-2	0.016588	0.031010	0.047691	0.024608	0.019756	0.031544	0.034384
srm610-2	0.178095	0.048303	0.364650	0.337852	0.317463	0.418523	0.530217

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	0.991648	1.014598	1.038088	1.021963	0.964298	0.980547	0.996775
concentration data							
SRM614-7b	0.66	68.38	1.56	2.12	0.45	0.49	0.51
SRM612-7	26.67	73.57	113.62	21.94	22.48	23.64	24.81
SRM610-7	295.86	121.65	913.17	305.05	364.44	319.90	390.01
AP1-7	0.66	54.41	0.35	12.60	0.08	0.08	0.04
AP2-7	1.83	58.28	0.33	32.27	0.97	0.82	0.87
AP3-7	2.48	56.06	0.23	50.75	2.87	2.57	2.79
AP4-7	7.26	62.27	0.90	119.24	5.34	5.72	5.59
MZ3-1	0.04	70.79	0.26	51.12	0.79	1.44	0.18
MZ3-2	0.04	70.31	0.36	66.08	0.57	0.96	0.13
MZ3-3	0.04	74.17	0.29	46.48	0.56	0.86	0.12
MZ3-4	0.05	32.69	0.23	278.68	0.77	0.89	0.13
MZ3-5	0.04	38.02	0.28	226.73	0.67	0.80	0.11
MZ3-6	0.04	34.58	0.16	266.25	0.75	0.77	0.14
MZ3-7	0.04	36.35	0.10	332.63	0.92	1.03	0.17
MZ3-8	0.05	35.95	0.11	317.60	0.86	0.81	0.14
MZ3-9	0.03	35.34	0.08	321.56	0.81	0.65	0.13
srm614-8	0.69	66.90	1.72	2.48	0.56	0.54	0.53
srm612-8	28.89	77.65	116.29	21.54	24.56	25.54	25.93
srm610-8	300.68	113.89	844.72	291.89	391.40	332.52	392.47
AP1-8	0.45	54.99	0.40	11.36	0.05	0.07	0.01
AP2-8	1.52	60.13	0.28	28.28	0.98	0.77	0.89
AP3-8	2.67	51.42	0.18	55.41	3.30	3.07	3.16
AP4-8	6.68	60.65	0.65	107.37	6.09	6.05	6.04
certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62
raw data							
	Sb	I	Cs	Ba	La	Ce	Pr
blank-5	188.60	50470.40	184.12	518.72	16.12	67.92	34.36
SRM614-5	1088.29	116242.41	2406.13	7497.80	1148.29	1969.01	2234.33
SRM612-5	37950.93	100491.88	131815.42	78531.88	56005.91	84395.68	104248.23
SRM610-5	151663.38	65011.17	454122.31	357928.03	271936.13	387308.94	506587.34
AP1-5	1275.29	75721.63	1045.13	52014.57	452.44	1318.89	454.20
AP2-5	5203.47	102038.49	1154.33	190725.83	4486.75	6950.40	7082.28
AP3-5	16935.86	92953.32	597.40	545824.94	16866.46	30936.65	30802.97
AP4-5	49283.84	88086.38	3786.90	1561709.60	38894.18	78607.77	75025.98
V1-1	358.16	82404.63	859.52	422672.22	2687.58	8294.73	1239.73
V1-2	213.24	92113.84	536.80	675720.63	3796.58	7052.04	1279.61
V1-3	149.44	77744.00	568.20	396123.78	4538.87	6944.20	1425.29
V1-4	304.16	68169.38	891.33	440797.63	2409.17	7823.52	1080.85
V1-5	146.28	70454.84	527.80	352231.38	1399.77	4196.06	543.04
V1-6	137.24	64621.08	382.92	325701.47	1945.89	5228.43	757.96
V1-7	219.00	68679.87	620.44	406446.56	2515.37	6873.00	1045.05
V1-8	144.64	66726.86	396.72	395302.19	1913.57	5295.31	682.28
V1-9	185.84	76663.51	505.76	644386.06	3960.34	10696.98	1585.33
V1-10	119.00	57340.04	311.96	219784.95	1003.17	2641.73	380.20
V1-11	108.96	58612.49	269.64	234628.44	1207.85	2956.22	414.48
V1-12	134.00	56787.16	253.00	216332.25	954.93	2378.29	333.68
V1-13	189.64	57592.84	767.60	274317.31	1441.17	5604.11	570.32
V1-14	97.36	55249.15	282.00	198125.00	859.16	2750.46	351.32
V1-15	215.56	61140.02	436.56	239407.91	1091.89	3349.30	405.20
SRM614-6	378.60	60969.26	837.08	2468.85	471.48	669.44	710.88
SRM612-6	26927.23	81934.38	85666.92	51017.61	42257.28	62730.19	72890.17
SRM610-6	185629.56	61707.55	510536.47	361101.84	320836.28	461694.63	560656.25
AP1-6	592.12	64000.64	633.08	27978.00	120.52	185.44	82.68
AP2-6	2938.14	87270.73	435.92	113345.12	2877.22	3875.06	4324.02
AP3-6	11140.62	81573.74	497.32	390562.28	14083.16	23978.62	24029.81
AP4-6	30307.77	75336.27	2179.57	846695.25	25059.10	48019.63	45558.94
blank-6	23.48	28638.24	118.44	243.24	10.04	75.16	21.40
blank average	106.04	39554.32	151.28	380.98	13.08	71.54	27.88
blank subtraction							
SRM614-5	982.25	76688.09	2254.85	7116.82	1135.21	1897.47	2206.45
SRM612-5	37844.89	60937.56	131664.14	78150.90	55992.83	84324.14	104220.35
SRM610-5	151557.34	25456.85	453971.03	357547.05	271923.05	387237.40	506559.46
AP1-5	1169.25	36167.30	893.85	51633.59	439.36	1247.35	426.32
AP2-5	5097.43	62484.17	1003.05	190344.85	4473.67	6878.86	7054.40

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	16829.81	53399.00	446.12	545443.96	16853.37	30865.11	30775.09
AP4-5	49177.80	48532.05	3635.62	1561328.62	38881.10	78536.23	74998.10
V1-1	252.12	42850.30	708.24	422291.24	2674.50	8223.19	1211.85
V1-2	107.20	52559.52	385.52	675339.65	3783.50	6980.50	1251.73
V1-3	43.40	38189.68	416.92	395742.80	4525.79	6872.66	1397.41
V1-4	198.12	28615.06	740.04	440416.65	2396.09	7751.98	1052.97
V1-5	40.24	30900.52	376.52	351850.40	1386.69	4124.52	515.16
V1-6	31.20	25066.76	231.64	325320.49	1932.81	5156.89	730.08
V1-7	112.96	29125.55	469.16	406065.58	2502.29	6801.46	1017.17
V1-8	38.60	27172.54	245.44	394921.21	1900.49	5223.77	654.40
V1-9	79.80	37109.19	354.48	644005.08	3947.26	10625.44	1557.45
V1-10	12.96	17785.72	160.68	219403.97	990.09	2570.19	352.32
V1-11	2.92	19058.17	118.36	234247.46	1194.77	2884.68	386.60
V1-12	27.96	17232.84	101.72	215951.27	941.85	2306.75	305.80
V1-13	83.60	18038.52	616.32	273936.33	1428.09	5532.57	542.44
V1-14	-8.68	15694.83	130.72	197744.02	846.08	2678.92	323.44
V1-15	109.52	21585.70	285.28	239026.93	1078.81	3277.76	377.32
SRM614-6	272.56	21414.94	685.80	2087.87	458.40	597.90	683.00
SRM612-6	26821.19	42380.06	85515.64	50636.63	42244.20	62658.65	72862.29
SRM610-6	185523.52	22153.23	510385.19	360720.86	320823.20	461623.09	560628.37
AP1-6	486.08	24446.32	481.80	27597.01	107.44	113.90	54.80
AP2-6	2832.10	47716.41	284.64	112964.14	2864.14	3803.52	4296.14
AP3-6	11034.58	42019.42	346.04	390181.30	14070.08	23907.07	24001.93
AP4-6	30201.73	35781.95	2028.29	846314.27	25046.02	47948.09	45531.06

zero correction

SRM614-5	982.25	76688.09	2254.85	7116.82	1135.21	1897.47	2206.45
SRM612-5	37844.89	60937.56	131664.14	78150.90	55992.83	84324.14	104220.35
SRM610-5	151557.34	25456.85	453971.03	357547.05	271923.05	387237.40	506559.46
AP1-5	1169.25	36167.30	893.85	51633.59	439.36	1247.35	426.32
AP2-5	5097.43	62484.17	1003.05	190344.85	4473.67	6878.86	7054.40
AP3-5	16829.81	53399.00	446.12	545443.96	16853.37	30865.11	30775.09
AP4-5	49177.80	48532.05	3635.62	1561328.62	38881.10	78536.23	74998.10
V1-1	252.12	42850.30	708.24	422291.24	2674.50	8223.19	1211.85
V1-2	107.20	52559.52	385.52	675339.65	3783.50	6980.50	1251.73
V1-3	43.40	38189.68	416.92	395742.80	4525.79	6872.66	1397.41
V1-4	198.12	28615.06	740.04	440416.65	2396.09	7751.98	1052.97
V1-5	40.24	30900.52	376.52	351850.40	1386.69	4124.52	515.16
V1-6	31.20	25066.76	231.64	325320.49	1932.81	5156.89	730.08
V1-7	112.96	29125.55	469.16	406065.58	2502.29	6801.46	1017.17
V1-8	38.60	27172.54	245.44	394921.21	1900.49	5223.77	654.40
V1-9	79.80	37109.19	354.48	644005.08	3947.26	10625.44	1557.45
V1-10	12.96	17785.72	160.68	219403.97	990.09	2570.19	352.32
V1-11	2.92	19058.17	118.36	234247.46	1194.77	2884.68	386.60
V1-12	27.96	17232.84	101.72	215951.27	941.85	2306.75	305.80
V1-13	83.60	18038.52	616.32	273936.33	1428.09	5532.57	542.44
V1-14	0.00	15694.83	130.72	197744.02	846.08	2678.92	323.44
V1-15	109.52	21585.70	285.28	239026.93	1078.81	3277.76	377.32
SRM614-6	272.56	21414.94	685.80	2087.87	458.40	597.90	683.00
SRM612-6	26821.19	42380.06	85515.64	50636.63	42244.20	62658.65	72862.29
SRM610-6	185523.52	22153.23	510385.19	360720.86	320823.20	461623.09	560628.37
AP1-6	486.08	24446.32	481.80	27597.01	107.44	113.90	54.80
AP2-6	2832.10	47716.41	284.64	112964.14	2864.14	3803.52	4296.14
AP3-6	11034.58	42019.42	346.04	390181.30	14070.08	23907.07	24001.93
AP4-6	30201.73	35781.95	2028.29	846314.27	25046.02	47948.09	45531.06

certified concentration

SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration

SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal

SRM614-5	0.000247	0.019306	0.000568	0.001792	0.000286	0.000478	0.000555
SRM612-5	0.010821	0.017424	0.037648	0.022346	0.016010	0.024111	0.029800
SRM610-5	0.139343	0.023405	0.417384	0.328731	0.250008	0.356029	0.465734

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000075	0.002325	0.000057	0.003319	0.000028	0.000080	0.000027
AP2-5	0.000232	0.002842	0.000046	0.008658	0.000203	0.000313	0.000321
AP3-5	0.000869	0.002756	0.000023	0.028153	0.000870	0.001593	0.001588
AP4-5	0.002510	0.002477	0.000186	0.079692	0.001985	0.004009	0.003828
V1-1	0.000027	0.004609	0.000076	0.045420	0.000288	0.000884	0.000130
V1-2	0.000010	0.004660	0.000034	0.059879	0.000335	0.000619	0.000111
V1-3	0.000005	0.004500	0.000049	0.046629	0.000533	0.000810	0.000165
V1-4	0.000022	0.003191	0.000083	0.049115	0.000267	0.000864	0.000117
V1-5	0.000004	0.003204	0.000039	0.036483	0.000144	0.000428	0.000053
V1-6	0.000004	0.002850	0.000026	0.036994	0.000220	0.000586	0.000083
V1-7	0.000013	0.003433	0.000055	0.047857	0.000295	0.000802	0.000120
V1-8	0.000004	0.003109	0.000028	0.045190	0.000217	0.000598	0.000075
V1-9	0.000007	0.003278	0.000031	0.056891	0.000349	0.000939	0.000138
V1-10	0.000002	0.002605	0.000024	0.032141	0.000145	0.000377	0.000052
V1-11	0.000000	0.002655	0.000016	0.032629	0.000166	0.000402	0.000054
V1-12	0.000004	0.002592	0.000015	0.032485	0.000142	0.000347	0.000046
V1-13	0.000013	0.002878	0.000098	0.043706	0.000228	0.000883	0.000087
V1-14	0.000000	0.002654	0.000022	0.033436	0.000143	0.000453	0.000055
V1-15	0.000017	0.003331	0.000044	0.036882	0.000166	0.000506	0.000058
SRM614-6	0.000236	0.018551	0.000594	0.001809	0.000397	0.000518	0.000592
SRM612-6	0.011782	0.018617	0.037565	0.022244	0.018557	0.027525	0.032007
SRM610-6	0.168414	0.020110	0.463315	0.327453	0.291235	0.419050	0.508924
AP1-6	0.000047	0.002369	0.000047	0.002675	0.000010	0.000011	0.000005
AP2-6	0.000169	0.002847	0.000017	0.006740	0.000171	0.000227	0.000256
AP3-6	0.000620	0.002361	0.000019	0.021922	0.000790	0.001343	0.001349
AP4-6	0.002219	0.002629	0.000149	0.062180	0.001840	0.003523	0.003345

standardize signal averages AP

AP1	0.000061	0.002347	0.000052	0.002997	0.000019	0.000046	0.000016
AP2	0.000200	0.002844	0.000031	0.007699	0.000187	0.000270	0.000289
AP3	0.000744	0.002558	0.000021	0.025037	0.000830	0.001468	0.001468
AP4	0.002365	0.002553	0.000167	0.070936	0.001912	0.003766	0.003587

linest from std sig ave

0.007465	0.054164	0.011667	0.004121	0.007797	0.004018	0.004197
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standardize signal averages SRM

srm614-2	0.000242	0.018928	0.000581	0.001800	0.000341	0.000498	0.000574
srm612-2	0.011302	0.018020	0.037606	0.022295	0.017284	0.025818	0.030904
srm610-2	0.153878	0.021758	0.440350	0.328092	0.270622	0.387539	0.487329

linest from std sig ave

0.027986	0.000000	0.009581	0.015094	0.019726	0.013490	0.010299
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concentration data

SRM614-5	0.16	89.68	0.57	0.63	0.19	0.16	0.20
SRM612-5	6.93	80.94	37.67	7.90	10.71	8.31	10.73
SRM610-5	89.21	108.72	417.62	116.17	167.17	122.67	167.65
AP1-5	0.22	50.24	0.27	5.46	0.09	0.13	0.05
AP2-5	0.69	61.41	0.21	14.23	0.63	0.50	0.54
AP3-5	2.59	59.55	0.11	46.28	2.71	2.55	2.66
AP4-5	7.47	53.53	0.86	131.00	6.17	6.42	6.41
V1-1	0.08	99.59	0.35	74.66	0.89	1.42	0.22
V1-2	0.03	100.70	0.16	98.43	1.04	0.99	0.19
V1-3	0.02	97.23	0.23	76.65	1.66	1.30	0.28
V1-4	0.07	68.95	0.38	80.74	0.83	1.39	0.20
V1-5	0.01	69.23	0.18	59.97	0.45	0.69	0.09
V1-6	0.01	61.59	0.12	60.81	0.68	0.94	0.14
V1-7	0.04	74.17	0.26	78.67	0.92	1.28	0.20
V1-8	0.01	67.19	0.13	74.28	0.68	0.96	0.13
V1-9	0.02	70.84	0.15	93.52	1.08	1.50	0.23
V1-10	0.01	56.30	0.11	52.83	0.45	0.60	0.09
V1-11	0.00	57.36	0.08	53.64	0.52	0.64	0.09
V1-12	0.01	56.01	0.07	53.40	0.44	0.56	0.08
V1-13	0.04	62.19	0.46	71.84	0.71	1.41	0.14
V1-14	0.00	57.34	0.10	54.96	0.44	0.73	0.09
V1-15	0.05	71.97	0.20	60.63	0.52	0.81	0.10
SRM614-6	0.15	86.17	0.59	0.64	0.27	0.18	0.21
SRM612-6	7.54	86.48	37.59	7.86	12.41	9.48	11.52
SRM610-6	107.82	93.42	463.58	115.72	194.74	144.39	183.19
AP1-6	0.14	51.19	0.22	4.40	0.03	0.02	0.01
AP2-6	0.50	61.52	0.08	11.08	0.53	0.36	0.43
AP3-6	1.85	51.01	0.09	36.03	2.46	2.15	2.26
AP4-6	6.61	56.81	0.69	102.21	5.72	5.65	5.60

certified concentration

SRM614	0.73	0.68	3.10	0.72	0.79	0.75
SRM612	38.44	41.64	37.74	35.77	38.35	37.16

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

	Sb	I	Cs	Ba	La	Ce	Pr
raw data							
blank-3	65.44	36306.09	82.32	376.92	14.48	29.44	22.32
SRM614-3	902.69	105074.79	1988.37	8442.93	988.81	1587.93	1754.57
SRM612-3	31463.06	101207.05	101292.37	67502.90	46996.63	67934.42	86443.93
SRM610-3	136803.09	67233.14	462834.38	359979.22	270699.44	402774.63	509951.59
AP1-3	1599.85	92190.68	687.04	86655.49	311.96	486.68	286.68
AP2-3	4307.46	82557.15	567.76	174075.81	3772.46	5567.91	6349.72
AP3-3	14202.20	95653.54	628.00	590957.31	17502.02	29163.68	31327.06
AP4-3	30022.93	84146.12	2288.29	932809.06	28806.80	50479.16	52710.38
V3-1	113.60	56868.68	842.64	150475.20	893.97	3232.90	519.56
V3-2	59.28	57490.00	345.28	190059.80	489.44	605.28	184.32
V3-3	75.80	56123.59	360.08	181448.94	841.68	1466.21	438.28
V3-4	153.76	59315.65	746.20	956907.56	1930.01	3186.74	633.92
V3-5	87.36	58804.69	387.16	908352.50	1681.13	1672.85	479.84
V3-6	84.88	64409.32	379.28	1344145.60	2076.69	1865.33	501.84
V3-7	231.00	77608.63	984.13	5487502.00	6960.24	5204.67	1725.29
V3-8	75.60	82525.55	445.68	5936054.00	7334.16	3277.06	1618.57
V3-9	102.52	86482.01	376.28	6429441.00	7796.08	3498.22	1629.17
SRM614-4	603.52	83147.47	1172.85	4403.14	702.00	1138.65	1225.33
SRM612-4	25346.86	87059.25	70418.88	45172.41	37647.45	53291.90	64490.92
SRM610-4	138619.19	56608.12	398124.53	276838.56	238428.73	363831.53	426919.38
AP1-4	938.77	77713.20	471.96	51895.85	149.48	126.88	69.20
AP2-4	2597.09	69525.99	354.20	94693.38	2450.77	3243.10	3746.94
AP3-4	11801.39	81270.73	438.56	475136.19	15403.77	26447.67	26508.75
AP4-4	19584.55	74399.82	1389.61	620528.31	22184.61	35461.28	37529.09
blank-4	42.92	26329.31	142.28	838.44	7.24	112.44	30.24
blank average	54.18	31317.70	112.30	607.68	10.86	70.94	26.28

blank subtraction							
SRM614-3	848.50	73757.09	1876.07	7835.24	977.95	1516.99	1728.29
SRM612-3	31408.88	69889.35	101180.07	66895.21	46985.76	67863.48	86417.65
SRM610-3	136748.91	35915.44	462722.08	359371.54	270688.58	402703.69	509925.31
AP1-3	1545.67	60872.98	574.74	86047.81	301.10	415.74	260.40
AP2-3	4253.28	51239.45	455.46	173468.13	3761.60	5496.97	6323.44
AP3-3	14148.02	64335.84	515.70	590349.63	17491.16	29092.74	31300.78
AP4-3	29968.75	52828.42	2175.99	932201.38	28795.94	50408.22	52684.10
V3-1	59.42	25550.98	730.34	149867.52	883.10	3161.96	493.28
V3-2	5.10	26172.31	232.98	189452.12	478.58	534.34	158.04
V3-3	21.62	24805.90	247.78	180841.26	830.82	1395.27	412.00
V3-4	99.58	27997.95	633.90	956299.88	1919.15	3115.80	607.64
V3-5	33.18	27486.99	274.86	907744.82	1670.27	1601.91	453.56
V3-6	30.70	33091.63	266.98	1343537.92	2065.83	1794.39	475.56
V3-7	176.82	46290.94	871.82	5486894.32	6949.38	5133.73	1699.01
V3-8	21.42	51207.85	333.38	5935446.32	7323.30	3206.12	1592.29
V3-9	48.34	55164.31	263.98	6428833.32	7785.22	3427.28	1602.89
SRM614-4	549.34	51829.77	1060.55	3795.46	691.14	1067.71	1199.05
SRM612-4	25292.68	55741.55	70306.57	44564.73	37636.59	53220.96	64464.64
SRM610-4	138565.01	25290.42	398012.23	276230.88	238417.87	363760.59	426893.10
AP1-4	884.58	46395.50	359.66	51288.17	138.62	55.94	42.92
AP2-4	2542.91	38208.29	241.90	94085.69	2439.91	3172.16	3720.66
AP3-4	11747.21	49953.04	326.26	474528.51	15392.91	26376.73	26482.47
AP4-4	19530.37	43082.12	1277.31	619920.63	22173.74	35390.34	37502.81

zero correction							
SRM614-3	848.50	73757.09	1876.07	7835.24	977.95	1516.99	1728.29
SRM612-3	31408.88	69889.35	101180.07	66895.21	46985.76	67863.48	86417.65
SRM610-3	136748.91	35915.44	462722.08	359371.54	270688.58	402703.69	509925.31
AP1-3	1545.67	60872.98	574.74	86047.81	301.10	415.74	260.40
AP2-3	4253.28	51239.45	455.46	173468.13	3761.60	5496.97	6323.44
AP3-3	14148.02	64335.84	515.70	590349.63	17491.16	29092.74	31300.78
AP4-3	29968.75	52828.42	2175.99	932201.38	28795.94	50408.22	52684.10
V3-1	59.42	25550.98	730.34	149867.52	883.10	3161.96	493.28
V3-2	5.10	26172.31	232.98	189452.12	478.58	534.34	158.04
V3-3	21.62	24805.90	247.78	180841.26	830.82	1395.27	412.00
V3-4	99.58	27997.95	633.90	956299.88	1919.15	3115.80	607.64
V3-5	33.18	27486.99	274.86	907744.82	1670.27	1601.91	453.56
V3-6	30.70	33091.63	266.98	1343537.92	2065.83	1794.39	475.56
V3-7	176.82	46290.94	871.82	5486894.32	6949.38	5133.73	1699.01
V3-8	21.42	51207.85	333.38	5935446.32	7323.30	3206.12	1592.29
V3-9	48.34	55164.31	263.98	6428833.32	7785.22	3427.28	1602.89
SRM614-4	549.34	51829.77	1060.55	3795.46	691.14	1067.71	1199.05

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	25292.68	55741.55	70306.57	44564.73	37636.59	53220.96	64464.64
SRM610-4	138565.01	25290.42	398012.23	276230.88	238417.87	363760.59	426893.10
AP1-4	884.58	46395.50	359.66	51288.17	138.62	55.94	42.92
AP2-4	2542.91	38208.29	241.90	94085.69	2439.91	3172.16	3720.66
AP3-4	11747.21	49953.04	326.26	474528.51	15392.91	26376.73	26482.47
AP4-4	19530.37	43082.12	1277.31	619920.63	22173.74	35390.34	37502.81

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

standardized concentration							
SRM614	0.000009	0.000000	0.000008	0.000036	0.000008	0.000009	0.000009
SRM612	0.000448	0.000000	0.000486	0.000440	0.000417	0.000447	0.000433
SRM610	0.004297	0.000000	0.004208	0.004945	0.005333	0.005221	0.005011
STD AP1	0.000002	0.000201	0.000001	0.000047	0.000000	0.000000	0.000000
STD AP2	0.000005	0.000105	0.000001	0.000082	0.000003	0.000003	0.000003
STD AP3	0.000010	0.000055	0.000001	0.000183	0.000008	0.000008	0.000008
STD AP4	0.000016	0.000208	0.000002	0.000257	0.000014	0.000014	0.000014

standardized signal							
SRM614-3	0.000310	0.026924	0.000685	0.002860	0.000357	0.000554	0.000631
SRM612-3	0.011935	0.026556	0.038446	0.025418	0.017853	0.025786	0.032836
SRM610-3	0.139283	0.036581	0.471297	0.366032	0.275705	0.410167	0.519375
AP1-3	0.000066	0.002595	0.000025	0.003668	0.000013	0.000018	0.000011
AP2-3	0.000233	0.002805	0.000025	0.009496	0.000206	0.000301	0.000346
AP3-3	0.000653	0.002971	0.000024	0.027259	0.000808	0.001343	0.001445
AP4-3	0.001609	0.002836	0.000117	0.050042	0.001546	0.002706	0.002828
V3-1	0.000010	0.004177	0.000119	0.024500	0.000144	0.000517	0.000081
V3-2	0.000001	0.003686	0.000033	0.026683	0.000067	0.000075	0.000022
V3-3	0.000003	0.003106	0.000031	0.022644	0.000104	0.000175	0.000052
V3-4	0.000011	0.002971	0.000067	0.101475	0.000204	0.000331	0.000064
V3-5	0.000004	0.003031	0.000030	0.100100	0.000184	0.000177	0.000050
V3-6	0.000003	0.002773	0.000022	0.112568	0.000173	0.000150	0.000040
V3-7	0.000008	0.002102	0.000040	0.249136	0.000316	0.000233	0.000077
V3-8	0.000001	0.002155	0.000014	0.249770	0.000308	0.000135	0.000067
V3-9	0.000002	0.002205	0.000011	0.256928	0.000311	0.000137	0.000064
SRM614-4	0.000291	0.027475	0.000562	0.002012	0.000366	0.000566	0.000636
SRM612-4	0.012985	0.028618	0.036095	0.022879	0.019323	0.027323	0.033096
SRM610-4	0.165571	0.030219	0.475584	0.330068	0.284885	0.434657	0.510094
AP1-4	0.000048	0.002534	0.000020	0.002801	0.000008	0.000003	0.000002
AP2-4	0.000189	0.002846	0.000018	0.007008	0.000182	0.000236	0.000277
AP3-4	0.000630	0.002680	0.000018	0.025457	0.000826	0.001415	0.001421
AP4-4	0.001227	0.002707	0.000080	0.038945	0.001393	0.002223	0.002356

standardize signal averages AP							
AP1	0.000057	0.002564	0.000022	0.003234	0.000010	0.000010	0.000007
AP2	0.000211	0.002825	0.000021	0.008252	0.000194	0.000269	0.000312
AP3	0.000642	0.002825	0.000021	0.026358	0.000817	0.001379	0.001433
AP4	0.001418	0.002771	0.000099	0.044493	0.001469	0.002465	0.002592

linest from std sig ave							
	0.012231	0.051157	0.020131	0.006211	0.009723	0.005818	0.005542

standardize signal averages SRM							
srm614-2	0.000300	0.027200	0.000624	0.002436	0.000362	0.000560	0.000633
srm612-2	0.012460	0.027587	0.037270	0.024149	0.018588	0.026555	0.032966
srm610-2	0.152427	0.033400	0.473441	0.348050	0.280295	0.422412	0.514735

linest from std sig ave							
	0.028240	0.000000	0.008914	0.014227	0.019042	0.012378	0.009750

concentration data							
SRM614-3	0.32	118.13	1.18	1.52	0.30	0.28	0.30
SRM612-3	12.52	116.51	66.38	13.54	14.89	12.87	15.61
SRM610-3	146.10	160.50	813.68	194.96	229.91	204.67	246.87
AP1-3	0.32	52.96	0.20	9.09	0.05	0.04	0.02
AP2-3	1.14	57.24	0.20	23.53	0.80	0.70	0.77
AP3-3	3.19	60.63	0.19	67.54	3.13	3.12	3.20
AP4-3	7.85	57.88	0.94	123.99	6.00	6.28	6.25
V3-1	0.05	85.25	0.96	60.70	0.56	1.20	0.18
V3-2	0.00	75.23	0.26	66.11	0.26	0.17	0.05
V3-3	0.01	63.39	0.25	56.10	0.40	0.41	0.11

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	0.05	60.63	0.54	251.42	0.79	0.77	0.14
V3-5	0.02	61.86	0.24	248.01	0.71	0.41	0.11
V3-6	0.01	56.58	0.18	278.90	0.67	0.35	0.09
V3-7	0.04	42.90	0.32	617.27	1.22	0.54	0.17
V3-8	0.00	43.98	0.11	618.84	1.20	0.31	0.15
V3-9	0.01	44.99	0.08	636.57	1.21	0.32	0.14
SRM614-4	0.31	120.54	0.97	1.07	0.31	0.28	0.30
SRM612-4	13.62	125.56	62.32	12.19	16.11	13.63	15.73
SRM610-4	173.68	132.58	821.08	175.81	237.57	216.89	242.45
AP1-4	0.24	51.71	0.16	6.94	0.03	0.01	0.01
AP2-4	0.92	58.08	0.14	17.36	0.70	0.55	0.61
AP3-4	3.07	54.69	0.14	63.07	3.20	3.28	3.14
AP4-4	5.99	55.24	0.64	96.49	5.40	5.16	5.21

certified concentration							
SRM614	0.73		0.68	3.10	0.72	0.79	0.75
SRM612	38.44		41.64	37.74	35.77	38.35	37.16
SRM610	368.50		360.90	424.10	457.40	447.80	429.80
STD AP1	0.77	80.21	0.46	18.85	0.00	0.02	0.04
STD AP2	1.97	42.05	0.49	32.64	1.04	1.07	1.10
STD AP3	4.12	21.95	0.42	73.09	3.27	3.27	3.28
STD AP4	6.31	83.09	0.61	102.58	5.61	5.63	5.62

Appendix A. Raw trace element datasheets from laser ablation.

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-3	9.76	2.72	7.40	3.88	5.08	2.72	3.68	4.20	1.88
SRM614-3	316.68	603.68	1480.53	499.32	2023.61	507.04	2075.49	668.28	2134.85
SRM612-3	15859.85	28973.80	65224.17	25401.46	106753.60	24920.90	112350.39	35881.68	121620.33
SRM610-3	85034.12	163582.23	420305.28	139912.31	705338.00	143485.41	750365.63	208165.33	816978.31
AP1-3	43.48	56.60	124.24	37.48	144.20	43.68	133.24	32.68	149.72
AP2-3	685.40	1130.97	2436.17	910.17	3772.34	1417.25	5806.19	1968.73	4301.66
AP3-3	3368.50	5401.83	12530.99	4395.46	17080.34	6727.32	27372.04	9105.57	19460.75
AP4-3	4913.59	7828.48	18321.78	6532.56	25659.03	9747.50	40661.67	13291.23	28531.32
EVA2.5-1	85.96	63.80	85.76	23.96	20.04	11.52	16.32	13.48	12.96
EVA2.5-2	46.60	43.32	61.92	15.04	57.76	15.92	45.16	16.00	53.72
EVA2.5-3	71.36	68.12	63.36	26.40	25.44	18.08	16.56	25.76	13.44
EVA2.5-4	100.84	74.76	88.00	25.04	28.44	16.84	14.08	18.12	13.88
EVA2.5-5	88.20	78.68	100.52	21.60	20.80	11.96	17.36	10.28	9.96
EVA2.5-6	107.60	93.48	88.60	12.36	26.68	9.76	15.16	10.32	7.36
EVA2.5-7	23.08	43.56	53.88	17.24	47.00	9.32	34.36	16.92	39.32
EVA2.5-8	25.48	21.48	27.76	5.92	13.44	3.92	10.12	5.48	9.96
EVA2.5-9	28.88	23.32	33.52	7.08	12.96	8.00	9.12	8.56	15.20
EVA2.5-10	19.16	21.76	32.24	10.84	11.96	6.44	12.08	4.68	18.56
EVA2.5-11	20.84	16.80	15.60	7.96	9.44	9.92	10.56	7.56	9.16
EVA2.5-12	21.48	14.08	25.52	10.72	10.80	8.56	7.40	8.60	10.28
EVA2.5-13	25.56	17.36	24.24	6.40	21.24	5.04	12.92	4.72	15.08
EVA2.5-14	16.72	7.84	18.92	3.60	9.84	3.56	6.08	5.76	11.48
EVA2.5-15	22.08	11.88	21.88	11.40	11.28	3.80	5.52	2.76	4.68
SRM614-4	233.20	391.60	922.81	327.44	1434.69	361.68	1439.49	512.12	1500.61
SRM612-4	11336.94	19867.67	42834.56	16444.41	74888.66	17188.02	78776.52	25581.26	83911.07
SRM610-4	67935.58	122952.89	301279.69	100069.41	533198.81	109904.70	570835.50	159130.86	611858.69
AP1-4	24.92	13.36	16.00	14.28	13.88	9.44	12.08	9.96	10.56
AP2-4	428.40	700.76	1406.93	520.84	2394.13	926.25	3795.58	1296.25	2682.98
AP3-4	2333.33	3511.10	8275.33	2717.38	11751.63	4474.35	18727.59	6199.60	13197.27
AP4-4	2609.41	4059.74	9169.57	3309.66	14085.04	5481.31	22583.93	7551.56	16022.09
blank-4	6.48	8.80	12.60	5.92	10.60	6.76	1.80	1.72	7.56
blank average	8.12	5.76	10.00	4.90	7.84	4.74	2.74	2.96	4.72
blank subtraction									
SRM614-3	308.56	597.92	1470.53	494.42	2015.77	502.30	2072.75	665.32	2130.13
SRM612-3	15851.73	28968.04	65214.17	25396.56	106745.76	24916.16	112347.65	35878.72	121615.61
SRM610-3	85026.00	163576.47	420295.28	139907.41	705330.16	143480.67	750362.89	208162.37	816973.59
AP1-3	35.36	50.84	114.24	32.58	136.36	38.94	130.50	29.72	145.00
AP2-3	677.28	1125.21	2426.17	905.27	3764.50	1412.51	5803.45	1965.77	4296.94
AP3-3	3360.38	5396.07	12520.99	4390.56	17072.50	6722.58	27369.29	9102.61	19456.03
AP4-3	4905.47	7822.72	18311.78	6527.66	25651.18	9742.76	40658.93	13288.27	28526.60
EVA2.5-1	77.84	58.04	75.76	19.06	12.20	6.78	13.58	10.52	8.24
EVA2.5-2	38.48	37.56	51.92	10.14	49.92	11.18	42.42	13.04	49.00
EVA2.5-3	63.24	62.36	53.36	21.50	17.60	13.34	13.82	22.80	8.72
EVA2.5-4	92.72	69.00	78.00	20.14	20.60	12.10	11.34	15.16	9.16
EVA2.5-5	80.08	72.92	90.52	16.70	12.96	7.22	14.62	7.32	5.24
EVA2.5-6	99.48	87.72	78.60	7.46	18.84	5.02	12.42	7.36	2.64
EVA2.5-7	14.96	37.80	43.88	12.34	39.16	4.58	31.62	13.96	34.60
EVA2.5-8	17.36	15.72	17.76	1.02	5.60	-0.82	7.38	2.52	5.24
EVA2.5-9	20.76	17.56	23.52	2.18	5.12	3.26	6.38	5.60	10.48
EVA2.5-10	11.04	16.00	22.24	5.94	4.12	1.70	9.34	1.72	13.84
EVA2.5-11	12.72	11.04	5.60	3.06	1.60	5.18	7.82	4.60	4.44
EVA2.5-12	13.36	8.32	15.52	5.82	2.96	3.82	4.66	5.64	5.56
EVA2.5-13	17.44	11.60	14.24	1.50	13.40	0.30	10.18	1.76	10.36
EVA2.5-14	8.60	2.08	8.92	-1.30	2.00	-1.18	3.34	2.80	6.76
EVA2.5-15	13.96	6.12	11.88	6.50	3.44	-0.94	2.78	-0.20	-0.04
SRM614-4	225.08	385.84	912.81	322.54	1426.85	356.94	1436.75	509.16	1495.89
SRM612-4	11328.82	19861.91	42824.56	16439.51	74880.82	17183.28	78773.78	25578.30	83906.35
SRM610-4	67927.46	122947.13	301269.69	100064.51	533190.97	109899.96	570832.76	159127.90	611853.97
AP1-4	16.80	7.60	6.00	9.38	6.04	4.70	9.34	7.00	5.84
AP2-4	420.28	695.00	1396.93	515.94	2386.29	921.51	3792.84	1293.29	2678.26
AP3-4	2325.21	3505.34	8265.33	2712.48	11743.79	4469.61	18724.85	6196.64	13192.55
AP4-4	2601.29	4053.98	9159.57	3304.76	14077.20	5476.57	22581.19	7548.60	16017.37
zero correction									
SRM614-3	308.56	597.92	1470.53	494.42	2015.77	502.30	2072.75	665.32	2130.13
SRM612-3	15851.73	28968.04	65214.17	25396.56	106745.76	24916.16	112347.65	35878.72	121615.61

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	85026.00	163576.47	420295.28	139907.41	705330.16	143480.67	750362.89	208162.37	816973.59
AP1-3	35.36	50.84	114.24	32.58	136.36	38.94	130.50	29.72	145.00
AP2-3	677.28	1125.21	2426.17	905.27	3764.50	1412.51	5803.45	1965.77	4296.94
AP3-3	3360.38	5396.07	12520.99	4390.56	17072.50	6722.58	27369.29	9102.61	19456.03
AP4-3	4905.47	7822.72	18311.78	6527.66	25651.18	9742.76	40658.93	13288.27	28526.60
EVA2.5-1	77.84	58.04	75.76	19.06	12.20	6.78	13.58	10.52	8.24
EVA2.5-2	38.48	37.56	51.92	10.14	49.92	11.18	42.42	13.04	49.00
EVA2.5-3	63.24	62.36	53.36	21.50	17.60	13.34	13.82	22.80	8.72
EVA2.5-4	92.72	69.00	78.00	20.14	20.60	12.10	11.34	15.16	9.16
EVA2.5-5	80.08	72.92	90.52	16.70	12.96	7.22	14.62	7.32	5.24
EVA2.5-6	99.48	87.72	78.60	7.46	18.84	5.02	12.42	7.36	2.64
EVA2.5-7	14.96	37.80	43.88	12.34	39.16	4.58	31.62	13.96	34.60
EVA2.5-8	17.36	15.72	17.76	1.02	5.60	0.00	7.38	2.52	5.24
EVA2.5-9	20.76	17.56	23.52	2.18	5.12	3.26	6.38	5.60	10.48
EVA2.5-10	11.04	16.00	22.24	5.94	4.12	1.70	9.34	1.72	13.84
EVA2.5-11	12.72	11.04	5.60	3.06	1.60	5.18	7.82	4.60	4.44
EVA2.5-12	13.36	8.32	15.52	5.82	2.96	3.82	4.66	5.64	5.56
EVA2.5-13	17.44	11.60	14.24	1.50	13.40	0.30	10.18	1.76	10.36
EVA2.5-14	8.60	2.08	8.92	0.00	2.00	0.00	3.34	2.80	6.76
EVA2.5-15	13.96	6.12	11.88	6.50	3.44	0.00	2.78	0.00	0.00
SRM614-4	225.08	385.84	912.81	322.54	1426.85	356.94	1436.75	509.16	1495.89
SRM612-4	11328.82	19861.91	42824.56	16439.51	74880.82	17183.28	78773.78	25578.30	83906.35
SRM610-4	67927.46	122947.13	301269.69	100064.51	533190.97	109899.96	570832.76	159127.90	611853.97
AP1-4	16.80	7.60	6.00	9.38	6.04	4.70	9.34	7.00	5.84
AP2-4	420.28	695.00	1396.93	515.94	2386.29	921.51	3792.84	1293.29	2678.26
AP3-4	2325.21	3505.34	8265.33	2712.48	11743.79	4469.61	18724.85	6196.64	13192.55
AP4-4	2601.29	4053.98	9159.57	3304.76	14077.20	5476.57	22581.19	7548.60	16017.37

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-3	0.000076	0.000147	0.000361	0.000121	0.000495	0.000123	0.000509	0.000163	0.000523
SRM612-3	0.004448	0.008129	0.018300	0.007127	0.029955	0.006992	0.031527	0.010068	0.034128
SRM610-3	0.065991	0.126955	0.326201	0.108585	0.547423	0.111359	0.582374	0.161560	0.634072
AP1-3	0.000002	0.000003	0.000006	0.000002	0.000007	0.000002	0.000007	0.000001	0.000007
AP2-3	0.000032	0.000054	0.000116	0.000043	0.000179	0.000067	0.000277	0.000094	0.000205
AP3-3	0.000144	0.000231	0.000535	0.000188	0.000730	0.000287	0.001170	0.000389	0.000832
AP4-3	0.000243	0.000388	0.000908	0.000324	0.001272	0.000483	0.002015	0.000659	0.001414
EVA2.5-1	0.000007	0.000005	0.000007	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
EVA2.5-2	0.000005	0.000005	0.000007	0.000001	0.000006	0.000001	0.000005	0.000002	0.000006
EVA2.5-3	0.000007	0.000007	0.000006	0.000002	0.000002	0.000002	0.000002	0.000003	0.000001
EVA2.5-4	0.000006	0.000005	0.000005	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
EVA2.5-5	0.000005	0.000004	0.000005	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000
EVA2.5-6	0.000005	0.000005	0.000004	0.000000	0.000001	0.000000	0.000001	0.000000	0.000000
EVA2.5-7	0.000001	0.000003	0.000004	0.000001	0.000003	0.000000	0.000003	0.000001	0.000003
EVA2.5-8	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
EVA2.5-9	0.000002	0.000001	0.000002	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001
EVA2.5-10	0.000001	0.000002	0.000002	0.000001	0.000000	0.000000	0.000001	0.000000	0.000001
EVA2.5-11	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
EVA2.5-12	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
EVA2.5-13	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000	0.000001
EVA2.5-14	0.000001	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000001	0.000000	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000
SRM614-4	0.000093	0.000160	0.000378	0.000133	0.000591	0.000148	0.000595	0.000211	0.000619
SRM612-4	0.005003	0.008772	0.018914	0.007261	0.033072	0.007589	0.034791	0.011297	0.037058
SRM610-4	0.072086	0.130474	0.319713	0.106190	0.565833	0.116628	0.605779	0.168870	0.649311
AP1-4	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000	0.000001	0.000000	0.000000
AP2-4	0.000029	0.000047	0.000095	0.000035	0.000163	0.000063	0.000259	0.000088	0.000183
AP3-4	0.000140	0.000211	0.000497	0.000163	0.000706	0.000269	0.001126	0.000373	0.000793
AP4-4	0.000196	0.000305	0.000689	0.000248	0.001058	0.000412	0.001698	0.000568	0.001204

standardize signal averages AP

AP1	0.000001	0.000002	0.000003	0.000001	0.000004	0.000001	0.000004	0.000001	0.000004
AP2	0.000030	0.000051	0.000105	0.000039	0.000171	0.000065	0.000268	0.000091	0.000194
AP3	0.000142	0.000221	0.000516	0.000175	0.000718	0.000278	0.001148	0.000381	0.000812
AP4	0.000219	0.000346	0.000798	0.000286	0.001165	0.000447	0.001857	0.000613	0.001309

linest from std sig ave

0.041588	0.027574	0.011968	0.033631	0.008377	0.032026	0.007821	0.023586	0.007495
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standardize signal averages SRM

srm614-2	0.000084	0.000153	0.000369	0.000127	0.000543	0.000136	0.000552	0.000187	0.000571
srm612-2	0.004726	0.008451	0.018607	0.007194	0.031513	0.007291	0.033159	0.010683	0.035593
srm610-2	0.069038	0.128715	0.322957	0.107388	0.556628	0.113993	0.594076	0.165215	0.641692

linest from std sig ave

0.072825	0.040852	0.016664	0.045656	0.009288	0.043682	0.008834	0.030110	0.007648
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concentration data

SRM614-3	0.27	0.35	0.37	0.35	0.36	0.34	0.34	0.33	0.34
SRM612-3	15.87	19.22	18.78	20.56	21.52	19.20	21.15	20.37	21.94
SRM610-3	235.37	300.22	334.82	313.19	393.29	305.86	390.64	326.80	407.60
AP1-3	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.02
AP2-3	0.54	0.59	0.55	0.58	0.60	0.86	0.86	0.88	0.61
AP3-3	2.38	2.54	2.56	2.52	2.44	3.67	3.65	3.66	2.49
AP4-3	4.03	4.27	4.33	4.34	4.25	6.17	6.29	6.20	4.23
EVA2.5-1	0.11	0.06	0.03	0.02	0.00	0.01	0.00	0.01	0.00
EVA2.5-2	0.08	0.05	0.03	0.02	0.02	0.02	0.02	0.02	0.02
EVA2.5-3	0.12	0.08	0.03	0.03	0.01	0.02	0.00	0.02	0.00
EVA2.5-4	0.11	0.05	0.03	0.02	0.00	0.01	0.00	0.01	0.00
EVA2.5-5	0.07	0.05	0.02	0.01	0.00	0.01	0.00	0.00	0.00
EVA2.5-6	0.09	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.00
EVA2.5-7	0.02	0.04	0.02	0.01	0.01	0.00	0.01	0.01	0.01
EVA2.5-8	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
EVA2.5-9	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
EVA2.5-10	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
EVA2.5-11	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
EVA2.5-12	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
EVA2.5-13	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
EVA2.5-14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EVA2.5-15	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
SRM614-4	0.33	0.38	0.39	0.39	0.42	0.41	0.40	0.43	0.40
SRM612-4	17.85	20.74	19.41	20.94	23.76	20.84	23.34	22.85	23.82
SRM610-4	257.11	308.54	328.16	306.28	406.51	320.34	406.34	341.59	417.39
AP1-4	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
AP2-4	0.48	0.52	0.45	0.47	0.54	0.80	0.81	0.83	0.55
AP3-4	2.32	2.32	2.37	2.19	2.36	3.43	3.51	3.51	2.37
AP4-4	3.24	3.35	3.29	3.33	3.54	5.26	5.30	5.34	3.60

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Nd Sm Eu Gd Tb Dy Ho Er Tm

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	6.32	1.72	4.72	3.48	1.32	2.36	1.80	2.12	1.32
SRM614-5	252.80	466.44	1062.69	395.80	1525.61	401.64	1592.73	543.64	1738.33
SRM612-5	13727.56	25250.42	55589.95	21544.12	92627.20	21467.84	96560.55	31278.38	104944.35
SRM610-5	80165.61	155717.67	397922.47	132960.50	670824.88	137841.25	714792.88	200520.94	785574.50
AP1-5	19.16	27.36	62.20	17.80	121.00	17.80	53.16	18.92	35.52
AP2-5	476.44	813.32	1811.01	724.44	2656.77	1071.77	4341.54	1434.17	3104.66
AP3-5	2350.17	3937.34	9175.45	3426.06	12903.75	5055.99	20807.88	6974.20	14822.60
AP4-5	3480.26	5646.43	12985.99	4735.99	18978.27	7363.92	30434.93	10148.18	21438.64
EVA3-1	236.92	164.80	163.56	87.16	51.84	40.92	39.08	34.60	20.36
EVA3-2	135.24	131.12	176.84	45.28	38.84	35.00	31.56	25.72	8.68
EVA3-3	144.12	114.04	137.96	38.52	38.96	24.72	21.76	16.48	18.04
SRM614-6	168.68	291.68	639.40	241.96	977.09	272.20	1026.17	327.92	1063.85
SRM612-6	10471.94	18933.55	41642.31	16022.57	71235.04	16675.90	75088.70	24432.82	81337.66
SRM610-6	70719.40	132279.94	330387.06	111259.19	585043.25	120493.36	627054.31	174217.22	681277.88
AP1-6	11.96	15.68	14.88	9.32	38.72	3.24	9.68	8.36	14.40
AP2-6	441.04	675.60	1403.01	569.76	2386.57	877.48	3736.58	1238.33	2694.66
AP3-6	2323.57	3705.62	8454.41	2999.26	12046.07	4680.35	18939.35	6314.44	13639.32
AP4-6	3093.46	5199.23	12112.71	4173.50	17075.10	6622.04	27635.64	9004.89	19411.07
blank-6	4.88	20.84	19.20	5.64	4.24	1.80	3.40	3.96	6.32
blank average	5.60	11.28	11.96	4.56	2.78	2.08	2.60	3.04	3.82
blank subtraction									
SRM614-5	247.20	455.16	1050.73	391.24	1522.83	399.56	1590.13	540.60	1734.51
SRM612-5	13721.96	25239.14	55577.99	21539.56	92624.42	21465.76	96557.95	31275.34	104940.53
SRM610-5	80160.01	155706.39	397910.51	132955.94	670822.10	137839.17	714790.28	200517.90	785570.68
AP1-5	13.56	16.08	50.24	13.24	118.22	15.72	50.56	15.88	31.70
AP2-5	470.84	802.04	1799.05	719.88	2653.99	1069.69	4338.94	1431.13	3100.84
AP3-5	2344.57	3926.06	9163.49	3421.50	12900.97	5053.91	20805.28	6971.16	14818.78
AP4-5	3474.66	5635.15	12974.03	4731.43	18975.49	7361.84	30432.33	10145.14	21434.82
EVA3-1	231.32	153.52	151.60	82.60	49.06	38.84	36.48	31.56	16.54
EVA3-2	129.64	119.84	164.88	40.72	36.06	32.92	28.96	22.68	4.86
EVA3-3	138.52	102.76	126.00	33.96	36.18	22.64	19.16	13.44	14.22
SRM614-6	163.08	280.40	627.44	237.40	974.31	270.12	1023.57	324.88	1060.03
SRM612-6	10466.34	18922.27	41630.35	16018.01	71232.26	16673.81	75086.10	24429.78	81333.84
SRM610-6	70713.80	132268.66	330375.10	111254.63	585040.47	120491.28	627051.71	174214.18	681274.06
AP1-6	6.36	4.40	2.92	4.76	35.94	1.16	7.08	5.32	10.58
AP2-6	435.44	664.32	1391.05	565.20	2383.79	875.40	3733.98	1235.29	2690.84
AP3-6	2317.97	3694.34	8442.45	2994.70	12043.29	4678.27	18936.75	6311.40	13635.50
AP4-6	3087.86	5187.95	12100.75	4168.94	17072.32	6619.96	27633.03	9001.85	19407.25
zero correction									
SRM614-5	247.20	455.16	1050.73	391.24	1522.83	399.56	1590.13	540.60	1734.51
SRM612-5	13721.96	25239.14	55577.99	21539.56	92624.42	21465.76	96557.95	31275.34	104940.53
SRM610-5	80160.01	155706.39	397910.51	132955.94	670822.10	137839.17	714790.28	200517.90	785570.68
AP1-5	13.56	16.08	50.24	13.24	118.22	15.72	50.56	15.88	31.70
AP2-5	470.84	802.04	1799.05	719.88	2653.99	1069.69	4338.94	1431.13	3100.84
AP3-5	2344.57	3926.06	9163.49	3421.50	12900.97	5053.91	20805.28	6971.16	14818.78
AP4-5	3474.66	5635.15	12974.03	4731.43	18975.49	7361.84	30432.33	10145.14	21434.82
EVA3-1	231.32	153.52	151.60	82.60	49.06	38.84	36.48	31.56	16.54
EVA3-2	129.64	119.84	164.88	40.72	36.06	32.92	28.96	22.68	4.86
EVA3-3	138.52	102.76	126.00	33.96	36.18	22.64	19.16	13.44	14.22
SRM614-6	163.08	280.40	627.44	237.40	974.31	270.12	1023.57	324.88	1060.03
SRM612-6	10466.34	18922.27	41630.35	16018.01	71232.26	16673.81	75086.10	24429.78	81333.84
SRM610-6	70713.80	132268.66	330375.10	111254.63	585040.47	120491.28	627051.71	174214.18	681274.06
AP1-6	6.36	4.40	2.92	4.76	35.94	1.16	7.08	5.32	10.58
AP2-6	435.44	664.32	1391.05	565.20	2383.79	875.40	3733.98	1235.29	2690.84
AP3-6	2317.97	3694.34	8442.45	2994.70	12043.29	4678.27	18936.75	6311.40	13635.50
AP4-6	3087.86	5187.95	12100.75	4168.94	17072.32	6619.96	27633.03	9001.85	19407.25
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000089	0.000164	0.000379	0.000141	0.000550	0.000144	0.000574	0.000195	0.000626
SRM612-5	0.004683	0.008613	0.018967	0.007351	0.031609	0.007326	0.032952	0.010673	0.035813
SRM610-5	0.066813	0.129781	0.331657	0.110818	0.559127	0.114888	0.595775	0.167131	0.654770
AP1-5	0.000001	0.000001	0.000003	0.000001	0.000007	0.000001	0.000003	0.000001	0.000002
AP2-5	0.000028	0.000048	0.000107	0.000043	0.000159	0.000064	0.000259	0.000085	0.000185
AP3-5	0.000115	0.000193	0.000450	0.000168	0.000633	0.000248	0.001021	0.000342	0.000727
AP4-5	0.000194	0.000314	0.000723	0.000264	0.001058	0.000410	0.001697	0.000566	0.001195
EVA3-1	0.000013	0.000008	0.000008	0.000004	0.000003	0.000002	0.000002	0.000002	0.000001
EVA3-2	0.000008	0.000007	0.000010	0.000002	0.000002	0.000002	0.000002	0.000001	0.000000
EVA3-3	0.000009	0.000007	0.000008	0.000002	0.000002	0.000002	0.000001	0.000001	0.000001
SRM614-6	0.000101	0.000174	0.000388	0.000147	0.000603	0.000167	0.000634	0.000201	0.000656
SRM612-6	0.004666	0.008435	0.018559	0.007141	0.031755	0.007433	0.033473	0.010891	0.036258
SRM610-6	0.066417	0.124231	0.310299	0.104494	0.549489	0.113169	0.588947	0.163628	0.639875
AP1-6	0.000000	0.000000	0.000000	0.000000	0.000003	0.000000	0.000000	0.000000	0.000001
AP2-6	0.000029	0.000045	0.000094	0.000038	0.000160	0.000059	0.000251	0.000083	0.000181
AP3-6	0.000128	0.000205	0.000468	0.000166	0.000668	0.000259	0.001050	0.000350	0.000756
AP4-6	0.000200	0.000336	0.000784	0.000270	0.001107	0.000429	0.001791	0.000584	0.001258

standardize signal averages AP

AP1	0.000001	0.000001	0.000002	0.000001	0.000005	0.000001	0.000002	0.000001	0.000001
AP2	0.000029	0.000046	0.000101	0.000041	0.000159	0.000061	0.000255	0.000084	0.000183
AP3	0.000122	0.000199	0.000459	0.000167	0.000650	0.000254	0.001035	0.000346	0.000741
AP4	0.000197	0.000325	0.000754	0.000267	0.001082	0.000420	0.001744	0.000575	0.001227

linest from std sig ave

	0.046916	0.029720	0.012898	0.035795	0.009080	0.034397	0.008417	0.025389	0.008057
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standardize signal averages SRM

srm614-2	0.000095	0.000169	0.000384	0.000144	0.000576	0.000156	0.000604	0.000198	0.000641
srm612-2	0.004674	0.008524	0.018763	0.007246	0.031682	0.007379	0.033212	0.010782	0.036035
srm610-2	0.066615	0.127006	0.320978	0.107656	0.554308	0.114029	0.592361	0.165379	0.647322

linest from std sig ave

	0.075467	0.041399	0.016766	0.045542	0.009327	0.043667	0.008860	0.030079	0.007581
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concentration data

SRM614-5	0.36	0.42	0.42	0.43	0.43	0.43	0.41	0.43	0.43
SRM612-5	18.84	21.95	20.98	22.57	24.61	21.61	23.79	23.24	24.75
SRM610-5	268.83	330.80	366.87	340.20	435.39	338.92	430.09	363.92	452.47
AP1-5	0.01	0.01	0.02	0.01	0.03	0.01	0.01	0.01	0.01
AP2-5	0.53	0.57	0.55	0.61	0.57	0.88	0.87	0.87	0.60
AP3-5	2.15	2.28	2.31	2.40	2.29	3.40	3.43	3.46	2.34
AP4-5	3.63	3.73	3.72	3.77	3.83	5.63	5.70	5.73	3.84
EVA3-1	0.23	0.10	0.04	0.06	0.01	0.03	0.01	0.02	0.00
EVA3-2	0.14	0.08	0.05	0.03	0.01	0.03	0.01	0.01	0.00
EVA3-3	0.17	0.08	0.04	0.03	0.01	0.02	0.00	0.01	0.00
SRM614-6	0.41	0.44	0.43	0.45	0.47	0.49	0.46	0.44	0.45
SRM612-6	18.77	21.50	20.53	21.92	24.73	21.93	24.16	23.71	25.06
SRM610-6	267.24	316.65	343.25	320.79	427.88	333.85	425.16	356.29	442.17
AP1-6	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
AP2-6	0.55	0.53	0.48	0.54	0.58	0.81	0.84	0.84	0.58
AP3-6	2.40	2.43	2.41	2.37	2.42	3.56	3.52	3.54	2.43
AP4-6	3.75	3.99	4.04	3.86	4.01	5.89	6.01	5.91	4.04

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

raw data

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-3	7.80	7.56	8.16	3.96	4.60	5.04	3.08	5.72	3.56
SRM614-3	138.76	221.36	522.48	191.68	725.48	209.00	768.88	279.32	798.20
SRM612-3	101.64	167.40	412.68	152.32	631.96	171.68	617.52	199.84	651.28
SRM610-3	39960.86	71258.60	167163.86	60051.78	279465.00	63736.60	296377.16	91421.16	319588.28
AP1-3	67.20	32.32	87.04	35.44	79.16	25.56	81.80	38.68	80.72
AP2-3	612.60	921.49	2138.65	741.00	3026.70	1162.61	4821.79	1621.05	3406.98
AP3-3	2934.10	4490.19	10735.42	3699.62	14612.24	5640.39	23460.45	7712.00	16506.89
AP4-3	5431.07	8343.29	20164.95	6380.72	26993.07	10156.10	42403.64	13792.48	29749.05
MZ5-1	88.52	50.92	57.36	34.04	34.40	22.80	38.28	24.72	20.68
MZ5-2	65.52	43.56	38.12	20.92	21.52	14.24	10.28	16.08	8.24
MZ5-3	91.12	43.80	42.56	23.28	25.60	21.68	17.40	9.12	8.84
MZ5-4	48.40	27.92	31.44	10.72	15.88	10.44	13.92	8.44	9.04
MZ5-5	40.40	24.64	18.20	19.56	15.76	8.00	6.52	10.48	8.16

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	36.44	18.40	21.72	10.20	11.44	7.64	10.32	9.72	4.36
MZ5-7	39.68	29.52	22.60	26.12	22.24	15.12	10.12	8.24	3.72
MZ5-8	46.48	15.20	20.08	16.44	21.40	9.00	15.28	8.12	9.56
MZ5-9	34.76	11.08	10.76	8.20	13.24	7.96	8.32	5.48	6.80
MZ5-10	143.28	46.72	49.40	36.84	30.76	28.52	26.12	24.92	10.12
MZ5-11	71.80	27.12	19.88	21.72	19.72	21.92	23.96	11.16	11.28
MZ5-12	29.72	21.60	12.40	22.92	16.12	14.52	6.08	11.44	10.24
MZ5-13	58.32	24.92	19.40	14.12	19.72	12.24	18.40	10.32	9.88
MZ5-14	71.76	49.16	29.92	23.76	13.12	17.64	18.76	20.72	16.12
MZ5-15	86.16	25.88	24.96	36.24	29.28	27.40	13.28	19.60	11.76
MZ5-16	62.80	27.12	38.72	12.76	17.76	18.24	18.64	13.76	7.68
MZ5-17	56.76	17.96	25.24	10.88	12.44	13.48	10.80	6.44	6.08
MZ5-18	39.68	22.48	19.36	13.36	17.00	10.40	14.72	4.92	5.12
SRM614-4	74.28	137.88	300.80	107.48	467.84	146.60	479.32	141.12	497.76
SRM612-4	3729.34	6398.24	13766.80	5113.63	22224.37	5535.27	23402.73	7802.96	24405.54
SRM610-4	31615.50	54634.47	127742.80	44663.21	208988.86	48133.07	220868.61	67951.54	235189.89
AP1-4	60.68	15.96	29.92	10.24	61.12	16.32	34.60	17.48	25.20
AP2-4	312.08	462.52	1061.25	403.96	1635.25	613.16	2633.61	907.57	1911.45
AP3-4	1599.01	2534.93	5780.83	1986.73	7962.72	3263.10	12506.35	4249.90	8842.21
AP4-4	2981.94	4401.86	10403.62	3426.14	14256.88	5436.11	22662.85	7489.12	15820.77
blank-4	7.36	6.52	3.64	4.80	8.36	9.84	3.92	4.04	5.88
blank average	7.58	7.04	5.90	4.38	6.48	7.44	3.50	4.88	4.72

blank subtraction									
SRM614-3	131.18	214.32	516.58	187.30	719.00	201.56	765.38	274.44	793.48
SRM612-3	94.06	160.36	406.78	147.94	625.48	164.24	614.02	194.96	646.56
SRM610-3	39953.28	71251.56	167157.96	60047.40	279458.52	63729.16	296373.66	91416.28	319583.56
AP1-3	59.62	25.28	81.14	31.06	72.68	18.12	78.30	33.80	76.00
AP2-3	605.02	914.45	2132.75	736.62	3020.22	1155.17	4818.29	1616.17	3402.26
AP3-3	2926.52	4483.15	10729.52	3695.24	14605.76	5632.95	23456.95	7707.12	16502.17
AP4-3	5423.49	8336.25	20159.05	6376.34	26986.59	10148.66	42400.14	13787.60	29744.33
MZ5-1	80.94	43.88	51.46	29.66	27.92	15.36	34.78	19.84	15.96
MZ5-2	57.94	36.52	32.22	16.54	15.04	6.80	6.78	11.20	3.52
MZ5-3	83.54	36.76	36.66	18.90	19.12	14.24	13.90	4.24	4.12
MZ5-4	40.82	20.88	25.54	6.34	9.40	3.00	10.42	3.56	4.32
MZ5-5	32.82	17.60	12.30	15.18	9.28	0.56	3.02	5.60	3.44
MZ5-6	28.86	11.36	15.82	5.82	4.96	0.20	6.82	4.84	-0.36
MZ5-7	32.10	22.48	16.70	21.74	15.76	7.68	6.62	3.36	-1.00
MZ5-8	38.90	8.16	14.18	12.06	14.92	1.56	11.78	3.24	4.84
MZ5-9	27.18	4.04	4.86	3.82	6.76	0.52	4.82	0.60	2.08
MZ5-10	135.70	39.68	43.50	32.46	24.28	21.08	22.62	20.04	5.40
MZ5-11	64.22	20.08	13.98	17.34	13.24	14.48	20.46	6.28	6.56
MZ5-12	22.14	14.56	6.50	18.54	9.64	7.08	2.58	6.56	5.52
MZ5-13	50.74	17.88	13.50	9.74	13.24	4.80	14.90	5.44	5.16
MZ5-14	64.18	42.12	24.02	19.38	6.64	10.20	15.26	15.84	11.40
MZ5-15	78.58	18.84	19.06	31.86	22.80	19.96	9.78	14.72	7.04
MZ5-16	55.22	20.08	32.82	8.38	11.28	10.80	15.14	8.88	2.96
MZ5-17	49.18	10.92	19.34	6.50	5.96	6.04	7.30	1.56	1.36
MZ5-18	32.10	15.44	13.46	8.98	10.52	2.96	11.22	0.04	0.40
SRM614-4	66.70	130.84	294.90	103.10	461.36	139.16	475.82	136.24	493.04
SRM612-4	3721.76	6391.20	13760.90	5109.25	22217.88	5527.83	23399.23	7798.08	24400.82
SRM610-4	31607.92	54627.43	127736.90	44658.83	208982.38	48125.63	220865.11	67946.66	235185.17
AP1-4	53.10	8.92	24.02	5.86	54.64	8.88	31.10	12.60	20.48
AP2-4	304.50	455.48	1055.35	399.58	1628.77	605.72	2630.11	902.69	1906.73
AP3-4	1591.43	2527.89	5774.93	1982.35	7956.24	3255.66	12502.85	4245.02	8837.49
AP4-4	2974.36	4394.82	10397.72	3421.76	14250.40	5428.67	22659.35	7484.24	15816.05

zero correction									
SRM614-3	131.18	214.32	516.58	187.30	719.00	201.56	765.38	274.44	793.48
SRM612-3	94.06	160.36	406.78	147.94	625.48	164.24	614.02	194.96	646.56
SRM610-3	39953.28	71251.56	167157.96	60047.40	279458.52	63729.16	296373.66	91416.28	319583.56
AP1-3	59.62	25.28	81.14	31.06	72.68	18.12	78.30	33.80	76.00
AP2-3	605.02	914.45	2132.75	736.62	3020.22	1155.17	4818.29	1616.17	3402.26
AP3-3	2926.52	4483.15	10729.52	3695.24	14605.76	5632.95	23456.95	7707.12	16502.17
AP4-3	5423.49	8336.25	20159.05	6376.34	26986.59	10148.66	42400.14	13787.60	29744.33
MZ5-1	80.94	43.88	51.46	29.66	27.92	15.36	34.78	19.84	15.96
MZ5-2	57.94	36.52	32.22	16.54	15.04	6.80	6.78	11.20	3.52
MZ5-3	83.54	36.76	36.66	18.90	19.12	14.24	13.90	4.24	4.12
MZ5-4	40.82	20.88	25.54	6.34	9.40	3.00	10.42	3.56	4.32
MZ5-5	32.82	17.60	12.30	15.18	9.28	0.56	3.02	5.60	3.44
MZ5-6	28.86	11.36	15.82	5.82	4.96	0.20	6.82	4.84	0.00
MZ5-7	32.10	22.48	16.70	21.74	15.76	7.68	6.62	3.36	0.00
MZ5-8	38.90	8.16	14.18	12.06	14.92	1.56	11.78	3.24	4.84
MZ5-9	27.18	4.04	4.86	3.82	6.76	0.52	4.82	0.60	2.08
MZ5-10	135.70	39.68	43.50	32.46	24.28	21.08	22.62	20.04	5.40
MZ5-11	64.22	20.08	13.98	17.34	13.24	14.48	20.46	6.28	6.56
MZ5-12	22.14	14.56	6.50	18.54	9.64	7.08	2.58	6.56	5.52
MZ5-13	50.74	17.88	13.50	9.74	13.24	4.80	14.90	5.44	5.16

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave									
	0.066926	0.039817	0.017393	0.044660	0.010092	0.042442	0.009674	0.029769	0.008435
concentration data									
SRM614-3	0.30	0.34	0.34	0.38	0.36	0.38	0.36	0.39	0.36
SRM612-3	0.30	0.35	0.37	0.41	0.42	0.43	0.39	0.38	0.40
SRM610-3	216.88	264.82	261.99	284.72	325.31	285.23	324.62	303.65	337.66
AP1-3	0.06	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.01
AP2-3	0.52	0.54	0.53	0.56	0.56	0.83	0.84	0.86	0.57
AP3-3	2.48	2.60	2.63	2.74	2.65	3.94	4.01	4.00	2.72
AP4-3	4.18	4.40	4.49	4.30	4.46	6.45	6.60	6.51	4.46
MZ5-1	0.08	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.00
MZ5-2	0.05	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.00
MZ5-3	0.09	0.03	0.01	0.02	0.00	0.01	0.00	0.00	0.00
MZ5-4	0.06	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
MZ5-5	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00
MZ5-6	0.04	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
MZ5-7	0.03	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00
MZ5-8	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MZ5-9	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MZ5-10	0.10	0.02	0.01	0.02	0.00	0.01	0.00	0.01	0.00
MZ5-11	0.04	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00
MZ5-12	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MZ5-13	0.05	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MZ5-14	0.06	0.03	0.01	0.02	0.00	0.01	0.00	0.01	0.00
MZ5-15	0.07	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00
MZ5-16	0.05	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
MZ5-17	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MZ5-18	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
SRM614-4	0.27	0.37	0.35	0.37	0.40	0.47	0.39	0.34	0.39
SRM612-4	14.19	16.68	15.14	17.01	18.16	17.37	18.00	18.19	18.10
SRM610-4	189.86	224.67	221.54	234.32	269.19	238.34	267.69	249.74	274.96
AP1-4	0.07	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
AP2-4	0.38	0.39	0.38	0.44	0.44	0.62	0.66	0.69	0.46
AP3-4	1.84	2.01	1.93	2.01	1.98	3.11	2.92	3.01	1.99
AP4-4	3.34	3.38	3.37	3.36	3.43	5.03	5.14	5.15	3.46
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	10.92	7.00	6.48	11.84	4.08	2.48	5.96	4.80	3.96
SRM614-1	149.80	136.88	364.00	168.72	511.40	155.92	539.52	172.44	505.00
SRM612-1	7046.72	12259.71	27992.72	10282.46	42322.16	10039.06	44253.49	14709.48	46883.75
SRM610-1	32956.23	59059.45	142612.69	49646.68	222622.25	52058.29	234155.11	72877.09	253067.91
AP1-1	42.04	70.52	150.60	38.92	158.04	33.08	169.24	47.96	159.28
AP2-1	207.72	359.52	864.24	304.64	1148.61	446.88	1797.65	588.44	1324.77
AP3-1	638.60	1059.33	2347.53	823.00	3496.14	1291.29	5428.43	1845.33	3795.66
AP4-1	1499.97	2370.17	5586.75	1997.97	7815.20	3096.26	12428.67	4067.62	8930.89
MZ4-1	27.40	19.08	33.32	10.40	11.24	13.68	14.04	8.80	19.32
MZ4-2	86.88	37.00	31.36	29.40	25.48	12.08	19.88	16.64	20.72
MZ4-3	105.24	54.36	45.20	36.40	33.48	23.40	30.08	19.56	15.88
MZ4-4	57.48	45.76	47.36	34.88	43.80	26.52	35.52	16.52	41.64
MZ4-5	55.84	21.12	20.40	27.60	20.60	19.76	13.20	9.20	7.52
MZ4-6	78.84	21.08	25.44	23.60	15.48	20.72	13.32	15.52	15.28
MZ4-7	65.52	37.32	24.32	21.72	14.72	26.88	24.24	17.76	13.04
MZ4-8	59.40	22.08	8.80	18.24	16.24	18.28	18.00	10.20	9.48
MZ4-9	61.68	33.20	15.84	24.68	10.48	17.48	12.28	12.40	10.24
MZ4-10	62.72	24.44	30.08	29.60	36.20	20.28	28.96	16.16	25.36
MZ4-11	76.96	26.88	24.76	26.12	16.60	24.64	11.12	20.28	12.52
MZ4-12	93.88	43.00	22.96	24.52	14.32	22.12	11.24	20.64	10.00
SRM614-2	139.44	185.64	432.60	135.24	636.36	154.48	666.72	224.68	682.96
SRM612-2	5295.39	9118.69	20502.04	7207.40	31465.78	7599.00	32873.91	10974.06	34633.16
SRM610-2	34049.19	59431.49	140710.52	48014.59	225638.47	51693.81	235873.69	72731.77	250999.69
AP1-2	8.28	6.04	12.64	5.16	11.60	4.00	12.44	9.72	20.56
AP2-2	164.00	256.84	553.56	230.76	842.08	293.16	1339.33	445.40	990.41
AP3-2	705.56	1083.57	2456.81	867.80	3655.82	1443.17	5651.71	1936.21	4077.42
AP4-2	1398.89	2175.17	4996.83	1720.53	7371.72	2873.70	11851.95	3924.22	8276.49
blank-2	6.04	9.32	14.00	2.92	4.56	3.72	4.36	5.36	2.60
blank average	8.48	8.16	10.24	7.38	4.32	3.10	5.16	5.08	3.28

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction									
SRM614-1	141.32	128.72	353.76	161.34	507.08	152.82	534.36	167.36	501.72
SRM612-1	7038.24	12251.55	27982.48	10275.08	42317.84	10035.96	44248.33	14704.40	46880.47
SRM610-1	32947.75	59051.29	142602.45	49639.30	222617.93	52055.19	234149.95	72872.01	253064.63
AP1-1	33.56	62.36	140.36	31.54	153.72	29.98	164.08	42.88	156.00
AP2-1	199.24	351.36	854.00	297.26	1144.29	443.78	1792.49	583.36	1321.49
AP3-1	630.12	1051.17	2337.29	815.62	3491.82	1288.19	5423.27	1840.25	3792.38
AP4-1	1491.49	2362.01	5576.51	1990.59	7810.88	3093.16	12423.51	4062.54	8927.61
MZ4-1	18.92	10.92	23.08	3.02	6.92	10.58	8.88	3.72	16.04
MZ4-2	78.40	28.84	21.12	22.02	21.16	8.98	14.72	11.56	17.44
MZ4-3	96.76	46.20	34.96	29.02	29.16	20.30	24.92	14.48	12.60
MZ4-4	49.00	37.60	37.12	27.50	39.48	23.42	30.36	11.44	38.36
MZ4-5	47.36	12.96	10.16	20.22	16.28	16.66	8.04	4.12	4.24
MZ4-6	70.36	12.92	15.20	16.22	11.16	17.62	8.16	10.44	12.00
MZ4-7	57.04	29.16	14.08	14.34	10.40	23.78	19.08	12.68	9.76
MZ4-8	50.92	13.92	-1.44	10.86	11.92	15.18	12.84	5.12	6.20
MZ4-9	53.20	25.04	5.60	17.30	6.16	14.38	7.12	7.32	6.96
MZ4-10	54.24	16.28	19.84	22.22	31.88	17.18	23.80	11.08	22.08
MZ4-11	68.48	18.72	14.52	18.74	12.28	21.54	5.96	15.20	9.24
MZ4-12	85.40	34.84	12.72	17.14	10.00	19.02	6.08	15.56	6.72
SRM614-2	130.96	177.48	422.36	127.86	632.04	151.38	661.56	219.60	679.68
SRM612-2	5286.91	9110.53	20491.79	7200.02	31461.46	7595.90	32868.75	10968.98	34629.88
SRM610-2	34040.71	59423.33	140700.28	48007.21	225634.15	51690.71	235868.53	72726.69	250996.41
AP1-2	-0.20	-2.12	2.40	-2.22	7.28	0.90	7.28	4.64	17.28
AP2-2	155.52	248.68	543.32	223.38	837.76	290.06	1334.17	440.32	987.13
AP3-2	697.08	1075.41	2446.57	860.42	3651.50	1440.07	5646.55	1931.13	4074.14
AP4-2	1390.41	2167.01	4986.59	1713.15	7367.40	2870.60	11846.79	3919.14	8273.21
zero correction									
SRM614-1	141.32	128.72	353.76	161.34	507.08	152.82	534.36	167.36	501.72
SRM612-1	7038.24	12251.55	27982.48	10275.08	42317.84	10035.96	44248.33	14704.40	46880.47
SRM610-1	32947.75	59051.29	142602.45	49639.30	222617.93	52055.19	234149.95	72872.01	253064.63
AP1-1	33.56	62.36	140.36	31.54	153.72	29.98	164.08	42.88	156.00
AP2-1	199.24	351.36	854.00	297.26	1144.29	443.78	1792.49	583.36	1321.49
AP3-1	630.12	1051.17	2337.29	815.62	3491.82	1288.19	5423.27	1840.25	3792.38
AP4-1	1491.49	2362.01	5576.51	1990.59	7810.88	3093.16	12423.51	4062.54	8927.61
MZ4-1	18.92	10.92	23.08	3.02	6.92	10.58	8.88	3.72	16.04
MZ4-2	78.40	28.84	21.12	22.02	21.16	8.98	14.72	11.56	17.44
MZ4-3	96.76	46.20	34.96	29.02	29.16	20.30	24.92	14.48	12.60
MZ4-4	49.00	37.60	37.12	27.50	39.48	23.42	30.36	11.44	38.36
MZ4-5	47.36	12.96	10.16	20.22	16.28	16.66	8.04	4.12	4.24
MZ4-6	70.36	12.92	15.20	16.22	11.16	17.62	8.16	10.44	12.00
MZ4-7	57.04	29.16	14.08	14.34	10.40	23.78	19.08	12.68	9.76
MZ4-8	50.92	13.92	0.00	10.86	11.92	15.18	12.84	5.12	6.20
MZ4-9	53.20	25.04	5.60	17.30	6.16	14.38	7.12	7.32	6.96
MZ4-10	54.24	16.28	19.84	22.22	31.88	17.18	23.80	11.08	22.08
MZ4-11	68.48	18.72	14.52	18.74	12.28	21.54	5.96	15.20	9.24
MZ4-12	85.40	34.84	12.72	17.14	10.00	19.02	6.08	15.56	6.72
SRM614-2	130.96	177.48	422.36	127.86	632.04	151.38	661.56	219.60	679.68
SRM612-2	5286.91	9110.53	20491.79	7200.02	31461.46	7595.90	32868.75	10968.98	34629.88
SRM610-2	34040.71	59423.33	140700.28	48007.21	225634.15	51690.71	235868.53	72726.69	250996.41
AP1-2	0.00	0.00	2.40	0.00	7.28	0.90	7.28	4.64	17.28
AP2-2	155.52	248.68	543.32	223.38	837.76	290.06	1334.17	440.32	987.13
AP3-2	697.08	1075.41	2446.57	860.42	3651.50	1440.07	5646.55	1931.13	4074.14
AP4-2	1390.41	2167.01	4986.59	1713.15	7367.40	2870.60	11846.79	3919.14	8273.21
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-1	0.000177	0.000161	0.000443	0.000202	0.000636	0.000192	0.000670	0.000210	0.000629
SRM612-1	0.005065	0.008817	0.020138	0.007394	0.030454	0.007222	0.031843	0.010582	0.033737

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.075397	0.135132	0.326329	0.113594	0.509435	0.119122	0.535825	0.166759	0.579109
AP1-1	0.000004	0.000008	0.000017	0.000004	0.000019	0.000004	0.000020	0.000005	0.000019
AP2-1	0.000029	0.000052	0.000126	0.000044	0.000169	0.000066	0.000265	0.000086	0.000195
AP3-1	0.000098	0.000163	0.000362	0.000126	0.000540	0.000199	0.000839	0.000285	0.000587
AP4-1	0.000176	0.000278	0.000657	0.000234	0.000920	0.000364	0.001463	0.000478	0.001051
MZ4-1	0.000003	0.000002	0.000004	0.000000	0.000001	0.000002	0.000001	0.000001	0.000003
MZ4-2	0.000012	0.000004	0.000003	0.000003	0.000003	0.000001	0.000002	0.000002	0.000003
MZ4-3	0.000015	0.000007	0.000005	0.000004	0.000004	0.000003	0.000004	0.000002	0.000002
MZ4-4	0.000008	0.000006	0.000006	0.000004	0.000006	0.000004	0.000005	0.000002	0.000006
MZ4-5	0.000008	0.000002	0.000002	0.000003	0.000003	0.000003	0.000001	0.000001	0.000001
MZ4-6	0.000011	0.000002	0.000002	0.000003	0.000002	0.000003	0.000001	0.000002	0.000002
MZ4-7	0.000011	0.000006	0.000003	0.000003	0.000002	0.000005	0.000004	0.000003	0.000002
MZ4-8	0.000011	0.000003	0.000000	0.000002	0.000002	0.000003	0.000003	0.000001	0.000001
MZ4-9	0.000011	0.000005	0.000001	0.000003	0.000001	0.000003	0.000001	0.000001	0.000001
MZ4-10	0.000011	0.000003	0.000004	0.000005	0.000007	0.000004	0.000005	0.000002	0.000005
MZ4-11	0.000011	0.000003	0.000002	0.000003	0.000002	0.000004	0.000001	0.000003	0.000002
MZ4-12	0.000013	0.000005	0.000002	0.000003	0.000001	0.000003	0.000001	0.000002	0.000001
SRM614-2	0.000125	0.000170	0.000404	0.000122	0.000604	0.000145	0.000632	0.000210	0.000649
SRM612-2	0.005081	0.008757	0.019696	0.006920	0.030239	0.007301	0.031592	0.010543	0.033284
SRM610-2	0.076265	0.133133	0.315227	0.107556	0.505514	0.115809	0.528443	0.162938	0.562336
AP1-2	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000001	0.000001	0.000003
AP2-2	0.000026	0.000042	0.000091	0.000037	0.000141	0.000049	0.000224	0.000074	0.000166
AP3-2	0.000109	0.000168	0.000381	0.000134	0.000569	0.000224	0.000880	0.000301	0.000635
AP4-2	0.000175	0.000273	0.000628	0.000216	0.000928	0.000362	0.001493	0.000494	0.001042
standardize signal averages AP									
AP1	0.000002	0.000004	0.000009	0.000002	0.000010	0.000002	0.000011	0.000003	0.000011
AP2	0.000028	0.000047	0.000109	0.000041	0.000155	0.000057	0.000244	0.000080	0.000180
AP3	0.000103	0.000165	0.000371	0.000130	0.000555	0.000212	0.000860	0.000293	0.000611
AP4	0.000175	0.000276	0.000642	0.000225	0.000924	0.000363	0.001478	0.000486	0.001047
linest from std sig ave									
	0.053350	0.035201	0.015298	0.043250	0.010624	0.040113	0.009972	0.029965	0.009514
standardize signal averages SRM									
srm614-2	0.000151	0.000165	0.000424	0.000162	0.000620	0.000168	0.000651	0.000210	0.000639
srm612-2	0.005073	0.008787	0.019917	0.007157	0.030346	0.007262	0.031717	0.010562	0.033511
srm610-2	0.075831	0.134132	0.320778	0.110575	0.507475	0.117465	0.532134	0.164848	0.570722
linest from std sig ave									
	0.066307	0.039203	0.016774	0.044345	0.010187	0.042395	0.009862	0.030178	0.008598
concentration data									
SRM614-1	0.81	0.49	0.58	0.75	0.58	0.66	0.57	0.54	0.51
SRM612-1	23.17	26.62	26.42	27.43	27.75	24.85	27.23	27.19	27.53
SRM610-1	344.98	407.96	428.13	421.35	464.15	409.80	458.27	428.56	472.54
AP1-1	0.09	0.11	0.10	0.07	0.08	0.06	0.08	0.06	0.07
AP2-1	0.63	0.73	0.77	0.76	0.72	1.05	1.05	1.03	0.74
AP3-1	2.08	2.28	2.21	2.18	2.29	3.19	3.34	3.40	2.23
AP4-1	3.74	3.91	4.01	4.04	3.90	5.83	5.82	5.72	3.99
MZ4-1	0.06	0.02	0.02	0.01	0.00	0.03	0.01	0.01	0.01
MZ4-2	0.25	0.06	0.02	0.06	0.01	0.02	0.01	0.02	0.01
MZ4-3	0.32	0.10	0.03	0.08	0.02	0.05	0.02	0.03	0.01
MZ4-4	0.17	0.08	0.04	0.08	0.03	0.06	0.02	0.02	0.02
MZ4-5	0.16	0.03	0.01	0.06	0.01	0.04	0.01	0.01	0.00
MZ4-6	0.24	0.03	0.02	0.05	0.01	0.05	0.01	0.02	0.01
MZ4-7	0.24	0.08	0.02	0.05	0.01	0.08	0.02	0.03	0.01
MZ4-8	0.23	0.04	0.00	0.04	0.01	0.05	0.01	0.01	0.00
MZ4-9	0.23	0.07	0.01	0.06	0.01	0.05	0.01	0.02	0.01
MZ4-10	0.24	0.05	0.02	0.08	0.03	0.06	0.02	0.03	0.02
MZ4-11	0.24	0.04	0.01	0.05	0.01	0.06	0.00	0.03	0.01
MZ4-12	0.27	0.07	0.01	0.04	0.01	0.05	0.00	0.03	0.00
SRM614-2	0.57	0.51	0.53	0.45	0.55	0.50	0.54	0.54	0.53
SRM612-2	23.25	26.44	25.84	25.67	27.55	25.12	27.02	27.09	27.16
SRM610-2	348.95	401.93	413.57	398.95	460.58	398.40	451.96	418.74	458.86
AP1-2	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
AP2-2	0.56	0.59	0.56	0.65	0.60	0.78	0.89	0.88	0.63
AP3-2	2.31	2.35	2.33	2.31	2.41	3.59	3.50	3.60	2.41
AP4-2	3.73	3.83	3.83	3.72	3.93	5.79	5.94	5.90	3.96
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	446.74	364.02	469.48	137.72	83.78	104.58	73.98	63.60	33.86
TGP3-5	270.02	251.86	325.88	69.44	54.70	51.46	43.02	25.32	20.54
TGP3-6	285.74	276.58	343.88	89.32	74.58	38.10	35.18	37.04	32.02
TGP3-7	2454.99	1020.55	786.12	920.77	454.98	537.78	460.14	410.44	233.54
TGP3-8	1219.79	589.14	447.16	421.76	199.58	253.86	208.86	190.76	104.06
TGP3-9	559.02	298.66	281.72	167.88	86.90	111.74	74.02	81.04	32.42
TGP3-10	1018.39	432.66	399.24	335.80	168.46	169.34	144.82	111.68	74.02
TGP3-11	617.06	308.18	303.28	199.08	109.30	103.10	86.70	76.40	27.26
TGP3-12	366.14	217.34	231.76	103.00	79.54	68.10	40.54	39.64	26.42
TGP3-13	4311.92	1577.55	913.09	1848.01	881.66	1270.99	1118.07	987.77	456.90
TGP3-14	1753.39	673.62	383.80	753.08	357.54	534.62	487.38	481.12	214.18
TGP3-15	8257.95	3029.16	1573.01	3336.30	1632.43	2438.63	2035.39	2012.25	840.90
SRM614-4	158.26	303.26	698.52	247.84	982.75	270.46	1049.59	350.52	1097.87
SRM612-4	9497.47	17067.52	36740.09	14486.76	62141.17	14752.50	65769.71	21177.60	70289.38
SRM610-4	59572.76	109226.48	271147.20	90309.51	460657.68	96620.01	493519.67	139954.51	535542.77
AP1-4	7.38	0.00	13.40	2.04	18.78	1.82	18.46	8.24	12.70
AP2-4	326.10	544.42	1178.05	459.68	1903.23	713.78	3022.32	1051.45	2122.43
AP3-4	1527.07	2438.51	5677.87	2030.25	8272.43	3260.32	12962.77	4536.07	9408.67
AP4-4	3449.16	5291.05	12859.11	4373.18	17910.52	6860.34	28757.90	9461.33	20206.21

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-3	0.000067	0.000127	0.000309	0.000124	0.000384	0.000099	0.000402	0.000137	0.000444
SRM612-3	0.003428	0.006847	0.015704	0.006500	0.023987	0.005737	0.025336	0.008310	0.027656
SRM610-3	0.051017	0.103186	0.273774	0.092837	0.417159	0.088417	0.445583	0.127811	0.495948
AP1-3	0.000007	0.000007	0.000017	0.000006	0.000013	0.000003	0.000015	0.000004	0.000013
AP2-3	0.000033	0.000054	0.000122	0.000051	0.000168	0.000068	0.000257	0.000087	0.000201
AP3-3	0.000117	0.000199	0.000485	0.000179	0.000645	0.000249	0.001019	0.000341	0.000740
AP4-3	0.000237	0.000390	0.000960	0.000352	0.001231	0.000478	0.001954	0.000644	0.001394
TGP3-1	0.000013	0.000014	0.000019	0.000005	0.000004	0.000002	0.000003	0.000002	0.000003
TGP3-2	0.000014	0.000012	0.000017	0.000003	0.000002	0.000001	0.000001	0.000001	0.000000
TGP3-3	0.000010	0.000013	0.000018	0.000003	0.000002	0.000001	0.000001	0.000001	0.000001
TGP3-4	0.000017	0.000014	0.000018	0.000005	0.000003	0.000004	0.000003	0.000002	0.000001
TGP3-5	0.000011	0.000010	0.000013	0.000003	0.000002	0.000002	0.000002	0.000001	0.000001
TGP3-6	0.000012	0.000012	0.000015	0.000004	0.000003	0.000002	0.000002	0.000002	0.000001
TGP3-7	0.000115	0.000048	0.000037	0.000043	0.000021	0.000025	0.000021	0.000019	0.000011
TGP3-8	0.000058	0.000028	0.000021	0.000020	0.000009	0.000012	0.000010	0.000009	0.000005
TGP3-9	0.000023	0.000012	0.000012	0.000007	0.000004	0.000005	0.000003	0.000003	0.000001
TGP3-10	0.000051	0.000022	0.000020	0.000017	0.000008	0.000008	0.000007	0.000006	0.000004
TGP3-11	0.000030	0.000015	0.000015	0.000010	0.000005	0.000005	0.000004	0.000004	0.000001
TGP3-12	0.000017	0.000010	0.000011	0.000005	0.000004	0.000003	0.000002	0.000002	0.000001
TGP3-13	0.000383	0.000140	0.000081	0.000164	0.000078	0.000113	0.000099	0.000088	0.000041
TGP3-14	0.000153	0.000059	0.000033	0.000066	0.000031	0.000047	0.000042	0.000042	0.000019
TGP3-15	0.000559	0.000205	0.000107	0.000226	0.000111	0.000165	0.000138	0.000136	0.000057
SRM614-4	0.000080	0.000154	0.000355	0.000126	0.000500	0.000137	0.000534	0.000178	0.000558
SRM612-4	0.04387	0.007884	0.016971	0.006692	0.028705	0.006815	0.030381	0.009783	0.032469
SRM610-4	0.063040	0.115583	0.286927	0.095565	0.487466	0.102243	0.522240	0.148099	0.566709
AP1-4	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000	0.000001	0.000001	0.000001
AP2-4	0.000025	0.000041	0.000089	0.000035	0.000143	0.000054	0.000228	0.000079	0.000160
AP3-4	0.000093	0.000149	0.000346	0.000124	0.000504	0.000199	0.000790	0.000277	0.000574
AP4-4	0.000224	0.000344	0.000835	0.000284	0.001163	0.000445	0.001867	0.000614	0.001312

standardize signal averages AP									
AP1	0.000004	0.000003	0.000009	0.000003	0.000007	0.000002	0.000008	0.000003	0.000007
AP2	0.000029	0.000048	0.000105	0.000043	0.000156	0.000061	0.000242	0.000083	0.000181
AP3	0.000105	0.000174	0.000416	0.000152	0.000575	0.000224	0.000905	0.000309	0.000657
AP4	0.000230	0.000367	0.000897	0.000318	0.001197	0.000462	0.001911	0.000629	0.001353

linest from std sig ave									
	0.042725	0.027800	0.011462	0.031943	0.008612	0.032787	0.008049	0.024250	0.007657

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srM614-2	0.000074	0.000141	0.000332	0.000125	0.000442	0.000118	0.000468	0.000157	0.000501
srM612-2	0.003908	0.007366	0.016338	0.006596	0.026346	0.006276	0.027859	0.009046	0.030062
srM610-2	0.057028	0.109385	0.280350	0.094201	0.452312	0.095330	0.483911	0.137955	0.531329

linest from std sig ave									
	0.088162	0.048067	0.019196	0.052040	0.011430	0.052229	0.010845	0.036058	0.009236

concentration data									
SRM614-3	0.25	0.30	0.30	0.34	0.28	0.28	0.28	0.28	0.29
SRM612-3	12.56	16.33	15.44	17.81	17.72	16.13	17.49	17.28	18.16
SRM610-3	186.94	246.02	269.13	254.33	308.12	248.62	307.58	265.82	325.67
AP1-3	0.12	0.07	0.08	0.08	0.05	0.04	0.05	0.04	0.04
AP2-3	0.56	0.60	0.56	0.65	0.58	0.89	0.83	0.85	0.61
AP3-3	1.99	2.21	2.22	2.29	2.22	3.26	3.27	3.30	2.26
AP4-3	4.04	4.32	4.39	4.48	4.23	6.26	6.27	6.23	4.26
TGP3-1	0.23	0.16	0.09	0.06	0.01	0.03	0.01	0.02	0.01
TGP3-2	0.23	0.13	0.08	0.04	0.01	0.02	0.00	0.01	0.00
TGP3-3	0.16	0.14	0.08	0.04	0.01	0.02	0.00	0.01	0.00
TGP3-4	0.30	0.16	0.08	0.07	0.01	0.05	0.01	0.02	0.00
TGP3-5	0.19	0.12	0.06	0.04	0.01	0.03	0.01	0.01	0.00
TGP3-6	0.21	0.13	0.07	0.05	0.01	0.02	0.00	0.02	0.00
TGP3-7	1.95	0.53	0.17	0.55	0.07	0.33	0.07	0.19	0.03
TGP3-8	0.99	0.31	0.10	0.25	0.03	0.16	0.03	0.09	0.02
TGP3-9	0.40	0.14	0.05	0.09	0.01	0.06	0.01	0.03	0.00
TGP3-10	0.87	0.24	0.09	0.21	0.03	0.11	0.02	0.05	0.01
TGP3-11	0.50	0.16	0.07	0.12	0.02	0.06	0.01	0.04	0.00
TGP3-12	0.29	0.11	0.05	0.06	0.01	0.04	0.01	0.02	0.00
TGP3-13	6.54	1.56	0.37	2.09	0.27	1.48	0.32	0.85	0.12
TGP3-14	2.60	0.65	0.15	0.84	0.11	0.61	0.14	0.41	0.06
TGP3-15	9.53	2.28	0.49	2.88	0.38	2.16	0.44	1.32	0.17
SRM614-4	0.29	0.37	0.35	0.35	0.37	0.39	0.37	0.37	0.37
SRM612-4	16.08	18.80	16.68	18.33	21.20	19.16	20.97	20.35	21.32
SRM610-4	230.99	275.57	282.06	261.80	360.05	287.50	360.49	308.01	372.14
AP1-4	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
AP2-4	0.42	0.45	0.41	0.44	0.49	0.70	0.73	0.77	0.49
AP3-4	1.59	1.65	1.58	1.58	1.73	2.60	2.54	2.68	1.75
AP4-4	3.82	3.81	3.82	3.62	4.00	5.83	5.99	5.94	4.01

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	8.36	3.16	3.60	4.76	4.80	1.24	2.84	1.16	1.12
SRM614-1	279.00	477.24	1187.57	462.76	1541.13	428.68	1607.13	488.52	1650.25
SRM612-1	11818.55	23261.05	53294.70	21685.24	80320.13	18893.19	83708.63	27625.40	92273.20
SRM610-1	63558.40	130092.33	339336.44	119875.36	525979.00	113758.12	562345.63	163945.77	626227.31
AP1-1	43.28	57.52	127.24	46.20	128.64	32.60	134.12	52.08	136.48
AP2-1	593.68	1026.01	2364.65	937.17	3255.50	1233.29	4991.99	1686.81	3686.90
AP3-1	3465.66	5573.31	14317.28	5319.43	17178.02	6582.44	26783.47	8897.65	19262.35
AP4-1	4882.15	8046.17	19509.83	7328.36	24762.42	9367.97	39263.78	12871.07	27557.07
TGP2-1	342.52	368.20	483.36	206.12	154.48	71.04	113.12	59.56	86.76
TGP2-2	311.12	302.84	355.28	119.00	82.20	59.68	51.52	33.08	21.92
TGP2-3	511.92	361.24	368.48	247.80	129.08	121.72	100.80	75.92	52.04
TGP2-4	149.28	107.04	121.12	87.40	54.92	36.56	59.72	32.16	49.32
TGP2-5	83.40	54.88	46.68	29.32	31.20	12.12	18.64	16.04	16.16
TGP2-6	68.08	44.64	43.24	26.40	15.56	14.76	13.72	11.60	9.72
TGP2-7	181.80	104.00	108.28	88.60	63.04	39.12	58.68	45.40	45.12
TGP2-8	88.36	59.52	44.52	44.24	29.76	21.84	20.72	18.40	18.32
TGP2-9	59.88	33.08	37.24	37.00	20.24	11.20	25.84	12.88	21.12
TGP2-10	28.48	26.20	21.84	10.12	14.04	9.76	14.64	5.60	10.24
TGP2-11	86.04	46.00	42.80	26.60	17.08	20.56	13.96	14.76	5.36
TGP2-12	92.12	55.60	47.16	34.16	31.40	27.40	37.12	21.56	24.12
TGP2-13	131.40	89.24	93.64	56.44	65.24	28.92	48.36	19.64	31.96
TGP2-14	95.76	69.12	65.52	38.44	22.80	12.92	10.20	9.84	12.20
TGP2-15	131.28	72.48	82.28	46.24	38.72	25.48	19.92	21.44	19.68
TGP2-16	128.60	106.08	143.40	36.48	36.64	22.80	21.80	12.64	19.24
TGP2-17	132.84	81.04	122.40	20.56	41.36	16.68	14.32	14.72	11.92
TGP2-18	137.68	117.40	152.92	29.12	32.52	26.24	19.32	8.24	15.48
SRM614-2	180.36	356.36	828.48	320.80	1144.37	309.64	1182.73	394.60	1226.33
SRM612-2	9017.81	16908.73	36247.20	14008.88	60837.50	14501.08	64530.13	20798.92	68896.07

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	54666.55	100786.33	247202.27	84281.27	421636.66	89458.59	452999.03	128080.32	487876.50
AP1-2	9.72	14.04	15.96	1.88	29.76	2.44	4.48	5.04	8.72
AP2-2	318.48	573.60	1286.41	486.32	1957.81	778.80	3185.14	1094.57	2347.97
AP3-2	2927.18	4516.59	11040.86	3579.94	14528.52	5497.03	22776.61	7658.68	16351.37
AP4-2	3018.66	4768.03	11024.26	3818.90	15833.89	6144.47	25158.38	8311.25	17723.34
blank-2	12.48	27.92	18.72	2.96	10.72	1.76	1.64	2.40	3.36
blank average	10.42	15.54	11.16	3.86	7.76	1.50	2.24	1.78	2.24
blank subtraction									
SRM614-1	268.58	461.70	1176.41	458.90	1533.37	427.18	1604.89	486.74	1648.01
SRM612-1	11808.13	23245.51	53283.54	21681.38	80312.37	18891.69	83706.39	27623.61	92270.95
SRM610-1	63547.98	130076.79	339325.28	119871.50	525971.24	113756.62	562343.39	163943.99	626225.07
AP1-1	32.86	41.98	116.08	42.34	120.88	31.10	131.88	50.30	134.24
AP2-1	583.26	1010.47	2353.49	933.31	3247.74	1231.79	4989.75	1685.03	3684.66
AP3-1	3455.24	5557.77	14306.12	5315.57	17170.26	6580.94	26781.23	8895.87	19260.11
AP4-1	4871.73	8030.62	19498.67	7324.50	24754.66	9366.47	39261.54	12869.29	27554.83
TGP2-1	332.10	352.66	472.20	202.26	146.72	69.54	110.88	57.78	84.52
TGP2-2	300.70	287.30	344.12	115.14	74.44	58.18	49.28	31.30	19.68
TGP2-3	501.50	345.70	357.32	243.94	121.32	120.22	98.56	74.14	49.80
TGP2-4	138.86	91.50	109.96	83.54	47.16	35.06	57.48	30.38	47.08
TGP2-5	72.98	39.34	35.52	25.46	23.44	10.62	16.40	14.26	13.92
TGP2-6	57.66	29.10	32.08	22.54	7.80	13.26	11.48	9.82	7.48
TGP2-7	171.38	88.46	97.12	84.74	55.28	37.62	56.44	43.62	42.88
TGP2-8	77.94	43.98	33.36	40.38	22.00	20.34	18.48	16.62	16.08
TGP2-9	49.46	17.54	26.08	33.14	12.48	9.70	23.60	11.10	18.88
TGP2-10	18.06	10.66	10.68	6.26	6.28	8.26	12.40	3.82	8.00
TGP2-11	75.62	30.46	31.64	22.74	9.32	19.06	11.72	12.98	3.12
TGP2-12	81.70	40.06	36.00	30.30	23.64	25.90	34.88	19.78	21.88
TGP2-13	120.98	73.70	82.48	52.58	57.48	27.42	46.12	17.86	29.72
TGP2-14	85.34	53.58	54.36	34.58	15.04	11.42	7.96	8.06	9.96
TGP2-15	120.86	56.94	71.12	42.38	30.96	23.98	17.68	19.66	17.44
TGP2-16	118.18	90.54	132.24	32.62	28.88	21.30	19.56	10.86	17.00
TGP2-17	122.42	65.50	111.24	16.70	33.60	15.18	12.08	12.94	9.68
TGP2-18	127.26	101.86	141.76	25.26	24.76	24.74	17.08	6.46	13.24
SRM614-2	169.94	340.82	817.32	316.94	1136.61	308.14	1180.49	392.82	1224.09
SRM612-2	9007.39	16893.19	36236.04	14005.02	60829.74	14499.58	64527.88	20797.14	68893.83
SRM610-2	54656.13	100770.79	247191.11	84277.41	421628.90	89457.09	452996.79	128078.54	487874.26
AP1-2	-0.70	-1.50	4.80	-1.98	22.00	0.94	2.24	3.26	6.48
AP2-2	308.06	558.06	1275.25	482.46	1950.05	777.30	3182.90	1092.79	2345.73
AP3-2	2916.76	4501.05	11029.70	3576.08	14520.76	5495.53	22774.37	7656.90	16349.13
AP4-2	3008.24	4752.49	11013.10	3815.04	15826.13	6142.97	25156.14	8309.47	17721.10
zero correction									
SRM614-1	268.58	461.70	1176.41	458.90	1533.37	427.18	1604.89	486.74	1648.01
SRM612-1	11808.13	23245.51	53283.54	21681.38	80312.37	18891.69	83706.39	27623.61	92270.95
SRM610-1	63547.98	130076.79	339325.28	119871.50	525971.24	113756.62	562343.39	163943.99	626225.07
AP1-1	32.86	41.98	116.08	42.34	120.88	31.10	131.88	50.30	134.24
AP2-1	583.26	1010.47	2353.49	933.31	3247.74	1231.79	4989.75	1685.03	3684.66
AP3-1	3455.24	5557.77	14306.12	5315.57	17170.26	6580.94	26781.23	8895.87	19260.11
AP4-1	4871.73	8030.62	19498.67	7324.50	24754.66	9366.47	39261.54	12869.29	27554.83
TGP2-1	332.10	352.66	472.20	202.26	146.72	69.54	110.88	57.78	84.52
TGP2-2	300.70	287.30	344.12	115.14	74.44	58.18	49.28	31.30	19.68
TGP2-3	501.50	345.70	357.32	243.94	121.32	120.22	98.56	74.14	49.80
TGP2-4	138.86	91.50	109.96	83.54	47.16	35.06	57.48	30.38	47.08
TGP2-5	72.98	39.34	35.52	25.46	23.44	10.62	16.40	14.26	13.92
TGP2-6	57.66	29.10	32.08	22.54	7.80	13.26	11.48	9.82	7.48
TGP2-7	171.38	88.46	97.12	84.74	55.28	37.62	56.44	43.62	42.88
TGP2-8	77.94	43.98	33.36	40.38	22.00	20.34	18.48	16.62	16.08
TGP2-9	49.46	17.54	26.08	33.14	12.48	9.70	23.60	11.10	18.88
TGP2-10	18.06	10.66	10.68	6.26	6.28	8.26	12.40	3.82	8.00
TGP2-11	75.62	30.46	31.64	22.74	9.32	19.06	11.72	12.98	3.12
TGP2-12	81.70	40.06	36.00	30.30	23.64	25.90	34.88	19.78	21.88
TGP2-13	120.98	73.70	82.48	52.58	57.48	27.42	46.12	17.86	29.72
TGP2-14	85.34	53.58	54.36	34.58	15.04	11.42	7.96	8.06	9.96
TGP2-15	120.86	56.94	71.12	42.38	30.96	23.98	17.68	19.66	17.44
TGP2-16	118.18	90.54	132.24	32.62	28.88	21.30	19.56	10.86	17.00
TGP2-17	122.42	65.50	111.24	16.70	33.60	15.18	12.08	12.94	9.68
TGP2-18	127.26	101.86	141.76	25.26	24.76	24.74	17.08	6.46	13.24
SRM614-2	169.94	340.82	817.32	316.94	1136.61	308.14	1180.49	392.82	1224.09
SRM612-2	9007.39	16893.19	36236.04	14005.02	60829.74	14499.58	64527.88	20797.14	68893.83
SRM610-2	54656.13	100770.79	247191.11	84277.41	421628.90	89457.09	452996.79	128078.54	487874.26
AP1-2	0.00	0.00	4.80	0.00	22.00	0.94	2.24	3.26	6.48
AP2-2	308.06	558.06	1275.25	482.46	1950.05	777.30	3182.90	1092.79	2345.73
AP3-2	2916.76	4501.05	11029.70	3576.08	14520.76	5495.53	22774.37	7656.90	16349.13
AP4-2	3008.24	4752.49	11013.10	3815.04	15826.13	6142.97	25156.14	8309.47	17721.10
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-1	0.000069	0.000118	0.000301	0.000117	0.000392	0.000109	0.000411	0.000125	0.000422
SRM612-1	0.003492	0.006875	0.015759	0.006412	0.023753	0.005587	0.024757	0.008170	0.027290
SRM610-1	0.057290	0.117267	0.305910	0.108067	0.474175	0.102554	0.506966	0.147799	0.564556
AP1-1	0.000002	0.000002	0.000005	0.000002	0.000006	0.000001	0.000006	0.000002	0.000006
AP2-1	0.000036	0.000062	0.000143	0.000057	0.000198	0.000075	0.000304	0.000103	0.000225
AP3-1	0.000164	0.000264	0.000680	0.000253	0.000817	0.000313	0.001274	0.000423	0.000916
AP4-1	0.000246	0.000406	0.000986	0.000370	0.001251	0.000473	0.001985	0.000651	0.001393
TGP2-1	0.000013	0.000014	0.000018	0.000008	0.000006	0.000003	0.000004	0.000002	0.000003
TGP2-2	0.000013	0.000012	0.000014	0.000005	0.000003	0.000002	0.000002	0.000001	0.000001
TGP2-3	0.000021	0.000014	0.000015	0.000010	0.000005	0.000005	0.000004	0.000003	0.000002
TGP2-4	0.000013	0.000008	0.000010	0.000008	0.000004	0.000003	0.000005	0.000003	0.000004
TGP2-5	0.000006	0.000003	0.000003	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001
TGP2-6	0.000006	0.000003	0.000003	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
TGP2-7	0.000019	0.000010	0.000011	0.000009	0.000006	0.000004	0.000006	0.000005	0.000005
TGP2-8	0.000008	0.000004	0.000003	0.000004	0.000002	0.000002	0.000002	0.000002	0.000002
TGP2-9	0.000005	0.000002	0.000003	0.000003	0.000001	0.000001	0.000002	0.000001	0.000002
TGP2-10	0.000001	0.000001	0.000001	0.000000	0.000000	0.000001	0.000001	0.000000	0.000001
TGP2-11	0.000005	0.000002	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001	0.000000
TGP2-12	0.000006	0.000003	0.000003	0.000002	0.000002	0.000002	0.000003	0.000002	0.000002
TGP2-13	0.000010	0.000006	0.000007	0.000004	0.000005	0.000002	0.000004	0.000002	0.000003
TGP2-14	0.000006	0.000004	0.000004	0.000003	0.000001	0.000001	0.000001	0.000001	0.000001
TGP2-15	0.000008	0.000004	0.000005	0.000003	0.000002	0.000002	0.000001	0.000001	0.000001
TGP2-16	0.000005	0.000004	0.000006	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
TGP2-17	0.000006	0.000003	0.000005	0.000001	0.000002	0.000001	0.000001	0.000001	0.000000
TGP2-18	0.000006	0.000005	0.000006	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001
SRM614-2	0.000077	0.000154	0.000368	0.000143	0.000512	0.000139	0.000532	0.000177	0.000552
SRM612-2	0.004243	0.007958	0.017070	0.006597	0.028655	0.006830	0.030397	0.009797	0.032454
SRM610-2	0.063915	0.117841	0.289064	0.098554	0.493050	0.104611	0.529732	0.149774	0.570517
AP1-2	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
AP2-2	0.000026	0.000047	0.000107	0.000041	0.000164	0.000065	0.000268	0.000092	0.000197
AP3-2	0.000160	0.000247	0.000604	0.000196	0.000795	0.000301	0.001248	0.000419	0.000896
AP4-2	0.000201	0.000318	0.000737	0.000255	0.001059	0.000411	0.001683	0.000556	0.001185

standardize signal averages AP									
AP1	0.000001	0.000001	0.000003	0.000001	0.000004	0.000001	0.000003	0.000001	0.000003
AP2	0.000031	0.000054	0.000125	0.000049	0.000181	0.000070	0.000286	0.000097	0.000211
AP3	0.000162	0.000255	0.000642	0.000224	0.000806	0.000307	0.001261	0.000421	0.000906
AP4	0.000224	0.000362	0.000861	0.000313	0.001155	0.000442	0.001834	0.000603	0.001289

linest from std sig ave									
	0.039179	0.025496	0.010532	0.029182	0.008114	0.031235	0.007653	0.023061	0.007306

standardize signal averages SRM									
srm614-2	0.000073	0.000136	0.000335	0.000130	0.000452	0.000124	0.000471	0.000151	0.000487
srm612-2	0.003868	0.007416	0.016414	0.006505	0.026204	0.006209	0.027577	0.008983	0.029872
srm610-2	0.060602	0.117554	0.297487	0.103310	0.483613	0.103582	0.518349	0.148787	0.567537

linest from std sig ave									
	0.082982	0.044736	0.018092	0.047466	0.010692	0.048080	0.010126	0.033440	0.008648

concentration data									
SRM614-1	0.23	0.26	0.27	0.29	0.27	0.29	0.27	0.25	0.26
SRM612-1	11.73	15.03	14.23	16.05	16.53	14.97	16.25	16.16	17.10
SRM610-1	192.50	256.42	276.31	270.47	329.98	274.72	332.75	292.31	353.74
AP1-1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
AP2-1	0.56	0.63	0.60	0.66	0.64	0.94	0.93	0.95	0.65
AP3-1	2.57	2.69	2.86	2.94	2.64	3.90	3.89	3.89	2.67
AP4-1	3.85	4.13	4.14	4.31	4.05	5.90	6.06	5.98	4.06
TGP2-1	0.20	0.14	0.08	0.09	0.02	0.03	0.01	0.02	0.01
TGP2-2	0.20	0.12	0.06	0.06	0.01	0.03	0.01	0.01	0.00
TGP2-3	0.33	0.15	0.06	0.12	0.02	0.06	0.01	0.03	0.01

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	0.20	0.08	0.04	0.09	0.01	0.04	0.02	0.03	0.01
TGP2-5	0.10	0.03	0.01	0.03	0.01	0.01	0.00	0.01	0.00
TGP2-6	0.09	0.03	0.01	0.03	0.00	0.02	0.00	0.01	0.00
TGP2-7	0.29	0.10	0.04	0.11	0.02	0.05	0.02	0.04	0.01
TGP2-8	0.12	0.05	0.01	0.05	0.01	0.03	0.01	0.02	0.00
TGP2-9	0.08	0.02	0.01	0.04	0.00	0.01	0.01	0.01	0.01
TGP2-10	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00
TGP2-11	0.08	0.02	0.01	0.02	0.00	0.02	0.00	0.01	0.00
TGP2-12	0.10	0.03	0.01	0.03	0.01	0.03	0.01	0.01	0.01
TGP2-13	0.16	0.06	0.03	0.05	0.02	0.03	0.01	0.01	0.01
TGP2-14	0.10	0.04	0.02	0.03	0.00	0.01	0.00	0.01	0.00
TGP2-15	0.12	0.04	0.02	0.03	0.01	0.02	0.00	0.01	0.00
TGP2-16	0.09	0.04	0.03	0.02	0.00	0.01	0.00	0.00	0.00
TGP2-17	0.09	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.00
TGP2-18	0.09	0.05	0.03	0.01	0.00	0.01	0.00	0.00	0.00
SRM614-2	0.26	0.34	0.33	0.36	0.36	0.37	0.35	0.35	0.35
SRM612-2	14.26	17.40	15.42	16.51	19.94	18.30	19.95	19.38	20.33
SRM610-2	214.76	257.67	261.09	246.66	343.11	280.23	347.69	296.22	357.47
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-2	0.40	0.48	0.45	0.47	0.53	0.81	0.82	0.84	0.57
AP3-2	2.50	2.51	2.54	2.28	2.57	3.75	3.81	3.86	2.61
AP4-2	3.14	3.23	3.09	2.97	3.43	5.12	5.14	5.11	3.45

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-11	4.84	7.24	5.00	5.44	1.12	2.96	1.40	1.80	3.40
SRM614-11	288.60	547.56	1252.33	465.52	1852.01	446.32	1779.61	621.20	1982.81
SRM612-11	12689.39	23598.45	54364.19	21339.40	85844.72	20238.75	89284.42	29047.40	98247.20
SRM610-11	88994.34	174970.58	469003.31	149924.64	705212.19	148063.34	751652.69	212334.08	827364.88
AP1-11	82.40	126.80	326.56	83.72	351.16	88.80	316.00	99.12	304.28
AP2-11	634.28	1037.93	2458.81	940.05	3391.14	1319.73	5199.87	1807.93	3727.26
AP3-11	3288.62	5175.35	12580.43	4616.47	16605.77	6483.96	25898.51	8838.17	18898.07
AP4-11	7944.64	12636.31	31738.94	10730.90	39731.70	15018.40	61673.59	19999.95	43458.32
GCK4-1	70.24	89.92	141.28	26.56	82.04	20.88	51.24	25.28	64.88
GCK4-2	58.72	63.28	123.48	11.12	33.00	18.24	24.04	10.68	22.80
GCK4-3	54.72	68.96	96.48	23.04	45.84	17.28	22.40	23.08	41.24
GCK4-4	81.00	93.72	176.92	34.60	90.28	27.24	80.40	27.44	62.04
GCK4-5	59.28	71.40	100.00	13.36	36.76	12.56	15.88	16.00	30.00
GCK4-6	66.40	82.56	108.68	10.60	56.76	11.16	28.48	15.12	33.92
GCK4-7	26.00	32.12	69.72	16.52	42.32	14.52	40.60	15.16	32.36
GCK4-8	27.52	17.64	21.52	5.60	16.44	4.04	9.64	4.44	10.12
GCK4-9	25.40	29.56	37.08	8.08	20.76	10.20	20.60	8.44	29.56
GCK4-10	25.40	35.84	71.24	15.40	62.40	18.48	58.72	25.56	52.28
GCK4-11	9.64	17.56	28.12	9.48	16.32	7.36	14.44	2.84	10.16
GCK4-12	6.96	19.16	32.04	3.56	17.08	9.16	13.56	3.32	17.80
GCK4-13	26.04	32.12	58.76	11.24	52.28	15.04	52.32	13.40	46.08
GCK4-14	5.08	13.40	15.16	10.60	6.68	5.48	7.32	5.08	17.00
GCK4-15	15.48	12.64	20.60	8.00	29.12	9.28	14.04	6.96	26.04
GCK4-16	15.48	11.80	9.72	6.40	11.68	2.08	2.76	4.20	6.60
GCK4-17	8.52	10.56	4.80	6.52	11.28	3.00	5.28	3.08	5.16
GCK4-18	12.72	8.44	8.20	4.00	6.04	2.48	3.76	3.12	7.48
SRM614-11	114.56	175.00	405.16	150.80	618.36	152.36	635.88	205.40	685.04
SRM612-11	6460.44	11221.22	23741.13	9736.65	41359.47	9871.82	43656.13	14447.00	46670.82
SRM610-11	42899.76	76940.47	187760.50	63592.84	310305.06	68200.42	329265.38	97273.43	354835.63
AP1-11	18.20	16.68	36.32	15.64	49.24	12.92	53.32	24.16	40.20
AP2-11	403.08	614.92	1305.85	510.36	2032.33	785.84	3180.14	1067.45	2423.73
AP3-11	1637.05	2629.21	6115.67	2082.45	8665.65	3295.58	13761.92	4526.59	9536.57
AP4-11	3691.46	5613.55	13548.76	4452.27	18138.06	6930.96	28480.24	9413.57	20001.39
blank-11	11.40	4.56	5.32	5.64	4.20	2.00	5.60	6.24	1.40
blank average	8.12	5.90	5.16	5.54	2.66	2.48	3.50	4.02	2.40

blank subtraction									
SRM614-11	280.48	541.66	1247.17	459.98	1849.35	443.84	1776.11	617.18	1980.41
SRM612-11	12681.27	23592.55	54359.03	21333.86	85842.06	20236.27	89280.92	29043.38	98244.79
SRM610-11	88986.22	174964.68	468998.15	149919.10	705209.53	148060.86	751649.19	212330.06	827362.48
AP1-11	74.28	120.90	321.40	78.18	348.50	86.32	312.50	95.10	301.88
AP2-11	626.16	1032.03	2453.65	934.51	3388.48	1317.25	5196.37	1803.91	3724.86
AP3-11	3280.50	5169.45	12575.27	4610.93	16603.11	6481.48	25895.01	8834.15	18895.67
AP4-11	7936.52	12630.41	31733.78	10725.36	39729.04	15015.92	61670.09	19995.93	43455.92

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	62.12	84.02	136.12	21.02	79.38	18.40	47.74	21.26	62.48
GCK4-2	50.60	57.38	118.32	5.58	30.34	15.76	20.54	6.66	20.40
GCK4-3	46.60	63.06	91.32	17.50	43.18	14.80	18.90	19.06	38.84
GCK4-4	72.88	87.82	171.76	29.06	87.62	24.76	76.90	23.42	59.64
GCK4-5	51.16	65.50	94.84	7.82	34.10	10.08	12.38	11.98	27.60
GCK4-6	58.28	76.66	103.52	5.06	54.10	8.68	24.98	11.10	31.52
GCK4-7	17.88	26.22	64.56	10.98	39.66	12.04	37.10	11.14	29.96
GCK4-8	19.40	11.74	16.36	0.06	13.78	1.56	6.14	0.42	7.72
GCK4-9	17.28	23.66	31.92	2.54	18.10	7.72	17.10	4.42	27.16
GCK4-10	17.28	29.94	66.08	9.86	59.74	16.00	55.22	21.54	49.88
GCK4-11	1.52	11.66	22.96	3.94	13.66	4.88	10.94	-1.18	7.76
GCK4-12	-1.16	13.26	26.88	-1.98	14.42	6.68	10.06	-0.70	15.40
GCK4-13	17.92	26.22	53.60	5.70	49.62	12.56	48.82	9.38	43.68
GCK4-14	-3.04	7.50	10.00	5.06	4.02	3.00	3.82	1.06	14.60
GCK4-15	7.36	6.74	15.44	2.46	26.46	6.80	10.54	2.94	23.64
GCK4-16	7.36	5.90	4.56	0.86	9.02	-0.40	-0.74	0.18	4.20
GCK4-17	0.40	4.66	-0.36	0.98	8.62	0.52	1.78	-0.94	2.76
GCK4-18	4.60	2.54	3.04	-1.54	3.38	0.00	0.26	-0.90	5.08
SRM614-11	106.44	169.10	400.00	145.26	615.70	149.88	632.38	201.38	682.64
SRM612-11	6452.32	11215.32	23735.97	9731.11	41356.81	9869.34	43652.62	14442.98	46668.42
SRM610-11	42891.64	76934.57	187755.34	63587.30	310302.40	68197.94	329261.88	97269.41	354833.23
AP1-11	10.08	10.78	31.16	10.10	46.58	10.44	49.82	20.14	37.80
AP2-11	394.96	609.02	1300.69	504.82	2029.67	783.36	3176.64	1063.43	2421.33
AP3-11	1628.93	2623.31	6110.51	2076.91	8662.99	3293.10	13758.42	4522.57	9534.17
AP4-11	3683.34	5607.65	13543.60	4446.73	18135.40	6928.48	28476.74	9409.55	19998.99

zero correction

SRM614-11	280.48	541.66	1247.17	459.98	1849.35	443.84	1776.11	617.18	1980.41
SRM612-11	12681.27	23592.55	54359.03	21333.86	85842.06	20236.27	89280.92	29043.38	98244.79
SRM610-11	88986.22	174964.68	468998.15	149919.10	705209.53	148060.86	751649.19	212330.06	827362.48
AP1-11	74.28	120.90	321.40	78.18	348.50	86.32	312.50	95.10	301.88
AP2-11	626.16	1032.03	2453.65	934.51	3388.48	1317.25	5196.37	1803.91	3724.86
AP3-11	3280.50	5169.45	12575.27	4610.93	16603.11	6481.48	25895.01	8834.15	18895.67
AP4-11	7936.52	12630.41	31733.78	10725.36	39729.04	15015.92	61670.09	19995.93	43455.92
GCK4-1	62.12	84.02	136.12	21.02	79.38	18.40	47.74	21.26	62.48
GCK4-2	50.60	57.38	118.32	5.58	30.34	15.76	20.54	6.66	20.40
GCK4-3	46.60	63.06	91.32	17.50	43.18	14.80	18.90	19.06	38.84
GCK4-4	72.88	87.82	171.76	29.06	87.62	24.76	76.90	23.42	59.64
GCK4-5	51.16	65.50	94.84	7.82	34.10	10.08	12.38	11.98	27.60
GCK4-6	58.28	76.66	103.52	5.06	54.10	8.68	24.98	11.10	31.52
GCK4-7	17.88	26.22	64.56	10.98	39.66	12.04	37.10	11.14	29.96
GCK4-8	19.40	11.74	16.36	0.06	13.78	1.56	6.14	0.42	7.72
GCK4-9	17.28	23.66	31.92	2.54	18.10	7.72	17.10	4.42	27.16
GCK4-10	17.28	29.94	66.08	9.86	59.74	16.00	55.22	21.54	49.88
GCK4-11	1.52	11.66	22.96	3.94	13.66	4.88	10.94	0.00	7.76
GCK4-12	0.00	13.26	26.88	0.00	14.42	6.68	10.06	0.00	15.40
GCK4-13	17.92	26.22	53.60	5.70	49.62	12.56	48.82	9.38	43.68
GCK4-14	0.00	7.50	10.00	5.06	4.02	3.00	3.82	1.06	14.60
GCK4-15	7.36	6.74	15.44	2.46	26.46	6.80	10.54	2.94	23.64
GCK4-16	7.36	5.90	4.56	0.86	9.02	0.00	0.00	0.18	4.20
GCK4-17	0.40	4.66	0.00	0.98	8.62	0.52	1.78	0.00	2.76
GCK4-18	4.60	2.54	3.04	0.00	3.38	0.00	0.26	0.00	5.08
SRM614-11	106.44	169.10	400.00	145.26	615.70	149.88	632.38	201.38	682.64
SRM612-11	6452.32	11215.32	23735.97	9731.11	41356.81	9869.34	43652.62	14442.98	46668.42
SRM610-11	42891.64	76934.57	187755.34	63587.30	310302.40	68197.94	329261.88	97269.41	354833.23
AP1-11	10.08	10.78	31.16	10.10	46.58	10.44	49.82	20.14	37.80
AP2-11	394.96	609.02	1300.69	504.82	2029.67	783.36	3176.64	1063.43	2421.33
AP3-11	1628.93	2623.31	6110.51	2076.91	8662.99	3293.10	13758.42	4522.57	9534.17
AP4-11	3683.34	5607.65	13543.60	4446.73	18135.40	6928.48	28476.74	9409.55	19998.99

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal									
SRM614-11	0.000077	0.000149	0.000344	0.000127	0.000510	0.000122	0.000490	0.000170	0.000546
SRM612-11	0.004012	0.007465	0.017199	0.006750	0.027161	0.006403	0.028249	0.009189	0.031085
SRM610-11	0.054686	0.107524	0.288222	0.092133	0.433385	0.090991	0.461925	0.130487	0.508454
AP1-11	0.000004	0.000006	0.000016	0.000004	0.000017	0.000004	0.000016	0.000005	0.000015
AP2-11	0.000034	0.000056	0.000133	0.000051	0.000183	0.000071	0.000281	0.000098	0.000201
AP3-11	0.000153	0.000240	0.000585	0.000214	0.000772	0.000301	0.001204	0.000411	0.000879
AP4-11	0.000357	0.000568	0.001426	0.000482	0.001786	0.000675	0.002772	0.000899	0.001953
GCK4-1	0.000003	0.000005	0.000008	0.000001	0.000004	0.000001	0.000003	0.000001	0.000003
GCK4-2	0.000003	0.000003	0.000007	0.000000	0.000002	0.000001	0.000001	0.000000	0.000001
GCK4-3	0.000002	0.000003	0.000005	0.000001	0.000002	0.000001	0.000001	0.000001	0.000002
GCK4-4	0.000003	0.000003	0.000006	0.000001	0.000003	0.000001	0.000003	0.000001	0.000002
GCK4-5	0.000002	0.000002	0.000004	0.000000	0.000001	0.000000	0.000000	0.000000	0.000001
GCK4-6	0.000002	0.000003	0.000004	0.000000	0.000002	0.000000	0.000001	0.000000	0.000001
GCK4-7	0.000002	0.000003	0.000007	0.000001	0.000004	0.000001	0.000004	0.000001	0.000003
GCK4-8	0.000002	0.000002	0.000002	0.000000	0.000002	0.000000	0.000001	0.000000	0.000001
GCK4-9	0.000002	0.000002	0.000003	0.000000	0.000002	0.000001	0.000002	0.000000	0.000002
GCK4-10	0.000002	0.000003	0.000006	0.000001	0.000006	0.000001	0.000005	0.000002	0.000005
GCK4-11	0.000000	0.000002	0.000004	0.000001	0.000003	0.000001	0.000002	0.000000	0.000001
GCK4-12	0.000000	0.000002	0.000004	0.000000	0.000002	0.000001	0.000002	0.000000	0.000003
GCK4-13	0.000001	0.000002	0.000004	0.000000	0.000004	0.000001	0.000004	0.000001	0.000003
GCK4-14	0.000000	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001
GCK4-15	0.000001	0.000001	0.000001	0.000000	0.000002	0.000001	0.000001	0.000000	0.000002
GCK4-16	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
GCK4-17	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
GCK4-18	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SRM614-11	0.000111	0.000176	0.000417	0.000152	0.000643	0.000156	0.000660	0.000210	0.000712
SRM612-11	0.005139	0.008932	0.018904	0.007750	0.032938	0.007860	0.034766	0.011503	0.037168
SRM610-11	0.069232	0.124182	0.303061	0.102638	0.500867	0.110080	0.531470	0.157005	0.572745
AP1-11	0.000001	0.000001	0.000003	0.000001	0.000004	0.000001	0.000004	0.000002	0.000003
AP2-11	0.000034	0.000052	0.000111	0.000043	0.000173	0.000067	0.000271	0.000091	0.000207
AP3-11	0.000123	0.000197	0.000460	0.000156	0.000652	0.000248	0.001035	0.000340	0.000718
AP4-11	0.000282	0.000429	0.001037	0.000341	0.001389	0.000531	0.002181	0.000721	0.001532
standardize signal averages AP									
AP1	0.000002	0.000003	0.000009	0.000002	0.000011	0.000003	0.000010	0.000003	0.000009
AP2	0.000034	0.000054	0.000122	0.000047	0.000178	0.000069	0.000276	0.000094	0.000204
AP3	0.000138	0.000219	0.000522	0.000185	0.000712	0.000275	0.001120	0.000376	0.000798
AP4	0.000319	0.000499	0.001232	0.000411	0.001587	0.000603	0.002477	0.000810	0.001743
linest from std sig ave									
	0.031071	0.020667	0.008446	0.024890	0.006559	0.025378	0.006252	0.019019	0.005999
standardize signal averages SRM									
srm614-2	0.000094	0.000163	0.000381	0.000139	0.000576	0.000139	0.000575	0.000190	0.000629
srm612-2	0.004576	0.008199	0.018052	0.007250	0.030049	0.007132	0.031508	0.010346	0.034127
srm610-2	0.061959	0.115853	0.295641	0.097385	0.467126	0.100535	0.496697	0.143746	0.540600
linest from std sig ave									
	0.081119	0.045375	0.018201	0.050326	0.011065	0.049512	0.010564	0.034595	0.009076
concentration data									
SRM614-11	0.21	0.26	0.25	0.27	0.29	0.27	0.26	0.28	0.28
SRM612-11	10.69	13.23	12.46	14.41	15.28	13.94	15.15	14.99	15.99
SRM610-11	145.72	190.59	208.76	196.67	243.80	198.04	247.67	212.84	261.61
AP1-11	0.05	0.05	0.05	0.04	0.05	0.04	0.04	0.04	0.04
AP2-11	0.42	0.46	0.45	0.50	0.48	0.72	0.70	0.74	0.48
AP3-11	1.89	1.98	1.97	2.13	2.02	3.05	3.00	3.12	2.10
AP4-11	4.42	4.68	4.81	4.79	4.67	6.83	6.91	6.82	4.68
GCK4-1	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01
GCK4-2	0.03	0.03	0.02	0.00	0.00	0.01	0.00	0.00	0.00
GCK4-3	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.00
GCK4-4	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01
GCK4-5	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCK4-6	0.03	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00
GCK4-7	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
GCK4-8	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCK4-9	0.02	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.01
GCK4-10	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01
GCK4-11	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00
GCK4-12	0.00	0.02	0.02	0.00	0.01	0.01	0.00	0.00	0.01
GCK4-13	0.02	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01
GCK4-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK4-15	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
GCK4-16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK4-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK4-18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SRM614-11	0.30	0.31	0.30	0.32	0.36	0.34	0.35	0.34	0.37

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	13.69	15.83	13.69	16.54	18.53	17.11	18.64	18.76	19.12
SRM610-11	184.49	220.11	219.51	219.10	281.76	239.59	284.95	256.09	294.68
AP1-11	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
AP2-11	0.42	0.43	0.37	0.43	0.45	0.68	0.68	0.69	0.50
AP3-11	1.52	1.63	1.55	1.55	1.71	2.51	2.58	2.58	1.72
AP4-11	3.50	3.54	3.49	3.38	3.63	5.37	5.44	5.47	3.67

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-9	6.60	3.68	5.84	2.80	3.36	1.80	1.68	3.24	1.24
SRM614-9	198.44	412.00	980.21	401.28	1318.13	364.28	1307.61	431.36	1477.93
SRM612-9	11783.15	23715.89	54519.91	22856.97	81800.22	19579.63	85104.40	27984.80	94070.49
SRM610-9	84702.44	173285.78	474140.34	160728.11	678115.81	143367.97	710549.06	204993.91	787912.81
AP1-9	42.72	55.40	159.52	52.28	155.56	30.84	128.32	40.52	161.72
AP2-9	568.72	1057.61	2348.21	1009.29	3311.74	1223.21	5172.51	1723.69	3843.62
AP3-9	3174.66	5426.87	13193.71	5118.31	16803.62	6414.48	26457.59	8802.61	18876.03
AP4-9	4714.79	8023.41	19707.87	7643.92	24876.66	9688.49	39578.22	12957.31	28253.12
GCK3-1	38.52	97.12	116.60	21.96	25.92	8.72	8.52	7.76	7.84
GCK3-2	142.88	198.60	256.32	44.92	36.44	20.40	33.32	15.12	15.76
GCK3-3	115.20	184.16	233.60	50.52	50.04	13.84	17.32	12.44	25.76
GCK3-4	47.92	44.92	99.44	46.08	47.48	28.44	38.92	14.60	35.84
GCK3-5	42.00	27.12	38.72	22.44	11.76	19.20	11.32	10.48	8.68
GCK3-6	42.24	27.64	23.76	19.80	16.60	15.84	10.80	8.16	8.88
GCK3-7	52.48	50.16	105.96	36.48	73.24	25.52	59.36	28.32	70.76
GCK3-8	47.48	26.60	30.96	17.52	17.80	13.88	22.16	11.28	13.68
GCK3-9	41.40	32.84	55.12	26.36	31.36	11.80	30.00	14.40	29.60
GCK3-10	57.96	51.68	115.12	54.08	67.64	82.28	112.84	113.24	121.20
GCK3-11	42.48	41.40	46.56	19.72	34.40	26.60	34.52	26.92	18.72
GCK3-12	49.76	27.88	28.96	23.52	16.60	12.04	18.28	13.44	17.08
GCK3-13	40.28	59.88	122.48	43.08	92.56	30.12	99.64	30.32	92.12
GCK3-14	73.76	37.72	39.64	29.20	21.92	14.44	28.72	20.84	22.64
GCK3-15	28.76	22.04	45.68	17.88	10.68	10.84	15.80	14.32	21.24
GCK3-16	65.68	35.40	50.00	32.60	37.08	20.84	27.68	9.04	24.72
GCK3-17	32.80	25.04	24.32	9.80	14.32	10.08	10.64	13.56	10.52
GCK3-18	33.56	29.24	29.00	7.56	24.56	12.40	5.44	10.80	12.68
SRM614-10	190.44	315.52	716.20	258.36	1104.85	289.68	1093.77	388.92	1200.45
SRM612-10	9385.89	17284.42	37761.65	14809.64	63172.40	15098.60	66666.45	21478.96	71599.37
SRM610-10	67603.46	126613.75	318036.00	105738.99	531150.81	111922.11	565545.44	160217.83	614863.81
AP1-10	12.16	10.04	15.36	7.76	21.76	3.16	10.04	3.32	5.76
AP2-10	323.36	561.52	1231.49	489.20	1909.85	788.32	3055.06	968.93	2199.77
AP3-10	2397.37	3838.14	8984.13	3247.86	12089.31	4733.75	19561.07	6428.32	13868.80
AP4-10	3658.22	5904.71	14242.52	4834.31	19354.31	7408.96	30252.73	10133.58	21766.84
blank-10	9.08	13.52	1.88	5.64	7.76	4.96	2.12	6.36	5.24
blank average	7.84	8.60	3.86	4.22	5.56	3.38	1.90	4.80	3.24

blank subtraction									
SRM614-9	190.60	403.40	976.35	397.06	1312.57	360.90	1305.71	426.56	1474.69
SRM612-9	11775.31	23707.29	54516.05	22852.75	81794.66	19576.25	85102.50	27980.00	94067.25
SRM610-9	84694.60	173277.18	474136.48	160723.89	678110.25	143364.59	710547.16	204989.11	787909.57
AP1-9	34.88	46.80	155.66	48.06	150.00	27.46	126.42	35.72	158.48
AP2-9	560.88	1049.01	2344.35	1005.07	3306.18	1219.83	5170.61	1718.89	3840.38
AP3-9	3166.82	5418.27	13189.85	5114.09	16798.05	6411.10	26455.69	8797.81	18872.79
AP4-9	4706.95	8014.81	19704.01	7639.70	24871.10	9685.11	39576.32	12952.51	28249.88
GCK3-1	30.68	88.52	112.74	17.74	20.36	5.34	6.62	2.96	4.60
GCK3-2	135.04	190.00	252.46	40.70	30.88	17.02	31.42	10.32	12.52
GCK3-3	107.36	175.56	229.74	46.30	44.48	10.46	15.42	7.64	22.52
GCK3-4	40.08	36.32	95.58	41.86	41.92	25.06	37.02	9.80	32.60
GCK3-5	34.16	18.52	34.86	18.22	6.20	15.82	9.42	5.68	5.44
GCK3-6	34.40	19.04	19.90	15.58	11.04	12.46	8.90	3.36	5.64
GCK3-7	44.64	41.56	102.10	32.26	67.68	22.14	57.46	23.52	67.52
GCK3-8	39.64	18.00	27.10	13.30	12.24	10.50	20.26	6.48	10.44
GCK3-9	33.56	24.24	51.26	22.14	25.80	8.42	28.10	9.60	26.36
GCK3-10	50.12	43.08	111.26	49.86	62.08	78.90	110.94	108.44	117.96
GCK3-11	34.64	32.80	42.70	15.50	28.84	23.22	32.62	22.12	15.48
GCK3-12	41.92	19.28	25.10	19.30	11.04	8.66	16.38	8.64	13.84
GCK3-13	32.44	51.28	118.62	38.86	87.00	26.74	97.74	25.52	88.88
GCK3-14	65.92	29.12	35.78	24.98	16.36	11.06	26.82	16.04	19.40
GCK3-15	20.92	13.44	41.82	13.66	5.12	7.46	13.90	9.52	18.00
GCK3-16	57.84	26.80	46.14	28.38	31.52	17.46	25.78	4.24	21.48

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	24.96	16.44	20.46	5.58	8.76	6.70	8.74	8.76	7.28
GCK3-18	25.72	20.64	25.14	3.34	19.00	9.02	3.54	6.00	9.44
SRM614-10	182.60	306.92	712.34	254.14	1099.29	286.30	1091.87	384.12	1197.21
SRM612-10	9378.05	17275.82	37757.79	14805.42	63166.83	15095.22	66664.55	21474.16	71596.13
SRM610-10	67595.62	126605.15	318032.14	105734.77	531145.25	111918.73	565543.54	160213.03	614860.57
AP1-10	4.32	1.44	11.50	3.54	16.20	0.00	8.14	-1.48	2.52
AP2-10	315.52	552.92	1227.63	484.98	1904.29	784.94	3053.16	964.13	2196.53
AP3-10	2389.53	3829.54	8980.27	3243.64	12083.75	4730.37	19559.17	6423.52	13865.56
AP4-10	3650.38	5896.11	14238.66	4830.09	19348.75	7405.58	30250.83	10128.78	21763.60

zero correction

SRM614-9	190.60	403.40	976.35	397.06	1312.57	360.90	1305.71	426.56	1474.69
SRM612-9	11775.31	23707.29	54516.05	22852.75	81794.66	19576.25	85102.50	27980.00	94067.25
SRM610-9	84694.60	173277.18	474136.48	160723.89	678110.25	143364.59	710547.16	204989.11	787909.57
AP1-9	34.88	46.80	155.66	48.06	150.00	27.46	126.42	35.72	158.48
AP2-9	560.88	1049.01	2344.35	1005.07	3306.18	1219.83	5170.61	1718.89	3840.38
AP3-9	3166.82	5418.27	13189.85	5114.09	16798.05	6411.10	26455.69	8797.81	18872.79
AP4-9	4706.95	8014.81	19704.01	7639.70	24871.10	9685.11	39576.32	12952.51	28249.88
GCK3-1	30.68	88.52	112.74	17.74	20.36	5.34	6.62	2.96	4.60
GCK3-2	135.04	190.00	252.46	40.70	30.88	17.02	31.42	10.32	12.52
GCK3-3	107.36	175.56	229.74	46.30	44.48	10.46	15.42	7.64	22.52
GCK3-4	40.08	36.32	95.58	41.86	41.92	25.06	37.02	9.80	32.60
GCK3-5	34.16	18.52	34.86	18.22	6.20	15.82	9.42	5.68	5.44
GCK3-6	34.40	19.04	19.90	15.58	11.04	12.46	8.90	3.36	5.64
GCK3-7	44.64	41.56	102.10	32.26	67.68	22.14	57.46	23.52	67.52
GCK3-8	39.64	18.00	27.10	13.30	12.24	10.50	20.26	6.48	10.44
GCK3-9	33.56	24.24	51.26	22.14	25.80	8.42	28.10	9.60	26.36
GCK3-10	50.12	43.08	111.26	49.86	62.08	78.90	110.94	108.44	117.96
GCK3-11	34.64	32.80	42.70	15.50	28.84	23.22	32.62	22.12	15.48
GCK3-12	41.92	19.28	25.10	19.30	11.04	8.66	16.38	8.64	13.84
GCK3-13	32.44	51.28	118.62	38.86	87.00	26.74	97.74	25.52	88.88
GCK3-14	65.92	29.12	35.78	24.98	16.36	11.06	26.82	16.04	19.40
GCK3-15	20.92	13.44	41.82	13.66	5.12	7.46	13.90	9.52	18.00
GCK3-16	57.84	26.80	46.14	28.38	31.52	17.46	25.78	4.24	21.48
GCK3-17	24.96	16.44	20.46	5.58	8.76	6.70	8.74	8.76	7.28
GCK3-18	25.72	20.64	25.14	3.34	19.00	9.02	3.54	6.00	9.44
SRM614-10	182.60	306.92	712.34	254.14	1099.29	286.30	1091.87	384.12	1197.21
SRM612-10	9378.05	17275.82	37757.79	14805.42	63166.83	15095.22	66664.55	21474.16	71596.13
SRM610-10	67595.62	126605.15	318032.14	105734.77	531145.25	111918.73	565543.54	160213.03	614860.57
AP1-10	4.32	1.44	11.50	3.54	16.20	0.00	8.14	0.00	2.52
AP2-10	315.52	552.92	1227.63	484.98	1904.29	784.94	3053.16	964.13	2196.53
AP3-10	2389.53	3829.54	8980.27	3243.64	12083.75	4730.37	19559.17	6423.52	13865.56
AP4-10	3650.38	5896.11	14238.66	4830.09	19348.75	7405.58	30250.83	10128.78	21763.60

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-9	0.000056	0.000118	0.000285	0.000116	0.000383	0.000105	0.000381	0.000125	0.000431
SRM612-9	0.003168	0.006377	0.014665	0.006148	0.022004	0.005266	0.022893	0.007527	0.025305
SRM610-9	0.047056	0.096272	0.263427	0.089297	0.376754	0.079652	0.394775	0.113891	0.437757
AP1-9	0.000001	0.000002	0.000007	0.000002	0.000006	0.000001	0.000005	0.000002	0.000007
AP2-9	0.000028	0.000053	0.000119	0.000051	0.000167	0.000062	0.000262	0.000087	0.000194
AP3-9	0.000119	0.000203	0.000494	0.000191	0.000629	0.000240	0.000990	0.000329	0.000706
AP4-9	0.000211	0.000359	0.000883	0.000343	0.001115	0.000434	0.001774	0.000581	0.001267
GCK3-1	0.000001	0.000004	0.000005	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000
GCK3-2	0.000005	0.000008	0.000010	0.000002	0.000001	0.000001	0.000001	0.000000	0.000000
GCK3-3	0.000005	0.000008	0.000010	0.000002	0.000002	0.000000	0.000001	0.000000	0.000001
GCK3-4	0.000005	0.000004	0.000011	0.000005	0.000005	0.000003	0.000004	0.000001	0.000004
GCK3-5	0.000004	0.000002	0.000004	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001
GCK3-6	0.000004	0.000002	0.000002	0.000002	0.000001	0.000001	0.000001	0.000000	0.000001
GCK3-7	0.000003	0.000003	0.000006	0.000002	0.000004	0.000001	0.000004	0.000001	0.000004
GCK3-8	0.000003	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000002	0.000002	0.000003	0.000001	0.000002	0.000001	0.000002	0.000001	0.000002
GCK3-10	0.000004	0.000003	0.000009	0.000004	0.000005	0.000006	0.000009	0.000008	0.000009
GCK3-11	0.000003	0.000002	0.000003	0.000001	0.000002	0.000002	0.000002	0.000002	0.000001
GCK3-12	0.000003	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
GCK3-13	0.000002	0.000004	0.000008	0.000003	0.000006	0.000002	0.000007	0.000002	0.000006
GCK3-14	0.000004	0.000002	0.000002	0.000002	0.000001	0.000001	0.000002	0.000001	0.000001
GCK3-15	0.000001	0.000001	0.000003	0.000001	0.000000	0.000000	0.000001	0.000001	0.000001
GCK3-16	0.000003	0.000001	0.000003	0.000002	0.000002	0.000001	0.000001	0.000000	0.000001
GCK3-17	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GCK3-18	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
SRM614-10	0.000096	0.000162	0.000375	0.000134	0.000579	0.000151	0.000575	0.000202	0.000630
SRM612-10	0.004418	0.008138	0.017787	0.006974	0.029756	0.007111	0.031404	0.010116	0.033727
SRM610-10	0.062585	0.117220	0.294457	0.097897	0.491773	0.103623	0.523622	0.148337	0.569283
AP1-10	0.000000	0.000000	0.000001	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
AP2-10	0.000026	0.000045	0.000101	0.000040	0.000156	0.000064	0.000250	0.000079	0.000180
AP3-10	0.000120	0.000192	0.000450	0.000163	0.000605	0.000237	0.000980	0.000322	0.000695
AP4-10	0.000214	0.000346	0.000836	0.000283	0.001136	0.000435	0.001775	0.000594	0.001277
standardize signal averages AP									
AP1	0.000001	0.000001	0.000004	0.000001	0.000004	0.000001	0.000003	0.000001	0.000003
AP2	0.000027	0.000049	0.000110	0.000045	0.000162	0.000063	0.000256	0.000083	0.000187
AP3	0.000119	0.000197	0.000472	0.000177	0.000617	0.000239	0.000985	0.000326	0.000701
AP4	0.000213	0.000353	0.000860	0.000313	0.001125	0.000434	0.001775	0.000588	0.001272
linest from std sig ave									
	0.044618	0.028020	0.011607	0.031366	0.008929	0.034030	0.008407	0.025348	0.007949
standardize signal averages SRM									
srm614-2	0.000076	0.000140	0.000330	0.000125	0.000481	0.000128	0.000478	0.000163	0.000531
srm612-2	0.003793	0.007258	0.016226	0.006561	0.025880	0.006189	0.027148	0.008821	0.029516
srm610-2	0.054820	0.106746	0.278942	0.093597	0.434263	0.091637	0.459198	0.131114	0.503520
linest from std sig ave									
	0.091709	0.049254	0.019293	0.052375	0.011904	0.054330	0.011428	0.037937	0.009746
concentration data									
SRM614-9	0.21	0.28	0.28	0.31	0.29	0.31	0.27	0.27	0.29
SRM612-9	12.12	15.33	14.60	16.54	16.85	15.37	16.51	16.36	17.25
SRM610-9	180.06	231.35	262.24	240.21	288.53	232.47	284.62	247.59	298.44
AP1-9	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02
AP2-9	0.51	0.59	0.55	0.64	0.60	0.84	0.88	0.88	0.62
AP3-9	2.11	2.27	2.29	2.40	2.24	3.26	3.32	3.33	2.24
AP4-9	3.76	4.02	4.09	4.29	3.97	5.90	5.95	5.87	4.02
GCK3-1	0.02	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00
GCK3-2	0.10	0.08	0.05	0.02	0.00	0.01	0.00	0.00	0.00
GCK3-3	0.08	0.09	0.05	0.03	0.01	0.01	0.00	0.00	0.00
GCK3-4	0.08	0.05	0.05	0.06	0.02	0.04	0.01	0.01	0.01
GCK3-5	0.06	0.02	0.02	0.02	0.00	0.02	0.00	0.01	0.00
GCK3-6	0.07	0.02	0.01	0.02	0.00	0.02	0.00	0.00	0.00
GCK3-7	0.05	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01
GCK3-8	0.04	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK3-9	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
GCK3-10	0.07	0.04	0.04	0.05	0.02	0.08	0.03	0.08	0.03
GCK3-11	0.05	0.03	0.01	0.01	0.01	0.02	0.01	0.02	0.00
GCK3-12	0.06	0.02	0.01	0.02	0.00	0.01	0.00	0.01	0.00
GCK3-13	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02
GCK3-14	0.08	0.02	0.01	0.02	0.00	0.01	0.01	0.01	0.00
GCK3-15	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00
GCK3-16	0.06	0.02	0.01	0.02	0.01	0.01	0.00	0.00	0.00
GCK3-17	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCK3-18	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00
SRM614-10	0.37	0.39	0.37	0.36	0.44	0.44	0.41	0.44	0.43
SRM612-10	16.90	19.56	17.71	18.76	22.79	20.75	22.64	21.99	22.99
SRM610-10	239.49	281.69	293.13	263.34	376.61	302.42	377.52	322.48	388.10
AP1-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-10	0.46	0.51	0.47	0.50	0.56	0.87	0.84	0.80	0.57
AP3-10	2.13	2.15	2.08	2.03	2.16	3.22	3.29	3.25	2.20
AP4-10	3.81	3.87	3.87	3.55	4.05	5.90	5.95	6.01	4.05
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-7	10.84	7.36	2.80	5.16	4.20	6.48	3.16	3.68	2.52
SRM614-7	243.64	457.00	1025.73	366.52	1526.33	407.84	1575.45	535.08	1762.57
SRM612-7	12375.27	21337.56	46212.94	17798.46	78398.48	18525.78	83552.71	27057.11	89402.63
SRM610-7	67442.46	121268.45	300691.06	98184.84	502019.91	106928.28	536345.81	153704.19	577875.88
AP1-7	52.28	76.56	167.24	44.84	176.76	48.08	207.28	68.68	208.24
AP2-7	579.20	890.41	1976.53	761.60	3110.10	1117.05	4768.43	1646.57	3342.94
AP3-7	3035.42	4560.87	10680.22	3506.30	15271.17	5833.35	23552.45	8051.29	17021.14
AP4-7	4258.98	6448.04	15471.37	5035.95	21802.40	8495.85	34552.75	11097.70	24257.66
GCK2-1	22.40	25.12	35.16	11.12	41.20	11.80	29.04	16.32	32.00
GCK2-2	16.80	11.08	15.16	4.04	8.20	10.76	8.80	6.36	12.60
GCK2-3	13.92	14.92	16.92	4.36	8.16	10.20	16.20	9.00	12.68
GCK2-4	21.36	19.60	41.20	11.88	36.00	10.88	35.64	11.64	33.84
GCK2-5	11.52	12.04	14.20	3.24	12.44	6.64	3.96	4.40	7.84
GCK2-6	23.12	13.84	18.68	10.88	19.68	11.88	10.64	6.04	10.92
GCK2-7	32.56	30.24	62.92	14.72	58.60	18.28	61.80	23.40	55.16
GCK2-8	20.40	11.96	20.56	6.12	23.00	7.04	14.76	3.28	7.84
GCK2-9	19.48	12.44	13.20	7.28	16.92	6.28	8.36	5.60	7.84
GCK2-10	109.84	58.44	83.04	15.12	27.28	19.48	27.64	11.32	20.08
GCK2-11	130.96	62.28	61.20	23.24	23.88	19.08	12.28	13.76	13.32
GCK2-12	97.88	40.76	68.08	13.32	29.72	18.92	12.44	12.48	10.24
GCK2-13	101.84	56.52	72.20	18.48	29.60	22.76	15.44	12.92	17.68
GCK2-14	85.16	44.60	69.72	13.92	16.04	8.36	11.24	6.40	10.20
GCK2-15	102.16	63.84	70.48	16.60	25.36	13.84	7.24	17.56	11.00
GCK2-16	73.04	52.40	74.20	13.96	17.80	19.16	11.32	11.48	8.92
GCK2-17	63.32	36.72	48.32	7.52	21.84	14.56	8.32	5.68	10.12
GCK2-18	48.96	36.88	50.64	5.08	13.44	7.16	12.84	10.52	12.24
SRM614-8	172.24	248.32	553.40	194.76	789.92	223.68	926.65	303.20	949.29
SRM612-8	8157.53	13874.64	29411.53	11706.67	51280.97	12199.79	53711.46	17555.90	56820.32
SRM610-8	53411.02	94149.65	224671.73	75013.95	384199.72	82142.38	407827.63	117984.02	432719.56
AP1-8	16.68	14.00	23.28	6.64	12.52	4.20	12.28	6.20	11.20
AP2-8	342.44	515.48	1156.17	440.16	1872.97	705.04	2963.58	985.37	2062.41
AP3-8	2345.89	3408.58	7762.40	2589.13	11146.74	4392.10	18061.94	6038.71	12879.59
AP4-8	2725.94	4097.06	9327.65	3193.02	14224.08	5335.43	22096.16	7190.48	15183.61
blank-8	4.40	18.20	20.44	2.80	8.20	3.24	2.04	5.88	8.96
blank average	7.62	12.78	11.62	3.98	6.20	4.86	2.60	4.78	5.74
blank subtraction									
SRM614-7	236.02	444.22	1014.11	362.54	1520.13	402.98	1572.85	530.30	1756.83
SRM612-7	12367.65	21324.78	46201.32	17794.48	78392.28	18520.92	83550.11	27052.33	89396.88
SRM610-7	67434.84	121255.67	300679.44	98180.86	502013.71	106923.42	536343.21	153699.41	577870.14
AP1-7	44.66	63.78	155.62	40.86	170.56	43.22	204.68	63.90	202.50
AP2-7	571.58	877.62	1964.91	757.62	3103.90	1112.19	4765.83	1641.79	3337.20
AP3-7	3027.80	4548.09	10668.60	3502.32	15264.97	5828.49	23549.85	8046.51	17015.40
AP4-7	4251.36	6435.26	15459.75	5031.97	21796.20	8490.99	34550.15	11092.92	24251.92
GCK2-1	14.78	12.34	23.54	7.14	35.00	6.94	26.44	11.54	26.26
GCK2-2	9.18	-1.70	3.54	0.06	2.00	5.90	6.20	1.58	6.86
GCK2-3	6.30	2.14	5.30	0.38	1.96	5.34	13.60	4.22	6.94
GCK2-4	13.74	6.82	29.58	7.90	29.80	6.02	33.04	6.86	28.10
GCK2-5	3.90	-0.74	2.58	-0.74	6.24	1.78	1.36	-0.38	2.10
GCK2-6	15.50	1.06	7.06	6.90	13.48	7.02	8.04	1.26	5.18
GCK2-7	24.94	17.46	51.30	10.74	52.40	13.42	59.20	18.62	49.42
GCK2-8	12.78	-0.82	8.94	2.14	16.80	2.18	12.16	-1.50	2.10
GCK2-9	11.86	-0.34	1.58	3.30	10.72	1.42	5.76	0.82	2.10
GCK2-10	102.22	45.66	71.42	11.14	21.08	14.62	25.04	6.54	14.34
GCK2-11	123.34	49.50	49.58	19.26	17.68	14.22	9.68	8.98	7.58
GCK2-12	90.26	27.98	56.46	9.34	23.52	14.06	9.84	7.70	4.50
GCK2-13	94.22	43.74	60.58	14.50	23.40	17.90	12.84	8.14	11.94
GCK2-14	77.54	31.82	58.10	9.94	9.84	3.50	8.64	1.62	4.46
GCK2-15	94.54	51.06	58.86	12.62	19.16	8.98	4.64	12.78	5.26
GCK2-16	65.42	39.62	62.58	9.98	11.60	14.30	8.72	6.70	3.18
GCK2-17	55.70	23.94	36.70	3.54	15.64	9.70	5.72	0.90	4.38
GCK2-18	41.34	24.10	39.02	1.10	7.24	2.30	10.24	5.74	6.50
SRM614-8	164.62	235.54	541.78	190.78	783.72	218.82	924.05	298.42	943.55
SRM612-8	8149.91	13861.86	29399.90	11702.69	51274.77	12194.93	53708.86	17551.12	56814.58
SRM610-8	53403.40	94136.87	224660.11	75009.96	384193.52	82137.52	407825.03	117979.24	432713.82
AP1-8	9.06	1.22	11.66	2.66	6.32	-0.66	9.68	1.42	5.46
AP2-8	334.82	502.70	1144.55	436.18	1866.77	700.18	2960.98	980.59	2056.67
AP3-8	2338.27	3395.80	7750.78	2585.15	11140.54	4387.24	18059.34	6033.93	12873.85
AP4-8	2718.32	4084.28	9316.03	3189.04	14217.88	5330.57	22093.56	7185.70	15177.86
zero correction									
SRM614-7	236.02	444.22	1014.11	362.54	1520.13	402.98	1572.85	530.30	1756.83
SRM612-7	12367.65	21324.78	46201.32	17794.48	78392.28	18520.92	83550.11	27052.33	89396.88
SRM610-7	67434.84	121255.67	300679.44	98180.86	502013.71	106923.42	536343.21	153699.41	577870.14
AP1-7	44.66	63.78	155.62	40.86	170.56	43.22	204.68	63.90	202.50
AP2-7	571.58	877.62	1964.91	757.62	3103.90	1112.19	4765.83	1641.79	3337.20

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	3027.80	4548.09	10668.60	3502.32	15264.97	5828.49	23549.85	8046.51	17015.40
AP4-7	4251.36	6435.26	15459.75	5031.97	21796.20	8490.99	34550.15	11092.92	24251.92
GCK2-1	14.78	12.34	23.54	7.14	35.00	6.94	26.44	11.54	26.26
GCK2-2	9.18	0.00	3.54	0.06	2.00	5.90	6.20	1.58	6.86
GCK2-3	6.30	2.14	5.30	0.38	1.96	5.34	13.60	4.22	6.94
GCK2-4	13.74	6.82	29.58	7.90	29.80	6.02	33.04	6.86	28.10
GCK2-5	3.90	0.00	2.58	0.00	6.24	1.78	1.36	0.00	2.10
GCK2-6	15.50	1.06	7.06	6.90	13.48	7.02	8.04	1.26	5.18
GCK2-7	24.94	17.46	51.30	10.74	52.40	13.42	59.20	18.62	49.42
GCK2-8	12.78	0.00	8.94	2.14	16.80	2.18	12.16	0.00	2.10
GCK2-9	11.86	0.00	1.58	3.30	10.72	1.42	5.76	0.82	2.10
GCK2-10	102.22	45.66	71.42	11.14	21.08	14.62	25.04	6.54	14.34
GCK2-11	123.34	49.50	49.58	19.26	17.68	14.22	9.68	8.98	7.58
GCK2-12	90.26	27.98	56.46	9.34	23.52	14.06	9.84	7.70	4.50
GCK2-13	94.22	43.74	60.58	14.50	23.40	17.90	12.84	8.14	11.94
GCK2-14	77.54	31.82	58.10	9.94	9.84	3.50	8.64	1.62	4.46
GCK2-15	94.54	51.06	58.86	12.62	19.16	8.98	4.64	12.78	5.26
GCK2-16	65.42	39.62	62.58	9.98	11.60	14.30	8.72	6.70	3.18
GCK2-17	55.70	23.94	36.70	3.54	15.64	9.70	5.72	0.90	4.38
GCK2-18	41.34	24.10	39.02	1.10	7.24	2.30	10.24	5.74	6.50
SRM614-8	164.62	235.54	541.78	190.78	783.72	218.82	924.05	298.42	943.55
SRM612-8	8149.91	13861.86	29399.90	11702.69	51274.77	12194.93	53708.86	17551.12	56814.58
SRM610-8	53403.40	94136.87	224660.11	75009.96	384193.52	82137.52	407825.03	117979.24	432713.82
AP1-8	9.06	1.22	11.66	2.66	6.32	0.00	9.68	1.42	5.46
AP2-8	334.82	502.70	1144.55	436.18	1866.77	700.18	2960.98	980.59	2056.67
AP3-8	2338.27	3395.80	7750.78	2585.15	11140.54	4387.24	18059.34	6033.93	12873.85
AP4-8	2718.32	4084.28	9316.03	3189.04	14217.88	5330.57	22093.56	7185.70	15177.86

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-7	0.000095	0.000178	0.000407	0.000145	0.000610	0.000162	0.000631	0.000213	0.000704
SRM612-7	0.005203	0.008971	0.019436	0.007486	0.032979	0.007792	0.035148	0.011381	0.037608
SRM610-7	0.069872	0.125638	0.311546	0.101729	0.520157	0.110788	0.555727	0.159254	0.598755
AP1-7	0.000002	0.000003	0.000008	0.000002	0.000009	0.000002	0.000011	0.000003	0.000011
AP2-7	0.000038	0.000059	0.000131	0.000051	0.000207	0.000074	0.000318	0.000110	0.000223
AP3-7	0.000149	0.000223	0.000524	0.000172	0.000750	0.000286	0.001157	0.000395	0.000836
AP4-7	0.000248	0.000375	0.000901	0.000293	0.001271	0.000495	0.002014	0.000647	0.001414
GCK2-1	0.000003	0.000002	0.000004	0.000001	0.000006	0.000001	0.000005	0.000002	0.000005
GCK2-2	0.000002	0.000000	0.000001	0.000000	0.000000	0.000001	0.000001	0.000000	0.000001
GCK2-3	0.000001	0.000000	0.000001	0.000000	0.000000	0.000001	0.000003	0.000001	0.000001
GCK2-4	0.000002	0.000001	0.000005	0.000001	0.000005	0.000001	0.000006	0.000001	0.000005
GCK2-5	0.000001	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
GCK2-6	0.000002	0.000000	0.000001	0.000001	0.000002	0.000001	0.000001	0.000000	0.000001
GCK2-7	0.000004	0.000003	0.000008	0.000002	0.000009	0.000002	0.000010	0.000003	0.000008
GCK2-8	0.000002	0.000000	0.000001	0.000000	0.000002	0.000000	0.000002	0.000000	0.000000
GCK2-9	0.000002	0.000000	0.000000	0.000001	0.000002	0.000000	0.000001	0.000000	0.000000
GCK2-10	0.000008	0.000003	0.000005	0.000001	0.000002	0.000001	0.000002	0.000000	0.000001
GCK2-11	0.000009	0.000004	0.000004	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
GCK2-12	0.000007	0.000002	0.000004	0.000001	0.000002	0.000001	0.000001	0.000001	0.000000
GCK2-13	0.000007	0.000003	0.000004	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001
GCK2-14	0.000006	0.000003	0.000005	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000
GCK2-15	0.000007	0.000004	0.000004	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000
GCK2-16	0.000006	0.000004	0.000006	0.000001	0.000001	0.000001	0.000001	0.000001	0.000000
GCK2-17	0.000005	0.000002	0.000003	0.000000	0.000001	0.000001	0.000001	0.000000	0.000000
GCK2-18	0.000005	0.000003	0.000005	0.000000	0.000001	0.000000	0.000001	0.000001	0.000001
SRM614-8	0.000121	0.000174	0.000400	0.000141	0.000578	0.000161	0.000682	0.000220	0.000696
SRM612-8	0.005426	0.009228	0.019572	0.007791	0.034134	0.008118	0.035755	0.011684	0.037822
SRM610-8	0.075299	0.132733	0.316771	0.105764	0.541714	0.115814	0.575035	0.166351	0.610128
AP1-8	0.000001	0.000000	0.000001	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000
AP2-8	0.000030	0.000046	0.000104	0.000040	0.000169	0.000064	0.000269	0.000089	0.000187
AP3-8	0.000142	0.000206	0.000470	0.000157	0.000676	0.000266	0.001096	0.000366	0.000781

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.000220	0.000330	0.000753	0.000258	0.001149	0.000431	0.001786	0.000581	0.001227
standardize signal averages AP									
AP1	0.000002	0.000002	0.000005	0.000001	0.000005	0.000001	0.000006	0.000002	0.000006
AP2	0.000034	0.000052	0.000118	0.000045	0.000188	0.000069	0.000293	0.000099	0.000205
AP3	0.000145	0.000215	0.000497	0.000164	0.000713	0.000276	0.001126	0.000381	0.000809
AP4	0.000234	0.000353	0.000827	0.000276	0.001210	0.000463	0.001900	0.000614	0.001320
linest from std sig ave									
	0.039461	0.027431	0.011790	0.035107	0.008159	0.031291	0.007725	0.023547	0.007457
standardize signal averages SRM									
srm614-2	0.000108	0.000176	0.000403	0.000143	0.000594	0.000162	0.000656	0.000216	0.000700
srm612-2	0.005314	0.009100	0.019504	0.007638	0.033557	0.007955	0.035452	0.011532	0.037715
srm610-2	0.072585	0.129186	0.314159	0.103747	0.530936	0.113301	0.565381	0.162803	0.604441
linest from std sig ave									
	0.069246	0.040693	0.017127	0.047242	0.009735	0.043935	0.009281	0.030547	0.008118
concentration data									
SRM614-7	0.32	0.42	0.41	0.44	0.43	0.43	0.42	0.43	0.45
SRM612-7	17.61	21.10	19.65	22.54	23.08	20.91	23.29	22.98	24.05
SRM610-7	236.47	295.57	315.03	306.29	363.99	297.31	368.20	321.61	382.94
AP1-7	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
AP2-7	0.60	0.64	0.62	0.71	0.67	0.93	0.98	1.03	0.66
AP3-7	2.34	2.44	2.46	2.41	2.44	3.57	3.56	3.71	2.49
AP4-7	3.90	4.11	4.24	4.11	4.14	6.18	6.21	6.07	4.21
GCK2-1	0.04	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01
GCK2-2	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
GCK2-3	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
GCK2-4	0.04	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01
GCK2-5	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCK2-6	0.04	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
GCK2-7	0.06	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.02
GCK2-8	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00
GCK2-9	0.03	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
GCK2-10	0.12	0.04	0.02	0.01	0.01	0.01	0.01	0.00	0.00
GCK2-11	0.15	0.04	0.02	0.02	0.00	0.01	0.00	0.01	0.00
GCK2-12	0.11	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.00
GCK2-13	0.11	0.04	0.02	0.02	0.01	0.02	0.00	0.01	0.00
GCK2-14	0.10	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00
GCK2-15	0.11	0.04	0.02	0.01	0.00	0.01	0.00	0.01	0.00
GCK2-16	0.09	0.04	0.03	0.01	0.00	0.02	0.00	0.01	0.00
GCK2-17	0.08	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00
GCK2-18	0.08	0.03	0.02	0.00	0.00	0.00	0.00	0.01	0.00
SRM614-8	0.41	0.41	0.40	0.42	0.40	0.43	0.45	0.44	0.45
SRM612-8	18.36	21.71	19.79	23.46	23.89	21.79	23.69	23.60	24.19
SRM610-8	254.84	312.26	320.32	318.44	379.07	310.80	380.99	335.94	390.21
AP1-8	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-8	0.48	0.50	0.49	0.55	0.55	0.79	0.83	0.84	0.56
AP3-8	2.23	2.26	2.21	2.20	2.20	3.32	3.38	3.44	2.32
AP4-8	3.46	3.61	3.54	3.61	3.74	5.38	5.50	5.46	3.65
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-5	8.52	6.04	12.12	2.48	6.56	3.20	2.44	3.44	1.48
SRM614-5	293.24	496.64	1060.97	343.28	1553.81	430.44	1516.93	548.32	1712.49
SRM612-5	11982.11	20569.88	44634.09	17115.66	75900.91	18136.70	79596.97	26000.27	84868.59
SRM610-5	76500.87	135593.44	340407.75	107176.36	557747.88	117521.90	591579.38	170004.13	634993.75
AP1-5	57.68	71.36	155.84	42.20	190.44	37.36	173.20	50.12	187.80
AP2-5	645.12	816.40	1903.93	733.56	2803.86	1089.49	4540.63	1568.45	3269.58
AP3-5	4694.43	6981.64	16751.22	5211.95	22529.73	8594.53	35367.40	11638.47	24685.54
AP4-5	7369.80	10758.06	26166.03	8231.17	34957.12	13162.95	55138.75	17807.42	38105.73
GCK1-1	85.84	44.40	72.64	23.56	61.60	23.84	47.80	20.00	35.16
GCK1-2	83.00	32.60	47.40	23.68	29.20	23.56	17.56	15.24	19.56
GCK1-3	63.16	28.08	37.04	12.00	22.56	24.20	14.32	11.88	13.12
GCK1-4	116.24	41.92	59.72	22.16	43.76	15.28	37.48	13.40	29.88
GCK1-5	73.56	33.84	48.12	12.92	38.76	15.28	25.00	12.00	19.72
GCK1-6	54.64	33.60	45.20	10.32	25.80	17.52	16.96	15.84	22.04

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	40.76	44.16	76.40	14.88	54.52	9.96	47.24	14.44	46.80
GCK1-8	21.96	19.88	21.24	9.24	15.08	9.00	16.44	8.52	8.84
GCK1-9	32.28	22.60	28.84	11.80	10.48	5.20	9.28	6.20	11.08
GCK1-10	58.16	23.04	54.84	13.12	39.12	18.44	38.80	14.00	29.32
GCK1-11	66.28	33.24	32.04	13.16	24.76	9.48	15.16	7.84	25.36
GCK1-12	53.36	23.32	33.60	12.76	21.20	4.12	12.96	7.88	12.96
GCK1-13	58.36	34.36	61.32	16.36	54.48	11.76	39.00	12.76	43.88
GCK1-14	60.36	26.56	24.04	21.84	21.36	15.56	18.40	8.88	13.64
GCK1-15	63.32	28.32	24.04	19.24	22.36	12.40	15.72	10.80	10.40
GCK1-16	40.48	16.44	49.20	15.24	37.32	15.16	32.20	15.20	21.28
GCK1-17	61.84	30.04	35.28	14.48	34.20	17.12	27.92	16.52	16.68
GCK1-18	74.44	21.68	19.76	10.76	22.28	13.12	15.92	16.60	19.84
SRM614-6	160.72	260.44	570.28	203.12	928.25	240.28	912.25	298.76	854.44
SRM612-6	8046.93	13543.68	28635.40	11339.54	49704.04	11652.79	52503.90	17037.38	55326.87
SRM610-6	56636.20	98220.59	237283.69	79408.52	406213.22	86551.09	429547.56	124731.18	455423.19
AP1-6	10.72	11.68	12.36	8.72	20.52	7.72	13.08	13.08	12.32
AP2-6	301.24	493.32	1161.61	429.48	1879.37	699.36	2861.74	969.17	2088.37
AP3-6	2555.33	3931.94	9130.89	2988.42	12731.39	4812.99	20335.23	6636.76	14021.00
AP4-6	2988.74	4669.91	10597.66	3372.42	14881.24	5642.91	23405.21	7691.80	16132.13
blank-6	4.08	4.08	6.40	3.20	9.56	5.72	1.44	1.44	2.56
blank average	6.30	5.06	9.26	2.84	8.06	4.46	1.94	2.44	2.02

blank subtraction									
SRM614-5	286.94	491.58	1051.71	340.44	1545.75	425.98	1514.99	545.88	1710.47
SRM612-5	11975.81	20564.81	44624.83	17112.82	75892.85	18132.24	79595.03	25997.83	84866.57
SRM610-5	76494.57	135588.38	340398.49	107173.52	557739.82	117517.44	591577.44	170001.69	634991.73
AP1-5	51.38	66.30	146.58	39.36	182.38	32.90	171.26	47.68	185.78
AP2-5	638.82	811.34	1894.67	730.72	2795.80	1085.03	4538.69	1566.01	3267.56
AP3-5	4688.13	6976.58	16741.95	5209.11	22521.67	8590.07	35365.46	11636.03	24683.52
AP4-5	7363.50	10753.00	26156.77	8228.33	34949.06	13158.49	55136.81	17804.98	38103.71
GCK1-1	79.54	39.34	63.38	20.72	53.54	19.38	45.86	17.56	33.14
GCK1-2	76.70	27.54	38.14	20.84	21.14	19.10	15.62	12.80	17.54
GCK1-3	56.86	23.02	27.78	9.16	14.50	19.74	12.38	9.44	11.10
GCK1-4	109.94	36.86	50.46	19.32	35.70	10.82	35.54	10.96	27.86
GCK1-5	67.26	28.78	38.86	10.08	30.70	10.82	23.06	9.56	17.70
GCK1-6	48.34	28.54	35.94	7.48	17.74	13.06	15.02	13.40	20.02
GCK1-7	34.46	39.10	67.14	12.04	46.46	5.50	45.30	12.00	44.78
GCK1-8	15.66	14.82	11.98	6.40	7.02	4.54	14.50	6.08	6.82
GCK1-9	25.98	17.54	19.58	8.96	2.42	0.74	7.34	3.76	9.06
GCK1-10	51.86	17.98	45.58	10.28	31.06	13.98	36.86	11.56	27.30
GCK1-11	59.98	28.18	22.78	10.32	16.70	5.02	13.22	5.40	23.34
GCK1-12	47.06	18.26	24.34	9.92	13.14	-0.34	11.02	5.44	10.94
GCK1-13	52.06	29.30	52.06	13.52	46.42	7.30	37.06	10.32	41.86
GCK1-14	54.06	21.50	14.78	19.00	13.30	11.10	16.46	6.44	11.62
GCK1-15	57.02	23.26	14.78	16.40	14.30	7.94	13.78	8.36	8.38
GCK1-16	34.18	11.38	39.94	12.40	29.26	10.70	30.26	12.76	19.26
GCK1-17	55.54	24.98	26.02	11.64	26.14	12.66	25.98	14.08	14.66
GCK1-18	68.14	16.62	10.50	7.92	14.22	8.66	13.98	14.16	17.82
SRM614-6	154.42	255.38	561.02	200.28	920.19	235.82	910.31	296.32	852.42
SRM612-6	8040.63	13538.62	28626.14	11336.70	49695.98	11648.32	52501.95	17034.93	55324.85
SRM610-6	56629.90	98215.53	237274.43	79405.68	406205.16	86546.63	429545.62	124728.74	455421.17
AP1-6	4.42	6.62	3.10	5.88	12.46	3.26	11.14	11.24	10.30
AP2-6	294.94	488.26	1152.35	426.64	1871.31	694.90	2859.80	966.73	2086.35
AP3-6	2549.03	3926.88	9121.63	2985.58	12723.33	4808.53	20333.29	6634.32	14018.98
AP4-6	2982.44	4664.85	10588.40	3369.58	14873.18	5638.45	23403.27	7689.36	16130.11

zero correction									
SRM614-5	286.94	491.58	1051.71	340.44	1545.75	425.98	1514.99	545.88	1710.47
SRM612-5	11975.81	20564.81	44624.83	17112.82	75892.85	18132.24	79595.03	25997.83	84866.57
SRM610-5	76494.57	135588.38	340398.49	107173.52	557739.82	117517.44	591577.44	170001.69	634991.73
AP1-5	51.38	66.30	146.58	39.36	182.38	32.90	171.26	47.68	185.78
AP2-5	638.82	811.34	1894.67	730.72	2795.80	1085.03	4538.69	1566.01	3267.56
AP3-5	4688.13	6976.58	16741.95	5209.11	22521.67	8590.07	35365.46	11636.03	24683.52
AP4-5	7363.50	10753.00	26156.77	8228.33	34949.06	13158.49	55136.81	17804.98	38103.71
GCK1-1	79.54	39.34	63.38	20.72	53.54	19.38	45.86	17.56	33.14
GCK1-2	76.70	27.54	38.14	20.84	21.14	19.10	15.62	12.80	17.54
GCK1-3	56.86	23.02	27.78	9.16	14.50	19.74	12.38	9.44	11.10
GCK1-4	109.94	36.86	50.46	19.32	35.70	10.82	35.54	10.96	27.86
GCK1-5	67.26	28.78	38.86	10.08	30.70	10.82	23.06	9.56	17.70
GCK1-6	48.34	28.54	35.94	7.48	17.74	13.06	15.02	13.40	20.02
GCK1-7	34.46	39.10	67.14	12.04	46.46	5.50	45.30	12.00	44.78
GCK1-8	15.66	14.82	11.98	6.40	7.02	4.54	14.50	6.08	6.82
GCK1-9	25.98	17.54	19.58	8.96	2.42	0.74	7.34	3.76	9.06
GCK1-10	51.86	17.98	45.58	10.28	31.06	13.98	36.86	11.56	27.30
GCK1-11	59.98	28.18	22.78	10.32	16.70	5.02	13.22	5.40	23.34
GCK1-12	47.06	18.26	24.34	9.92	13.14	0.00	11.02	5.44	10.94
GCK1-13	52.06	29.30	52.06	13.52	46.42	7.30	37.06	10.32	41.86
GCK1-14	54.06	21.50	14.78	19.00	13.30	11.10	16.46	6.44	11.62

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	57.02	23.26	14.78	16.40	14.30	7.94	13.78	8.36	8.38
GCK1-16	34.18	11.38	39.94	12.40	29.26	10.70	30.26	12.76	19.26
GCK1-17	55.54	24.98	26.02	11.64	26.14	12.66	25.98	14.08	14.66
GCK1-18	68.14	16.62	10.50	7.92	14.22	8.66	13.98	14.16	17.82
SRM614-6	154.42	255.38	561.02	200.28	920.19	235.82	910.31	296.32	852.42
SRM612-6	8040.63	13538.62	28626.14	11336.70	49695.98	11648.32	52501.95	17034.93	55324.85
SRM610-6	56629.90	98215.53	237274.43	79405.68	406205.16	86546.63	429545.62	124728.74	455421.17
AP1-6	4.42	6.62	3.10	5.88	12.46	3.26	11.14	11.24	10.30
AP2-6	294.94	488.26	1152.35	426.64	1871.31	694.90	2859.80	966.73	2086.35
AP3-6	2549.03	3926.88	9121.63	2985.58	12723.33	4808.53	20333.29	6634.32	14018.98
AP4-6	2982.44	4664.85	10588.40	3369.58	14873.18	5638.45	23403.27	7689.36	16130.11

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	424.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-5	0.000116	0.000199	0.000427	0.000138	0.000627	0.000173	0.000615	0.000221	0.000694
SRM612-5	0.005370	0.009222	0.020011	0.007674	0.034033	0.008131	0.035693	0.011658	0.038057
SRM610-5	0.071126	0.126073	0.316509	0.099652	0.518597	0.109270	0.550060	0.158071	0.590427
AP1-5	0.000003	0.000004	0.000008	0.000002	0.000011	0.000002	0.000010	0.000003	0.000011
AP2-5	0.000045	0.000057	0.000134	0.000052	0.000197	0.000077	0.000320	0.000111	0.000231
AP3-5	0.000231	0.000344	0.000825	0.000257	0.001110	0.000423	0.001743	0.000573	0.001217
AP4-5	0.000402	0.000587	0.001427	0.000449	0.001907	0.000718	0.003008	0.000971	0.002079
GCK1-1	0.000004	0.000002	0.000004	0.000001	0.000003	0.000001	0.000003	0.000001	0.000002
GCK1-2	0.000004	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
GCK1-3	0.000004	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
GCK1-4	0.000006	0.000002	0.000003	0.000001	0.000002	0.000001	0.000002	0.000001	0.000001
GCK1-5	0.000004	0.000002	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001
GCK1-6	0.000003	0.000002	0.000002	0.000000	0.000001	0.000001	0.000001	0.000001	0.000001
GCK1-7	0.000004	0.000005	0.000008	0.000001	0.000006	0.000001	0.000005	0.000001	0.000005
GCK1-8	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001	0.000002	0.000001	0.000001
GCK1-9	0.000003	0.000002	0.000002	0.000001	0.000000	0.000000	0.000001	0.000000	0.000001
GCK1-10	0.000003	0.000001	0.000002	0.000001	0.000002	0.000001	0.000002	0.000001	0.000001
GCK1-11	0.000004	0.000002	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001
GCK1-12	0.000003	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001
GCK1-13	0.000005	0.000003	0.000005	0.000001	0.000004	0.000001	0.000003	0.000001	0.000004
GCK1-14	0.000005	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
GCK1-15	0.000005	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
GCK1-16	0.000004	0.000001	0.000005	0.000002	0.000004	0.000001	0.000004	0.000002	0.000002
GCK1-17	0.000006	0.000003	0.000003	0.000001	0.000003	0.000001	0.000003	0.000001	0.000002
GCK1-18	0.000009	0.000002	0.000001	0.000001	0.000002	0.000001	0.000002	0.000002	0.000002
SRM614-6	0.000115	0.000189	0.000416	0.000149	0.000682	0.000175	0.000675	0.000220	0.000632
SRM612-6	0.005666	0.009540	0.020170	0.007988	0.035017	0.008208	0.036994	0.012003	0.038983
SRM610-6	0.077163	0.133827	0.323306	0.108197	0.553488	0.117927	0.585291	0.169953	0.620548
AP1-6	0.000000	0.000001	0.000000	0.000000	0.000001	0.000000	0.000001	0.000001	0.000001
AP2-6	0.000029	0.000048	0.000113	0.000042	0.000183	0.000068	0.000279	0.000094	0.000204
AP3-6	0.000167	0.000257	0.000598	0.000196	0.000834	0.000315	0.001332	0.000435	0.000918
AP4-6	0.000270	0.000422	0.000958	0.000305	0.001345	0.000510	0.002116	0.000695	0.001459

standardize signal averages AP									
AP1	0.000002	0.000002	0.000004	0.000001	0.000006	0.000001	0.000005	0.000002	0.000006
AP2	0.000037	0.000052	0.000123	0.000047	0.000190	0.000072	0.000300	0.000102	0.000217
AP3	0.000199	0.000301	0.000711	0.000226	0.000972	0.000369	0.001538	0.000504	0.001068
AP4	0.000336	0.000504	0.001192	0.000377	0.001626	0.000614	0.002562	0.000833	0.001769

linest from std sig ave									
	0.027887	0.019313	0.008206	0.025690	0.006059	0.023582	0.005719	0.017504	0.005595

standardize signal averages SRM									
srM614-2	0.000115	0.000194	0.000421	0.000143	0.000655	0.000174	0.000645	0.000221	0.000663
srM612-2	0.005518	0.009381	0.020091	0.007831	0.034525	0.008169	0.036343	0.011831	0.038520
srM610-2	0.074144	0.129950	0.319907	0.103924	0.536042	0.113598	0.567675	0.164012	0.605488

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave									
	0.067785	0.040449	0.016819	0.047156	0.009642	0.043816	0.009243	0.030320	0.008103
concentration data									
SRM614-5	0.28	0.33	0.30	0.30	0.33	0.35	0.30	0.33	0.33
SRM612-5	12.84	15.27	14.08	16.91	17.69	16.44	17.51	17.50	18.26
SRM610-5	170.11	208.82	222.75	219.56	269.49	221.00	269.81	237.30	283.33
AP1-5	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02
AP2-5	0.50	0.44	0.44	0.53	0.48	0.72	0.73	0.77	0.51
AP3-5	2.57	2.65	2.70	2.63	2.68	3.98	3.98	4.00	2.72
AP4-5	4.47	4.52	4.67	4.60	4.61	6.75	6.86	6.78	4.64
GCK1-1	0.05	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00
GCK1-2	0.04	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK1-3	0.04	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK1-4	0.07	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK1-5	0.04	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK1-6	0.03	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00
GCK1-7	0.05	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01
GCK1-8	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00
GCK1-9	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
GCK1-10	0.03	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00
GCK1-11	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCK1-12	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCK1-13	0.05	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
GCK1-14	0.05	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00
GCK1-15	0.06	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.00
GCK1-16	0.05	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01
GCK1-17	0.07	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00
GCK1-18	0.10	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.01
SRM614-6	0.27	0.31	0.29	0.33	0.35	0.35	0.33	0.33	0.30
SRM612-6	13.55	15.80	14.20	17.60	18.20	16.60	18.15	18.02	18.71
SRM610-6	184.55	221.67	227.53	238.38	287.62	238.51	287.09	255.14	297.78
AP1-6	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
AP2-6	0.32	0.37	0.37	0.43	0.44	0.64	0.64	0.66	0.45
AP3-6	1.86	1.98	1.96	2.00	2.01	2.96	3.04	3.04	2.05
AP4-6	3.00	3.25	3.13	3.12	3.25	4.80	4.83	4.86	3.26
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	6.80	4.40	2.36	3.72	2.12	2.44	4.52	9.80	3.16
SRM614-1	308.60	468.80	1169.65	410.56	1545.09	439.68	1545.97	558.72	1616.41
SRM612-1	12432.83	22264.53	48088.63	18654.98	81182.77	18952.11	84942.00	27783.08	90996.31
SRM610-1	79792.49	144349.94	360312.63	116810.09	589814.06	127059.88	628090.06	181885.47	678365.94
AP1-1	85.04	79.00	168.40	47.32	189.36	44.20	195.52	65.72	159.40
AP2-1	707.24	1126.93	2417.41	861.84	3704.06	1536.45	6100.59	2012.93	4270.22
AP3-1	5066.95	8013.81	18925.03	6403.80	26370.67	10209.98	42134.72	13864.72	29408.41
AP4-1	6593.64	10244.98	24361.86	7766.60	33282.19	12579.91	52820.62	17457.14	37112.29
V2-1	48.44	26.64	40.28	18.80	31.04	21.36	28.48	8.72	24.92
V2-2	27.44	12.36	13.56	16.32	10.32	10.04	13.88	6.44	6.48
V2-3	20.76	25.20	15.60	16.44	7.76	13.00	8.96	12.36	11.40
V2-4	131.56	69.20	114.36	54.52	112.84	56.68	103.84	49.08	104.20
V2-5	84.32	36.44	43.64	26.88	20.44	24.52	17.00	11.16	19.80
V2-6	67.84	40.92	74.64	25.00	41.76	21.48	35.80	18.36	21.72
V2-7	121.76	73.48	108.68	45.92	84.88	33.12	91.48	31.00	90.72
V2-8	46.12	30.52	51.20	19.28	21.60	4.64	17.76	10.56	13.16
V2-9	58.64	24.92	45.76	17.28	20.72	9.76	22.00	11.56	26.12
V2-10	96.24	47.80	88.32	40.48	71.32	27.52	58.48	23.92	66.32
V2-11	58.96	19.72	24.92	14.52	15.88	8.64	8.24	8.72	9.12
V2-12	49.00	39.16	51.16	15.88	31.92	14.00	21.68	8.84	10.68
V2-13	380.44	194.20	208.32	114.88	106.92	102.76	82.56	54.80	49.16
V2-14	309.04	189.00	215.80	102.36	76.88	90.20	67.00	43.16	25.08
V2-15	356.20	170.64	196.20	104.72	81.48	82.60	70.36	57.72	22.16
SRM614-2	165.16	302.36	646.40	218.16	917.49	246.92	955.13	326.28	1016.81
SRM612-2	9341.49	16448.89	35118.20	13654.68	60329.70	14456.28	63190.48	20461.23	67289.34
SRM610-2	66110.53	117465.22	289253.06	93209.81	475116.19	102400.54	507164.63	146358.98	541513.75
AP1-2	14.72	28.44	24.40	10.12	19.20	13.12	52.72	21.60	35.04
AP2-2	440.92	689.24	1430.41	537.36	2352.45	922.85	3709.14	1262.37	2561.89
AP3-2	1970.61	3040.78	6971.60	2362.81	10171.58	3963.54	16104.57	5271.07	11337.42
AP4-2	3702.82	5699.91	13376.72	4446.15	19239.15	7482.44	31089.22	10392.70	22008.48

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	2.92	30.44	34.72	4.68	3.72	3.20	0.84	3.24	4.20
blank average	4.86	17.42	18.54	4.20	2.92	2.82	2.68	6.52	3.68
blank subtraction									
SRM614-1	303.74	451.38	1151.11	406.36	1542.17	436.86	1543.29	552.20	1612.73
SRM612-1	12427.97	22247.10	48070.09	18650.78	81179.85	18949.28	84939.32	27776.56	90992.63
SRM610-1	79787.63	144332.52	360294.09	116805.89	589811.14	127057.06	628087.38	181878.95	678362.26
AP1-1	80.18	61.58	149.86	43.12	186.44	41.38	192.84	59.20	155.72
AP2-1	702.38	1109.51	2398.87	857.64	3701.14	1533.63	6097.91	2006.41	4266.54
AP3-1	5062.09	7996.39	18906.49	6399.60	26367.75	10207.16	42132.03	13858.20	29404.73
AP4-1	6588.78	10227.56	24343.32	7762.40	33279.27	12577.09	52817.94	17450.62	37108.61
V2-1	43.58	9.22	21.74	14.60	28.12	18.54	25.80	2.20	21.24
V2-2	22.58	-5.06	-4.98	12.12	7.40	7.22	11.20	-0.08	2.80
V2-3	15.90	7.78	-2.94	12.24	4.84	10.18	6.28	5.84	7.72
V2-4	126.70	51.78	95.82	50.32	109.92	53.86	101.16	42.56	100.52
V2-5	79.46	19.02	25.10	22.68	17.52	21.70	14.32	4.64	16.12
V2-6	62.98	23.50	56.10	20.80	38.84	18.66	33.12	11.84	18.04
V2-7	116.90	56.06	90.14	41.72	81.96	30.30	88.80	24.48	87.04
V2-8	41.26	13.10	32.66	15.08	18.68	1.82	15.08	4.04	9.48
V2-9	53.78	7.50	27.22	13.08	17.80	6.94	19.32	5.04	22.44
V2-10	91.38	30.38	69.78	36.28	68.40	24.70	55.80	17.40	62.64
V2-11	54.10	2.30	6.38	10.32	12.96	5.82	5.56	2.20	5.44
V2-12	44.14	21.74	32.62	11.68	29.00	11.18	19.00	2.32	7.00
V2-13	375.58	176.78	189.78	110.68	104.00	99.94	79.88	48.28	45.48
V2-14	304.18	171.58	197.26	98.16	73.96	87.38	64.32	36.64	21.40
V2-15	351.34	153.22	177.66	100.52	78.56	79.78	67.68	51.20	18.48
SRM614-2	160.30	284.94	627.86	213.96	914.57	244.10	952.45	319.76	1013.13
SRM612-2	9336.63	16431.47	35099.66	13650.48	60326.78	14453.46	63187.80	20454.71	67285.66
SRM610-2	66105.67	117447.80	289234.52	93205.60	475113.27	102397.72	507161.95	146352.46	541510.07
AP1-2	9.86	11.02	5.86	5.92	16.28	10.30	50.04	15.08	31.36
AP2-2	436.06	671.82	1411.87	533.16	2349.53	920.03	3706.46	1255.85	2558.21
AP3-2	1965.75	3023.36	6953.06	2358.61	10168.66	3960.72	16101.89	5264.55	11333.74
AP4-2	3697.96	5682.49	13358.18	4441.94	19236.23	7479.62	31086.53	10386.18	22004.80
zero correction									
SRM614-1	303.74	451.38	1151.11	406.36	1542.17	436.86	1543.29	552.20	1612.73
SRM612-1	12427.97	22247.10	48070.09	18650.78	81179.85	18949.28	84939.32	27776.56	90992.63
SRM610-1	79787.63	144332.52	360294.09	116805.89	589811.14	127057.06	628087.38	181878.95	678362.26
AP1-1	80.18	61.58	149.86	43.12	186.44	41.38	192.84	59.20	155.72
AP2-1	702.38	1109.51	2398.87	857.64	3701.14	1533.63	6097.91	2006.41	4266.54
AP3-1	5062.09	7996.39	18906.49	6399.60	26367.75	10207.16	42132.03	13858.20	29404.73
AP4-1	6588.78	10227.56	24343.32	7762.40	33279.27	12577.09	52817.94	17450.62	37108.61
V2-1	43.58	9.22	21.74	14.60	28.12	18.54	25.80	2.20	21.24
V2-2	22.58	0.00	0.00	12.12	7.40	7.22	11.20	0.00	2.80
V2-3	15.90	7.78	0.00	12.24	4.84	10.18	6.28	5.84	7.72
V2-4	126.70	51.78	95.82	50.32	109.92	53.86	101.16	42.56	100.52
V2-5	79.46	19.02	25.10	22.68	17.52	21.70	14.32	4.64	16.12
V2-6	62.98	23.50	56.10	20.80	38.84	18.66	33.12	11.84	18.04
V2-7	116.90	56.06	90.14	41.72	81.96	30.30	88.80	24.48	87.04
V2-8	41.26	13.10	32.66	15.08	18.68	1.82	15.08	4.04	9.48
V2-9	53.78	7.50	27.22	13.08	17.80	6.94	19.32	5.04	22.44
V2-10	91.38	30.38	69.78	36.28	68.40	24.70	55.80	17.40	62.64
V2-11	54.10	2.30	6.38	10.32	12.96	5.82	5.56	2.20	5.44
V2-12	44.14	21.74	32.62	11.68	29.00	11.18	19.00	2.32	7.00
V2-13	375.58	176.78	189.78	110.68	104.00	99.94	79.88	48.28	45.48
V2-14	304.18	171.58	197.26	98.16	73.96	87.38	64.32	36.64	21.40
V2-15	351.34	153.22	177.66	100.52	78.56	79.78	67.68	51.20	18.48
SRM614-2	160.30	284.94	627.86	213.96	914.57	244.10	952.45	319.76	1013.13
SRM612-2	9336.63	16431.47	35099.66	13650.48	60326.78	14453.46	63187.80	20454.71	67285.66
SRM610-2	66105.67	117447.80	289234.52	93205.60	475113.27	102397.72	507161.95	146352.46	541510.07
AP1-2	9.86	11.02	5.86	5.92	16.28	10.30	50.04	15.08	31.36
AP2-2	436.06	671.82	1411.87	533.16	2349.53	920.03	3706.46	1255.85	2558.21
AP3-2	1965.75	3023.36	6953.06	2358.61	10168.66	3960.72	16101.89	5264.55	11333.74
AP4-2	3697.96	5682.49	13358.18	4441.94	19236.23	7479.62	31086.53	10386.18	22004.80
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-1	0.000121	0.000180	0.000459	0.000162	0.000615	0.000174	0.000615	0.000220	0.000643
SRM612-1	0.005561	0.009954	0.021508	0.008345	0.036323	0.008479	0.038005	0.012428	0.040714
SRM610-1	0.076371	0.138152	0.344865	0.111804	0.564553	0.121616	0.601190	0.174090	0.649312
AP1-1	0.000005	0.000004	0.000009	0.000003	0.000011	0.000002	0.000011	0.000003	0.000009
AP2-1	0.000041	0.000064	0.000139	0.000050	0.000214	0.000089	0.000353	0.000116	0.000247
AP3-1	0.000241	0.000381	0.000900	0.000305	0.001255	0.000486	0.002005	0.000660	0.001400
AP4-1	0.000328	0.000509	0.001213	0.000387	0.001658	0.000627	0.002631	0.000869	0.001849
V2-1	0.000005	0.000001	0.000002	0.000002	0.000003	0.000002	0.000003	0.000000	0.000002
V2-2	0.000003	0.000000	0.000000	0.000002	0.000001	0.000001	0.000001	0.000000	0.000000
V2-3	0.000002	0.000001	0.000000	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001
V2-4	0.000015	0.000006	0.000011	0.000006	0.000013	0.000006	0.000012	0.000005	0.000012
V2-5	0.000009	0.000002	0.000003	0.000003	0.000002	0.000002	0.000002	0.000001	0.000002
V2-6	0.000007	0.000003	0.000006	0.000002	0.000004	0.000002	0.000004	0.000001	0.000002
V2-7	0.000019	0.000009	0.000015	0.000007	0.000013	0.000005	0.000014	0.000004	0.000014
V2-8	0.000007	0.000002	0.000005	0.000003	0.000003	0.000000	0.000003	0.000001	0.000002
V2-9	0.000010	0.000001	0.000005	0.000002	0.000003	0.000001	0.000004	0.000001	0.000002
V2-10	0.000018	0.000006	0.000014	0.000007	0.000013	0.000005	0.000011	0.000003	0.000012
V2-11	0.000012	0.000000	0.000001	0.000002	0.000003	0.000001	0.000001	0.000000	0.000001
V2-12	0.000010	0.000005	0.000007	0.000003	0.000006	0.000003	0.000004	0.000001	0.000002
V2-13	0.000021	0.000010	0.000011	0.000006	0.000006	0.000006	0.000004	0.000003	0.000003
V2-14	0.000017	0.000009	0.000011	0.000005	0.000004	0.000005	0.000004	0.000002	0.000001
V2-15	0.000018	0.000008	0.000009	0.000005	0.000004	0.000004	0.000003	0.000003	0.000001
SRM614-2	0.000106	0.000188	0.000415	0.000141	0.000605	0.000161	0.000630	0.000211	0.000670
SRM612-2	0.005440	0.009574	0.020451	0.007953	0.035149	0.008421	0.036816	0.011918	0.039203
SRM610-2	0.073881	0.131262	0.323254	0.104169	0.530996	0.114442	0.566815	0.163567	0.605203
AP1-2	0.000001	0.000001	0.000000	0.000000	0.000001	0.000001	0.000001	0.000000	0.000003
AP2-2	0.000035	0.000054	0.000113	0.000043	0.000188	0.000074	0.000297	0.000101	0.000205
AP3-2	0.000152	0.000234	0.000539	0.000183	0.000788	0.000307	0.001248	0.000408	0.000879
AP4-2	0.000249	0.000383	0.000900	0.000299	0.001297	0.000504	0.002095	0.000700	0.001483
standardize signal averages AP									
AP1	0.000003	0.000002	0.000005	0.000002	0.000006	0.000002	0.000008	0.000002	0.000006
AP2	0.000038	0.000059	0.000126	0.000046	0.000201	0.000081	0.000325	0.000108	0.000226
AP3	0.000197	0.000307	0.000719	0.000244	0.001022	0.000396	0.001627	0.000534	0.001139
AP4	0.000289	0.000446	0.001057	0.000343	0.001477	0.000565	0.002363	0.000785	0.001666
linest from std sig ave									
	0.031061	0.020871	0.008892	0.026725	0.006371	0.024365	0.005941	0.017916	0.005715
standardize signal averages SRM									
srm614-2	0.000114	0.000184	0.000437	0.000152	0.000610	0.000168	0.000623	0.000216	0.000657
srm612-2	0.005500	0.009764	0.020979	0.008149	0.035736	0.008450	0.037410	0.012173	0.039959
srm610-2	0.075126	0.134707	0.334060	0.107986	0.547775	0.118029	0.584002	0.168828	0.627257
linest from std sig ave									
	0.066905	0.039020	0.016106	0.045382	0.009435	0.042172	0.008984	0.029455	0.007822
concentration data									
SRM614-1	0.32	0.32	0.35	0.37	0.34	0.36	0.31	0.34	0.32
SRM612-1	14.81	17.82	16.40	19.13	19.85	17.72	19.36	19.10	19.96
SRM610-1	203.44	247.28	262.99	256.26	308.45	254.13	306.30	267.50	318.26
AP1-1	0.06	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02
AP2-1	0.50	0.54	0.49	0.53	0.55	0.86	0.84	0.83	0.56
AP3-1	2.99	3.17	3.19	3.25	3.19	4.72	4.75	4.71	3.19
AP4-1	4.07	4.24	4.30	4.12	4.21	6.09	6.24	6.21	4.21
V2-1	0.06	0.01	0.01	0.02	0.01	0.02	0.01	0.00	0.01
V2-2	0.04	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00
V2-3	0.03	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00
V2-4	0.19	0.05	0.04	0.06	0.03	0.06	0.03	0.04	0.03
V2-5	0.11	0.02	0.01	0.03	0.00	0.02	0.00	0.00	0.00
V2-6	0.09	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.00
V2-7	0.23	0.08	0.05	0.07	0.03	0.05	0.03	0.03	0.03
V2-8	0.09	0.02	0.02	0.03	0.01	0.00	0.01	0.00	0.00
V2-9	0.13	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01
V2-10	0.22	0.05	0.05	0.08	0.03	0.05	0.03	0.02	0.03
V2-11	0.14	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00
V2-12	0.12	0.04	0.03	0.03	0.02	0.02	0.01	0.00	0.00
V2-13	0.26	0.08	0.04	0.07	0.01	0.05	0.01	0.02	0.01
V2-14	0.21	0.08	0.04	0.06	0.01	0.05	0.01	0.01	0.00
V2-15	0.22	0.06	0.03	0.05	0.01	0.04	0.01	0.02	0.00
SRM614-2	0.28	0.34	0.32	0.32	0.33	0.34	0.32	0.32	0.33
SRM612-2	14.49	17.14	15.60	18.23	19.20	17.60	18.76	18.31	19.22

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	196.81	234.95	246.51	238.76	290.12	239.14	288.79	251.33	296.64
AP1-2	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01
AP2-2	0.43	0.45	0.40	0.46	0.48	0.72	0.70	0.72	0.47
AP3-2	1.89	1.95	1.91	1.95	2.00	2.98	2.96	2.92	2.00
AP4-2	3.09	3.19	3.19	3.19	3.30	4.90	4.97	5.00	3.38

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-23	15.84	2.96	2.32	0.96	1.68	1.84	0.92	0.84	2.48
SRM614-23	134.56	260.56	654.56	279.48	849.72	225.72	856.56	293.72	932.89
SRM612-23	6466.12	13006.35	29737.09	12709.03	45343.61	11106.58	48353.27	16113.57	53316.98
SRM610-23	36405.16	74327.82	188248.81	71008.80	292038.25	65789.73	311660.16	94561.09	348507.41
AP1-23	80.72	36.92	81.96	58.12	88.68	28.40	66.88	28.80	77.60
AP2-23	457.48	711.72	1661.29	704.60	2237.57	878.92	3618.58	1200.01	2632.17
AP3-23	1566.85	2635.37	6376.56	2443.05	8097.41	3214.46	12934.43	4268.18	9189.53
AP4-23	2447.81	4283.70	10072.70	3929.50	13509.44	5380.67	21803.84	7179.28	15498.41
34HP45-494-1	22464.77	8494.57	4307.74	13280.31	5087.19	7387.44	6259.32	6010.91	2628.81
34HP45-494-2	13469.84	5129.95	2768.54	7624.44	3041.86	4363.98	3704.46	3631.90	1619.77
34HP45-494-3	17710.94	6269.08	3443.58	10363.06	3908.42	5832.39	5200.55	5299.03	2396.09
34HP45-494-4	7285.60	2782.74	1628.17	3979.82	1496.41	2195.69	1907.05	1842.25	843.24
34HP45-494-5	12709.83	4384.26	2403.29	6517.76	2609.45	3983.78	3392.06	3433.06	1572.57
34HP45-494-6	9853.22	3513.62	1910.61	4978.23	1963.01	3133.30	2600.61	2549.53	1113.89
34HP45-494-7	11405.10	4138.86	2183.37	5771.71	2481.13	3667.54	3171.98	3045.18	1360.33
34HP45-494-8	6149.47	2335.13	1446.21	2873.98	1232.57	1806.77	1578.73	1548.69	678.24
34HP45-494-9	7657.88	2831.42	1636.33	3756.10	1449.49	2202.61	1923.41	1768.21	825.12
34HP45-494-10	37868.86	13163.79	6574.16	17857.58	7284.40	11009.26	9084.81	8819.65	3911.26
34HP45-494-11	29106.76	10040.94	5299.35	14311.36	5898.83	9166.41	7849.36	7855.28	3360.94
34HP45-494-12	33073.39	11199.10	5832.79	15802.65	6462.04	10060.90	8899.29	8779.17	3936.34
34HP45-494-13	12631.11	4418.62	2266.57	5945.99	2226.89	3228.66	2823.58	2651.34	1108.53
34HP45-494-14	11730.31	4076.06	2080.25	5521.83	2145.21	3136.46	2724.86	2600.13	1130.89
34HP45-494-15	11423.43	4019.62	2053.97	5222.83	2217.93	3289.38	2688.38	2645.77	1167.01
34HP45-494-16	861.48	380.60	320.48	341.20	131.68	176.56	155.64	132.16	65.40
34HP45-494-17	892.17	465.04	366.40	342.44	147.44	210.04	171.08	152.08	75.16
34HP45-494-18	710.92	314.28	296.24	255.84	111.28	156.72	127.96	109.76	55.32
SRM614-24	143.76	277.28	578.00	199.28	749.76	205.60	809.00	283.52	829.28
SRM612-24	6348.56	11478.55	23791.37	9462.45	41191.67	9874.54	43381.93	14486.68	46775.47
SRM610-24	39372.82	71985.05	171739.36	60503.38	299169.97	64686.61	319398.75	93605.33	344051.28
AP1-24	13.60	25.04	36.40	4.72	19.12	5.48	6.52	11.92	8.76
AP2-24	349.96	548.08	1118.77	449.24	1795.69	622.20	2870.50	947.29	1982.73
AP3-24	1511.73	2362.13	5482.39	1865.01	7279.96	2815.70	11661.15	3845.78	8251.89
AP4-24	2211.65	3467.70	7918.00	2849.66	11585.79	4529.95	18349.86	6173.95	13221.31
blank-24	11.96	50.64	75.40	8.12	4.08	2.56	3.12	3.68	8.32
blank average	13.90	26.80	38.86	4.54	2.88	2.20	2.02	2.26	5.40

blank subtraction									
SRM614-23	120.66	233.76	615.70	274.94	846.84	223.52	854.54	291.46	927.49
SRM612-23	6452.22	12979.55	29698.23	12704.49	45340.73	11104.38	48351.25	16111.31	53311.58
SRM610-23	36391.26	74301.02	188209.95	71004.26	292035.37	65787.53	311658.14	94558.83	348502.01
AP1-23	66.82	10.12	43.10	53.58	85.80	26.20	64.86	26.54	72.20
AP2-23	443.58	684.92	1622.43	700.06	2234.69	876.72	3616.56	1197.75	2626.77
AP3-23	1552.95	2608.57	6337.70	2438.51	8094.53	3212.26	12932.41	4265.92	9184.13
AP4-23	2433.91	4256.90	10033.84	3924.96	13506.56	5378.47	21801.82	7177.02	15493.01
34HP45-494-1	22450.87	8467.77	4268.88	13275.77	5084.31	7385.24	6257.30	6008.65	2623.41
34HP45-494-2	13455.94	5103.15	2729.68	7619.90	3038.98	4361.78	3702.44	3629.64	1614.37
34HP45-494-3	17697.04	6242.28	3404.72	10358.52	3905.54	5830.19	5198.53	5296.77	2390.69
34HP45-494-4	7271.70	2755.94	1589.31	3975.28	1493.53	2193.49	1905.03	1839.99	837.84
34HP45-494-5	12695.93	4357.46	2364.43	6513.22	2606.57	3981.58	3390.04	3430.80	1567.17
34HP45-494-6	9839.32	3486.82	1871.75	4973.69	1960.13	3131.10	2598.59	2547.27	1108.49
34HP45-494-7	11391.20	4112.06	2144.51	5767.17	2478.25	3665.34	3169.96	3042.92	1354.93
34HP45-494-8	6135.57	2308.33	1407.35	2869.44	1229.69	1804.57	1576.71	1546.43	672.84
34HP45-494-9	7643.98	2804.62	1597.47	3751.56	1446.61	2200.41	1921.39	1765.95	819.72
34HP45-494-10	37854.95	13136.99	6535.30	17853.04	7281.52	11007.06	9082.79	8817.39	3905.86
34HP45-494-11	29092.86	10014.14	5260.49	14306.82	5895.95	9164.21	7847.34	7853.02	3355.54
34HP45-494-12	33059.49	11172.30	5793.93	15798.11	6459.16	10058.70	8897.27	8776.91	3930.94
34HP45-494-13	12617.21	4391.82	2227.71	5941.45	2224.01	3226.46	2821.56	2649.07	1103.13
34HP45-494-14	11716.41	4049.26	2041.39	5517.29	2142.33	3134.26	2722.84	2597.87	1125.49
34HP45-494-15	11409.52	3992.82	2015.11	5218.29	2215.05	3287.18	2686.35	2643.51	1161.61
34HP45-494-16	847.58	353.80	281.62	336.66	128.80	174.36	153.62	129.90	60.00
34HP45-494-17	878.26	438.24	327.54	337.90	144.56	207.84	169.06	149.82	69.76

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	697.02	287.48	257.38	251.30	108.40	154.52	125.94	107.50	49.92
SRM614-24	129.86	250.48	539.14	194.74	746.88	203.40	806.98	281.26	823.88
SRM612-24	6334.66	11451.74	23752.51	9457.91	41188.79	9872.34	43379.91	14484.42	46770.06
SRM610-24	39358.92	71958.25	171700.50	60498.84	299167.09	64684.40	319396.73	93603.07	344045.88
AP1-24	-0.30	-1.76	-2.46	0.18	16.24	3.28	4.50	9.66	3.36
AP2-24	336.06	521.28	1079.91	444.70	1792.81	620.00	2868.48	945.03	1977.33
AP3-24	1497.83	2335.33	5443.53	1860.47	7277.08	2813.50	11659.13	3843.52	8246.49
AP4-24	2197.75	3440.90	7879.14	2845.12	11582.90	4527.75	18347.84	6171.69	13215.91

zero correction									
SRM614-23	120.66	233.76	615.70	274.94	846.84	223.52	854.54	291.46	927.49
SRM612-23	6452.22	12979.55	29698.23	12704.49	45340.73	11104.38	48351.25	16111.31	53311.58
SRM610-23	36391.26	74301.02	188209.95	71004.26	292035.37	65787.53	311658.14	94558.83	348502.01
AP1-23	66.82	10.12	43.10	53.58	85.80	26.20	64.86	26.54	72.20
AP2-23	443.58	684.92	1622.43	700.06	2234.69	876.72	3616.56	1197.75	2626.77
AP3-23	1552.95	2608.57	6337.70	2438.51	8094.53	3212.26	12932.41	4265.92	9184.13
AP4-23	2433.91	4256.90	10033.84	3924.96	13506.56	5378.47	21801.82	7177.02	15493.01
34HP45-494-1	22450.87	8467.77	4268.88	13275.77	5084.31	7385.24	6257.30	6008.65	2623.41
34HP45-494-2	13455.94	5103.15	2729.68	7619.90	3038.98	4361.78	3702.44	3629.64	1614.37
34HP45-494-3	17697.04	6242.28	3404.72	10358.52	3905.54	5830.19	5198.53	5296.77	2390.69
34HP45-494-4	7271.70	2755.94	1589.31	3975.28	1493.53	2193.49	1905.03	1839.99	837.84
34HP45-494-5	12695.93	4357.46	2364.43	6513.22	2606.57	3981.58	3390.04	3430.80	1567.17
34HP45-494-6	9839.32	3486.82	1871.75	4973.69	1960.13	3131.10	2598.59	2547.27	1108.49
34HP45-494-7	11391.20	4112.06	2144.51	5767.17	2478.25	3665.34	3169.96	3042.92	1354.93
34HP45-494-8	6135.57	2308.33	1407.35	2869.44	1229.69	1804.57	1576.71	1546.43	672.84
34HP45-494-9	7643.98	2804.62	1597.47	3751.56	1446.61	2200.41	1921.39	1765.95	819.72
34HP45-494-10	37854.95	13136.99	6535.30	17853.04	7281.52	11007.06	9082.79	8817.39	3905.86
34HP45-494-11	29092.86	10014.14	5260.49	14306.82	5895.95	9164.21	7847.34	7853.02	3355.54
34HP45-494-12	33059.49	11172.30	5793.93	15798.11	6459.16	10058.70	8897.27	8776.91	3930.94
34HP45-494-13	12617.21	4391.82	2227.71	5941.45	2224.01	3226.46	2821.56	2649.07	1103.13
34HP45-494-14	11716.41	4049.26	2041.39	5517.29	2142.33	3134.26	2722.84	2597.87	1125.49
34HP45-494-15	11409.52	3992.82	2015.11	5218.29	2215.05	3287.18	2686.35	2643.51	1161.61
34HP45-494-16	847.58	353.80	281.62	336.66	128.80	174.36	153.62	129.90	60.00
34HP45-494-17	878.26	438.24	327.54	337.90	144.56	207.84	169.06	149.82	69.76
34HP45-494-18	697.02	287.48	257.38	251.30	108.40	154.52	125.94	107.50	49.92
SRM614-24	129.86	250.48	539.14	194.74	746.88	203.40	806.98	281.26	823.88
SRM612-24	6334.66	11451.74	23752.51	9457.91	41188.79	9872.34	43379.91	14484.42	46770.06
SRM610-24	39358.92	71958.25	171700.50	60498.84	299167.09	64684.40	319396.73	93603.07	344045.88
AP1-24	0.00	0.00	0.00	0.18	16.24	3.28	4.50	9.66	3.36
AP2-24	336.06	521.28	1079.91	444.70	1792.81	620.00	2868.48	945.03	1977.33
AP3-24	1497.83	2335.33	5443.53	1860.47	7277.08	2813.50	11659.13	3843.52	8246.49
AP4-24	2197.75	3440.90	7879.14	2845.12	11582.90	4527.75	18347.84	6171.69	13215.91

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-23	0.000058	0.000112	0.000296	0.000132	0.000407	0.000108	0.000411	0.000140	0.000446
SRM612-23	0.003314	0.006667	0.015255	0.006526	0.023289	0.005704	0.024836	0.008276	0.027384
SRM610-23	0.050217	0.102529	0.259713	0.097980	0.402983	0.090781	0.430060	0.130483	0.480902
AP1-23	0.000007	0.000001	0.000004	0.000005	0.000008	0.000003	0.000006	0.000003	0.000007
AP2-23	0.000033	0.000050	0.000120	0.000052	0.000165	0.000065	0.000267	0.000088	0.000194
AP3-23	0.000103	0.000173	0.000421	0.000162	0.000537	0.000213	0.000858	0.000283	0.000609
AP4-23	0.000163	0.000285	0.000671	0.000262	0.000903	0.000360	0.001458	0.000480	0.001036
34HP45-494-1	0.001478	0.000558	0.000281	0.000874	0.000335	0.000486	0.000412	0.000396	0.000173
34HP45-494-2	0.001013	0.000384	0.000206	0.000574	0.000229	0.000328	0.000279	0.000273	0.000122
34HP45-494-3	0.001411	0.000498	0.000271	0.000826	0.000311	0.000465	0.000414	0.000422	0.000191
34HP45-494-4	0.000517	0.000196	0.000113	0.000283	0.000106	0.000156	0.000136	0.000131	0.000060
34HP45-494-5	0.000904	0.000310	0.000168	0.000464	0.000186	0.000283	0.000241	0.000244	0.000112
34HP45-494-6	0.000787	0.000279	0.000150	0.000398	0.000157	0.000250	0.000208	0.000204	0.000089
34HP45-494-7	0.001007	0.000363	0.000190	0.000510	0.000219	0.000324	0.000280	0.000269	0.000120
34HP45-494-8	0.000602	0.000227	0.000138	0.000282	0.000121	0.000177	0.000155	0.000152	0.000066
34HP45-494-9	0.000780	0.000286	0.000163	0.000383	0.000148	0.000225	0.000196	0.000180	0.000084

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.002996	0.001040	0.000517	0.001413	0.000576	0.000871	0.000719	0.000698	0.000309
34HP45-494-11	0.002129	0.000733	0.000385	0.001047	0.000432	0.000671	0.000574	0.000575	0.000246
34HP45-494-12	0.002380	0.000804	0.000417	0.001137	0.000465	0.000724	0.000641	0.000632	0.000283
34HP45-494-13	0.001026	0.000357	0.000181	0.000483	0.000181	0.000262	0.000229	0.000215	0.000090
34HP45-494-14	0.000906	0.000313	0.000158	0.000427	0.000166	0.000242	0.000211	0.000201	0.000087
34HP45-494-15	0.000853	0.000299	0.000151	0.000390	0.000166	0.000246	0.000201	0.000198	0.000087
34HP45-494-16	0.000077	0.000032	0.000025	0.000030	0.000012	0.000016	0.000014	0.000012	0.000005
34HP45-494-17	0.000073	0.000036	0.000027	0.000028	0.000012	0.000017	0.000014	0.000012	0.000006
34HP45-494-18	0.000052	0.000022	0.000019	0.000019	0.000008	0.000012	0.000009	0.000008	0.000004
SRM614-24	0.000097	0.000188	0.000404	0.000146	0.000560	0.000153	0.000605	0.000211	0.000618
SRM612-24	0.004888	0.008837	0.018330	0.007299	0.031785	0.007618	0.033476	0.011178	0.036092
SRM610-24	0.074889	0.136916	0.326697	0.115112	0.569229	0.123076	0.607720	0.178100	0.654620
AP1-24	0.000000	0.000000	0.000000	0.000000	0.000002	0.000000	0.000001	0.000001	0.000000
AP2-24	0.000029	0.000045	0.000094	0.000039	0.000155	0.000054	0.000248	0.000082	0.000171
AP3-24	0.000115	0.000180	0.000419	0.000143	0.000561	0.000217	0.000898	0.000296	0.000635
AP4-24	0.000171	0.000268	0.000613	0.000221	0.000901	0.000352	0.001427	0.000480	0.001028

standardize signal averages AP

AP1	0.000003	0.000001	0.000002	0.000003	0.000005	0.000001	0.000003	0.000002	0.000004
AP2	0.000031	0.000048	0.000107	0.000045	0.000160	0.000059	0.000258	0.000085	0.000182
AP3	0.000109	0.000177	0.000420	0.000153	0.000549	0.000215	0.000878	0.000290	0.000622
AP4	0.000167	0.000276	0.000642	0.000242	0.000902	0.000356	0.001443	0.000480	0.001032

linest from std sig ave

0.054216	0.034480	0.014794	0.039297	0.010831	0.040509	0.010082	0.030293	0.009564
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standardize signal averages SRM

srm614-2	0.000078	0.000150	0.000350	0.000139	0.000484	0.000130	0.000508	0.000176	0.000532
srm612-2	0.004101	0.007752	0.016792	0.006912	0.027537	0.006661	0.029156	0.009727	0.031738
srm610-2	0.062553	0.119722	0.293205	0.106546	0.486106	0.106928	0.518890	0.154291	0.567761

linest from std sig ave

0.080388	0.043923	0.018355	0.046021	0.010636	0.046571	0.010114	0.032244	0.008644
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concentration data

SRM614-23	0.27	0.33	0.38	0.45	0.38	0.37	0.36	0.36	0.37
SRM612-23	15.41	19.71	19.35	21.99	21.63	19.82	21.48	21.50	22.46
SRM610-23	233.50	303.19	329.51	330.21	374.33	315.39	371.87	339.00	394.45
AP1-23	0.14	0.01	0.03	0.08	0.04	0.04	0.03	0.03	0.03
AP2-23	0.71	0.69	0.71	0.81	0.71	1.04	1.07	1.07	0.74
AP3-23	2.23	2.38	2.48	2.54	2.32	3.44	3.45	3.42	2.33
AP4-23	3.52	3.92	3.96	4.12	3.90	5.81	5.86	5.80	3.95
34HP45-494-1	31.98	7.67	1.66	13.71	1.45	7.86	1.66	4.78	0.66
34HP45-494-2	21.91	5.29	1.21	8.99	0.99	5.31	1.12	3.30	0.46
34HP45-494-3	30.51	6.84	1.60	12.94	1.35	7.51	1.67	5.10	0.73
34HP45-494-4	11.19	2.70	0.67	4.43	0.46	2.52	0.55	1.58	0.23
34HP45-494-5	19.55	4.27	0.99	7.27	0.80	4.58	0.97	2.95	0.43
34HP45-494-6	17.02	3.84	0.88	6.24	0.68	4.05	0.84	2.46	0.34
34HP45-494-7	21.78	5.00	1.12	7.99	0.95	5.24	1.13	3.25	0.46
34HP45-494-8	13.03	3.12	0.82	4.42	0.52	2.86	0.62	1.83	0.25
34HP45-494-9	16.87	3.94	0.96	6.00	0.64	3.63	0.79	2.18	0.32
34HP45-494-10	64.80	14.30	3.05	22.15	2.49	14.08	2.89	8.43	1.18
34HP45-494-11	46.05	10.08	2.27	16.42	1.86	10.84	2.31	6.95	0.94
34HP45-494-12	51.48	11.06	2.46	17.83	2.01	11.70	2.58	7.64	1.08
34HP45-494-13	22.19	4.91	1.07	7.57	0.78	4.24	0.92	2.60	0.34
34HP45-494-14	19.60	4.31	0.93	6.69	0.72	3.92	0.85	2.43	0.33
34HP45-494-15	18.45	4.11	0.89	6.12	0.72	3.97	0.81	2.39	0.33
34HP45-494-16	1.66	0.44	0.15	0.48	0.05	0.25	0.06	0.14	0.02
34HP45-494-17	1.58	0.50	0.16	0.44	0.05	0.28	0.06	0.15	0.02
34HP45-494-18	1.13	0.30	0.11	0.29	0.04	0.19	0.04	0.10	0.01
SRM614-24	0.45	0.56	0.51	0.49	0.52	0.53	0.52	0.55	0.51
SRM612-24	22.73	26.13	23.26	24.60	29.53	26.47	28.95	29.04	29.60
SRM610-24	348.21	404.87	414.50	387.95	528.76	427.59	525.50	462.71	536.94
AP1-24	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00
AP2-24	0.63	0.62	0.55	0.60	0.67	0.87	1.00	0.99	0.65
AP3-24	2.50	2.48	2.48	2.25	2.42	3.50	3.61	3.58	2.42
AP4-24	3.70	3.68	3.62	3.47	3.89	5.69	5.74	5.80	3.92

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Nd Sm Eu Gd Tb Dy Ho Er Tm

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	3561.60	5934.23	14779.04	5771.41	17908.76	6725.18	27790.44	9246.03	20108.93
34HP45-671-1	52411.95	18719.07	9462.89	25787.41	11693.60	16520.67	13455.64	13162.01	5400.33
34HP45-671-2	59617.20	20526.00	10572.90	28630.58	13357.05	19357.09	16200.45	16097.59	6626.14
34HP45-671-3	9922.20	3720.94	2303.33	5657.61	2738.80	4359.92	4271.82	4515.01	1994.67
34HP45-671-4	4744.41	1856.73	1377.17	2774.04	1067.43	1404.11	1231.29	1316.63	602.66
34HP45-671-5	2482.19	1079.37	781.12	1767.19	640.30	979.59	883.00	919.31	409.98
34HP45-671-6	2320.59	893.17	648.16	1449.83	569.66	735.54	748.00	726.14	338.74
34HP45-671-7	10270.32	3631.62	2144.57	5617.01	2111.03	3170.56	2991.58	3146.12	1401.87
34HP45-671-8	5912.45	2089.81	1234.21	3338.64	1415.11	2275.51	2347.13	2462.87	1179.23
34HP45-671-9	5360.37	1771.05	1059.33	2886.88	1109.07	1917.43	2028.45	2289.03	1117.23
34HP45-671-10	44981.67	14731.84	7324.88	20945.74	8316.19	11846.65	9910.70	9923.52	4258.08
34HP45-671-11	33597.61	10854.06	5217.67	15972.11	6077.61	8887.95	7518.96	7176.34	3044.76
34HP45-671-12	40323.37	13095.43	6476.32	18033.20	7138.78	10488.68	8508.17	8186.79	3444.84
34HP45-671-13	887.30	366.28	285.44	585.18	177.10	187.26	171.48	158.18	86.86
34HP45-671-14	253.78	157.48	115.92	153.30	73.94	62.38	74.64	58.30	49.18
34HP45-671-15	110.98	71.60	79.28	55.18	26.50	21.06	30.04	11.90	15.78
34HP45-671-16	213.94	115.24	87.72	120.42	53.18	53.74	52.88	39.06	34.98
34HP45-671-17	157.34	86.52	77.28	85.26	37.78	27.62	32.36	30.94	21.34
34HP45-671-18	161.10	70.76	74.64	93.30	39.82	26.30	29.64	35.66	25.10
SRM614-22	103.38	192.36	444.24	185.18	643.94	178.66	663.68	234.70	681.94
SRM612-22	5623.57	10215.86	22502.41	8812.31	37156.91	8969.11	39300.98	12881.57	42140.81
SRM610-22	46930.92	88383.22	215783.74	74877.44	365585.88	78189.22	389659.72	112599.34	425132.60
AP1-22	6.30	6.80	7.84	4.66	19.50	0.00	6.48	7.30	8.58
AP2-22	232.34	411.96	893.21	381.46	1427.23	520.10	2214.61	715.38	1540.23
AP3-22	1617.11	2468.29	5704.83	2022.23	8024.55	3103.16	12579.99	4180.92	9018.35
AP4-22	2312.63	3702.70	8815.13	3024.44	11880.09	4697.33	19289.51	6240.62	13404.93

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-21	0.000067	0.000117	0.000256	0.000127	0.000384	0.000106	0.000407	0.000131	0.000425
SRM612-21	0.002783	0.005512	0.012681	0.005491	0.018346	0.004439	0.019300	0.006482	0.021123
SRM610-21	0.041974	0.086230	0.227282	0.084983	0.329975	0.074080	0.353573	0.105420	0.393457
AP1-21	0.000027	0.000015	0.000030	0.000025	0.000035	0.000011	0.000029	0.000014	0.000029
AP2-21	0.000032	0.000046	0.000106	0.000049	0.000141	0.000057	0.000224	0.000079	0.000166
AP3-21	0.000022	0.000041	0.000091	0.000040	0.000135	0.000054	0.000219	0.000070	0.000153
AP4-21	0.000209	0.000349	0.000869	0.000339	0.001053	0.000395	0.001634	0.000544	0.001182
34HP45-671-1	0.002725	0.000973	0.000492	0.001341	0.000608	0.000859	0.000700	0.000684	0.000281
34HP45-671-2	0.003407	0.001173	0.000604	0.001636	0.000763	0.001106	0.000926	0.000920	0.000379
34HP45-671-3	0.000596	0.000224	0.000138	0.000340	0.000165	0.000262	0.000257	0.000271	0.000120
34HP45-671-4	0.000256	0.000100	0.000074	0.000150	0.000058	0.000076	0.000067	0.000071	0.000033
34HP45-671-5	0.000149	0.000065	0.000047	0.000106	0.000038	0.000059	0.000053	0.000055	0.000025
34HP45-671-6	0.000165	0.000063	0.000046	0.000103	0.000040	0.000052	0.000053	0.000051	0.000024
34HP45-671-7	0.000560	0.000198	0.000117	0.000306	0.000115	0.000173	0.000163	0.000172	0.000076
34HP45-671-8	0.000335	0.000118	0.000070	0.000189	0.000080	0.000129	0.000133	0.000140	0.000067
34HP45-671-9	0.000296	0.000098	0.000058	0.000159	0.000061	0.000106	0.000112	0.000126	0.000062
34HP45-671-10	0.002941	0.000963	0.000479	0.001370	0.000544	0.000775	0.000648	0.000649	0.000278
34HP45-671-11	0.002329	0.000752	0.000362	0.001107	0.000421	0.000616	0.000521	0.000497	0.000211
34HP45-671-12	0.002886	0.000937	0.000463	0.001291	0.000511	0.000751	0.000609	0.000586	0.000247
34HP45-671-13	0.000138	0.000057	0.000045	0.000091	0.000028	0.000029	0.000027	0.000025	0.000014
34HP45-671-14	0.000048	0.000030	0.000022	0.000029	0.000014	0.000012	0.000014	0.000011	0.000009
34HP45-671-15	0.000022	0.000014	0.000016	0.000011	0.000005	0.000004	0.000006	0.000002	0.000003
34HP45-671-16	0.000045	0.000024	0.000018	0.000025	0.000011	0.000011	0.000011	0.000008	0.000007
34HP45-671-17	0.000026	0.000015	0.000013	0.000014	0.000006	0.000005	0.000005	0.000005	0.000004
34HP45-671-18	0.000025	0.000011	0.000012	0.000015	0.000006	0.000004	0.000005	0.000006	0.000004
SRM614-22	0.000100	0.000186	0.000430	0.000179	0.000624	0.000173	0.000643	0.000227	0.000661
SRM612-22	0.004662	0.008469	0.018654	0.007305	0.030802	0.007435	0.032579	0.010678	0.034933
SRM610-22	0.069856	0.131556	0.321189	0.111453	0.544167	0.116383	0.580000	0.167602	0.632801
AP1-22	0.000001	0.000001	0.000001	0.000000	0.000002	0.000000	0.000001	0.000001	0.000001
AP2-22	0.000023	0.000040	0.000087	0.000037	0.000138	0.000050	0.000215	0.000069	0.000149
AP3-22	0.000123	0.000188	0.000435	0.000154	0.000611	0.000236	0.000958	0.000318	0.000687
AP4-22	0.000176	0.000282	0.000672	0.000231	0.000906	0.000358	0.001471	0.000476	0.001022

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP									
AP1	0.000014	0.000008	0.000016	0.000013	0.000019	0.000005	0.000015	0.000007	0.000015
AP2	0.000027	0.000043	0.000096	0.000043	0.000139	0.000054	0.000219	0.000074	0.000158
AP3	0.000073	0.000114	0.000263	0.000097	0.000373	0.000145	0.000589	0.000194	0.000420
AP4	0.000193	0.000316	0.000771	0.000285	0.000979	0.000377	0.001552	0.000510	0.001126
linest from std sig ave									
	0.051759	0.033149	0.013702	0.036647	0.010788	0.041242	0.010133	0.030775	0.009652
standardize signal averages SRM									
srms614-2	0.000084	0.000152	0.000343	0.000153	0.000504	0.000140	0.000525	0.000179	0.000543
srms612-2	0.003722	0.006990	0.015667	0.006398	0.024574	0.005937	0.025940	0.008580	0.028028
srms610-2	0.055915	0.108893	0.274236	0.098218	0.437071	0.095232	0.466787	0.136511	0.513129
linest from std sig ave									
	0.089926	0.048292	0.019625	0.049923	0.011829	0.052291	0.011244	0.036444	0.009564
concentration data									
SRM614-21	0.30	0.33	0.30	0.40	0.36	0.38	0.35	0.35	0.35
SRM612-21	12.35	15.67	14.90	17.26	16.97	15.70	16.77	17.11	17.48
SRM610-21	186.32	245.15	267.08	267.10	305.30	262.03	307.26	278.24	325.69
AP1-21	0.55	0.20	0.17	0.37	0.15	0.18	0.12	0.17	0.11
AP2-21	0.65	0.61	0.58	0.72	0.61	0.94	0.91	0.98	0.64
AP3-21	0.46	0.54	0.50	0.58	0.58	0.88	0.88	0.87	0.59
AP4-21	4.32	4.61	4.75	4.96	4.53	6.51	6.61	6.67	4.55
34HP45-671-1	56.26	12.87	2.69	19.60	2.62	14.13	2.83	8.40	1.08
34HP45-671-2	70.36	15.51	3.30	23.92	3.29	18.20	3.74	11.30	1.46
34HP45-671-3	12.31	2.96	0.76	4.97	0.71	4.31	1.04	3.33	0.46
34HP45-671-4	5.29	1.33	0.41	2.19	0.25	1.25	0.27	0.87	0.13
34HP45-671-5	3.08	0.86	0.26	1.55	0.17	0.97	0.21	0.68	0.09
34HP45-671-6	3.40	0.84	0.25	1.50	0.17	0.86	0.21	0.63	0.09
34HP45-671-7	11.57	2.62	0.64	4.48	0.50	2.85	0.66	2.11	0.29
34HP45-671-8	6.92	1.57	0.38	2.77	0.35	2.12	0.54	1.71	0.26
34HP45-671-9	6.11	1.29	0.32	2.33	0.26	1.74	0.45	1.55	0.24
34HP45-671-10	60.73	12.74	2.62	20.02	2.34	12.74	2.62	7.97	1.07
34HP45-671-11	48.09	9.95	1.98	16.19	1.81	10.14	2.11	6.11	0.81
34HP45-671-12	59.59	12.39	2.53	18.87	2.20	12.35	2.46	7.19	0.95
34HP45-671-13	2.86	0.76	0.24	1.33	0.12	0.48	0.11	0.30	0.05
34HP45-671-14	1.00	0.40	0.12	0.43	0.06	0.20	0.06	0.14	0.04
34HP45-671-15	0.45	0.19	0.09	0.16	0.02	0.07	0.02	0.03	0.01
34HP45-671-16	0.92	0.32	0.10	0.37	0.05	0.18	0.04	0.10	0.03
34HP45-671-17	0.54	0.19	0.07	0.21	0.03	0.08	0.02	0.06	0.01
34HP45-671-18	0.53	0.15	0.06	0.22	0.03	0.07	0.02	0.07	0.02
SRM614-22	0.44	0.53	0.51	0.56	0.58	0.61	0.56	0.60	0.55
SRM612-22	20.69	24.08	21.92	22.96	28.50	26.30	28.31	28.18	28.92
SRM610-22	310.09	374.01	377.43	350.30	503.48	411.65	504.03	442.36	523.81
AP1-22	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00
AP2-22	0.47	0.53	0.47	0.54	0.60	0.83	0.87	0.85	0.57
AP3-22	2.54	2.49	2.38	2.25	2.63	3.89	3.87	3.91	2.65
AP4-22	3.64	3.73	3.67	3.37	3.90	5.89	5.95	5.84	3.94
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-19	4.92	3.48	5.92	1.76	1.88	1.08	1.56	2.96	0.56
SRM614-19	267.60	342.36	783.68	394.12	1025.61	289.20	1091.41	340.56	1150.61
SRM612-19	6439.08	12807.51	29396.29	12272.15	45084.70	10807.38	47567.67	15811.53	52238.34
SRM610-19	46987.66	97103.51	255411.52	91381.67	378885.66	83597.03	405715.28	119868.91	454622.31
AP1-19	39.92	28.88	34.24	24.44	21.00	10.80	11.68	12.48	17.80
AP2-19	592.36	834.60	1920.29	886.48	2570.41	1004.81	3978.42	1412.33	3003.02
AP3-19	3235.42	5536.71	13817.60	5408.99	17140.38	6499.08	27096.87	9089.61	19310.39
AP4-19	4914.83	8590.57	21348.72	8656.81	25888.87	9824.86	40106.55	13299.04	28728.52
34HP60-102-1	10332.86	3531.74	2108.05	5457.63	2073.57	2597.81	2138.01	2328.73	971.41
34HP60-102-2	6539.68	2371.33	1424.45	3822.90	1254.05	1501.49	1162.93	1120.97	425.12
34HP60-102-3	2251.01	927.53	591.80	1339.49	455.68	519.36	341.04	328.32	120.20
34HP60-102-4	1092.65	411.52	226.64	578.32	157.76	150.68	104.80	102.52	48.28
34HP60-102-5	5358.71	1930.89	1008.73	2091.53	989.85	1091.77	777.56	822.84	300.16
34HP60-102-6	11345.82	3473.02	2012.89	4650.55	2088.45	2616.77	2311.17	2413.33	978.81
34HP60-102-7	2666.86	1027.01	539.40	1160.69	540.20	613.52	487.36	454.64	179.16

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	8732.13	3173.06	1669.09	3739.62	1752.01	2158.81	1709.01	1712.53	670.92
34HP60-102-9	13762.96	4819.07	2519.41	5505.99	2574.29	3281.30	2518.41	2524.61	986.77
34HP60-102-10	6031.59	1998.77	1095.29	2531.85	1151.93	1616.53	1370.17	1453.77	574.92
34HP60-102-11	4251.66	1431.01	831.08	1781.09	838.20	1140.73	1040.33	1038.73	462.48
34HP60-102-12	5787.87	1958.05	1061.41	2410.17	1085.25	1591.37	1309.61	1398.93	612.96
34HP60-102-13	10697.86	3391.34	1690.37	4274.38	1789.77	2171.21	1734.25	1690.37	639.08
34HP60-102-14	8944.25	2859.90	1550.65	3581.18	1509.37	1879.49	1558.77	1365.69	579.40
34HP60-102-15	6825.56	2292.21	1136.61	2670.29	1181.25	1460.57	1198.01	1078.21	415.52
34HP60-102-16	2012.01	771.24	473.32	1033.69	356.00	488.00	346.44	355.76	161.36
34HP60-102-17	1711.17	632.20	393.96	899.69	346.76	407.88	312.24	304.40	157.00
34HP60-102-18	438.92	179.36	147.60	267.76	91.44	104.76	81.80	78.32	31.92
SRM614-20	126.24	273.40	519.36	193.08	753.08	208.08	804.92	279.36	827.80
SRM612-20	6235.00	11738.47	25391.22	10280.66	42051.16	10203.22	44382.57	14645.00	48249.63
SRM610-20	47668.95	90313.75	225567.19	78368.24	373281.06	80189.45	398369.97	114654.33	437634.72
AP1-20	13.12	18.36	24.40	9.68	28.28	8.72	11.56	2.96	21.48
AP2-20	262.68	455.52	952.05	404.32	1539.65	541.92	2413.49	821.36	1752.89
AP3-20	1629.89	2636.81	6103.55	2226.29	8300.01	3147.18	12865.99	4329.90	9466.77
AP4-20	3247.10	5124.23	12612.91	4398.50	16420.69	6301.32	26194.59	8671.25	18430.30
blank-20	7.16	33.04	27.40	2.68	3.80	4.52	2.00	0.40	11.32
blank average	6.04	18.26	16.66	2.22	2.84	2.80	1.78	1.68	5.94

blank subtraction

SRM614-19	261.56	324.10	767.02	391.90	1022.77	286.40	1089.63	338.88	1144.67
SRM612-19	6433.04	12789.25	29379.62	12269.93	45081.85	10804.58	47565.89	15809.85	52232.40
SRM610-19	46981.62	97085.25	255394.86	91379.45	378882.82	83594.23	405713.50	119867.23	454616.37
AP1-19	33.88	10.62	17.58	22.22	18.16	8.00	9.90	10.80	11.86
AP2-19	586.32	816.34	1903.63	884.26	2567.57	1002.01	3976.64	1410.65	2997.08
AP3-19	3229.38	5518.45	13800.94	5406.77	17137.54	6496.28	27095.09	9087.93	19304.45
AP4-19	4908.79	8572.31	21332.06	8654.59	25886.02	9822.06	40104.77	13297.35	28722.58
34HP60-102-1	10326.82	3513.48	2091.39	5455.41	2070.73	2595.01	2136.23	2327.05	965.47
34HP60-102-2	6533.64	2353.07	1407.79	3820.68	1251.21	1498.69	1161.15	1119.29	419.18
34HP60-102-3	2244.97	909.27	575.14	1337.27	452.84	516.56	339.26	326.64	114.26
34HP60-102-4	1086.61	393.26	209.98	576.10	154.92	147.88	103.02	100.84	42.34
34HP60-102-5	5352.67	1912.63	992.07	2089.31	987.01	1088.97	775.78	821.16	294.22
34HP60-102-6	11339.78	3454.76	1996.23	4648.33	2085.61	2613.97	2309.39	2411.65	972.87
34HP60-102-7	2660.81	1008.75	522.74	1158.47	537.36	610.72	485.58	452.96	173.22
34HP60-102-8	8726.09	3154.80	1652.43	3737.40	1749.17	2156.01	1707.23	1710.85	664.98
34HP60-102-9	13756.92	4800.81	2502.75	5503.77	2571.45	3278.50	2516.63	2522.93	980.83
34HP60-102-10	6025.55	1980.51	1078.63	2529.63	1149.09	1613.73	1368.39	1452.09	568.98
34HP60-102-11	4245.62	1412.75	814.42	1778.87	835.36	1137.93	1038.55	1037.05	456.54
34HP60-102-12	5781.83	1939.79	1044.75	2407.95	1082.41	1588.57	1307.83	1397.25	607.02
34HP60-102-13	10691.82	3373.08	1673.71	4272.16	1786.93	2168.41	1732.47	1688.69	633.14
34HP60-102-14	8938.21	2841.64	1533.99	3578.96	1506.53	1876.69	1556.99	1364.01	573.46
34HP60-102-15	6819.52	2273.95	1119.95	2668.07	1178.41	1457.77	1196.23	1076.53	409.58
34HP60-102-16	2005.97	752.98	456.66	1031.47	353.16	485.20	344.66	354.08	155.42
34HP60-102-17	1705.13	613.94	377.30	897.47	343.92	405.08	310.46	302.72	151.06
34HP60-102-18	432.88	161.10	130.94	265.54	88.60	101.96	80.02	76.64	25.98
SRM614-20	120.20	255.14	502.70	190.86	750.24	205.28	803.14	277.68	821.86
SRM612-20	6228.96	11720.21	25374.56	10278.44	42048.32	10200.42	44380.79	14643.32	48243.69
SRM610-20	47662.91	90295.49	225550.53	78366.02	373278.22	80186.65	398368.19	114652.65	437628.78
AP1-20	7.08	0.10	7.74	7.46	25.44	5.92	9.78	1.28	15.54
AP2-20	256.64	437.26	935.39	402.10	1536.81	539.12	2411.71	819.68	1746.95
AP3-20	1623.85	2618.55	6086.89	2224.07	8297.17	3144.38	12864.21	4328.22	9460.83
AP4-20	3241.06	5105.97	12596.25	4396.28	16417.85	6298.52	26192.81	8669.57	18424.36

zero correction

SRM614-19	261.56	324.10	767.02	391.90	1022.77	286.40	1089.63	338.88	1144.67
SRM612-19	6433.04	12789.25	29379.62	12269.93	45081.85	10804.58	47565.89	15809.85	52232.40
SRM610-19	46981.62	97085.25	255394.86	91379.45	378882.82	83594.23	405713.50	119867.23	454616.37
AP1-19	33.88	10.62	17.58	22.22	18.16	8.00	9.90	10.80	11.86
AP2-19	586.32	816.34	1903.63	884.26	2567.57	1002.01	3976.64	1410.65	2997.08
AP3-19	3229.38	5518.45	13800.94	5406.77	17137.54	6496.28	27095.09	9087.93	19304.45
AP4-19	4908.79	8572.31	21332.06	8654.59	25886.02	9822.06	40104.77	13297.35	28722.58
34HP60-102-1	10326.82	3513.48	2091.39	5455.41	2070.73	2595.01	2136.23	2327.05	965.47
34HP60-102-2	6533.64	2353.07	1407.79	3820.68	1251.21	1498.69	1161.15	1119.29	419.18
34HP60-102-3	2244.97	909.27	575.14	1337.27	452.84	516.56	339.26	326.64	114.26
34HP60-102-4	1086.61	393.26	209.98	576.10	154.92	147.88	103.02	100.84	42.34
34HP60-102-5	5352.67	1912.63	992.07	2089.31	987.01	1088.97	775.78	821.16	294.22
34HP60-102-6	11339.78	3454.76	1996.23	4648.33	2085.61	2613.97	2309.39	2411.65	972.87
34HP60-102-7	2660.81	1008.75	522.74	1158.47	537.36	610.72	485.58	452.96	173.22
34HP60-102-8	8726.09	3154.80	1652.43	3737.40	1749.17	2156.01	1707.23	1710.85	664.98
34HP60-102-9	13756.92	4800.81	2502.75	5503.77	2571.45	3278.50	2516.63	2522.93	980.83
34HP60-102-10	6025.55	1980.51	1078.63	2529.63	1149.09	1613.73	1368.39	1452.09	568.98
34HP60-102-11	4245.62	1412.75	814.42	1778.87	835.36	1137.93	1038.55	1037.05	456.54
34HP60-102-12	5781.83	1939.79	1044.75	2407.95	1082.41	1588.57	1307.83	1397.25	607.02
34HP60-102-13	10691.82	3373.08	1673.71	4272.16	1786.93	2168.41	1732.47	1688.69	633.14
34HP60-102-14	8938.21	2841.64	1533.99	3578.96	1506.53	1876.69	1556.99	1364.01	573.46
34HP60-102-15	6819.52	2273.95	1119.95	2668.07	1178.41	1457.77	1196.23	1076.53	409.58

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	2005.97	752.98	456.66	1031.47	353.16	485.20	344.66	354.08	155.42
34HP60-102-17	1705.13	613.94	377.30	897.47	343.92	405.08	310.46	302.72	151.06
34HP60-102-18	432.88	161.10	130.94	265.54	88.60	101.96	80.02	76.64	25.98
SRM614-20	120.20	255.14	502.70	190.86	750.24	205.28	803.14	277.68	821.86
SRM612-20	6228.96	11720.21	25374.56	10278.44	42048.32	10200.42	44380.79	14643.32	48243.69
SRM610-20	47662.91	90295.49	225550.53	78366.02	373278.22	80186.65	398368.19	114652.65	437628.78
AP1-20	7.08	0.10	7.74	7.46	25.44	5.92	9.78	1.28	15.54
AP2-20	256.64	437.26	935.39	402.10	1536.81	539.12	2411.71	819.68	1746.95
AP3-20	1623.85	2618.55	6086.89	2224.07	8297.17	3144.38	12864.21	4328.22	9460.83
AP4-20	3241.06	5105.97	12596.25	4396.28	16417.85	6298.52	26192.81	8669.57	18424.36

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-19	0.000110	0.000137	0.000324	0.000165	0.000432	0.000121	0.000460	0.000143	0.000483
SRM612-19	0.003417	0.006794	0.015607	0.006518	0.023948	0.005740	0.025268	0.008398	0.027746
SRM610-19	0.048876	0.101000	0.265692	0.095064	0.394160	0.086965	0.422072	0.124700	0.472947
AP1-19	0.000003	0.000001	0.000002	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001
AP2-19	0.000036	0.000050	0.000117	0.000054	0.000158	0.000062	0.000245	0.000087	0.000185
AP3-19	0.000156	0.000267	0.000667	0.000261	0.000828	0.000314	0.001309	0.000439	0.000933
AP4-19	0.000240	0.000418	0.001041	0.000422	0.001264	0.000479	0.001958	0.000649	0.001402
34HP60-102-1	0.000861	0.000293	0.000174	0.000455	0.000173	0.000216	0.000178	0.000194	0.000080
34HP60-102-2	0.000814	0.000293	0.000175	0.000476	0.000156	0.000187	0.000145	0.000139	0.000052
34HP60-102-3	0.000389	0.000158	0.000100	0.000232	0.000079	0.000090	0.000059	0.000057	0.000020
34HP60-102-4	0.000285	0.000103	0.000055	0.000151	0.000041	0.000039	0.000027	0.000026	0.000011
34HP60-102-5	0.000952	0.000340	0.000176	0.000372	0.000176	0.000194	0.000138	0.000146	0.000052
34HP60-102-6	0.000962	0.000293	0.000169	0.000394	0.000177	0.000222	0.000196	0.000205	0.000082
34HP60-102-7	0.000636	0.000241	0.000125	0.000277	0.000128	0.000146	0.000116	0.000108	0.000041
34HP60-102-8	0.001509	0.000545	0.000286	0.000646	0.000302	0.000373	0.000295	0.000296	0.000115
34HP60-102-9	0.002069	0.000722	0.000376	0.000828	0.000387	0.000493	0.000378	0.000379	0.000147
34HP60-102-10	0.000520	0.000171	0.000093	0.000219	0.000099	0.000139	0.000118	0.000125	0.000049
34HP60-102-11	0.000401	0.000133	0.000077	0.000168	0.000079	0.000107	0.000098	0.000098	0.000043
34HP60-102-12	0.000504	0.000169	0.000091	0.000210	0.000094	0.000139	0.000114	0.000122	0.000053
34HP60-102-13	0.000849	0.000268	0.000133	0.000339	0.000142	0.000172	0.000138	0.000134	0.000050
34HP60-102-14	0.000697	0.000222	0.000120	0.000279	0.000118	0.000146	0.000121	0.000106	0.000045
34HP60-102-15	0.000573	0.000191	0.000094	0.000224	0.000099	0.000122	0.000100	0.000090	0.000034
34HP60-102-16	0.000240	0.000090	0.000055	0.000124	0.000042	0.000058	0.000041	0.000042	0.000019
34HP60-102-17	0.000194	0.000070	0.000043	0.000102	0.000039	0.000046	0.000035	0.000034	0.000017
34HP60-102-18	0.000065	0.000024	0.000020	0.000040	0.000013	0.000015	0.000012	0.000012	0.000004
SRM614-20	0.000083	0.000177	0.000349	0.000132	0.000520	0.000142	0.000557	0.000193	0.000570
SRM612-20	0.004177	0.007859	0.017014	0.006892	0.028194	0.006839	0.029758	0.009819	0.032348
SRM610-20	0.060394	0.114414	0.285796	0.099298	0.472983	0.101605	0.504775	0.145277	0.554522
AP1-20	0.000001	0.000000	0.000001	0.000001	0.000002	0.000001	0.000001	0.000000	0.000002
AP2-20	0.000024	0.000040	0.000086	0.000037	0.000141	0.000050	0.000222	0.000075	0.000161
AP3-20	0.000116	0.000187	0.000434	0.000159	0.000592	0.000224	0.000918	0.000309	0.000675
AP4-20	0.000207	0.000327	0.000806	0.000281	0.001050	0.000403	0.001676	0.000555	0.001179

standardize signal averages AP

AP1	0.000002	0.000000	0.000001	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001
AP2	0.000030	0.000045	0.000102	0.000046	0.000150	0.000056	0.000233	0.000081	0.000173
AP3	0.000136	0.000227	0.000550	0.000210	0.000710	0.000269	0.001113	0.000374	0.000804
AP4	0.000223	0.000373	0.000924	0.000352	0.001157	0.000441	0.001817	0.000602	0.001290

linest from std sig ave

	0.041566	0.025992	0.010595	0.027550	0.008451	0.032678	0.008018	0.024044	0.007600
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standardize signal averages SRM

srm614-2	0.000097	0.000157	0.000336	0.000149	0.000476	0.000132	0.000508	0.000168	0.000526
srm612-2	0.003797	0.007326	0.016310	0.006705	0.026071	0.006290	0.027513	0.009108	0.030047
srm610-2	0.054635	0.107707	0.275744	0.097181	0.433571	0.094285	0.463423	0.134989	0.513734

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.092018	0.048814	0.019516	0.050447	0.011923	0.052806	0.011324	0.036847	0.009552
concentration data									
SRM614-19	0.39	0.30	0.29	0.39	0.31	0.34	0.32	0.29	0.31
SRM612-19	12.18	15.14	14.18	15.40	17.36	16.09	17.38	17.32	18.09
SRM610-19	174.24	225.14	241.43	224.62	285.69	243.73	290.23	257.15	308.27
AP1-19	0.05	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.00
AP2-19	0.60	0.52	0.50	0.60	0.53	0.80	0.78	0.83	0.56
AP3-19	2.59	2.76	2.82	2.87	2.79	4.09	4.19	4.21	2.83
AP4-19	3.97	4.34	4.40	4.64	4.26	6.25	6.26	6.23	4.25
34HP60-102-1	14.28	3.04	0.74	5.00	0.58	2.82	0.57	1.86	0.24
34HP60-102-2	13.50	3.04	0.74	5.23	0.53	2.43	0.46	1.34	0.16
34HP60-102-3	6.45	1.63	0.42	2.55	0.26	1.17	0.19	0.54	0.06
34HP60-102-4	4.73	1.07	0.23	1.66	0.14	0.51	0.09	0.25	0.03
34HP60-102-5	15.78	3.53	0.75	4.08	0.59	2.52	0.44	1.40	0.16
34HP60-102-6	15.95	3.04	0.72	4.33	0.60	2.89	0.63	1.96	0.25
34HP60-102-7	10.55	2.50	0.53	3.04	0.43	1.90	0.37	1.04	0.13
34HP60-102-8	25.02	5.66	1.21	7.10	1.02	4.86	0.94	2.84	0.35
34HP60-102-9	34.30	7.49	1.59	9.10	1.30	6.43	1.21	3.64	0.45
34HP60-102-10	8.63	1.77	0.39	2.40	0.33	1.82	0.38	1.20	0.15
34HP60-102-11	6.64	1.38	0.32	1.85	0.27	1.40	0.31	0.94	0.13
34HP60-102-12	8.37	1.76	0.39	2.31	0.32	1.81	0.37	1.17	0.16
34HP60-102-13	14.08	2.78	0.56	3.73	0.48	2.24	0.44	1.29	0.15
34HP60-102-14	11.56	2.30	0.51	3.07	0.40	1.91	0.39	1.02	0.14
34HP60-102-15	9.49	1.98	0.40	2.46	0.33	1.60	0.32	0.87	0.10
34HP60-102-16	3.99	0.94	0.23	1.36	0.14	0.76	0.13	0.41	0.06
34HP60-102-17	3.22	0.72	0.18	1.12	0.13	0.60	0.11	0.33	0.05
34HP60-102-18	1.08	0.25	0.08	0.44	0.05	0.20	0.04	0.11	0.01
SRM614-20	0.30	0.39	0.32	0.31	0.38	0.40	0.38	0.40	0.37
SRM612-20	14.89	17.52	15.46	16.28	20.43	19.17	20.46	20.25	21.08
SRM610-20	215.30	255.05	259.70	234.62	342.82	284.76	347.10	299.58	361.44
AP1-20	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
AP2-20	0.39	0.42	0.36	0.41	0.48	0.65	0.71	0.72	0.49
AP3-20	1.92	1.94	1.84	1.74	2.00	2.92	2.94	2.96	2.05
AP4-20	3.44	3.39	3.41	3.09	3.54	5.25	5.36	5.32	3.57
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-17	6.60	1.88	1.96	3.96	5.80	1.08	2.64	0.96	6.00
SRM614-17	107.12	226.48	536.16	277.04	683.28	187.52	704.56	265.40	757.52
SRM612-17	4241.78	9067.77	21532.80	10244.90	28629.72	7024.80	30218.25	10219.82	33233.95
SRM610-17	38367.34	85751.52	241030.47	91841.40	313298.72	69434.63	331701.78	100679.21	375687.75
AP1-17	132.40	50.48	86.88	139.60	55.80	16.60	27.56	17.40	24.92
AP2-17	506.00	730.52	1685.85	896.25	2130.05	823.44	3170.02	1070.17	2415.41
AP3-17	1808.09	3129.94	7523.52	3458.42	9095.09	3534.14	14292.20	4830.67	10389.70
AP4-17	4233.54	7370.88	18856.39	7939.84	21718.88	8175.01	33579.35	10984.54	23933.46
34HP60-24-1	1660.85	703.96	491.60	1222.29	418.44	435.96	346.12	369.40	159.80
34HP60-24-2	1076.81	501.76	346.68	720.56	242.72	311.04	228.56	237.56	92.76
34HP60-24-3	1688.81	748.96	478.96	1193.77	402.68	447.88	342.48	394.04	135.84
34HP60-24-4	4586.51	1787.29	1160.09	2739.02	1020.81	1347.85	1127.61	1206.97	471.52
34HP60-24-5	12107.75	4332.74	2588.73	6769.80	2534.45	3474.26	2954.58	3163.50	1277.81
34HP60-24-6	13904.20	4880.95	2872.10	7549.24	2852.78	4060.42	3331.02	3490.26	1498.81
34HP60-24-7	3100.98	1307.85	922.05	1735.45	704.12	955.53	895.69	922.65	406.72
34HP60-24-8	913.25	452.64	475.08	560.88	207.16	337.04	352.64	399.16	153.04
34HP60-24-9	1559.61	714.04	666.60	938.37	364.92	539.36	565.16	660.44	296.72
34HP60-24-10	7037.28	2519.65	1603.33	3433.02	1492.05	2035.77	1692.53	1812.05	779.60
34HP60-24-11	7836.44	2878.50	1730.41	4001.70	1557.81	2269.37	1904.25	1973.37	863.40
34HP60-24-12	9506.29	3537.10	2136.53	4641.79	1872.69	2727.98	2300.49	2411.45	1041.05
SRM614-18	127.96	223.76	467.92	184.20	650.24	163.12	762.60	248.84	751.24
SRM612-18	6439.60	11967.67	26213.39	10501.46	42786.60	10219.22	44637.17	14788.32	48519.56
SRM610-18	50311.24	96785.55	243071.48	84413.31	405394.41	85755.56	436251.94	124052.26	476947.56
AP1-18	31.28	22.64	26.04	9.76	12.44	5.68	12.24	6.36	3.80
AP2-18	347.44	567.48	1238.37	505.16	1909.73	750.48	3003.06	995.41	2117.53
AP3-18	1564.45	2477.93	5924.91	2323.25	8325.97	3315.54	13470.52	4537.39	9706.77
AP4-18	3641.98	5712.11	13793.64	4894.23	18242.26	7039.08	28977.44	9638.33	20809.08
blank-18	5.80	40.56	42.32	0.92	4.72	1.12	0.00	3.12	4.72
blank average	6.20	21.22	22.14	2.44	5.26	1.10	1.32	2.04	5.36
blank subtraction									

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	100.92	205.26	514.02	274.60	678.02	186.42	703.24	263.36	752.16
SRM612-17	4235.58	9046.55	21510.66	10242.46	28624.46	7023.70	30216.93	10217.78	33228.59
SRM610-17	38361.14	85730.30	241008.33	91838.96	313293.46	69433.53	331700.46	100677.17	375682.39
AP1-17	126.20	29.26	64.74	137.16	50.54	15.50	26.24	15.36	19.56
AP2-17	499.80	709.30	1663.71	893.81	2124.79	822.34	3168.70	1068.13	2410.05
AP3-17	1801.89	3108.72	7501.38	3455.98	9089.83	3533.04	14290.88	4828.63	10384.34
AP4-17	4227.34	7349.66	18834.25	7937.40	21713.62	8173.91	33578.03	10982.50	23928.09
34HP60-24-1	1654.65	682.74	469.46	1219.85	413.18	434.86	344.80	367.36	154.44
34HP60-24-2	1070.61	480.54	324.54	718.12	237.46	309.94	227.24	235.52	87.40
34HP60-24-3	1682.61	727.74	456.82	1191.33	397.42	446.78	341.16	392.00	130.48
34HP60-24-4	4580.31	1766.07	1137.95	2736.58	1015.55	1346.75	1126.29	1204.93	466.16
34HP60-24-5	12101.55	4311.52	2566.59	6767.36	2529.19	3473.16	2953.26	3161.46	1272.45
34HP60-24-6	13898.00	4859.73	2849.96	7546.80	2847.52	4059.32	3329.70	3488.22	1493.45
34HP60-24-7	3094.78	1286.63	899.91	1733.01	698.86	954.43	894.37	920.61	401.36
34HP60-24-8	907.05	431.42	452.94	558.44	201.90	335.94	351.32	397.12	147.68
34HP60-24-9	1553.41	692.82	644.46	935.93	359.66	538.26	563.84	658.40	291.36
34HP60-24-10	7031.08	2498.43	1581.19	3430.58	1486.79	2034.67	1691.21	1810.01	774.24
34HP60-24-11	7830.24	2857.28	1708.27	3999.26	1552.55	2268.27	1902.93	1971.33	858.04
34HP60-24-12	9500.09	3515.88	2114.39	4639.35	1867.43	2726.88	2299.17	2409.41	1035.69
SRM614-18	121.76	202.54	445.78	181.76	644.98	162.02	761.28	246.80	745.88
SRM612-18	6433.40	11946.45	26191.25	10499.02	42781.34	10218.12	44635.85	14786.28	48514.19
SRM610-18	50305.04	96764.33	243049.34	84410.87	405389.15	85754.46	436250.62	124050.22	476942.20
AP1-18	25.08	1.42	3.90	7.32	7.18	4.58	10.92	4.32	-1.56
AP2-18	341.24	546.26	1216.23	502.72	1904.47	749.38	3001.74	993.37	2112.17
AP3-18	1558.25	2456.71	5902.77	2320.81	8320.71	3314.44	13469.20	4535.35	9701.41
AP4-18	3635.78	5690.89	13771.50	4891.79	18237.00	7037.98	28976.12	9636.29	20803.72

zero correction

SRM614-17	100.92	205.26	514.02	274.60	678.02	186.42	703.24	263.36	752.16
SRM612-17	4235.58	9046.55	21510.66	10242.46	28624.46	7023.70	30216.93	10217.78	33228.59
SRM610-17	38361.14	85730.30	241008.33	91838.96	313293.46	69433.53	331700.46	100677.17	375682.39
AP1-17	126.20	29.26	64.74	137.16	50.54	15.50	26.24	15.36	19.56
AP2-17	499.80	709.30	1663.71	893.81	2124.79	822.34	3168.70	1068.13	2410.05
AP3-17	1801.89	3108.72	7501.38	3455.98	9089.83	3533.04	14290.88	4828.63	10384.34
AP4-17	4227.34	7349.66	18834.25	7937.40	21713.62	8173.91	33578.03	10982.50	23928.09
34HP60-24-1	1654.65	682.74	469.46	1219.85	413.18	434.86	344.80	367.36	154.44
34HP60-24-2	1070.61	480.54	324.54	718.12	237.46	309.94	227.24	235.52	87.40
34HP60-24-3	1682.61	727.74	456.82	1191.33	397.42	446.78	341.16	392.00	130.48
34HP60-24-4	4580.31	1766.07	1137.95	2736.58	1015.55	1346.75	1126.29	1204.93	466.16
34HP60-24-5	12101.55	4311.52	2566.59	6767.36	2529.19	3473.16	2953.26	3161.46	1272.45
34HP60-24-6	13898.00	4859.73	2849.96	7546.80	2847.52	4059.32	3329.70	3488.22	1493.45
34HP60-24-7	3094.78	1286.63	899.91	1733.01	698.86	954.43	894.37	920.61	401.36
34HP60-24-8	907.05	431.42	452.94	558.44	201.90	335.94	351.32	397.12	147.68
34HP60-24-9	1553.41	692.82	644.46	935.93	359.66	538.26	563.84	658.40	291.36
34HP60-24-10	7031.08	2498.43	1581.19	3430.58	1486.79	2034.67	1691.21	1810.01	774.24
34HP60-24-11	7830.24	2857.28	1708.27	3999.26	1552.55	2268.27	1902.93	1971.33	858.04
34HP60-24-12	9500.09	3515.88	2114.39	4639.35	1867.43	2726.88	2299.17	2409.41	1035.69
SRM614-18	121.76	202.54	445.78	181.76	644.98	162.02	761.28	246.80	745.88
SRM612-18	6433.40	11946.45	26191.25	10499.02	42781.34	10218.12	44635.85	14786.28	48514.19
SRM610-18	50305.04	96764.33	243049.34	84410.87	405389.15	85754.46	436250.62	124050.22	476942.20
AP1-18	25.08	1.42	3.90	7.32	7.18	4.58	10.92	4.32	0.00
AP2-18	341.24	546.26	1216.23	502.72	1904.47	749.38	3001.74	993.37	2112.17
AP3-18	1558.25	2456.71	5902.77	2320.81	8320.71	3314.44	13469.20	4535.35	9701.41
AP4-18	3635.78	5690.89	13771.50	4891.79	18237.00	7037.98	28976.12	9636.29	20803.72

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-17	0.000047	0.000095	0.000239	0.000128	0.000315	0.000087	0.000327	0.000122	0.000350
SRM612-17	0.002162	0.004618	0.010982	0.005229	0.014613	0.003586	0.015426	0.005216	0.016964
SRM610-17	0.029717	0.066412	0.186699	0.071144	0.242696	0.053787	0.256955	0.077990	0.291026
AP1-17	0.000008	0.000002	0.000004	0.000009	0.000003	0.000001	0.000002	0.000001	0.000001

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000033	0.000046	0.000108	0.000058	0.000138	0.000054	0.000206	0.000070	0.000157
AP3-17	0.000109	0.000187	0.000452	0.000208	0.000548	0.000213	0.000861	0.000291	0.000626
AP4-17	0.000207	0.000360	0.000923	0.000389	0.001064	0.000400	0.001645	0.000538	0.001172
34HP60-24-1	0.000345	0.000142	0.000098	0.000254	0.000086	0.000091	0.000072	0.000077	0.000032
34HP60-24-2	0.000206	0.000093	0.000063	0.000138	0.000046	0.000060	0.000044	0.000045	0.000017
34HP60-24-3	0.000299	0.000129	0.000081	0.000212	0.000071	0.000079	0.000061	0.000070	0.000023
34HP60-24-4	0.000562	0.000217	0.000140	0.000336	0.000125	0.000165	0.000138	0.000148	0.000057
34HP60-24-5	0.001073	0.000382	0.000228	0.000600	0.000224	0.000308	0.000262	0.000280	0.000113
34HP60-24-6	0.001197	0.000418	0.000245	0.000650	0.000245	0.000350	0.000287	0.000300	0.000129
34HP60-24-7	0.000318	0.000132	0.000092	0.000178	0.000072	0.000098	0.000092	0.000095	0.000041
34HP60-24-8	0.000089	0.000042	0.000044	0.000055	0.000020	0.000033	0.000034	0.000039	0.000014
34HP60-24-9	0.000137	0.000061	0.000057	0.000083	0.000032	0.000047	0.000050	0.000058	0.000026
34HP60-24-10	0.000662	0.000235	0.000149	0.000323	0.000140	0.000191	0.000159	0.000170	0.000073
34HP60-24-11	0.000666	0.000243	0.000145	0.000340	0.000132	0.000193	0.000162	0.000168	0.000073
34HP60-24-12	0.000736	0.000272	0.000164	0.000359	0.000145	0.000211	0.000178	0.000187	0.000080
SRM614-18	0.000099	0.000165	0.000363	0.000148	0.000525	0.000132	0.000620	0.000201	0.000608
SRM612-18	0.04245	0.007883	0.017283	0.006928	0.028231	0.006743	0.029455	0.009757	0.032014
SRM610-18	0.061906	0.119080	0.299101	0.103878	0.498879	0.105531	0.536858	0.152658	0.586934
AP1-18	0.000002	0.000000	0.000000	0.000001	0.000000	0.000000	0.000001	0.000000	0.000000
AP2-18	0.000027	0.000043	0.000096	0.000040	0.000150	0.000059	0.000237	0.000078	0.000167
AP3-18	0.000112	0.000176	0.000423	0.000166	0.000597	0.000238	0.000966	0.000325	0.000696
AP4-18	0.000224	0.000351	0.000849	0.000302	0.001124	0.000434	0.001786	0.000594	0.001282

standardize signal averages AP									
AP1	0.000005	0.000001	0.000002	0.000005	0.000002	0.000001	0.000001	0.000001	0.000001
AP2	0.000030	0.000045	0.000102	0.000049	0.000144	0.000056	0.000222	0.000074	0.000162
AP3	0.000110	0.000182	0.000438	0.000187	0.000572	0.000225	0.000914	0.000308	0.000661
AP4	0.000216	0.000355	0.000886	0.000345	0.001094	0.000417	0.001715	0.000566	0.001227

linest from std sig ave									
	0.044807	0.028336	0.011500	0.028711	0.009281	0.035590	0.008781	0.026435	0.008284

standardize signal averages SRM									
srM614-2	0.000073	0.000130	0.000301	0.000138	0.000420	0.000109	0.000474	0.000162	0.000479
srM612-2	0.003204	0.006251	0.014133	0.006079	0.021422	0.005164	0.022441	0.007487	0.024489
srM610-2	0.045812	0.092746	0.242900	0.087511	0.370787	0.079659	0.396906	0.115324	0.438980

linest from std sig ave									
	0.109739	0.056691	0.022156	0.056020	0.013943	0.062507	0.013223	0.043135	0.011179

concentration data									
SRM614-17	0.18	0.23	0.24	0.31	0.25	0.26	0.25	0.28	0.25
SRM612-17	8.31	11.22	10.83	12.88	11.63	10.94	11.62	11.83	12.05
SRM610-17	114.19	161.39	184.14	175.18	193.18	164.18	193.51	176.82	206.76
AP1-17	0.14	0.02	0.02	0.10	0.01	0.01	0.01	0.01	0.00
AP2-17	0.58	0.52	0.50	0.67	0.51	0.76	0.72	0.73	0.52
AP3-17	1.94	2.12	2.07	2.38	2.03	3.02	3.02	3.07	2.07
AP4-17	3.70	4.07	4.23	4.45	3.94	5.68	5.76	5.67	3.87
34HP60-24-1	6.16	1.61	0.45	2.91	0.32	1.29	0.25	0.81	0.11
34HP60-24-2	3.69	1.05	0.29	1.58	0.17	0.85	0.15	0.48	0.06
34HP60-24-3	5.34	1.46	0.37	2.42	0.26	1.13	0.21	0.73	0.08
34HP60-24-4	10.04	2.45	0.64	3.84	0.46	2.35	0.48	1.56	0.19
34HP60-24-5	19.19	4.32	1.04	6.88	0.83	4.37	0.92	2.96	0.37
34HP60-24-6	21.39	4.73	1.13	7.44	0.91	4.96	1.00	3.17	0.43
34HP60-24-7	5.68	1.49	0.42	2.04	0.27	1.39	0.32	1.00	0.14
34HP60-24-8	1.59	0.48	0.20	0.63	0.07	0.47	0.12	0.41	0.05
34HP60-24-9	2.45	0.69	0.26	0.95	0.12	0.67	0.17	0.61	0.08
34HP60-24-10	11.83	2.66	0.68	3.70	0.52	2.72	0.56	1.80	0.24
34HP60-24-11	11.91	2.75	0.67	3.90	0.49	2.74	0.57	1.77	0.24
34HP60-24-12	13.15	3.08	0.75	4.12	0.54	3.00	0.62	1.97	0.27
SRM614-18	0.38	0.40	0.36	0.36	0.42	0.40	0.47	0.46	0.43
SRM612-18	16.31	19.16	17.05	17.06	22.47	20.58	22.18	22.12	22.74
SRM610-18	237.89	289.38	295.00	255.78	397.10	322.11	404.31	346.10	416.99
AP1-18	0.04	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
AP2-18	0.48	0.49	0.44	0.46	0.56	0.84	0.83	0.83	0.55
AP3-18	2.00	1.99	1.94	1.91	2.21	3.38	3.38	3.43	2.30
AP4-18	4.01	3.97	3.89	3.45	4.16	6.16	6.26	6.26	4.24

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Nd Sm Eu Gd Tb Dy Ho Er Tm

Appendix A. Raw trace element datasheets from laser ablation.

raw data									
blank-15	5.56	5.76	2.12	4.72	2.60	0.84	0.72	0.28	1.16
SRM614-15	154.68	301.12	762.48	299.04	1003.61	264.40	1007.45	347.28	1140.69
SRM612-15	7969.13	15908.09	37702.13	15821.41	53316.02	12762.55	55658.63	18461.55	61569.91
SRM610-15	73942.38	153162.22	436914.56	144721.58	585417.25	121801.05	614872.31	174900.78	687673.56
AP1-15	16.68	22.64	36.24	17.68	23.76	12.04	21.24	13.00	19.24
AP2-15	262.16	529.32	1138.13	516.48	1640.93	628.40	2692.22	968.61	1910.17
AP3-15	1897.69	3505.50	8430.73	3324.78	10671.78	4240.86	16918.30	5575.31	12154.79
AP4-15	2905.38	5064.95	11952.27	5018.55	16424.53	6238.75	25822.47	8618.89	18671.95
34BV166-1	96.08	50.28	52.72	60.28	22.44	24.52	23.40	25.60	11.00
34BV166-2	82.60	43.52	39.32	46.40	15.88	24.92	29.24	17.60	10.12
34BV166-3	64.04	43.24	26.44	28.72	7.52	11.96	9.64	13.24	3.92
34BV166-4	182.60	92.00	61.16	102.72	34.80	29.84	39.12	28.00	19.60
34BV166-5	115.32	72.28	44.92	72.20	22.24	28.00	30.44	17.52	17.32
34BV166-6	130.52	57.28	69.48	65.32	31.56	30.68	28.96	26.72	15.32
SRM614-16	150.60	276.56	626.92	252.68	934.05	242.68	976.01	322.12	1003.49
SRM612-16	9623.61	17891.14	39343.82	15788.93	64803.48	15254.57	68677.95	22378.29	75569.83
SRM610-16	66617.06	129458.48	331430.66	112333.03	558946.88	114241.92	601388.38	166819.98	662066.19
AP1-16	9.88	13.44	18.92	2.16	35.72	0.92	10.28	5.12	11.72
AP2-16	292.32	474.72	999.29	452.24	1593.13	666.44	2634.89	857.20	1837.29
AP3-16	1812.81	2829.58	6437.48	2542.57	9065.65	3653.14	14558.28	4906.95	10526.54
AP4-16	2429.37	4083.78	9075.17	3548.10	13388.76	5211.03	21428.72	7059.60	15220.33
blank-16	6.40	5.32	10.76	2.20	1.48	10.44	2.08	1.76	2.68
blank average	5.98	5.54	6.44	3.46	2.04	5.64	1.40	1.02	1.92
blank subtraction									
SRM614-15	148.70	295.58	756.04	295.58	1001.57	258.76	1006.05	346.26	1138.77
SRM612-15	7963.14	15902.55	37695.69	15817.95	53313.98	12756.91	55657.23	18460.52	61567.99
SRM610-15	73936.39	153156.68	436908.12	144718.12	585415.21	121795.41	614870.91	174899.76	687671.64
AP1-15	10.70	17.10	29.80	14.22	21.72	6.40	19.84	11.98	17.32
AP2-15	256.18	523.78	1131.69	513.02	1638.89	622.76	2690.82	967.59	1908.25
AP3-15	1891.71	3499.96	8424.29	3321.32	10669.74	4235.22	16916.89	5574.29	12152.87
AP4-15	2899.40	5059.41	11945.83	5015.09	16422.49	6233.11	25821.06	8617.87	18670.02
34BV166-1	90.10	44.74	46.28	56.82	20.40	18.88	22.00	24.58	9.08
34BV166-2	76.62	37.98	32.88	42.94	13.84	19.28	27.84	16.58	8.20
34BV166-3	58.06	37.70	20.00	25.26	5.48	6.32	8.24	12.22	2.00
34BV166-4	176.62	86.46	54.72	99.26	32.76	24.20	37.72	26.98	17.68
34BV166-5	109.34	66.74	38.48	68.74	20.20	22.36	29.04	16.50	15.40
34BV166-6	124.54	51.74	63.04	61.86	29.52	25.04	27.56	25.70	13.40
SRM614-16	144.62	271.02	620.48	249.22	932.01	237.04	974.61	321.10	1001.57
SRM612-16	9617.63	17885.60	39337.38	15785.47	64801.44	15248.93	68676.54	22377.26	75567.91
SRM610-16	66611.07	129452.94	331424.22	112329.57	558944.84	114236.28	601386.98	166818.96	662064.27
AP1-16	3.90	7.90	12.48	-1.30	33.68	-4.72	8.88	4.10	9.80
AP2-16	286.34	469.18	992.85	448.78	1591.09	660.80	2633.49	856.18	1835.37
AP3-16	1806.83	2824.04	6431.04	2539.11	9063.61	3647.50	14556.88	4905.93	10524.62
AP4-16	2423.39	4078.24	9068.73	3544.64	13386.72	5205.39	21427.32	7058.58	15218.41
zero correction									
SRM614-15	148.70	295.58	756.04	295.58	1001.57	258.76	1006.05	346.26	1138.77
SRM612-15	7963.14	15902.55	37695.69	15817.95	53313.98	12756.91	55657.23	18460.52	61567.99
SRM610-15	73936.39	153156.68	436908.12	144718.12	585415.21	121795.41	614870.91	174899.76	687671.64
AP1-15	10.70	17.10	29.80	14.22	21.72	6.40	19.84	11.98	17.32
AP2-15	256.18	523.78	1131.69	513.02	1638.89	622.76	2690.82	967.59	1908.25
AP3-15	1891.71	3499.96	8424.29	3321.32	10669.74	4235.22	16916.89	5574.29	12152.87
AP4-15	2899.40	5059.41	11945.83	5015.09	16422.49	6233.11	25821.06	8617.87	18670.02
34BV166-1	90.10	44.74	46.28	56.82	20.40	18.88	22.00	24.58	9.08
34BV166-2	76.62	37.98	32.88	42.94	13.84	19.28	27.84	16.58	8.20
34BV166-3	58.06	37.70	20.00	25.26	5.48	6.32	8.24	12.22	2.00
34BV166-4	176.62	86.46	54.72	99.26	32.76	24.20	37.72	26.98	17.68
34BV166-5	109.34	66.74	38.48	68.74	20.20	22.36	29.04	16.50	15.40
34BV166-6	124.54	51.74	63.04	61.86	29.52	25.04	27.56	25.70	13.40
SRM614-16	144.62	271.02	620.48	249.22	932.01	237.04	974.61	321.10	1001.57
SRM612-16	9617.63	17885.60	39337.38	15785.47	64801.44	15248.93	68676.54	22377.26	75567.91
SRM610-16	66611.07	129452.94	331424.22	112329.57	558944.84	114236.28	601386.98	166818.96	662064.27
AP1-16	3.90	7.90	12.48	0.00	33.68	0.00	8.88	4.10	9.80
AP2-16	286.34	469.18	992.85	448.78	1591.09	660.80	2633.49	856.18	1835.37
AP3-16	1806.83	2824.04	6431.04	2539.11	9063.61	3647.50	14556.88	4905.93	10524.62
AP4-16	2423.39	4078.24	9068.73	3544.64	13386.72	5205.39	21427.32	7058.58	15218.41
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-15	0.000052	0.000104	0.000265	0.000104	0.000352	0.000091	0.000353	0.000122	0.000400
SRM612-15	0.002610	0.005212	0.012354	0.005184	0.017473	0.004181	0.018241	0.006050	0.020178
SRM610-15	0.039713	0.082265	0.234675	0.077732	0.314442	0.065420	0.330264	0.093943	0.369367
AP1-15	0.000001	0.000001	0.000002	0.000001	0.000002	0.000000	0.000001	0.000001	0.000001
AP2-15	0.000018	0.000037	0.000080	0.000036	0.000116	0.000044	0.000190	0.000068	0.000135
AP3-15	0.000101	0.000187	0.000451	0.000178	0.000571	0.000227	0.000906	0.000298	0.000651
AP4-15	0.000171	0.000298	0.000704	0.000295	0.000968	0.000367	0.001521	0.000508	0.001100
34BV166-1	0.000022	0.000011	0.000011	0.000014	0.000005	0.000005	0.000005	0.000006	0.000002
34BV166-2	0.000022	0.000011	0.000009	0.000012	0.000004	0.000005	0.000008	0.000005	0.000002
34BV166-3	0.000018	0.000012	0.000006	0.000008	0.000002	0.000002	0.000003	0.000004	0.000001
34BV166-4	0.000061	0.000030	0.000019	0.000034	0.000011	0.000008	0.000013	0.000009	0.000006
34BV166-5	0.000036	0.000022	0.000013	0.000022	0.000007	0.000007	0.000009	0.000005	0.000005
34BV166-6	0.000029	0.000012	0.000015	0.000015	0.000007	0.000006	0.000006	0.000006	0.000003
SRM614-16	0.000084	0.000157	0.000360	0.000145	0.000541	0.000138	0.000566	0.000186	0.000582
SRM612-16	0.004152	0.007722	0.016984	0.006815	0.027977	0.006584	0.029650	0.009661	0.032626
SRM610-16	0.059758	0.116134	0.297324	0.100772	0.501436	0.102483	0.539511	0.149655	0.593945
AP1-16	0.000000	0.000001	0.000001	0.000000	0.000003	0.000000	0.000001	0.000000	0.000001
AP2-16	0.000024	0.000039	0.000083	0.000037	0.000133	0.000055	0.000220	0.000071	0.000153
AP3-16	0.000111	0.000173	0.000395	0.000156	0.000556	0.000224	0.000893	0.000301	0.000646
AP4-16	0.000167	0.000281	0.000624	0.000244	0.000921	0.000358	0.001475	0.000486	0.001048
standardize signal averages AP									
AP1	0.000001	0.000001	0.000002	0.000001	0.000002	0.000000	0.000001	0.000001	0.000001
AP2	0.000021	0.000038	0.000081	0.000037	0.000124	0.000050	0.000205	0.000070	0.000144
AP3	0.000106	0.000180	0.000423	0.000167	0.000564	0.000225	0.000900	0.000300	0.000648
AP4	0.000169	0.000289	0.000664	0.000270	0.000945	0.000363	0.001498	0.000497	0.001074
linest from std sig ave									
	0.054538	0.033230	0.014458	0.035574	0.010430	0.039520	0.009774	0.029358	0.009213
standardize signal averages SRM									
srm614-2	0.000068	0.000131	0.000313	0.000124	0.000446	0.000114	0.000460	0.000154	0.000491
srm612-2	0.003381	0.006467	0.014669	0.006000	0.022725	0.005382	0.023946	0.007856	0.026402
srm610-2	0.049735	0.099199	0.266000	0.089252	0.407939	0.083951	0.434887	0.121799	0.481656
linest from std sig ave									
	0.101092	0.053009	0.020234	0.054933	0.012674	0.059313	0.012068	0.040843	0.010189
concentration data									
SRM614-15	0.24	0.30	0.33	0.32	0.31	0.31	0.30	0.31	0.32
SRM612-15	12.21	14.85	15.32	15.82	15.63	14.17	15.29	15.23	15.94
SRM610-15	185.75	234.44	290.99	237.15	281.27	221.73	276.85	236.54	291.85
AP1-15	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00
AP2-15	0.39	0.49	0.46	0.51	0.48	0.69	0.74	0.80	0.49
AP3-15	2.20	2.48	2.60	2.52	2.38	3.58	3.53	3.50	2.39
AP4-15	3.72	3.95	4.06	4.19	4.03	5.79	5.93	5.95	4.04
34BV166-1	0.47	0.14	0.06	0.19	0.02	0.07	0.02	0.07	0.01
34BV166-2	0.47	0.14	0.05	0.17	0.02	0.09	0.03	0.05	0.01
34BV166-3	0.39	0.15	0.04	0.11	0.01	0.03	0.01	0.04	0.00
34BV166-4	1.32	0.39	0.11	0.48	0.05	0.13	0.05	0.11	0.02
34BV166-5	0.77	0.29	0.07	0.32	0.03	0.11	0.04	0.06	0.02
34BV166-6	0.64	0.16	0.09	0.21	0.03	0.09	0.03	0.07	0.01
SRM614-16	0.39	0.45	0.45	0.44	0.48	0.47	0.47	0.47	0.46
SRM612-16	19.42	22.01	21.06	20.79	25.03	22.31	24.85	24.33	25.78
SRM610-16	279.51	330.97	368.68	307.45	448.53	347.35	452.25	376.81	469.29
AP1-16	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
AP2-16	0.52	0.52	0.48	0.53	0.55	0.87	0.86	0.84	0.56
AP3-16	2.41	2.30	2.28	2.21	2.31	3.53	3.48	3.53	2.37
AP4-16	3.63	3.72	3.60	3.46	3.83	5.65	5.75	5.69	3.85
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	
raw data										
blank-13		9.12	1.84	3.52	1.72	4.76	2.32	2.44	0.84	1.80
SRM614-13		187.80	360.48	754.00	316.24	980.93	265.76	1101.21	364.96	1129.37
SRM612-13		8693.45	17439.46	40288.75	16790.09	60068.90	14382.40	62893.72	20717.32	68886.35
SRM610-13		60102.54	124101.94	326491.81	115346.45	497828.56	105979.12	530032.13	151632.77	591193.25
AP1-13		45.40	85.48	180.32	79.16	204.20	46.20	194.00	62.36	216.48
AP2-13		418.76	684.80	1548.17	606.40	2243.41	873.60	3425.82	1202.33	2543.41
AP3-13		1743.33	3080.78	7303.76	2997.50	9689.69	3789.26	15244.69	5149.19	11065.98
AP4-13		2881.78	4721.39	11426.27	4629.03	15253.65	5918.75	24425.90	7993.44	17526.18
W3-1		133.96	101.72	76.04	98.68	56.88	34.08	55.32	26.16	40.88
W3-2		128.20	79.56	72.84	87.04	34.64	37.80	21.16	35.76	18.08
W3-3		143.76	84.40	103.20	93.40	63.92	46.36	48.32	32.60	45.12
W3-4		119.12	82.48	79.12	83.08	43.00	30.28	33.12	34.00	11.84
W3-5		130.56	80.12	66.96	87.48	44.24	34.56	43.32	34.88	14.28
W3-6		127.72	79.00	70.32	60.56	33.08	34.80	43.76	15.92	26.32
W3-7		220.48	125.56	88.68	140.88	43.12	64.60	50.44	49.56	23.36
W3-8		216.00	120.48	81.60	121.88	55.80	71.56	55.32	41.84	25.12
W3-9		241.32	123.52	88.72	152.12	53.24	71.76	59.48	39.12	28.60
W3-10		699.04	334.96	224.84	400.00	155.24	171.48	162.12	132.64	52.68
W3-11		726.84	363.20	203.92	392.80	144.64	189.08	121.08	131.76	67.60
W3-12		531.16	225.40	160.60	268.00	115.88	124.28	85.20	89.00	61.52
SRM614-14		220.76	366.36	855.36	300.64	1196.53	304.96	1272.17	433.60	1308.73
SRM612-14		10575.98	18975.03	42731.68	16543.33	69834.03	16350.93	74399.26	23895.49	80457.89
SRM610-14		58196.57	109035.05	272226.00	92280.04	468392.88	96780.86	501236.50	140749.19	548668.56
AP1-14		13.04	10.72	28.36	9.84	18.12	7.40	15.08	9.24	26.84
AP2-14		320.56	543.48	1061.17	440.28	1756.57	639.32	2746.30	966.89	1967.33
AP3-14		1683.89	2663.90	6224.23	2213.69	8618.69	3393.82	13912.88	4737.07	9956.22
AP4-14		2456.45	4012.26	9297.61	3367.30	13201.51	4998.39	21390.72	7152.84	15054.77
blank-14		4.16	7.56	8.36	1.44	2.44	3.24	1.88	0.88	1.44
blank average		6.64	4.70	5.94	1.58	3.60	2.78	2.16	0.86	1.62
blank subtraction										
SRM614-13		181.16	355.78	748.06	314.66	977.33	262.98	1099.05	364.10	1127.75
SRM612-13		8686.81	17434.76	40282.81	16788.51	60065.30	14379.62	62891.55	20716.46	68884.73
SRM610-13		60095.90	124097.24	326485.87	115344.87	497824.96	105976.34	530029.97	151631.91	591191.63
AP1-13		38.76	80.78	174.38	77.58	200.60	43.42	191.84	61.50	214.86
AP2-13		412.12	680.10	1542.23	604.82	2239.81	870.82	3423.66	1201.47	2541.79
AP3-13		1736.69	3076.08	7297.82	2995.92	9686.09	3786.48	15242.53	5148.33	11064.36
AP4-13		2875.14	4716.69	11420.32	4627.45	15250.05	5915.97	24423.74	7992.58	17524.56
W3-1		127.32	97.02	70.10	97.10	53.28	31.30	53.16	25.30	39.26
W3-2		121.56	74.86	66.90	85.46	31.04	35.02	19.00	34.90	16.46
W3-3		137.12	79.70	97.26	91.82	60.32	43.58	46.16	31.74	43.50
W3-4		112.48	77.78	73.18	81.50	39.40	27.50	30.96	33.14	10.22
W3-5		123.92	75.42	61.02	85.90	40.64	31.78	41.16	34.02	12.66
W3-6		121.08	74.30	64.38	58.98	29.48	32.02	41.60	15.06	24.70
W3-7		213.84	120.86	82.74	139.30	39.52	61.82	48.28	48.70	21.74
W3-8		209.36	115.78	75.66	120.30	52.20	68.78	53.16	40.98	23.50
W3-9		234.68	118.82	82.78	150.54	49.64	68.98	57.32	38.26	26.98
W3-10		692.40	330.26	218.90	398.42	151.64	168.70	159.96	131.78	51.06
W3-11		720.20	358.50	197.98	391.22	141.04	186.30	118.92	130.90	65.98
W3-12		524.52	220.70	154.66	266.42	112.28	121.50	83.04	88.14	59.90
SRM614-14		214.12	361.66	849.42	299.06	1192.93	302.18	1270.01	432.74	1307.11
SRM612-14		10569.34	18970.33	42725.74	16541.75	69830.43	16348.15	74397.10	23894.63	80456.27
SRM610-14		58189.93	109030.35	272220.06	92278.46	468389.28	96778.08	501234.34	140748.33	548666.94
AP1-14		6.40	6.02	22.42	8.26	14.52	4.62	12.92	8.38	25.22
AP2-14		313.92	538.78	1055.23	438.70	1752.97	636.54	2744.14	966.03	1965.71
AP3-14		1677.25	2659.19	6218.29	2212.11	8615.09	3391.04	13910.72	4736.21	9954.60
AP4-14		2449.81	4007.56	9291.67	3365.72	13197.91	4995.61	21388.56	7151.98	15053.14
zero correction										
SRM614-13		181.16	355.78	748.06	314.66	977.33	262.98	1099.05	364.10	1127.75
SRM612-13		8686.81	17434.76	40282.81	16788.51	60065.30	14379.62	62891.55	20716.46	68884.73
SRM610-13		60095.90	124097.24	326485.87	115344.87	497824.96	105976.34	530029.97	151631.91	591191.63
AP1-13		38.76	80.78	174.38	77.58	200.60	43.42	191.84	61.50	214.86
AP2-13		412.12	680.10	1542.23	604.82	2239.81	870.82	3423.66	1201.47	2541.79
AP3-13		1736.69	3076.08	7297.82	2995.92	9686.09	3786.48	15242.53	5148.33	11064.36
AP4-13		2875.14	4716.69	11420.32	4627.45	15250.05	5915.97	24423.74	7992.58	17524.56
W3-1		127.32	97.02	70.10	97.10	53.28	31.30	53.16	25.30	39.26
W3-2		121.56	74.86	66.90	85.46	31.04	35.02	19.00	34.90	16.46
W3-3		137.12	79.70	97.26	91.82	60.32	43.58	46.16	31.74	43.50
W3-4		112.48	77.78	73.18	81.50	39.40	27.50	30.96	33.14	10.22
W3-5		123.92	75.42	61.02	85.90	40.64	31.78	41.16	34.02	12.66
W3-6		121.08	74.30	64.38	58.98	29.48	32.02	41.60	15.06	24.70
W3-7		213.84	120.86	82.74	139.30	39.52	61.82	48.28	48.70	21.74
W3-8		209.36	115.78	75.66	120.30	52.20	68.78	53.16	40.98	23.50
W3-9		234.68	118.82	82.78	150.54	49.64	68.98	57.32	38.26	26.98

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	692.40	330.26	218.90	398.42	151.64	168.70	159.96	131.78	51.06
W3-11	720.20	358.50	197.98	391.22	141.04	186.30	118.92	130.90	65.98
W3-12	524.52	220.70	154.66	266.42	112.28	121.50	83.04	88.14	59.90
SRM614-14	214.12	361.66	849.42	299.06	1192.93	302.18	1270.01	432.74	1307.11
SRM612-14	10569.34	18970.33	42725.74	16541.75	69830.43	16348.15	74397.10	23894.63	80456.27
SRM610-14	58189.93	109030.35	272220.06	92278.46	468389.28	96778.08	501234.34	140748.33	548666.94
AP1-14	6.40	6.02	22.42	8.26	14.52	4.62	12.92	8.38	25.22
AP2-14	313.92	538.78	1055.23	438.70	1752.97	636.54	2744.14	966.03	1965.71
AP3-14	1677.25	2659.19	6218.29	2212.11	8615.09	3391.04	13910.72	4736.21	9954.60
AP4-14	2449.81	4007.56	9291.67	3365.72	13197.91	4995.61	21388.56	7151.98	15053.14
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-13	0.000062	0.000122	0.000257	0.000108	0.000335	0.000090	0.000377	0.000125	0.000387
SRM612-13	0.002983	0.005986	0.013832	0.005765	0.020624	0.004937	0.021595	0.007113	0.023652
SRM610-13	0.050774	0.104848	0.275844	0.097453	0.420606	0.089538	0.447815	0.128112	0.499490
AP1-13	0.000002	0.000005	0.000011	0.000005	0.000013	0.000003	0.000012	0.000004	0.000014
AP2-13	0.000025	0.000042	0.000094	0.000037	0.000137	0.000053	0.000209	0.000073	0.000155
AP3-13	0.000100	0.000178	0.000422	0.000173	0.000560	0.000219	0.000881	0.000298	0.000640
AP4-13	0.000164	0.000270	0.000653	0.000265	0.000872	0.000338	0.001397	0.000457	0.001002
W3-1	0.000021	0.000016	0.000012	0.000016	0.000009	0.000005	0.000009	0.000004	0.000007
W3-2	0.000019	0.000012	0.000010	0.000013	0.000005	0.000005	0.000003	0.000005	0.000003
W3-3	0.000022	0.000013	0.000016	0.000015	0.000010	0.000007	0.000007	0.000005	0.000007
W3-4	0.000019	0.000013	0.000013	0.000014	0.000007	0.000005	0.000005	0.000006	0.000002
W3-5	0.000020	0.000012	0.000010	0.000014	0.000006	0.000005	0.000007	0.000005	0.000002
W3-6	0.000019	0.000012	0.000010	0.000009	0.000005	0.000005	0.000006	0.000002	0.000004
W3-7	0.000041	0.000023	0.000016	0.000026	0.000008	0.000012	0.000009	0.000009	0.000004
W3-8	0.000035	0.000019	0.000013	0.000020	0.000009	0.000011	0.000009	0.000007	0.000004
W3-9	0.000038	0.000019	0.000013	0.000024	0.000008	0.000011	0.000009	0.000006	0.000004
W3-10	0.000079	0.000038	0.000025	0.000046	0.000017	0.000019	0.000018	0.000015	0.000006
W3-11	0.000082	0.000041	0.000023	0.000045	0.000016	0.000021	0.000014	0.000015	0.000008
W3-12	0.000059	0.000025	0.000017	0.000030	0.000013	0.000014	0.000009	0.000010	0.000007
SRM614-14	0.000091	0.000153	0.000360	0.000127	0.000505	0.000128	0.000538	0.000183	0.000554
SRM612-14	0.004214	0.007563	0.017034	0.006595	0.027841	0.006518	0.029662	0.009527	0.032077
SRM610-14	0.062352	0.116828	0.291690	0.098878	0.501889	0.103700	0.537083	0.150815	0.587908
AP1-14	0.000000	0.000000	0.000002	0.000001	0.000001	0.000000	0.000001	0.000001	0.000002
AP2-14	0.000023	0.000040	0.000079	0.000033	0.000131	0.000048	0.000205	0.000072	0.000147
AP3-14	0.000115	0.000183	0.000427	0.000152	0.000592	0.000233	0.000956	0.000325	0.000684
AP4-14	0.000167	0.000273	0.000632	0.000229	0.000898	0.000340	0.001455	0.000487	0.001024
standardize signal averages AP									
AP1	0.000001	0.000003	0.000006	0.000003	0.000007	0.000002	0.000007	0.000002	0.000008
AP2	0.000024	0.000041	0.000087	0.000035	0.000134	0.000050	0.000207	0.000073	0.000151
AP3	0.000108	0.000180	0.000425	0.000163	0.000576	0.000226	0.000918	0.000312	0.000662
AP4	0.000166	0.000271	0.000643	0.000247	0.000885	0.000339	0.001426	0.000472	0.001013
linest from std sig ave									
	0.054940	0.034741	0.014761	0.038132	0.010846	0.041340	0.010060	0.030069	0.009537
standardize signal averages SRM									
SRM614-2	0.000076	0.000138	0.000308	0.000117	0.000420	0.000109	0.000458	0.000154	0.000470
SRM612-2	0.003598	0.006775	0.015433	0.006180	0.024233	0.005728	0.025628	0.008320	0.027865
SRM610-2	0.056563	0.110838	0.283767	0.098166	0.461247	0.096619	0.492449	0.139463	0.543699
linest from std sig ave									
	0.088909	0.047451	0.018968	0.049954	0.011210	0.051547	0.010659	0.035676	0.009027
concentration data									
SRM614-13	0.29	0.36	0.32	0.35	0.31	0.32	0.33	0.32	0.32
SRM612-13	14.05	17.84	17.51	18.85	19.18	17.51	18.63	18.34	19.35
SRM610-13	239.24	312.39	349.20	318.70	391.25	317.45	386.38	330.38	408.55

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.05	0.07	0.07	0.08	0.06	0.05	0.05	0.05	0.05
AP2-13	0.55	0.58	0.55	0.56	0.59	0.88	0.84	0.88	0.59
AP3-13	2.20	2.46	2.48	2.63	2.42	3.61	3.54	3.57	2.43
AP4-13	3.60	3.74	3.85	4.03	3.77	5.58	5.61	5.48	3.81
W3-1	0.46	0.22	0.07	0.25	0.04	0.09	0.04	0.05	0.02
W3-2	0.41	0.16	0.06	0.20	0.02	0.09	0.01	0.06	0.01
W3-3	0.48	0.18	0.09	0.22	0.04	0.11	0.03	0.06	0.03
W3-4	0.43	0.19	0.07	0.21	0.03	0.08	0.02	0.07	0.01
W3-5	0.43	0.17	0.06	0.21	0.03	0.08	0.03	0.06	0.01
W3-6	0.41	0.16	0.06	0.14	0.02	0.08	0.03	0.03	0.01
W3-7	0.89	0.32	0.09	0.40	0.03	0.19	0.04	0.11	0.02
W3-8	0.76	0.27	0.07	0.30	0.04	0.19	0.04	0.08	0.01
W3-9	0.83	0.26	0.08	0.37	0.03	0.18	0.04	0.07	0.02
W3-10	1.73	0.52	0.15	0.69	0.08	0.32	0.07	0.18	0.02
W3-11	1.80	0.57	0.13	0.68	0.07	0.35	0.05	0.18	0.03
W3-12	1.29	0.34	0.10	0.45	0.05	0.22	0.04	0.12	0.03
SRM614-14	0.43	0.46	0.46	0.41	0.47	0.45	0.46	0.47	0.45
SRM612-14	19.86	22.53	21.56	21.57	25.90	23.11	25.59	24.57	26.24
SRM610-14	293.79	348.09	369.26	323.36	466.86	367.66	463.40	388.92	480.87
AP1-14	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01
AP2-14	0.51	0.56	0.46	0.50	0.57	0.78	0.82	0.87	0.56
AP3-14	2.53	2.53	2.52	2.31	2.56	3.84	3.84	3.90	2.60
AP4-14	3.65	3.78	3.72	3.48	3.89	5.61	5.84	5.84	3.90

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

raw data	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-11	3.16	1.24	9.84	8.68	3.28	7.00	4.56	2.16	2.36
SRM614-11	261.00	493.88	1218.65	454.68	1694.49	449.44	1772.73	588.44	1798.65
SRM612-11	11923.87	23023.13	51017.41	20439.80	82496.19	19400.87	88244.54	28301.80	95998.30
SRM610-11	75902.43	151261.92	390485.34	130823.41	641160.38	132661.95	690490.75	192032.61	764181.13
AP1-11	136.36	136.20	243.16	127.48	257.36	79.48	228.04	86.36	223.36
AP2-11	603.08	952.65	2186.57	880.32	3128.58	1213.21	4605.35	1615.85	3494.70
AP3-11	2845.70	4546.35	11145.90	3936.34	14297.16	5492.23	22858.21	7814.68	16315.89
AP4-11	3058.30	5044.51	11702.55	4301.46	16426.25	6377.60	26541.07	8533.33	18627.47
W1-1	137.76	94.24	159.92	44.48	38.32	12.92	27.60	22.04	29.48
W1-2	102.08	86.84	103.20	33.48	25.24	16.36	12.96	14.96	8.76
W1-3	62.24	57.92	66.56	18.60	22.12	14.12	8.36	5.00	10.28
W1-4	222.52	159.56	230.96	67.96	70.48	36.56	64.28	35.96	40.76
W1-5	131.16	118.68	161.40	30.60	23.24	23.92	16.32	14.20	13.36
W1-6	114.52	116.64	135.52	19.68	31.36	21.96	17.00	13.24	17.16
W1-7	387.16	231.56	269.48	150.88	103.76	81.00	101.20	70.92	75.40
W1-8	199.84	166.56	186.24	56.68	59.88	40.96	36.44	29.88	31.76
W1-9	263.12	183.64	193.48	78.92	72.44	42.32	50.96	45.60	35.52
W1-10	299.36	200.88	262.72	100.28	83.08	63.80	84.48	52.64	54.16
W1-11	195.68	149.44	182.36	46.12	58.52	48.40	31.88	26.20	27.52
W1-12	209.92	124.08	172.60	52.64	43.52	43.84	36.80	36.80	29.48
W1-13	189.04	123.48	194.80	47.92	46.84	30.88	46.60	25.80	28.96
W1-14	114.76	100.16	129.36	33.52	32.68	25.40	17.84	10.36	17.40
W1-15	126.60	120.16	121.04	25.92	28.20	15.80	17.48	8.04	6.72
W1-16	147.00	93.12	126.08	32.32	44.36	16.76	27.20	20.60	25.16
W1-17	127.32	72.60	103.92	11.64	32.08	10.36	10.40	6.24	14.00
W1-18	74.60	89.04	95.16	11.60	27.16	9.16	18.60	2.88	17.84
SRM614-12	225.68	388.84	834.48	297.24	1278.65	304.36	1252.57	429.92	1398.25
SRM612-12	10204.90	17752.54	38592.38	14993.60	66318.38	15617.89	70356.91	22705.37	75216.54
SRM610-12	66069.77	122006.77	299348.75	99774.20	532294.38	108942.05	570561.69	157837.17	616054.69
AP1-12	8.36	27.04	27.84	5.20	23.08	6.44	16.60	12.68	14.16
AP2-12	343.52	570.44	1114.61	382.72	1775.37	710.32	2814.30	968.41	2079.93
AP3-12	1652.97	2478.25	5947.39	2011.09	8402.49	3201.30	13563.68	4388.90	9616.05
AP4-12	2759.86	4271.30	9994.74	3410.66	14219.72	5560.63	22506.57	7457.96	15924.21
blank-12	7.48	33.52	33.00	0.28	2.32	1.00	3.08	3.40	6.44
blank average	5.32	17.38	21.42	4.48	2.80	4.00	3.82	2.78	4.40

blank subtraction									
SRM614-11	255.68	476.50	1197.23	450.20	1691.69	445.44	1768.91	585.66	1794.25
SRM612-11	11918.55	23005.75	50995.99	20435.31	82493.39	19396.87	88240.72	28299.02	95993.90
SRM610-11	75897.11	151244.54	390463.92	130818.93	641157.58	132657.95	690486.93	192029.83	764176.73
AP1-11	131.04	118.82	221.74	123.00	254.56	75.48	224.22	83.58	218.96
AP2-11	597.76	935.27	2165.15	875.84	3125.78	1209.21	4601.53	1613.07	3490.30
AP3-11	2840.38	4528.97	11124.48	3931.86	14294.36	5488.23	22854.39	7811.90	16311.49

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	3052.98	5027.13	11681.13	4296.98	16423.45	6373.60	26537.25	8530.55	18623.06
W1-1	132.44	76.86	138.50	40.00	35.52	8.92	23.78	19.26	25.08
W1-2	96.76	69.46	81.78	29.00	22.44	12.36	9.14	12.18	4.36
W1-3	56.92	40.54	45.14	14.12	19.32	10.12	4.54	2.22	5.88
W1-4	217.20	142.18	209.54	63.48	67.68	32.56	60.46	33.18	36.36
W1-5	125.84	101.30	139.98	26.12	20.44	19.92	12.50	11.42	8.96
W1-6	109.20	99.26	114.10	15.20	28.56	17.96	13.18	10.46	12.76
W1-7	381.84	214.18	248.06	146.40	100.96	77.00	97.38	68.14	71.00
W1-8	194.52	149.18	164.82	52.20	57.08	36.96	32.62	27.10	27.36
W1-9	257.80	166.26	172.06	74.44	69.64	38.32	47.14	42.82	31.12
W1-10	294.04	183.50	241.30	95.80	80.28	59.80	80.66	49.86	49.76
W1-11	190.36	132.06	160.94	41.64	55.72	44.40	28.06	23.42	23.12
W1-12	204.60	106.70	151.18	48.16	40.72	39.84	32.98	34.02	25.08
W1-13	183.72	106.10	173.38	43.44	44.04	26.88	42.78	23.02	24.56
W1-14	109.44	82.78	107.94	29.04	29.88	21.40	14.02	7.58	13.00
W1-15	121.28	102.78	99.62	21.44	25.40	11.80	13.66	5.26	2.32
W1-16	141.68	75.74	104.66	27.84	41.56	12.76	23.38	17.82	20.76
W1-17	122.00	55.22	82.50	7.16	29.28	6.36	6.58	3.46	9.60
W1-18	69.28	71.66	73.74	7.12	24.36	5.16	14.78	0.10	13.44
SRM614-12	220.36	371.46	813.06	292.76	1275.85	300.36	1248.75	427.14	1393.85
SRM612-12	10199.58	17735.16	38570.96	14989.12	66315.57	15613.89	70353.09	22702.59	75212.14
SRM610-12	66064.45	121989.39	299327.33	99769.72	532291.58	108938.05	570557.87	157834.39	616050.29
AP1-12	3.04	9.66	6.42	0.72	20.28	2.44	12.78	9.90	9.76
AP2-12	338.20	553.06	1093.19	378.24	1772.57	706.32	2810.48	965.63	2075.53
AP3-12	1647.65	2460.87	5925.97	2006.61	8399.69	3197.30	13559.86	4386.12	9611.65
AP4-12	2754.54	4253.92	9973.32	3406.18	14216.92	5556.63	22502.75	7455.18	15919.81
zero correction									
SRM614-11	255.68	476.50	1197.23	450.20	1691.69	445.44	1768.91	585.66	1794.25
SRM612-11	11918.55	23005.75	50995.99	20435.31	82493.39	19396.87	88240.72	28299.02	95993.90
SRM610-11	75897.11	151244.54	390463.92	130818.93	641157.58	132657.95	690486.93	192029.83	764176.73
AP1-11	131.04	118.82	221.74	123.00	254.56	75.48	224.22	83.58	218.96
AP2-11	597.76	935.27	2165.15	875.84	3125.78	1209.21	4601.53	1613.07	3490.30
AP3-11	2840.38	4528.97	11124.48	3931.86	14294.36	5488.23	22854.39	7811.90	16311.49
AP4-11	3052.98	5027.13	11681.13	4296.98	16423.45	6373.60	26537.25	8530.55	18623.06
W1-1	132.44	76.86	138.50	40.00	35.52	8.92	23.78	19.26	25.08
W1-2	96.76	69.46	81.78	29.00	22.44	12.36	9.14	12.18	4.36
W1-3	56.92	40.54	45.14	14.12	19.32	10.12	4.54	2.22	5.88
W1-4	217.20	142.18	209.54	63.48	67.68	32.56	60.46	33.18	36.36
W1-5	125.84	101.30	139.98	26.12	20.44	19.92	12.50	11.42	8.96
W1-6	109.20	99.26	114.10	15.20	28.56	17.96	13.18	10.46	12.76
W1-7	381.84	214.18	248.06	146.40	100.96	77.00	97.38	68.14	71.00
W1-8	194.52	149.18	164.82	52.20	57.08	36.96	32.62	27.10	27.36
W1-9	257.80	166.26	172.06	74.44	69.64	38.32	47.14	42.82	31.12
W1-10	294.04	183.50	241.30	95.80	80.28	59.80	80.66	49.86	49.76
W1-11	190.36	132.06	160.94	41.64	55.72	44.40	28.06	23.42	23.12
W1-12	204.60	106.70	151.18	48.16	40.72	39.84	32.98	34.02	25.08
W1-13	183.72	106.10	173.38	43.44	44.04	26.88	42.78	23.02	24.56
W1-14	109.44	82.78	107.94	29.04	29.88	21.40	14.02	7.58	13.00
W1-15	121.28	102.78	99.62	21.44	25.40	11.80	13.66	5.26	2.32
W1-16	141.68	75.74	104.66	27.84	41.56	12.76	23.38	17.82	20.76
W1-17	122.00	55.22	82.50	7.16	29.28	6.36	6.58	3.46	9.60
W1-18	69.28	71.66	73.74	7.12	24.36	5.16	14.78	0.10	13.44
SRM614-12	220.36	371.46	813.06	292.76	1275.85	300.36	1248.75	427.14	1393.85
SRM612-12	10199.58	17735.16	38570.96	14989.12	66315.57	15613.89	70353.09	22702.59	75212.14
SRM610-12	66064.45	121989.39	299327.33	99769.72	532291.58	108938.05	570557.87	157834.39	616050.29
AP1-12	3.04	9.66	6.42	0.72	20.28	2.44	12.78	9.90	9.76
AP2-12	338.20	553.06	1093.19	378.24	1772.57	706.32	2810.48	965.63	2075.53
AP3-12	1647.65	2460.87	5925.97	2006.61	8399.69	3197.30	13559.86	4386.12	9611.65
AP4-12	2754.54	4253.92	9973.32	3406.18	14216.92	5556.63	22502.75	7455.18	15919.81
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal									
SRM614-11	0.000073	0.000136	0.000343	0.000129	0.000484	0.000127	0.000506	0.000168	0.000514
SRM612-11	0.003883	0.007496	0.016615	0.006658	0.026878	0.006320	0.028750	0.009220	0.031276
SRM610-11	0.057099	0.113785	0.293755	0.098418	0.482357	0.099801	0.519468	0.144468	0.574907
AP1-11	0.000007	0.000006	0.000012	0.000007	0.000014	0.000004	0.000012	0.000005	0.000012
AP2-11	0.000034	0.000053	0.000123	0.000050	0.000178	0.000069	0.000262	0.000092	0.000199
AP3-11	0.000154	0.000245	0.000602	0.000213	0.000774	0.000297	0.001237	0.000423	0.000883
AP4-11	0.000188	0.000310	0.000720	0.000265	0.001012	0.000393	0.001635	0.000526	0.001147
W1-1	0.000010	0.000006	0.000011	0.000003	0.000003	0.000001	0.000002	0.000001	0.000002
W1-2	0.000009	0.000007	0.000008	0.000003	0.000002	0.000001	0.000001	0.000001	0.000000
W1-3	0.000007	0.000005	0.000005	0.000002	0.000002	0.000001	0.000001	0.000000	0.000001
W1-4	0.000012	0.000008	0.000011	0.000003	0.000004	0.000002	0.000003	0.000002	0.000002
W1-5	0.000008	0.000006	0.000008	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001
W1-6	0.000006	0.000006	0.000007	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001
W1-7	0.000021	0.000012	0.000013	0.000008	0.000005	0.000004	0.000005	0.000004	0.000004
W1-8	0.000011	0.000009	0.000010	0.000003	0.000003	0.000002	0.000002	0.000002	0.000002
W1-9	0.000015	0.000010	0.000010	0.000004	0.000004	0.000002	0.000003	0.000002	0.000002
W1-10	0.000014	0.000009	0.000012	0.000005	0.000004	0.000003	0.000004	0.000002	0.000002
W1-11	0.000009	0.000006	0.000008	0.000002	0.000003	0.000002	0.000001	0.000001	0.000001
W1-12	0.000011	0.000005	0.000008	0.000002	0.000002	0.000002	0.000002	0.000002	0.000001
W1-13	0.000010	0.000006	0.000009	0.000002	0.000002	0.000001	0.000002	0.000001	0.000001
W1-14	0.000006	0.000004	0.000006	0.000001	0.000002	0.000001	0.000001	0.000000	0.000001
W1-15	0.000006	0.000005	0.000005	0.000001	0.000001	0.000001	0.000001	0.000000	0.000000
W1-16	0.000010	0.000005	0.000008	0.000002	0.000003	0.000001	0.000002	0.000001	0.000002
W1-17	0.000009	0.000004	0.000006	0.000001	0.000002	0.000000	0.000000	0.000000	0.000001
W1-18	0.000005	0.000005	0.000005	0.000001	0.000002	0.000000	0.000001	0.000000	0.000001
SRM614-12	0.000096	0.000161	0.000353	0.000127	0.000554	0.000130	0.000542	0.000185	0.000605
SRM612-12	0.004629	0.008050	0.017506	0.006803	0.030099	0.007087	0.031932	0.010304	0.034137
SRM610-12	0.067280	0.124234	0.304835	0.101605	0.542086	0.110943	0.581056	0.160739	0.627386
AP1-12	0.000000	0.000001	0.000000	0.000000	0.000002	0.000000	0.000001	0.000001	0.000001
AP2-12	0.000028	0.000045	0.000089	0.000031	0.000145	0.000058	0.000230	0.000079	0.000170
AP3-12	0.000126	0.000188	0.000454	0.000154	0.000643	0.000245	0.001039	0.000336	0.000736
AP4-12	0.000202	0.000312	0.000731	0.000250	0.001042	0.000407	0.001649	0.000546	0.001167
standardize signal averages AP									
AP1	0.000004	0.000004	0.000006	0.000003	0.000008	0.000002	0.000007	0.000003	0.000006
AP2	0.000031	0.000049	0.000106	0.000040	0.000161	0.000063	0.000246	0.000085	0.000184
AP3	0.000140	0.000217	0.000528	0.000183	0.000709	0.000271	0.001138	0.000379	0.000810
AP4	0.000195	0.000311	0.000725	0.000257	0.001027	0.000400	0.001642	0.000536	0.001157
linest from std sig ave									
	0.045044	0.029807	0.012624	0.035572	0.009163	0.034829	0.008525	0.025827	0.008154
standardize signal averages SRM									
srm614-2	0.000084	0.000149	0.000348	0.000128	0.000519	0.000129	0.000524	0.000177	0.000559
srm612-2	0.004256	0.007773	0.017061	0.006731	0.028488	0.006703	0.030341	0.009762	0.032707
srm610-2	0.062190	0.119009	0.299295	0.100012	0.512221	0.105372	0.550262	0.152603	0.601146
linest from std sig ave									
	0.080845	0.044185	0.017982	0.049023	0.010094	0.047257	0.009538	0.032599	0.008164
concentration data									
SRM614-11	0.28	0.35	0.37	0.39	0.38	0.38	0.37	0.37	0.36
SRM612-11	15.00	19.16	17.99	20.31	21.12	18.88	21.02	20.42	21.87
SRM610-11	220.58	290.87	318.05	300.25	379.06	298.11	379.79	320.00	402.05
AP1-11	0.13	0.08	0.06	0.10	0.05	0.06	0.04	0.05	0.04
AP2-11	0.61	0.63	0.62	0.71	0.65	0.96	0.89	0.95	0.65
AP3-11	2.76	2.92	3.03	3.02	2.83	4.13	4.21	4.36	2.87
AP4-11	3.38	3.68	3.62	3.76	3.70	5.46	5.56	5.42	3.73
W1-1	0.18	0.07	0.05	0.04	0.01	0.01	0.01	0.02	0.01
W1-2	0.17	0.08	0.04	0.04	0.01	0.02	0.00	0.01	0.00
W1-3	0.12	0.06	0.03	0.02	0.01	0.02	0.00	0.00	0.00
W1-4	0.21	0.09	0.06	0.05	0.01	0.02	0.01	0.02	0.01
W1-5	0.14	0.07	0.04	0.02	0.00	0.02	0.00	0.01	0.00
W1-6	0.12	0.07	0.03	0.01	0.01	0.01	0.00	0.01	0.00
W1-7	0.37	0.14	0.07	0.11	0.02	0.06	0.02	0.04	0.01
W1-8	0.20	0.10	0.05	0.04	0.01	0.03	0.01	0.02	0.01
W1-9	0.27	0.11	0.05	0.06	0.01	0.03	0.01	0.03	0.01
W1-10	0.26	0.11	0.06	0.07	0.01	0.04	0.01	0.02	0.01
W1-11	0.16	0.08	0.04	0.03	0.01	0.03	0.00	0.01	0.00
W1-12	0.19	0.07	0.04	0.04	0.01	0.03	0.01	0.02	0.00
W1-13	0.18	0.07	0.05	0.03	0.01	0.02	0.01	0.01	0.00
W1-14	0.10	0.05	0.03	0.02	0.01	0.02	0.00	0.00	0.00
W1-15	0.12	0.06	0.03	0.02	0.00	0.01	0.00	0.00	0.00
W1-16	0.18	0.07	0.04	0.03	0.01	0.01	0.01	0.01	0.00
W1-17	0.16	0.05	0.03	0.01	0.01	0.01	0.00	0.00	0.00
W1-18	0.09	0.06	0.03	0.01	0.01	0.01	0.00	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.37	0.41	0.38	0.39	0.44	0.39	0.40	0.41	0.42
SRM612-12	17.88	20.58	18.95	20.76	23.65	21.17	23.35	22.82	23.87
SRM610-12	259.91	317.59	330.05	309.98	426.00	331.39	424.82	356.04	438.75
AP1-12	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00
AP2-12	0.50	0.54	0.45	0.44	0.53	0.80	0.78	0.81	0.55
AP3-12	2.27	2.24	2.29	2.18	2.35	3.40	3.53	3.46	2.39
AP4-12	3.63	3.71	3.68	3.54	3.81	5.66	5.61	5.63	3.80

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

raw data	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-9	5.36	2.72	3.96	4.08	1.68	4.72	1.24	1.08	3.20
SRM614-9	215.84	370.48	926.77	400.04	1375.65	343.68	1397.97	482.44	1493.29
SRM612-9	11718.19	22880.01	51370.29	20480.80	81890.42	19378.27	86372.13	27916.92	94721.61
SRM610-9	77821.92	157783.20	406546.38	139027.03	668279.06	138289.69	717028.44	200461.69	795033.81
AP1-9	66.12	113.84	284.44	79.80	342.36	60.44	314.04	107.56	330.60
AP2-9	568.52	995.33	2245.09	910.49	3337.02	1285.89	5087.11	1629.73	3719.66
AP3-9	2332.93	3936.42	9420.17	3575.98	12698.27	4970.03	20076.63	6758.04	14411.40
AP4-9	3778.30	6334.00	14665.52	5554.27	20801.72	7952.52	32963.03	10866.86	23096.53
T2-1	148.96	264.00	346.88	23.56	81.24	16.20	60.32	24.72	57.20
T2-2	113.12	227.88	308.00	10.44	34.08	9.36	10.64	15.36	11.44
T2-3	109.16	175.48	258.68	22.92	46.76	12.00	20.36	8.12	22.20
T2-4	169.68	226.88	297.68	14.76	54.00	14.00	31.00	16.48	25.80
T2-5	132.28	151.80	229.80	17.56	27.12	11.44	17.44	8.76	8.20
T2-6	98.44	144.60	202.80	11.16	30.56	5.88	9.56	9.44	16.36
T2-7	90.92	115.80	156.48	17.56	48.80	11.08	42.96	17.12	40.04
T2-8	107.76	113.96	171.32	15.00	20.40	5.60	7.28	7.28	10.92
T2-9	90.72	103.88	132.28	13.96	22.20	14.88	7.96	10.20	8.32
T2-10	25.36	38.92	82.12	14.28	32.72	8.36	28.20	10.96	25.56
T2-11	21.12	30.72	43.48	11.84	12.24	9.24	9.64	5.84	14.44
T2-12	29.84	47.76	47.20	8.08	13.56	13.24	7.36	5.84	7.28
T2-13	32.92	60.92	122.52	28.48	78.36	22.80	65.72	25.64	66.72
T2-14	25.52	38.80	34.48	7.80	8.48	9.36	7.68	6.04	8.72
T2-15	23.28	28.52	43.60	8.04	26.08	4.60	23.08	4.44	15.16
T2-16	53.68	62.92	139.68	30.84	91.44	27.84	73.52	25.36	89.80
T2-17	14.16	23.56	50.84	9.40	27.56	7.92	8.56	8.56	16.32
T2-18	23.04	30.68	49.00	13.08	38.48	16.28	34.32	10.20	29.12
SRM614-10	194.60	337.88	682.52	245.88	1069.49	266.56	1041.85	374.72	1177.49
SRM612-10	9739.89	17146.54	37463.89	14893.04	64834.41	15174.89	68334.55	21876.36	73186.06
SRM610-10	68799.31	126823.11	314235.72	104440.63	551442.25	112898.72	592369.94	163916.84	641464.13
AP1-10	16.28	12.20	16.44	5.92	11.08	3.56	12.88	6.00	10.28
AP2-10	410.04	618.56	1391.93	563.64	2236.41	824.28	3437.50	1192.01	2529.73
AP3-10	1758.81	2891.94	6523.32	2295.73	9369.33	3628.94	14981.96	4940.95	10632.18
AP4-10	2769.66	4435.02	10203.86	3620.82	14736.60	5528.43	23230.29	7670.60	16188.17
blank-10	6.28	18.64	10.20	2.12	4.96	1.00	2.36	2.44	4.80
blank average	5.82	10.68	7.08	3.10	3.32	2.86	1.80	1.76	4.00

blank subtraction									
SRM614-9	210.02	359.80	919.69	396.94	1372.33	340.82	1396.17	480.68	1489.29
SRM612-9	11712.37	22869.33	51363.21	20477.69	81887.10	19375.41	86370.32	27915.16	94717.61
SRM610-9	77816.10	157772.52	406539.30	139023.93	668275.74	138286.83	717026.64	200459.93	795029.81
AP1-9	60.30	103.16	277.36	76.70	339.04	57.58	312.24	105.80	326.60
AP2-9	562.70	984.65	2238.01	907.39	3333.70	1283.03	5085.31	1627.97	3715.66
AP3-9	2327.11	3925.74	9413.09	3572.88	12694.95	4967.17	20074.83	6756.28	14407.40
AP4-9	3772.48	6323.32	14658.44	5551.17	20798.40	7949.66	32961.23	10885.10	23092.53
T2-1	143.14	253.32	339.80	20.46	77.92	13.34	58.52	22.96	53.20
T2-2	107.30	217.20	300.92	7.34	30.76	6.50	8.84	13.60	7.44
T2-3	103.34	164.80	251.60	19.82	43.44	9.14	18.56	6.36	18.20
T2-4	163.86	216.20	290.60	11.66	50.68	11.14	29.20	14.72	21.80
T2-5	126.46	141.12	222.72	14.46	23.80	8.58	15.64	7.00	4.20
T2-6	92.62	133.92	195.72	8.06	27.24	3.02	7.76	7.68	12.36
T2-7	85.10	105.12	149.40	14.46	45.48	8.22	41.16	15.36	36.04
T2-8	101.94	103.28	164.24	11.90	17.08	2.74	5.48	5.52	6.92
T2-9	84.90	93.20	125.20	10.86	18.88	12.02	6.16	8.44	4.32
T2-10	19.54	28.24	75.04	11.18	29.40	5.50	26.40	9.20	21.56
T2-11	15.30	20.04	36.40	8.74	8.92	6.38	7.84	4.08	10.44
T2-12	24.02	37.08	40.12	4.98	10.24	10.38	5.56	4.08	3.28
T2-13	27.10	50.24	115.44	25.38	75.04	19.94	63.92	23.88	62.72
T2-14	19.70	28.12	27.40	4.70	5.16	6.50	5.88	4.28	4.72
T2-15	17.46	17.84	36.52	4.94	22.76	1.74	21.28	2.68	11.16

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	47.86	52.24	132.60	27.74	88.12	24.98	71.72	23.60	85.80
T2-17	8.34	12.88	43.76	6.30	24.24	5.06	6.76	6.80	12.32
T2-18	17.22	20.00	41.92	9.98	35.16	13.42	32.52	8.44	25.12
SRM614-10	188.78	327.20	675.44	242.78	1066.17	263.70	1040.05	372.96	1173.49
SRM612-10	9734.07	17135.85	37456.81	14889.94	64831.09	15172.03	68332.75	21874.60	73182.05
SRM610-10	68793.48	126812.43	314228.64	104437.53	551438.93	112895.86	592368.14	163915.08	641460.13
AP1-10	10.46	1.52	9.36	2.82	7.76	0.70	11.08	4.24	6.28
AP2-10	404.22	607.88	1384.85	560.54	2233.09	821.42	3435.70	1190.25	2525.73
AP3-10	1752.99	2881.26	6516.24	2292.63	9366.01	3626.08	14980.16	4939.19	10628.18
AP4-10	2763.84	4424.34	10196.78	3617.72	14733.28	5525.57	23228.49	7668.84	16184.17
zero correction									
SRM614-9	210.02	359.80	919.69	396.94	1372.33	340.82	1396.17	480.68	1489.29
SRM612-9	11712.37	22869.33	51363.21	20477.69	81887.10	19375.41	86370.32	27915.16	94717.61
SRM610-9	77816.10	157772.52	406539.30	139023.93	668275.74	138286.83	717026.64	200459.93	795029.81
AP1-9	60.30	103.16	277.36	76.70	339.04	57.58	312.24	105.80	326.60
AP2-9	562.70	984.65	2238.01	907.39	3333.70	1283.03	5085.31	1627.97	3715.66
AP3-9	2327.11	3925.74	9413.09	3572.88	12694.95	4967.17	20074.83	6756.28	14407.40
AP4-9	3772.48	6323.32	14658.44	5551.17	20798.40	7949.66	32961.23	10885.10	23092.53
T2-1	143.14	253.32	339.80	20.46	77.92	13.34	58.52	22.96	53.20
T2-2	107.30	217.20	300.92	7.34	30.76	6.50	8.84	13.60	7.44
T2-3	103.34	164.80	251.60	19.82	43.44	9.14	18.56	6.36	18.20
T2-4	163.86	216.20	290.60	11.66	50.68	11.14	29.20	14.72	21.80
T2-5	126.46	141.12	222.72	14.46	23.80	8.58	15.64	7.00	4.20
T2-6	92.62	133.92	195.72	8.06	27.24	3.02	7.76	7.68	12.36
T2-7	85.10	105.12	149.40	14.46	45.48	8.22	41.16	15.36	36.04
T2-8	101.94	103.28	164.24	11.90	17.08	2.74	5.48	5.52	6.92
T2-9	84.90	93.20	125.20	10.86	18.88	12.02	6.16	8.44	4.32
T2-10	19.54	28.24	75.04	11.18	29.40	5.50	26.40	9.20	21.56
T2-11	15.30	20.04	36.40	8.74	8.92	6.38	7.84	4.08	10.44
T2-12	24.02	37.08	40.12	4.98	10.24	10.38	5.56	4.08	3.28
T2-13	27.10	50.24	115.44	25.38	75.04	19.94	63.92	23.88	62.72
T2-14	19.70	28.12	27.40	4.70	5.16	6.50	5.88	4.28	4.72
T2-15	17.46	17.84	36.52	4.94	22.76	1.74	21.28	2.68	11.16
T2-16	47.86	52.24	132.60	27.74	88.12	24.98	71.72	23.60	85.80
T2-17	8.34	12.88	43.76	6.30	24.24	5.06	6.76	6.80	12.32
T2-18	17.22	20.00	41.92	9.98	35.16	13.42	32.52	8.44	25.12
SRM614-10	188.78	327.20	675.44	242.78	1066.17	263.70	1040.05	372.96	1173.49
SRM612-10	9734.07	17135.85	37456.81	14889.94	64831.09	15172.03	68332.75	21874.60	73182.05
SRM610-10	68793.48	126812.43	314228.64	104437.53	551438.93	112895.86	592368.14	163915.08	641460.13
AP1-10	10.46	1.52	9.36	2.82	7.76	0.70	11.08	4.24	6.28
AP2-10	404.22	607.88	1384.85	560.54	2233.09	821.42	3435.70	1190.25	2525.73
AP3-10	1752.99	2881.26	6516.24	2292.63	9366.01	3626.08	14980.16	4939.19	10628.18
AP4-10	2763.84	4424.34	10196.78	3617.72	14733.28	5525.57	23228.49	7668.84	16184.17
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-9	0.000078	0.000134	0.000343	0.000148	0.000511	0.000127	0.000520	0.000179	0.000555
SRM612-9	0.003871	0.007558	0.016976	0.006768	0.027064	0.006404	0.028546	0.009226	0.031304
SRM610-9	0.058609	0.118831	0.306196	0.104710	0.503330	0.104154	0.540048	0.150982	0.598798
AP1-9	0.000003	0.000006	0.000015	0.000004	0.000018	0.000003	0.000017	0.000006	0.000018
AP2-9	0.000030	0.000053	0.000120	0.000049	0.000179	0.000069	0.000274	0.000088	0.000200
AP3-9	0.000126	0.000213	0.000510	0.000194	0.000688	0.000269	0.001088	0.000366	0.000781
AP4-9	0.000203	0.000341	0.000790	0.000299	0.001121	0.000429	0.001777	0.000587	0.001245
T2-1	0.000006	0.000011	0.000015	0.000001	0.000004	0.000001	0.000003	0.000001	0.000002
T2-2	0.000006	0.000011	0.000015	0.000000	0.000002	0.000000	0.000000	0.000001	0.000000
T2-3	0.000006	0.000010	0.000015	0.000001	0.000003	0.000001	0.000001	0.000000	0.000001
T2-4	0.000009	0.000012	0.000016	0.000001	0.000003	0.000001	0.000002	0.000001	0.000001
T2-5	0.000008	0.000009	0.000014	0.000001	0.000001	0.000001	0.000001	0.000000	0.000000
T2-6	0.000007	0.000010	0.000014	0.000001	0.000002	0.000000	0.000001	0.000001	0.000001
T2-7	0.000005	0.000006	0.000009	0.000001	0.000003	0.000001	0.000003	0.000001	0.000002

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000006	0.000006	0.000010	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000
T2-9	0.000005	0.000006	0.000008	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000
T2-10	0.000003	0.000004	0.000010	0.000001	0.000004	0.000001	0.000004	0.000001	0.000003
T2-11	0.000002	0.000002	0.000004	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001
T2-12	0.000003	0.000004	0.000004	0.000001	0.000001	0.000001	0.000001	0.000000	0.000000
T2-13	0.000003	0.000005	0.000012	0.000003	0.000008	0.000002	0.000006	0.000002	0.000006
T2-14	0.000002	0.000003	0.000003	0.000000	0.000000	0.000001	0.000001	0.000000	0.000000
T2-15	0.000002	0.000002	0.000003	0.000000	0.000002	0.000000	0.000002	0.000000	0.000001
T2-16	0.000003	0.000004	0.000009	0.000002	0.000006	0.000002	0.000005	0.000002	0.000006
T2-17	0.000001	0.000001	0.000003	0.000000	0.000002	0.000000	0.000000	0.000000	0.000001
T2-18	0.000001	0.000001	0.000002	0.000001	0.000002	0.000001	0.000002	0.000000	0.000001
SRM614-10	0.000101	0.000175	0.000362	0.000130	0.000571	0.000141	0.000557	0.000200	0.000629
SRM612-10	0.004579	0.008060	0.017619	0.007004	0.030495	0.007137	0.032142	0.010289	0.034423
SRM610-10	0.066661	0.122882	0.304489	0.101200	0.534346	0.109397	0.574007	0.158834	0.621577
AP1-10	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000	0.000000
AP2-10	0.000028	0.000043	0.000097	0.000039	0.000157	0.000058	0.000241	0.000083	0.000177
AP3-10	0.000125	0.000206	0.000466	0.000164	0.000670	0.000260	0.001072	0.000354	0.000761
AP4-10	0.000196	0.000314	0.000724	0.000257	0.001047	0.000393	0.001650	0.000545	0.001150

standardize signal averages AP									
AP1	0.000002	0.000003	0.000008	0.000002	0.000010	0.000002	0.000009	0.000003	0.000009
AP2	0.000029	0.000048	0.000109	0.000044	0.000168	0.000063	0.000257	0.000086	0.000189
AP3	0.000126	0.000210	0.000488	0.000179	0.000679	0.000264	0.001080	0.000360	0.000771
AP4	0.000200	0.000328	0.000757	0.000278	0.001084	0.000411	0.001713	0.000566	0.001197

linest from std sig ave									
	0.045988	0.029119	0.012618	0.034063	0.008957	0.034509	0.008425	0.025377	0.008104

standardize signal averages SRM									
srm614-2	0.000090	0.000155	0.000352	0.000139	0.000541	0.000134	0.000539	0.000189	0.000592
srm612-2	0.004225	0.007809	0.017297	0.006886	0.028779	0.006770	0.030344	0.009758	0.032864
srm610-2	0.062635	0.120856	0.305342	0.102955	0.518838	0.106775	0.557027	0.154908	0.610188

linest from std sig ave									
	0.080274	0.043511	0.017626	0.047622	0.009965	0.046636	0.009422	0.032115	0.008043

concentration data									
SRM614-9	0.31	0.33	0.37	0.43	0.39	0.38	0.38	0.39	0.39
SRM612-9	15.27	18.88	18.37	19.77	20.79	18.95	20.62	20.08	21.76
SRM610-9	231.16	296.76	331.35	305.89	386.63	308.25	390.20	328.59	416.16
AP1-9	0.06	0.07	0.08	0.06	0.07	0.04	0.06	0.06	0.06
AP2-9	0.56	0.62	0.61	0.66	0.64	0.95	0.92	0.89	0.65
AP3-9	2.31	2.47	2.57	2.63	2.46	3.71	3.66	3.71	2.52
AP4-9	3.73	3.96	3.98	4.07	4.01	5.90	5.97	5.94	4.02
T2-1	0.12	0.13	0.08	0.01	0.01	0.01	0.01	0.01	0.01
T2-2	0.10	0.13	0.08	0.01	0.01	0.00	0.00	0.01	0.00
T2-3	0.12	0.12	0.08	0.02	0.01	0.01	0.00	0.00	0.00
T2-4	0.17	0.14	0.08	0.01	0.01	0.01	0.01	0.01	0.00
T2-5	0.15	0.10	0.07	0.01	0.01	0.01	0.00	0.00	0.00
T2-6	0.12	0.11	0.07	0.01	0.01	0.00	0.00	0.01	0.00
T2-7	0.10	0.07	0.05	0.01	0.01	0.01	0.01	0.01	0.01
T2-8	0.11	0.07	0.05	0.01	0.00	0.00	0.00	0.00	0.00
T2-9	0.10	0.07	0.04	0.01	0.00	0.01	0.00	0.01	0.00
T2-10	0.05	0.04	0.05	0.02	0.01	0.01	0.01	0.01	0.01
T2-11	0.03	0.03	0.02	0.01	0.00	0.01	0.00	0.00	0.00
T2-12	0.05	0.05	0.02	0.01	0.00	0.02	0.00	0.00	0.00
T2-13	0.05	0.06	0.06	0.03	0.03	0.03	0.02	0.02	0.02
T2-14	0.03	0.03	0.01	0.01	0.00	0.01	0.00	0.00	0.00
T2-15	0.03	0.02	0.02	0.01	0.01	0.00	0.01	0.00	0.00
T2-16	0.06	0.04	0.05	0.03	0.02	0.02	0.02	0.02	0.02
T2-17	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
T2-18	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
SRM614-10	0.40	0.44	0.39	0.38	0.44	0.42	0.40	0.43	0.44
SRM612-10	18.06	20.13	19.07	20.46	23.42	21.12	23.22	22.39	23.92
SRM610-10	262.92	306.88	329.51	295.64	410.45	323.77	414.73	345.68	431.99
AP1-10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-10	0.52	0.50	0.49	0.53	0.56	0.79	0.81	0.84	0.57
AP3-10	2.30	2.40	2.35	2.23	2.40	3.57	3.60	3.58	2.46
AP4-10	3.60	3.65	3.65	3.49	3.74	5.40	5.55	5.51	3.72

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srM614-2	0.000043	0.000098	0.000237	0.000101	0.000313	0.000078	0.000300	0.000102	0.000343
srM612-2	0.002154	0.004661	0.011473	0.005121	0.015481	0.003789	0.016392	0.005478	0.018614
srM610-2	0.029842	0.068874	0.190365	0.074955	0.265530	0.058049	0.286027	0.084725	0.330312

linest from std sig ave									
	0.168443	0.076339	0.028267	0.065407	0.019470	0.085775	0.018348	0.058715	0.014857

concentration data									
SRM614-1	0.21	0.28	0.28	0.29	0.31	0.30	0.30	0.29	0.32
SRM612-1	10.95	13.14	13.52	13.53	15.35	14.14	15.27	15.23	16.32
SRM610-1	144.67	187.83	217.38	189.31	252.61	212.74	258.56	231.45	280.27
AP1-1	0.10	0.12	0.08	0.09	0.13	0.04	0.04	0.06	0.04
AP2-1	0.63	0.69	0.66	0.72	0.63	0.87	0.89	0.91	0.62
AP3-1	3.19	3.45	3.59	3.65	3.21	4.58	4.70	4.71	3.23
AP4-1	3.14	3.62	3.57	3.62	3.60	5.52	5.47	5.57	3.79
41LU1-REDO-1	0.85	0.53	0.26	0.77	0.07	0.19	0.05	0.15	0.04
41LU1-REDO-2	0.13	0.26	0.17	0.10	0.02	0.04	0.01	0.02	0.00
41LU1-REDO-3	0.12	0.22	0.13	0.06	0.01	0.03	0.01	0.01	0.00
41LU1-REDO-4	0.15	0.28	0.20	0.11	0.03	0.03	0.02	0.04	0.02
41LU1-REDO-5	0.10	0.36	0.20	0.03	0.02	0.00	0.01	0.01	0.01
41LU1-REDO-6	0.06	0.24	0.17	0.02	0.01	0.02	0.02	0.04	0.01
41LU1-REDO-7	0.14	0.31	0.18	0.15	0.04	0.01	0.04	0.04	0.03
41LU1REDO-8	0.06	0.28	0.15	0.05	0.01	0.01	0.00	0.01	0.00
41LU1-REDO-9	0.08	0.28	0.15	0.04	0.01	0.03	0.01	0.01	0.01
41LU1REDO-10	0.24	0.32	0.20	0.29	0.02	0.09	0.03	0.10	0.03
41LU1-REDO-11	0.20	0.29	0.14	0.22	0.02	0.08	0.03	0.09	0.02
41LU1REDO-12	0.15	0.23	0.13	0.18	0.01	0.05	0.02	0.08	0.02
41LU1-REDO-13	0.38	0.24	0.14	0.27	0.02	0.11	0.04	0.12	0.02
41LU1-REDO-14	0.26	0.24	0.11	0.20	0.02	0.11	0.03	0.05	0.01
41LU1-REDO-15	0.24	0.16	0.12	0.14	0.02	0.07	0.02	0.08	0.02
SRM614-2	0.33	0.34	0.33	0.26	0.42	0.38	0.36	0.37	0.37
SRM612-2	15.72	16.70	15.98	14.61	20.76	18.93	20.66	20.15	21.02
SRM610-2	224.74	253.07	272.12	222.60	366.64	293.93	368.33	315.80	382.29
AP1-2	0.01	0.02	0.02	0.00	0.05	0.00	0.00	0.00	0.01
AP2-2	0.50	0.48	0.48	0.45	0.55	0.79	0.81	0.79	0.52
AP3-2	2.49	2.42	2.41	2.29	2.52	3.60	3.70	3.67	2.44
AP4-2	3.15	3.05	2.97	2.88	3.38	5.02	5.09	4.95	3.38

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-17	17.68	29.80	21.84	70.60	7.28	7.44	8.88	7.80	6.68
SRM614-17	83.24	176.40	424.92	217.76	533.56	129.12	528.88	190.52	606.56
SRM612-17	4787.55	10732.26	26764.67	12732.15	34568.43	8527.85	36426.05	12326.03	41944.40
SRM610-17	35301.60	84677.20	237362.94	98509.88	323236.91	72123.92	351864.22	104939.79	413720.56
AP1-17	311.52	166.04	212.56	890.48	142.24	58.56	88.64	70.00	65.96
AP2-17	411.96	558.36	1158.17	954.25	1237.57	489.00	1861.37	694.00	1484.41
AP3-17	1168.09	1968.01	4431.79	2696.78	4838.23	1757.57	7342.20	2551.01	5528.99
AP4-17	1193.37	2408.85	5711.75	2963.30	6641.24	2656.90	10569.26	3591.30	7855.36
41LU1-1	7900.44	3523.90	1773.97	11944.19	2395.77	1897.37	1325.85	1574.25	465.20
41LU1-2	14605.16	5901.87	3061.14	21127.32	3999.30	3190.78	2167.77	2859.78	786.76
41LU1-3	4867.39	2135.81	1064.41	6764.88	1443.13	1065.09	777.92	957.13	286.16
41LU1-4	24789.26	10338.06	5128.03	36985.33	7220.76	6459.52	4900.15	5541.55	1842.37
41LU1-5	11500.35	4876.79	2496.61	16765.33	3312.46	3084.90	2331.77	2631.81	871.52
41LU1-6	13043.99	5476.75	2774.98	19102.15	3822.90	3645.46	2757.62	3127.58	1095.53
41LU1-7	226602.84	85246.96	43791.81	299482.28	62589.31	76092.35	61647.35	67383.74	26056.83
41LU1-8	53487.62	20960.44	11623.15	70455.91	17341.50	24344.22	21096.12	23082.85	9540.01
41LU1-9	62029.91	24378.90	13010.03	74271.66	19498.35	27339.79	23761.89	25446.66	10675.90
41LU1-10	107946.80	42074.52	22143.81	154271.78	32174.10	45925.14	39686.18	43318.84	18410.22
41LU1-11	327132.31	114581.56	56053.08	389232.13	76215.31	101155.01	83487.55	88745.30	35100.64
41LU1-12	268901.00	95410.58	46987.98	329524.09	63481.16	86666.97	71540.04	76105.67	30459.25
SRM614-18	135.20	256.16	551.08	202.16	664.44	194.52	697.92	229.32	772.56
SRM612-18	6850.28	13022.47	30644.77	12287.03	43580.84	10555.78	45381.98	15156.93	50268.48
SRM610-18	62197.23	128917.77	341067.91	122625.97	540217.88	112245.03	578489.00	162796.59	651204.81
AP1-18	17.88	34.00	44.56	16.88	19.00	8.56	11.44	2.68	9.92
AP2-18	242.88	449.08	1028.33	448.24	1444.93	603.56	2202.73	737.52	1540.49
AP3-18	1077.45	2007.93	4732.11	1938.57	5923.07	2323.93	9564.97	3183.38	6863.72
AP4-18	1442.29	2686.10	5979.03	2602.89	8127.25	3135.58	12860.55	4381.30	9463.49
blank-18	13.88	53.52	58.44	12.40	7.80	2.08	6.56	4.88	8.60

Appendix A. Raw trace element datasheets from laser ablation.

blank average	15.78	41.66	40.14	41.50	7.54	4.76	7.72	6.34	7.64
blank subtraction									
SRM614-17	67.46	134.74	384.78	176.26	526.02	124.36	521.16	184.18	598.92
SRM612-17	4771.77	10690.60	26724.53	12690.65	34560.89	8523.09	36418.33	12319.69	41936.75
SRM610-17	35285.82	84635.53	237322.80	98468.37	323229.37	72119.16	351856.50	104933.45	413712.92
AP1-17	295.74	124.38	172.42	848.98	134.70	53.80	80.92	63.66	58.32
AP2-17	396.18	516.70	1118.03	912.75	1230.03	484.24	1853.65	687.66	1476.77
AP3-17	1152.31	1926.35	4391.64	2655.27	4830.69	1752.81	7334.48	2544.67	5521.35
AP4-17	1177.59	2367.19	5671.61	2921.80	6633.70	2652.13	10561.54	3584.96	7847.72
41LU1-1	7884.66	3482.24	1733.83	11902.69	2388.23	1892.61	1318.13	1567.91	457.56
41LU1-2	14589.38	5860.21	3021.00	21085.82	3991.76	3186.02	2160.05	2853.44	779.12
41LU1-3	4851.61	2094.15	1024.27	6723.38	1435.59	1060.33	770.20	950.79	278.52
41LU1-4	24773.48	10296.40	5087.89	36943.83	7213.22	6454.76	4892.43	5535.21	1834.73
41LU1-5	11484.56	4835.13	2456.47	16723.83	3304.92	3080.14	2324.05	2625.47	863.88
41LU1-6	13028.21	5435.09	2734.84	19060.65	3815.36	3640.70	2749.90	3121.24	1087.89
41LU1-7	226587.06	85205.30	43751.66	299440.78	62581.77	76087.59	61639.63	67377.40	26049.19
41LU1-8	53471.84	20918.78	11583.01	70414.41	17333.96	24339.46	21088.40	23076.51	9532.37
41LU1-9	62014.13	24337.24	12969.89	74230.16	19490.81	27335.03	23754.17	25440.32	10668.26
41LU1-10	107931.02	42032.86	22103.66	154230.28	32166.56	45920.38	39678.46	43312.50	18402.58
41LU1-11	327116.53	114539.90	56012.94	389190.63	76207.77	101150.25	83479.83	88738.96	35093.00
41LU1-12	268885.22	95368.92	46947.84	329482.59	63473.62	86662.21	71532.32	76099.33	30451.61
SRM614-18	119.42	214.50	510.94	160.66	656.90	189.76	690.20	222.98	764.92
SRM612-18	6834.50	12980.81	30604.63	12245.53	43573.30	10551.02	45374.26	15150.58	50260.84
SRM610-18	62181.45	128876.11	341027.77	122584.47	540210.34	112240.27	578481.28	162790.25	651197.17
AP1-18	2.10	-7.66	4.42	-24.62	11.46	3.80	3.72	-3.66	2.28
AP2-18	227.10	407.42	988.19	406.74	1437.39	598.80	2195.01	731.18	1532.85
AP3-18	1061.67	1966.27	4691.97	1897.07	5915.53	2319.17	9557.25	3177.04	6856.08
AP4-18	1426.51	2644.43	5938.89	2561.39	8119.71	3130.82	12852.83	4374.96	9455.85
zero correction									
SRM614-17	67.46	134.74	384.78	176.26	526.02	124.36	521.16	184.18	598.92
SRM612-17	4771.77	10690.60	26724.53	12690.65	34560.89	8523.09	36418.33	12319.69	41936.75
SRM610-17	35285.82	84635.53	237322.80	98468.37	323229.37	72119.16	351856.50	104933.45	413712.92
AP1-17	295.74	124.38	172.42	848.98	134.70	53.80	80.92	63.66	58.32
AP2-17	396.18	516.70	1118.03	912.75	1230.03	484.24	1853.65	687.66	1476.77
AP3-17	1152.31	1926.35	4391.64	2655.27	4830.69	1752.81	7334.48	2544.67	5521.35
AP4-17	1177.59	2367.19	5671.61	2921.80	6633.70	2652.13	10561.54	3584.96	7847.72
41LU1-1	7884.66	3482.24	1733.83	11902.69	2388.23	1892.61	1318.13	1567.91	457.56
41LU1-2	14589.38	5860.21	3021.00	21085.82	3991.76	3186.02	2160.05	2853.44	779.12
41LU1-3	4851.61	2094.15	1024.27	6723.38	1435.59	1060.33	770.20	950.79	278.52
41LU1-4	24773.48	10296.40	5087.89	36943.83	7213.22	6454.76	4892.43	5535.21	1834.73
41LU1-5	11484.56	4835.13	2456.47	16723.83	3304.92	3080.14	2324.05	2625.47	863.88
41LU1-6	13028.21	5435.09	2734.84	19060.65	3815.36	3640.70	2749.90	3121.24	1087.89
41LU1-7	226587.06	85205.30	43751.66	299440.78	62581.77	76087.59	61639.63	67377.40	26049.19
41LU1-8	53471.84	20918.78	11583.01	70414.41	17333.96	24339.46	21088.40	23076.51	9532.37
41LU1-9	62014.13	24337.24	12969.89	74230.16	19490.81	27335.03	23754.17	25440.32	10668.26
41LU1-10	107931.02	42032.86	22103.66	154230.28	32166.56	45920.38	39678.46	43312.50	18402.58
41LU1-11	327116.53	114539.90	56012.94	389190.63	76207.77	101150.25	83479.83	88738.96	35093.00
41LU1-12	268885.22	95368.92	46947.84	329482.59	63473.62	86662.21	71532.32	76099.33	30451.61
SRM614-18	119.42	214.50	510.94	160.66	656.90	189.76	690.20	222.98	764.92
SRM612-18	6834.50	12980.81	30604.63	12245.53	43573.30	10551.02	45374.26	15150.58	50260.84
SRM610-18	62181.45	128876.11	341027.77	122584.47	540210.34	112240.27	578481.28	162790.25	651197.17
AP1-18	2.10	0.00	4.42	0.00	11.46	3.80	3.72	0.00	2.28
AP2-18	227.10	407.42	988.19	406.74	1437.39	598.80	2195.01	731.18	1532.85
AP3-18	1061.67	1966.27	4691.97	1897.07	5915.53	2319.17	9557.25	3177.04	6856.08
AP4-18	1426.51	2644.43	5938.89	2561.39	8119.71	3130.82	12852.83	4374.96	9455.85
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-17	0.000036	0.000071	0.000203	0.000093	0.000278	0.000066	0.000276	0.000097	0.000317

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.001970	0.004414	0.011034	0.005240	0.014270	0.003519	0.015036	0.005087	0.017315
SRM610-17	0.029876	0.071660	0.200939	0.083372	0.273675	0.061063	0.297914	0.088846	0.350287
AP1-17	0.000022	0.000009	0.000013	0.000064	0.000010	0.000004	0.000006	0.000005	0.000004
AP2-17	0.000031	0.000041	0.000089	0.000073	0.000098	0.000038	0.000147	0.000055	0.000117
AP3-17	0.000100	0.000167	0.000380	0.000230	0.000418	0.000152	0.000635	0.000220	0.000478
AP4-17	0.000108	0.000218	0.000522	0.000269	0.000610	0.000244	0.000971	0.000330	0.000722
41LU1-1	0.001183	0.000522	0.000260	0.001786	0.000358	0.000284	0.000198	0.000235	0.000069
41LU1-2	0.002289	0.000919	0.000474	0.003308	0.000626	0.000500	0.000339	0.000448	0.000122
41LU1-3	0.000904	0.000390	0.000191	0.001253	0.000268	0.000198	0.000144	0.000177	0.000052
41LU1-4	0.004489	0.001866	0.000922	0.006695	0.001307	0.001170	0.000887	0.001003	0.000332
41LU1-5	0.002666	0.001122	0.000570	0.003882	0.000767	0.000715	0.000539	0.000609	0.000201
41LU1-6	0.003310	0.001381	0.000695	0.004842	0.000969	0.000925	0.000699	0.000793	0.000276
41LU1-7	0.015468	0.005816	0.002987	0.020441	0.004272	0.005194	0.004208	0.004599	0.001778
41LU1-8	0.005135	0.002009	0.001112	0.006762	0.001665	0.002337	0.002025	0.002216	0.000915
41LU1-9	0.005931	0.002328	0.001240	0.007100	0.001864	0.002614	0.002272	0.002433	0.001020
41LU1-10	0.007356	0.002865	0.001506	0.010511	0.002192	0.003130	0.002704	0.002952	0.001254
41LU1-11	0.016255	0.005692	0.002783	0.019340	0.003787	0.005026	0.004148	0.004410	0.001744
41LU1-12	0.014186	0.005032	0.002477	0.017383	0.003349	0.004572	0.003774	0.004015	0.001607
SRM614-18	0.000070	0.000126	0.000301	0.000094	0.000386	0.000112	0.000406	0.000131	0.000450
SRM612-18	0.003095	0.005879	0.013861	0.005546	0.019734	0.004778	0.020550	0.006862	0.022763
SRM610-18	0.047181	0.097787	0.258761	0.093013	0.409894	0.085164	0.438933	0.123520	0.494107
AP1-18	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
AP2-18	0.000017	0.000030	0.000072	0.000030	0.000105	0.000044	0.000161	0.000054	0.000112
AP3-18	0.000079	0.000147	0.000351	0.000142	0.000443	0.000174	0.000715	0.000238	0.000513
AP4-18	0.000115	0.000214	0.000480	0.000207	0.000657	0.000253	0.001039	0.000354	0.000765
standardize signal averages AP									
AP1	0.000011	0.000005	0.000007	0.000032	0.000005	0.000002	0.000003	0.000002	0.000002
AP2	0.000024	0.000035	0.000081	0.000051	0.000102	0.000041	0.000154	0.000054	0.000115
AP3	0.000090	0.000157	0.000366	0.000186	0.000430	0.000163	0.000675	0.000229	0.000495
AP4	0.000112	0.000216	0.000501	0.000238	0.000633	0.000249	0.001005	0.000342	0.000743
linest from std sig ave									
	0.074199	0.042263	0.018248	0.036546	0.014936	0.056672	0.014076	0.041306	0.012913
standardize signal averages SRM									
srM614-2	0.000053	0.000099	0.000252	0.000094	0.000332	0.000089	0.000341	0.000114	0.000383
srM612-2	0.002533	0.005146	0.012447	0.005393	0.017002	0.004149	0.017793	0.005974	0.020039
srM610-2	0.038529	0.084724	0.229850	0.088193	0.341785	0.073113	0.368423	0.106183	0.422197
linest from std sig ave									
	0.130511	0.062078	0.023417	0.055606	0.015130	0.068124	0.014247	0.046862	0.011625
concentration data									
SRM614-17	0.23	0.26	0.32	0.29	0.36	0.32	0.33	0.35	0.35
SRM612-17	12.54	16.00	17.27	16.42	18.28	17.10	18.15	18.02	19.18
SRM610-17	190.12	259.74	314.47	261.31	350.56	296.79	359.64	314.74	387.93
AP1-17	0.66	0.16	0.09	0.93	0.06	0.09	0.03	0.08	0.02
AP2-17	0.93	0.69	0.65	1.06	0.58	0.87	0.83	0.90	0.60
AP3-17	2.95	2.81	2.77	3.35	2.49	3.43	3.56	3.63	2.46
AP4-17	3.21	3.67	3.80	3.92	3.63	5.51	5.45	5.43	3.72
41LU1-1	35.01	8.81	1.89	26.03	2.13	6.42	1.11	3.88	0.35
41LU1-2	67.74	15.50	3.45	48.22	3.73	11.30	1.90	7.38	0.63
41LU1-3	26.77	6.58	1.39	18.27	1.59	4.47	0.81	2.92	0.27
41LU1-4	132.88	31.46	6.71	97.60	7.79	26.44	4.98	16.53	1.71
41LU1-5	78.90	18.92	4.15	56.59	4.57	16.16	3.03	10.04	1.03
41LU1-6	97.97	23.28	5.06	70.59	5.78	20.91	3.92	13.07	1.42
41LU1-7	457.85	98.07	21.74	298.02	25.45	117.43	23.63	75.79	9.16
41LU1-8	151.99	33.87	8.10	98.58	9.92	52.84	11.37	36.52	4.72
41LU1-9	175.57	39.25	9.03	103.51	11.11	59.11	12.76	40.10	5.26
41LU1-10	217.73	48.30	10.97	153.24	13.06	70.75	15.18	48.64	6.46
41LU1-11	481.16	95.96	20.26	281.96	22.56	113.64	23.29	72.66	8.98
41LU1-12	419.92	84.83	18.03	253.44	19.95	103.37	21.19	66.16	8.28
SRM614-18	0.45	0.46	0.47	0.30	0.49	0.54	0.49	0.46	0.50
SRM612-18	19.70	21.31	21.69	17.38	25.28	23.23	24.81	24.31	25.21
SRM610-18	300.24	354.43	404.96	291.53	525.04	413.93	529.87	437.58	547.21
AP1-18	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
AP2-18	0.49	0.50	0.53	0.43	0.63	0.99	0.90	0.88	0.58
AP3-18	2.35	2.48	2.56	2.07	2.64	3.92	4.02	3.92	2.64
AP4-18	3.41	3.61	3.50	3.02	3.91	5.72	5.84	5.83	3.94
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-19	11.60	2.80	12.32	14.80	3.28	0.96	0.64	3.44	1.64
SRM614-19	185.36	289.72	643.96	233.36	937.89	235.40	928.69	300.96	1001.77
SRM612-19	7366.80	13629.96	30166.97	11859.35	48514.31	11666.35	51389.29	16829.38	56210.80
SRM610-19	55703.83	105428.55	266854.47	88947.02	439497.16	92057.64	469548.13	132452.34	513682.38
AP1-19	44.48	30.40	57.40	33.96	59.40	13.92	44.24	26.04	46.96
AP2-19	334.24	572.24	1208.41	475.76	1775.25	717.08	2928.70	969.97	2091.17
AP3-19	1155.37	1938.81	4584.91	1758.01	6530.40	2596.53	10579.90	3616.10	7581.20
AP4-19	1717.57	2906.22	6468.60	2465.81	9835.25	3865.82	15706.09	5347.15	11127.02
THEO-1	658.92	249.72	213.84	242.64	104.36	141.80	124.56	114.24	52.48
THEO-2	680.00	287.76	199.80	254.64	104.80	154.24	110.20	121.16	53.60
THEO-2	341.44	164.68	117.12	134.72	74.80	77.32	66.36	71.48	47.84
THEO-3	1471.41	533.88	375.28	520.96	255.84	366.04	313.04	268.68	161.88
THEO-4	3571.74	1252.61	773.84	1504.77	628.08	882.68	681.52	667.00	280.12
THEO-5	2562.53	869.04	462.00	1019.45	455.12	651.16	518.80	486.08	226.64
THEO-6	9251.25	2749.94	1352.89	3391.90	1246.93	1701.61	1274.49	1169.09	471.52
THEO-7	8337.01	2812.02	1458.13	3443.46	1443.05	1942.05	1561.25	1327.05	559.72
THEO-8	2417.81	830.52	473.80	1024.93	422.96	622.64	469.80	409.12	172.92
THEO-9	8744.05	3077.26	1613.21	3715.70	1505.29	2071.41	1562.49	1340.89	527.88
THEO-10	7504.12	2655.13	1295.61	2719.70	1270.69	1800.53	1320.49	1102.01	463.84
THEO-11	6672.44	2300.21	1239.97	2460.21	1138.37	1625.45	1281.73	1072.37	437.84
THEO-12	6325.68	2232.57	1168.13	2328.85	1087.89	1476.33	1126.89	971.69	415.76
THEO-13	3459.82	1489.85	1523.53	1176.93	609.20	791.24	643.68	579.88	258.32
THEO-14	3548.10	1624.57	1487.21	1235.45	572.72	797.48	673.52	629.36	234.88
THEO-15	5445.71	2766.30	3938.78	1561.69	824.00	995.93	781.00	720.24	316.52
THEO-16	9272.29	3497.46	1952.77	3267.74	1593.65	2277.41	1723.93	1585.53	669.52
THEO-17	12292.59	4266.50	2368.37	4312.94	2066.45	2967.18	2340.69	2098.21	861.08
THEO-18	13506.64	4676.99	2511.21	4512.75	2246.73	3109.86	2369.33	2139.17	820.36
SRM614-20	131.52	320.72	657.48	194.08	805.96	224.08	751.64	273.28	878.72
SRM612-20	6272.88	11018.90	23495.09	9167.41	39705.63	9520.81	41454.99	13905.24	44659.85
SRM610-20	50263.36	91254.56	223696.86	75508.47	389569.38	81583.74	416908.50	118368.83	452452.22
AP1-20	12.56	47.84	75.16	7.08	10.84	6.44	6.80	2.16	7.20
AP2-20	196.04	380.92	762.40	260.76	1213.97	469.48	1840.89	634.24	1340.45
AP3-20	1348.81	2045.65	4651.99	1616.37	6470.52	2569.41	10643.14	3539.42	7409.72
AP4-20	1430.93	2323.97	5046.91	1960.33	8169.81	3166.14	12886.95	4355.22	9153.85
blank-20	8.56	196.40	224.96	3.24	9.08	2.44	3.12	4.32	10.00
blank average	10.08	99.60	118.64	9.02	6.18	1.70	1.88	3.88	5.82
blank subtraction									
SRM614-19	175.28	190.12	525.32	224.34	931.71	233.70	926.81	297.08	995.95
SRM612-19	7356.72	13530.36	30048.33	11850.33	48508.13	11664.65	51387.41	16825.49	56204.98
SRM610-19	55693.75	105328.95	266735.83	88938.00	439490.98	92055.94	469546.25	132448.46	513676.56
AP1-19	34.40	-69.20	-61.24	24.94	53.22	12.22	42.36	22.16	41.14
AP2-19	324.16	472.64	1089.77	466.74	1769.07	715.38	2926.82	966.09	2085.35
AP3-19	1145.29	1839.21	4466.27	1748.99	6524.22	2594.83	10578.02	3612.22	7575.38
AP4-19	1707.49	2806.62	6349.96	2456.79	9829.07	3864.12	15704.21	5343.27	11121.20
THEO-1	648.84	150.12	95.20	233.62	98.18	140.10	122.68	110.36	46.66
THEO-2	669.92	188.16	81.16	245.62	98.62	152.54	108.32	117.28	47.78
THEO-2	331.36	65.08	-1.52	125.70	68.62	75.62	64.48	67.60	42.02
THEO-3	1461.33	434.28	256.64	511.94	249.66	364.34	311.16	264.80	156.06
THEO-4	3561.66	1153.01	655.20	1495.75	621.90	880.98	679.64	663.12	274.30
THEO-5	2552.45	769.44	343.36	1010.43	448.94	649.46	516.92	482.20	220.82
THEO-6	9241.17	2650.33	1234.25	3382.88	1240.75	1699.91	1272.61	1165.21	465.70
THEO-7	8326.93	2712.42	1339.49	3434.44	1436.87	1940.35	1559.37	1323.17	553.90
THEO-8	2407.73	730.92	355.16	1015.91	416.78	620.94	467.92	405.24	167.10
THEO-9	8733.97	2977.66	1494.57	3706.68	1499.11	2069.71	1560.61	1337.01	522.06
THEO-10	7494.04	2555.53	1176.97	2710.68	1264.51	1798.83	1318.61	1098.13	458.02
THEO-11	6662.36	2200.61	1121.33	2451.19	1132.19	1623.75	1279.85	1068.49	432.02
THEO-12	6315.60	2132.97	1049.49	2319.83	1081.71	1474.63	1125.01	967.81	409.94
THEO-13	3449.74	1390.25	1404.89	1167.91	603.02	789.54	641.80	576.00	252.50
THEO-14	3538.02	1524.97	1368.57	1226.43	566.54	795.78	671.64	625.48	229.06
THEO-15	5435.63	2666.70	3820.14	1552.67	817.82	994.23	779.12	716.36	310.70
THEO-16	9262.21	3397.86	1834.13	3258.72	1587.47	2275.71	1722.05	1581.65	663.70
THEO-17	12282.51	4166.90	2249.73	4303.92	2060.27	2965.48	2338.81	2094.33	855.26
THEO-18	13496.56	4577.39	2392.57	4503.73	2240.55	3108.16	2367.45	2135.29	814.54
SRM614-20	121.44	221.12	538.84	185.06	799.78	222.38	749.76	269.40	872.90
SRM612-20	6262.79	10919.30	23376.45	9158.39	39699.44	9519.11	41453.11	13901.36	44654.03
SRM610-20	50253.28	91154.95	223578.22	75499.45	389563.20	81582.04	416906.62	118364.95	452446.40
AP1-20	2.48	-51.76	-43.48	-1.94	4.66	4.74	4.92	-1.72	1.38
AP2-20	185.96	281.32	643.76	251.74	1207.79	467.78	1839.01	630.36	1334.63
AP3-20	1338.73	1946.05	4533.35	1607.35	6464.34	2567.71	10641.26	3535.54	7403.90
AP4-20	1420.85	2224.37	4928.27	1951.31	8163.63	3164.44	12885.07	4351.34	9148.03
zero correction									
SRM614-19	175.28	190.12	525.32	224.34	931.71	233.70	926.81	297.08	995.95

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	7356.72	13530.36	30048.33	11850.33	48508.13	11664.65	51387.41	16825.49	56204.98
SRM610-19	55693.75	105328.95	266735.83	88938.00	439490.98	92055.94	469546.25	132448.46	513676.56
AP1-19	34.40	0.00	0.00	24.94	53.22	12.22	42.36	22.16	41.14
AP2-19	324.16	472.64	1089.77	466.74	1769.07	715.38	2926.82	966.09	2085.35
AP3-19	1145.29	1839.21	4466.27	1748.99	6524.22	2594.83	10578.02	3612.22	7575.38
AP4-19	1707.49	2806.62	6349.96	2456.79	9829.07	3864.12	15704.21	5343.27	11121.20
THEO-1	648.84	150.12	95.20	233.62	98.18	140.10	122.68	110.36	46.66
THEO-2	669.92	188.16	81.16	245.62	98.62	152.54	108.32	117.28	47.78
THEO-2	331.36	65.08	0.00	125.70	68.62	75.62	64.48	67.60	42.02
THEO-3	1461.33	434.28	256.64	511.94	249.66	364.34	311.16	264.80	156.06
THEO-4	3561.66	1153.01	655.20	1495.75	621.90	880.98	679.64	663.12	274.30
THEO-5	2552.45	769.44	343.36	1010.43	448.94	649.46	516.92	482.20	220.82
THEO-6	9241.17	2650.33	1234.25	3382.88	1240.75	1699.91	1272.61	1165.21	465.70
THEO-7	8326.93	2712.42	1339.49	3434.44	1436.87	1940.35	1559.37	1323.17	553.90
THEO-8	2407.73	730.92	355.16	1015.91	416.78	620.94	467.92	405.24	167.10
THEO-9	8733.97	2977.66	1494.57	3706.68	1499.11	2069.71	1560.61	1337.01	522.06
THEO-10	7494.04	2555.53	1176.97	2710.68	1264.51	1798.83	1318.61	1098.13	458.02
THEO-11	6662.36	2200.61	1121.33	2451.19	1132.19	1623.75	1279.85	1068.49	432.02
THEO-12	6315.60	2132.97	1049.49	2319.83	1081.71	1474.63	1125.01	967.81	409.94
THEO-13	3449.74	1390.25	1404.89	1167.91	603.02	789.54	641.80	576.00	252.50
THEO-14	3538.02	1524.97	1368.57	1226.43	566.54	795.78	671.64	625.48	229.06
THEO-15	5435.63	2666.70	3820.14	1552.67	817.82	994.23	779.12	716.36	310.70
THEO-16	9262.21	3397.86	1834.13	3258.72	1587.47	2275.71	1722.05	1581.65	663.70
THEO-17	12282.51	4166.90	2249.73	4303.92	2060.27	2965.48	2338.81	2094.33	855.26
THEO-18	13496.56	4577.39	2392.57	4503.73	2240.55	3108.16	2367.45	2135.29	814.54
SRM614-20	121.44	221.12	538.84	185.06	799.78	222.38	749.76	269.40	872.90
SRM612-20	6262.79	10919.30	23376.45	9158.39	39699.44	9519.11	41453.11	13901.36	44654.03
SRM610-20	50253.28	91154.95	223578.22	75499.45	389563.20	81582.04	416906.62	118364.95	452446.40
AP1-20	2.48	0.00	0.00	0.00	4.66	4.74	4.92	0.00	1.38
AP2-20	185.96	281.32	643.76	251.74	1207.79	467.78	1839.01	630.36	1334.63
AP3-20	1338.73	1946.05	4533.35	1607.35	6464.34	2567.71	10641.26	3535.54	7403.90
AP4-20	1420.85	2224.37	4928.27	1951.31	8163.63	3164.44	12885.07	4351.34	9148.03

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-19	0.000098	0.000106	0.000292	0.000125	0.000519	0.000130	0.000516	0.000165	0.000554
SRM612-19	0.004101	0.007542	0.016748	0.006605	0.027038	0.006502	0.028643	0.009378	0.031328
SRM610-19	0.060269	0.113981	0.288647	0.096244	0.475593	0.099618	0.508117	0.143328	0.555872
AP1-19	0.000003	0.000000	0.000000	0.000002	0.000004	0.000001	0.000003	0.000002	0.000003
AP2-19	0.000034	0.000049	0.000114	0.000049	0.000184	0.000075	0.000305	0.000101	0.000217
AP3-19	0.000086	0.000138	0.000334	0.000131	0.000488	0.000194	0.000791	0.000270	0.000566
AP4-19	0.000132	0.000218	0.000492	0.000190	0.000762	0.000299	0.001217	0.000414	0.000862
THEO-1	0.000142	0.000033	0.000021	0.000051	0.000021	0.000031	0.000027	0.000024	0.000010
THEO-2	0.000106	0.000030	0.000013	0.000039	0.000016	0.000024	0.000017	0.000019	0.000008
THEO-2	0.000044	0.000009	0.000000	0.000017	0.000009	0.000010	0.000009	0.000009	0.000006
THEO-3	0.000258	0.000077	0.000045	0.000090	0.000044	0.000064	0.000055	0.000047	0.000028
THEO-4	0.000576	0.000186	0.000106	0.000242	0.000101	0.000142	0.000110	0.000107	0.000044
THEO-5	0.000328	0.000099	0.000044	0.000130	0.000058	0.000083	0.000066	0.000062	0.000028
THEO-6	0.001787	0.000513	0.000239	0.000654	0.000240	0.000329	0.000246	0.000225	0.000090
THEO-7	0.001273	0.000415	0.000205	0.000525	0.000220	0.000297	0.000238	0.000202	0.000085
THEO-8	0.000440	0.000134	0.000065	0.000186	0.000076	0.000114	0.000086	0.000074	0.000031
THEO-9	0.001357	0.000463	0.000232	0.000576	0.000233	0.000322	0.000242	0.000208	0.000081
THEO-10	0.001065	0.000363	0.000167	0.000385	0.000180	0.000256	0.000187	0.000156	0.000065
THEO-11	0.001004	0.000332	0.000169	0.000369	0.000171	0.000245	0.000193	0.000161	0.000065
THEO-12	0.001188	0.000401	0.000197	0.000436	0.000204	0.000277	0.000212	0.000182	0.000077
THEO-13	0.000575	0.000232	0.000234	0.000195	0.000101	0.000132	0.000107	0.000096	0.000042
THEO-14	0.000635	0.000274	0.000246	0.000220	0.000102	0.000143	0.000121	0.000112	0.000041
THEO-15	0.000943	0.000463	0.000663	0.000269	0.000142	0.000173	0.000135	0.000124	0.000054
THEO-16	0.001728	0.000634	0.000342	0.000608	0.000296	0.000424	0.000321	0.000295	0.000124
THEO-17	0.001759	0.000597	0.000322	0.000616	0.000295	0.000425	0.000335	0.000300	0.000122
THEO-18	0.001985	0.000673	0.000352	0.000662	0.000329	0.000457	0.000348	0.000314	0.000120

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000081	0.000147	0.000359	0.000123	0.000533	0.000148	0.000499	0.000179	0.000581
SRM612-20	0.004555	0.007942	0.017002	0.006661	0.028875	0.006924	0.030150	0.010111	0.032478
SRM610-20	0.065143	0.118164	0.289825	0.097870	0.504991	0.105755	0.540436	0.153437	0.586507
AP1-20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
AP2-20	0.000024	0.000036	0.000083	0.000032	0.000156	0.000060	0.000237	0.000081	0.000172
AP3-20	0.000107	0.000156	0.000362	0.000129	0.000517	0.000205	0.000851	0.000283	0.000592
AP4-20	0.000132	0.000206	0.000456	0.000181	0.000756	0.000293	0.001194	0.000403	0.000847

standardize signal averages AP

AP1	0.000001	0.000000	0.000000	0.000001	0.000002	0.000001	0.000002	0.000001	0.000002
AP2	0.000029	0.000043	0.000098	0.000041	0.000170	0.000067	0.000271	0.000091	0.000195
AP3	0.000096	0.000147	0.000348	0.000130	0.000502	0.000200	0.000821	0.000276	0.000579
AP4	0.000132	0.000212	0.000474	0.000186	0.000759	0.000296	0.001205	0.000409	0.000855

linest from std sig ave

	0.065703	0.043696	0.019141	0.049360	0.012485	0.046723	0.011597	0.034183	0.011087
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standardize signal averages SRM

srm614-2	0.000089	0.000127	0.000326	0.000124	0.000526	0.000139	0.000508	0.000172	0.000568
srm612-2	0.004328	0.007742	0.016875	0.006633	0.027956	0.006713	0.029396	0.009745	0.031903
srm610-2	0.062706	0.116073	0.289236	0.097057	0.490292	0.102686	0.524277	0.148382	0.571189

linest from std sig ave

	0.080177	0.045299	0.018606	0.050513	0.010545	0.048489	0.010011	0.033524	0.008592
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concentration data

SRM614-19	0.55	0.40	0.48	0.53	0.56	0.52	0.51	0.48	0.53
SRM612-19	23.11	28.26	27.49	27.96	28.95	26.05	28.49	27.49	29.79
SRM610-19	339.61	427.14	473.84	407.43	509.24	399.18	505.37	420.19	528.55
AP1-19	0.07	0.00	0.00	0.04	0.02	0.02	0.02	0.02	0.01
AP2-19	0.89	0.86	0.87	0.96	0.92	1.39	1.41	1.37	0.96
AP3-19	2.24	2.40	2.55	2.58	2.43	3.62	3.66	3.68	2.51
AP4-19	3.47	3.79	3.76	3.75	3.79	5.58	5.63	5.65	3.81
THEO-1	3.72	0.57	0.16	1.00	0.11	0.57	0.12	0.33	0.05
THEO-2	2.77	0.52	0.10	0.76	0.08	0.45	0.08	0.25	0.03
THEO-2	1.15	0.15	0.00	0.33	0.05	0.19	0.04	0.12	0.02
THEO-3	6.76	1.34	0.35	1.78	0.22	1.20	0.25	0.64	0.12
THEO-4	15.09	3.25	0.81	4.76	0.50	2.65	0.51	1.46	0.20
THEO-5	8.59	1.72	0.34	2.56	0.29	1.55	0.31	0.84	0.13
THEO-6	46.85	8.94	1.82	12.88	1.20	6.13	1.14	3.07	0.40
THEO-7	33.37	7.23	1.56	10.34	1.09	5.53	1.10	2.76	0.37
THEO-8	11.54	2.33	0.50	3.66	0.38	2.12	0.40	1.01	0.14
THEO-9	35.56	8.06	1.77	11.34	1.16	5.99	1.12	2.83	0.36
THEO-10	27.91	6.33	1.28	7.58	0.89	4.76	0.87	2.13	0.29
THEO-11	26.31	5.78	1.29	7.27	0.85	4.56	0.89	2.20	0.29
THEO-12	31.14	6.99	1.51	8.59	1.01	5.17	0.98	2.48	0.34
THEO-13	15.07	4.04	1.79	3.83	0.50	2.45	0.49	1.31	0.19
THEO-14	16.65	4.77	1.88	4.33	0.51	2.66	0.56	1.53	0.18
THEO-15	24.72	8.07	5.06	5.31	0.71	3.22	0.63	1.70	0.24
THEO-16	45.29	11.05	2.61	11.97	1.47	7.91	1.49	4.02	0.55
THEO-17	46.10	10.40	2.46	12.14	1.47	7.91	1.55	4.09	0.54
THEO-18	52.02	11.73	2.69	13.04	1.64	8.52	1.61	4.28	0.53
SRM614-20	0.46	0.55	0.59	0.52	0.57	0.59	0.50	0.53	0.55
SRM612-20	25.67	29.76	27.91	28.20	30.92	27.74	29.99	29.64	30.88
SRM610-20	367.08	442.82	475.77	414.31	540.72	423.78	537.51	449.82	557.68
AP1-20	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
AP2-20	0.63	0.63	0.63	0.64	0.77	1.12	1.10	1.11	0.76
AP3-20	2.81	2.71	2.77	2.53	2.57	3.83	3.94	3.86	2.62
AP4-20	3.45	3.59	3.49	3.56	3.77	5.46	5.52	5.50	3.75

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-15	9.08	2.72	4.00	1.12	6.44	1.88	1.60	0.76	0.00
SRM614-15	101.32	191.96	448.08	160.56	596.60	166.92	635.80	209.92	732.56
SRM612-15	4824.27	9817.25	22651.81	9443.85	33424.07	8140.41	35654.60	11791.95	38959.50
SRM610-15	41843.20	85506.04	222014.81	80508.61	340947.19	74999.63	366579.63	107477.13	411449.59
AP1-15	41.76	47.64	103.16	36.20	104.84	27.56	55.52	22.80	72.40
AP2-15	345.96	577.12	1298.77	547.84	1680.97	686.44	2658.18	932.29	1984.81
AP3-15	1725.13	2860.74	7212.52	2785.46	9268.17	3577.50	14676.84	4904.87	10653.74

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	2027.25	3608.86	8183.77	3323.82	11581.35	4645.87	18833.75	6307.36	13364.16
LA3324-2-1	505.20	197.92	110.52	299.80	107.36	128.80	94.68	86.04	40.56
LA3324-2-2	642.28	261.36	179.40	370.60	164.92	187.44	159.08	155.36	70.48
LA3324-2-3	2217.21	796.64	411.20	1325.49	481.40	668.32	566.60	510.76	217.08
LA3324-2-4	564.00	235.52	140.84	283.24	106.72	144.16	105.12	102.36	41.44
LA3324-2-5	516.32	221.40	139.64	295.48	114.88	163.96	112.32	102.56	54.64
LA3324-2-6	1398.89	533.04	287.84	760.36	311.68	372.12	273.20	269.48	107.68
LA3324-2-7	6170.51	2186.21	1113.61	3269.62	1181.33	1626.13	1167.21	1097.09	468.04
LA3324-2-8	3838.18	1390.05	717.04	1994.33	785.28	1076.25	882.16	808.56	334.40
LA3324-2-9	4859.91	1804.97	871.12	2464.73	932.45	1274.97	978.37	921.69	412.68
LA3324-2-10	1618.49	601.32	330.44	994.81	344.32	490.16	387.40	426.24	180.88
LA3324-2-11	1711.61	597.28	352.52	1027.57	356.80	499.76	412.80	447.44	197.80
LA3324-2-12	13834.88	4744.39	2530.89	7848.40	2843.74	4407.71	3825.38	3698.62	1582.65
SRM614-16	128.04	224.52	501.68	184.76	738.76	185.40	831.76	249.92	850.36
SRM612-16	6015.23	10890.70	23838.41	9432.93	39758.82	9756.29	42110.32	13936.64	45583.98
SRM610-16	50470.45	95505.58	236084.89	80476.02	403719.84	84457.88	433621.16	122134.33	474482.69
AP1-16	9.48	16.64	21.96	6.44	21.84	8.80	6.52	3.12	9.72
AP2-16	293.68	448.48	903.29	333.04	1480.01	611.72	2379.17	817.72	1677.05
AP3-16	1748.85	2853.82	6599.32	2335.45	9087.17	3513.54	14525.16	4896.31	10466.38
AP4-16	2019.89	3346.26	7657.36	2738.46	11220.30	4309.18	18153.42	5968.91	12699.51
blank-16	5.92	18.48	18.16	3.00	3.52	3.72	2.24	1.00	5.36
blank average	7.50	10.60	11.08	2.06	4.98	2.80	1.92	0.88	2.68

blank subtraction										
SRM614-15	93.82	181.36	437.00	158.50	591.62	164.12	633.88	209.04	729.88	
SRM612-15	4816.77	9806.65	22640.73	9441.79	33419.09	8137.61	35652.68	11791.07	38956.82	
SRM610-15	41835.69	85495.44	222003.73	80506.55	340942.21	74996.82	366577.71	107476.25	411446.91	
AP1-15	34.26	37.04	92.08	34.14	99.86	24.76	53.60	21.92	69.72	
AP2-15	338.46	566.52	1287.69	545.78	1675.99	683.64	2656.25	931.41	1982.13	
AP3-15	1717.63	2850.14	7201.44	2783.40	9263.19	3574.70	14674.92	4903.99	10651.06	
AP4-15	2019.75	3598.26	8172.69	3321.76	11576.36	4643.07	18831.83	6306.48	13361.47	
LA3324-2-1	497.70	187.32	99.44	297.74	102.38	126.00	92.76	85.16	37.88	
LA3324-2-2	634.78	250.76	168.32	368.54	159.94	184.64	157.16	154.48	67.80	
LA3324-2-3	2209.71	786.04	400.12	1323.43	476.42	665.52	564.68	509.88	214.40	
LA3324-2-4	556.50	224.92	129.76	281.18	101.74	141.36	103.20	101.48	38.76	
LA3324-2-5	508.82	210.80	128.56	293.42	109.90	161.16	110.40	101.68	51.96	
LA3324-2-6	1391.39	522.44	276.76	758.30	306.70	369.32	271.28	268.60	105.00	
LA3324-2-7	6163.01	2175.61	1102.53	3267.56	1176.35	1623.33	1165.29	1096.21	465.36	
LA3324-2-8	3830.68	1379.45	705.96	1992.27	780.30	1073.45	880.24	807.68	331.72	
LA3324-2-9	4852.41	1794.37	860.04	2462.67	927.47	1272.17	976.45	920.81	410.00	
LA3324-2-10	1610.99	590.72	319.36	992.75	339.34	487.36	385.48	425.36	178.20	
LA3324-2-11	1704.11	586.68	341.44	1025.51	351.82	496.96	410.88	446.56	195.12	
LA3324-2-12	13827.38	4733.79	2519.81	7846.34	2838.76	4404.91	3823.46	3697.74	1579.97	
SRM614-16	120.54	213.92	490.60	182.70	733.78	182.60	829.84	249.04	847.68	
SRM612-16	6007.73	10880.10	23827.33	9430.87	39753.84	9753.49	42108.40	13935.76	45581.30	
SRM610-16	50462.94	95494.98	236073.81	80473.96	403714.86	84455.07	433619.24	122133.45	474480.01	
AP1-16	1.98	6.04	10.88	4.38	16.86	6.00	4.60	2.24	7.04	
AP2-16	286.18	437.88	892.21	330.98	1475.03	608.92	2377.25	816.84	1674.37	
AP3-16	1741.35	2843.22	6588.24	2333.39	9082.19	3510.74	14523.24	4895.43	10463.70	
AP4-16	2012.39	3335.66	7646.28	2736.40	11215.32	4306.38	18151.50	5968.03	12696.83	

zero correction										
SRM614-15	93.82	181.36	437.00	158.50	591.62	164.12	633.88	209.04	729.88	
SRM612-15	4816.77	9806.65	22640.73	9441.79	33419.09	8137.61	35652.68	11791.07	38956.82	
SRM610-15	41835.69	85495.44	222003.73	80506.55	340942.21	74996.82	366577.71	107476.25	411446.91	
AP1-15	34.26	37.04	92.08	34.14	99.86	24.76	53.60	21.92	69.72	
AP2-15	338.46	566.52	1287.69	545.78	1675.99	683.64	2656.25	931.41	1982.13	
AP3-15	1717.63	2850.14	7201.44	2783.40	9263.19	3574.70	14674.92	4903.99	10651.06	
AP4-15	2019.75	3598.26	8172.69	3321.76	11576.36	4643.07	18831.83	6306.48	13361.47	
LA3324-2-1	497.70	187.32	99.44	297.74	102.38	126.00	92.76	85.16	37.88	
LA3324-2-2	634.78	250.76	168.32	368.54	159.94	184.64	157.16	154.48	67.80	
LA3324-2-3	2209.71	786.04	400.12	1323.43	476.42	665.52	564.68	509.88	214.40	
LA3324-2-4	556.50	224.92	129.76	281.18	101.74	141.36	103.20	101.48	38.76	
LA3324-2-5	508.82	210.80	128.56	293.42	109.90	161.16	110.40	101.68	51.96	
LA3324-2-6	1391.39	522.44	276.76	758.30	306.70	369.32	271.28	268.60	105.00	
LA3324-2-7	6163.01	2175.61	1102.53	3267.56	1176.35	1623.33	1165.29	1096.21	465.36	
LA3324-2-8	3830.68	1379.45	705.96	1992.27	780.30	1073.45	880.24	807.68	331.72	
LA3324-2-9	4852.41	1794.37	860.04	2462.67	927.47	1272.17	976.45	920.81	410.00	
LA3324-2-10	1610.99	590.72	319.36	992.75	339.34	487.36	385.48	425.36	178.20	
LA3324-2-11	1704.11	586.68	341.44	1025.51	351.82	496.96	410.88	446.56	195.12	
LA3324-2-12	13827.38	4733.79	2519.81	7846.34	2838.76	4404.91	3823.46	3697.74	1579.97	
SRM614-16	120.54	213.92	490.60	182.70	733.78	182.60	829.84	249.04	847.68	
SRM612-16	6007.73	10880.10	23827.33	9430.87	39753.84	9753.49	42108.40	13935.76	45581.30	
SRM610-16	50462.94	95494.98	236073.81	80473.96	403714.86	84455.07	433619.24	122133.45	474480.01	
AP1-16	1.98	6.04	10.88	4.38	16.86	6.00	4.60	2.24	7.04	
AP2-16	286.18	437.88	892.21	330.98	1475.03	608.92	2377.25	816.84	1674.37	
AP3-16	1741.35	2843.22	6588.24	2333.39	9082.19	3510.74	14523.24	4895.43	10463.70	
AP4-16	2012.39	3335.66	7646.28	2736.40	11215.32	4306.38	18151.50	5968.03	12696.83	

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-15	0.000069	0.000133	0.000321	0.000117	0.000435	0.000121	0.000466	0.000154	0.000537
SRM612-15	0.003359	0.006839	0.015790	0.006585	0.023308	0.005675	0.024865	0.008223	0.027170
SRM610-15	0.053898	0.110147	0.286015	0.103719	0.439247	0.096621	0.472274	0.138465	0.530081
AP1-15	0.000003	0.000003	0.000008	0.000003	0.000009	0.000002	0.000005	0.000002	0.000006
AP2-15	0.000027	0.000046	0.000105	0.000044	0.000136	0.000056	0.000216	0.000076	0.000161
AP3-15	0.000103	0.000171	0.000432	0.000167	0.000555	0.000214	0.000879	0.000294	0.000638
AP4-15	0.000134	0.000239	0.000542	0.000220	0.000768	0.000308	0.001249	0.000418	0.000886
LA3324-2-1	0.000130	0.000049	0.000026	0.000078	0.000027	0.000033	0.000024	0.000022	0.000010
LA3324-2-2	0.000136	0.000054	0.000036	0.000079	0.000034	0.000040	0.000034	0.000033	0.000015
LA3324-2-3	0.000419	0.000149	0.000076	0.000251	0.000090	0.000126	0.000107	0.000097	0.000041
LA3324-2-4	0.000079	0.000032	0.000018	0.000040	0.000014	0.000020	0.000015	0.000014	0.000005
LA3324-2-5	0.000070	0.000029	0.000018	0.000040	0.000015	0.000022	0.000015	0.000014	0.000007
LA3324-2-6	0.000193	0.000072	0.000038	0.000105	0.000043	0.000051	0.000038	0.000037	0.000015
LA3324-2-7	0.001287	0.000454	0.000230	0.000682	0.000246	0.000339	0.000243	0.000229	0.000097
LA3324-2-8	0.000715	0.000257	0.000132	0.000372	0.000146	0.000200	0.000164	0.000151	0.000062
LA3324-2-9	0.000886	0.000327	0.000157	0.000449	0.000169	0.000232	0.000178	0.000168	0.000075
LA3324-2-10	0.000293	0.000108	0.000058	0.000181	0.000062	0.000089	0.000070	0.000077	0.000032
LA3324-2-11	0.000251	0.000087	0.000050	0.000151	0.000052	0.000073	0.000061	0.000066	0.000029
LA3324-2-12	0.001425	0.000488	0.000260	0.000809	0.000293	0.000454	0.000394	0.000381	0.000163
SRM614-16	0.000089	0.000158	0.000363	0.000135	0.000543	0.000135	0.000614	0.000184	0.000627
SRM612-16	0.004248	0.007694	0.016849	0.006669	0.028111	0.006897	0.029776	0.009854	0.032232
SRM610-16	0.060921	0.115285	0.284998	0.097151	0.487380	0.101957	0.523482	0.147444	0.572811
AP1-16	0.000000	0.000001	0.000001	0.000000	0.000002	0.000001	0.000000	0.000000	0.000001
AP2-16	0.000025	0.000038	0.000077	0.000029	0.000128	0.000053	0.000206	0.000071	0.000145
AP3-16	0.000110	0.000179	0.000415	0.000147	0.000572	0.000221	0.000915	0.000309	0.000659
AP4-16	0.000139	0.000230	0.000527	0.000188	0.000772	0.000297	0.001250	0.000411	0.000874

standardize signal averages AP									
AP1	0.000002	0.000002	0.000004	0.000002	0.000005	0.000001	0.000003	0.000001	0.000003
AP2	0.000026	0.000042	0.000091	0.000036	0.000132	0.000054	0.000211	0.000073	0.000153
AP3	0.000106	0.000175	0.000423	0.000157	0.000564	0.000218	0.000897	0.000301	0.000649
AP4	0.000136	0.000234	0.000534	0.000204	0.000770	0.000302	0.001249	0.000415	0.000880

linest from std sig ave									
	0.062126	0.038486	0.016518	0.043389	0.011943	0.045008	0.011046	0.033020	0.010501

standardize signal averages SRM									
srm614-2	0.000079	0.000146	0.000342	0.000126	0.000489	0.000128	0.000540	0.000169	0.000582
srm612-2	0.003804	0.007267	0.016320	0.006627	0.025709	0.006286	0.027321	0.009039	0.029701
srm610-2	0.057410	0.112716	0.285506	0.100435	0.463314	0.099289	0.497878	0.142955	0.551446

linest from std sig ave									
	0.087586	0.046654	0.018850	0.048819	0.011160	0.050153	0.010542	0.034800	0.008900

concentration data									
SRM614-15	0.37	0.44	0.46	0.43	0.45	0.47	0.44	0.44	0.48
SRM612-15	17.90	22.57	22.37	24.50	23.87	21.91	23.56	23.29	24.47
SRM610-15	287.18	363.56	405.18	385.95	449.91	372.96	447.41	392.12	477.40
AP1-15	0.07	0.05	0.05	0.05	0.04	0.04	0.02	0.03	0.03
AP2-15	0.68	0.71	0.69	0.77	0.65	1.00	0.95	1.00	0.67
AP3-15	2.55	2.62	2.84	2.89	2.64	3.85	3.88	3.87	2.67
AP4-15	3.32	3.66	3.57	3.81	3.66	5.53	5.50	5.51	3.71
LA3324-2-1	3.21	0.75	0.17	1.34	0.13	0.59	0.11	0.29	0.04
LA3324-2-2	3.37	0.83	0.24	1.37	0.16	0.71	0.15	0.44	0.06
LA3324-2-3	10.39	2.29	0.50	4.35	0.43	2.27	0.47	1.27	0.17
LA3324-2-4	1.95	0.49	0.12	0.69	0.07	0.36	0.06	0.19	0.02
LA3324-2-5	1.74	0.45	0.12	0.70	0.07	0.40	0.07	0.18	0.03
LA3324-2-6	4.78	1.11	0.25	1.82	0.20	0.92	0.17	0.49	0.06

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	31.90	6.98	1.52	11.81	1.17	6.09	1.07	3.02	0.41
LA3324-2-8	17.72	3.95	0.87	6.43	0.69	3.60	0.72	1.99	0.26
LA3324-2-9	21.95	5.03	1.03	7.78	0.81	4.17	0.79	2.21	0.31
LA3324-2-10	7.27	1.65	0.38	3.13	0.29	1.59	0.31	1.02	0.14
LA3324-2-11	6.23	1.33	0.33	2.62	0.25	1.32	0.27	0.87	0.12
LA3324-2-12	35.32	7.49	1.71	14.00	1.39	8.15	1.74	5.02	0.68
SRM614-16	0.48	0.52	0.51	0.50	0.56	0.52	0.58	0.52	0.56
SRM612-16	22.64	25.39	23.87	24.82	28.79	26.62	28.21	27.91	29.03
SRM610-16	324.60	380.52	403.74	361.51	499.21	393.56	495.92	417.55	515.88
AP1-16	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
AP2-16	0.61	0.58	0.51	0.50	0.61	0.95	0.91	0.93	0.61
AP3-16	2.72	2.75	2.74	2.55	2.73	3.97	4.03	4.06	2.76
AP4-16	3.43	3.53	3.47	3.26	3.68	5.32	5.51	5.41	3.66

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-13	6.32	2.48	3.60	2.20	0.36	3.76	0.84	2.08	0.72
SRM614-13	141.24	268.56	650.92	225.00	843.52	262.12	877.52	312.92	915.69
SRM612-13	6650.96	13362.84	29552.05	12091.99	47314.39	11397.78	50312.04	16792.70	55653.95
SRM610-13	53767.50	107874.48	276090.66	96701.59	452351.69	95287.50	489091.19	138626.06	544524.56
AP1-13	59.56	41.96	89.44	53.20	111.36	32.16	82.40	39.84	122.20
AP2-13	342.48	550.92	1192.85	497.96	1749.57	670.48	2777.42	973.05	2009.29
AP3-13	1647.37	2730.94	6188.44	2397.61	8859.29	3450.46	14327.04	4747.47	10243.10
AP4-13	2757.66	4436.82	10378.30	3866.46	14506.04	5749.83	23035.41	7617.40	16581.25
LA3324-1-1	1119.37	522.52	287.40	723.84	282.44	409.44	296.44	284.32	170.40
LA3324-1-2	532.60	191.36	158.36	285.08	125.00	159.12	152.20	118.40	67.24
LA3324-1-3	487.16	201.52	139.60	275.36	102.20	150.00	121.36	119.28	56.12
LA3324-1-4	2877.94	1116.53	699.56	1521.97	596.40	835.72	741.96	713.56	333.00
LA3324-1-5	1430.81	564.28	429.96	769.00	289.12	439.04	379.16	410.32	173.24
LA3324-1-6	2151.97	825.96	585.68	1016.45	442.84	632.00	533.32	501.92	238.12
LA3324-1-7	1520.81	593.88	399.72	792.80	346.24	499.44	425.36	428.24	194.28
LA3324-1-8	2668.94	952.77	622.84	1393.25	529.84	820.40	682.36	728.40	311.52
LA3324-1-9	3799.46	1406.85	818.00	1802.37	705.44	1134.49	871.84	888.29	432.96
LA3324-1-10	2568.29	969.41	498.56	1094.93	490.00	705.00	534.68	482.80	209.80
LA3324-1-11	1505.65	568.60	327.68	666.60	270.36	366.52	292.16	261.92	102.40
LA3324-1-12	1754.57	631.64	331.76	711.12	316.80	405.04	317.72	284.04	140.60
LA3324-1-13	1708.97	632.92	346.16	751.48	292.52	415.92	312.76	290.32	129.52
LA3324-1-14	1981.29	756.88	373.12	809.96	359.00	488.44	340.60	303.08	144.52
LA3324-1-15	1731.17	599.96	295.00	722.84	312.92	442.16	300.60	303.00	121.96
LA3324-1-16	851.88	341.00	177.72	387.76	161.48	206.44	159.40	130.64	70.08
LA3324-1-17	986.53	354.00	205.12	369.96	160.44	209.92	145.52	177.40	63.20
LA3324-1-18	952.09	366.16	187.12	402.52	172.56	208.32	165.92	156.44	62.64
SRM614-14	129.84	237.92	517.44	202.60	774.40	198.84	742.68	297.20	824.48
SRM612-14	6192.03	11312.18	24275.18	9548.45	41263.79	9851.70	43706.21	14575.28	46830.98
SRM610-14	55201.59	101946.77	249737.56	84466.71	444492.47	91188.27	476958.28	133071.83	518479.06
AP1-14	15.52	11.80	18.16	6.12	8.36	2.60	4.28	10.52	10.64
AP2-14	240.88	390.08	792.48	327.60	1290.01	545.92	2100.01	704.52	1531.93
AP3-14	1427.45	2212.49	4847.63	1800.33	7447.16	2891.70	12054.23	3921.98	8318.29
AP4-14	1842.01	3129.38	6724.08	2419.49	10257.78	4054.46	16714.61	5589.39	11687.23
blank-14	5.84	25.32	25.32	3.76	5.20	2.20	6.88	3.68	4.32
blank average	6.08	13.90	14.46	2.98	2.78	2.98	3.86	2.88	2.52

blank subtraction									
SRM614-13	135.16	254.66	636.46	222.02	840.74	259.14	873.66	310.04	913.17
SRM612-13	6644.88	13348.93	29537.59	12089.01	47311.61	11394.80	50308.18	16789.81	55651.43
SRM610-13	53761.42	107860.58	276076.20	96698.61	452348.91	95284.52	489087.33	138623.18	544522.04
AP1-13	53.48	28.06	74.98	50.22	108.58	29.18	78.54	36.96	119.68
AP2-13	336.40	537.02	1178.39	494.98	1746.79	667.50	2773.56	970.17	2006.77
AP3-13	1641.29	2717.04	6173.98	2394.63	8856.51	3447.48	14323.18	4744.59	10240.58
AP4-13	2751.58	4422.92	10363.84	3863.48	14503.26	5746.85	23031.55	7614.52	16578.73
LA3324-1-1	1113.29	508.62	272.94	720.86	279.66	406.46	292.58	281.44	167.88
LA3324-1-2	526.52	177.46	143.90	282.10	122.22	156.14	148.34	115.52	64.72
LA3324-1-3	481.08	187.62	125.14	272.38	99.42	147.02	117.50	116.40	53.60
LA3324-1-4	2871.86	1102.63	685.10	1518.99	593.62	832.74	738.10	710.68	330.48
LA3324-1-5	1424.73	550.38	415.50	766.02	286.34	436.06	375.30	407.44	170.72
LA3324-1-6	2145.89	812.06	571.22	1013.47	440.06	629.02	529.46	499.04	235.60
LA3324-1-7	1514.73	579.98	385.26	789.82	343.46	496.46	421.50	425.36	191.76
LA3324-1-8	2662.86	938.87	608.38	1390.27	527.06	817.42	678.50	725.52	309.00
LA3324-1-9	3793.38	1392.95	803.54	1799.39	702.66	1131.51	867.98	885.41	430.44

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	2562.27	955.51	484.10	1091.95	487.22	702.02	530.82	479.92	207.28
LA3324-1-11	1499.57	554.70	313.22	663.62	267.58	363.54	288.30	259.04	99.88
LA3324-1-12	1748.49	617.74	317.30	708.14	314.02	402.06	313.86	281.16	138.08
LA3324-1-13	1702.89	619.02	331.70	748.50	289.74	412.94	308.90	287.44	127.00
LA3324-1-14	1975.21	742.98	358.66	806.98	356.22	485.46	336.74	300.20	142.00
LA3324-1-15	1725.09	586.06	280.54	719.86	310.14	439.18	296.74	300.12	119.44
LA3324-1-16	845.80	327.10	163.26	384.78	158.70	203.46	155.54	127.76	67.56
LA3324-1-17	980.45	340.10	190.66	366.98	157.66	206.94	141.66	174.52	60.68
LA3324-1-18	946.01	352.26	172.66	399.54	169.78	205.34	162.06	153.56	60.12
SRM614-14	123.76	224.02	502.98	199.62	771.62	195.86	738.82	294.32	821.96
SRM612-14	6185.95	11298.28	24260.72	9545.47	41261.01	9848.72	43702.35	14572.40	46828.46
SRM610-14	55195.51	101932.87	249723.10	84463.73	444489.69	91185.29	476954.42	133068.95	518476.54
AP1-14	9.44	-2.10	3.70	3.14	5.58	-0.38	0.42	7.64	8.12
AP2-14	234.80	376.18	778.02	324.62	1287.23	542.94	2096.15	701.64	1529.41
AP3-14	1421.37	2198.59	4833.17	1797.35	7444.38	2888.72	12050.37	3919.10	8315.77
AP4-14	1835.93	3115.48	6709.62	2416.51	10255.00	4051.48	16710.75	5586.51	11684.71

zero correction									
SRM614-13	135.16	254.66	636.46	222.02	840.74	259.14	873.66	310.04	913.17
SRM612-13	6644.88	13348.93	29537.59	12089.01	47311.61	11394.80	50308.18	16789.81	55651.43
SRM610-13	53761.42	107860.58	276076.20	96698.61	452348.91	95284.52	489087.33	138623.18	544522.04
AP1-13	53.48	28.06	74.98	50.22	108.58	29.18	78.54	36.96	119.68
AP2-13	336.40	537.02	1178.39	494.98	1746.79	667.50	2773.56	970.17	2006.77
AP3-13	1641.29	2717.04	6173.98	2394.63	8856.51	3447.48	14323.18	4744.59	10240.58
AP4-13	2751.58	4422.92	10363.84	3863.48	14503.26	5746.85	23031.55	7614.52	16578.73
LA3324-1-1	1113.29	508.62	272.94	720.86	279.66	406.46	292.58	281.44	167.88
LA3324-1-2	526.52	177.46	143.90	282.10	122.22	156.14	148.34	115.52	64.72
LA3324-1-3	481.08	187.62	125.14	272.38	99.42	147.02	117.50	116.40	53.60
LA3324-1-4	2871.86	1102.63	685.10	1518.99	593.62	832.74	738.10	710.68	330.48
LA3324-1-5	1424.73	550.38	415.50	766.02	286.34	436.06	375.30	407.44	170.72
LA3324-1-6	2145.89	812.06	571.22	1013.47	440.06	629.02	529.46	499.04	235.60
LA3324-1-7	1514.73	579.98	385.26	789.82	343.46	496.46	421.50	425.36	191.76
LA3324-1-8	2662.86	938.87	608.38	1390.27	527.06	817.42	678.50	725.52	309.00
LA3324-1-9	3793.38	1392.95	803.54	1799.39	702.66	1131.51	867.98	885.41	430.44
LA3324-1-10	2562.21	955.51	484.10	1091.95	487.22	702.02	530.82	479.92	207.28
LA3324-1-11	1499.57	554.70	313.22	663.62	267.58	363.54	288.30	259.04	99.88
LA3324-1-12	1748.49	617.74	317.30	708.14	314.02	402.06	313.86	281.16	138.08
LA3324-1-13	1702.89	619.02	331.70	748.50	289.74	412.94	308.90	287.44	127.00
LA3324-1-14	1975.21	742.98	358.66	806.98	356.22	485.46	336.74	300.20	142.00
LA3324-1-15	1725.09	586.06	280.54	719.86	310.14	439.18	296.74	300.12	119.44
LA3324-1-16	845.80	327.10	163.26	384.78	158.70	203.46	155.54	127.76	67.56
LA3324-1-17	980.45	340.10	190.66	366.98	157.66	206.94	141.66	174.52	60.68
LA3324-1-18	946.01	352.26	172.66	399.54	169.78	205.34	162.06	153.56	60.12
SRM614-14	123.76	224.02	502.98	199.62	771.62	195.86	738.82	294.32	821.96
SRM612-14	6185.95	11298.28	24260.72	9545.47	41261.01	9848.72	43702.35	14572.40	46828.46
SRM610-14	55195.51	101932.87	249723.10	84463.73	444489.69	91185.29	476954.42	133068.95	518476.54
AP1-14	9.44	0.00	3.70	3.14	5.58	0.00	0.42	7.64	8.12
AP2-14	234.80	376.18	778.02	324.62	1287.23	542.94	2096.15	701.64	1529.41
AP3-14	1421.37	2198.59	4833.17	1797.35	7444.38	2888.72	12050.37	3919.10	8315.77
AP4-14	1835.93	3115.48	6709.62	2416.51	10255.00	4051.48	16710.75	5586.51	11684.71

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-13	0.000070	0.000132	0.000329	0.000115	0.000434	0.000134	0.000451	0.000160	0.000472
SRM612-13	0.003844	0.007722	0.017088	0.006994	0.027370	0.006592	0.029104	0.009713	0.032195
SRM610-13	0.055725	0.111800	0.286159	0.100230	0.468869	0.098764	0.506949	0.143686	0.564409
AP1-13	0.000004	0.000002	0.000005	0.000003	0.000007	0.000002	0.000005	0.000002	0.000008
AP2-13	0.000028	0.000044	0.000097	0.000041	0.000144	0.000055	0.000229	0.000080	0.000165
AP3-13	0.000091	0.000151	0.000344	0.000133	0.000493	0.000192	0.000798	0.000264	0.000570
AP4-13	0.000173	0.000278	0.000652	0.000243	0.000912	0.000361	0.001448	0.000479	0.001042
LA3324-1-1	0.000135	0.000062	0.000033	0.000088	0.000034	0.000049	0.000036	0.000034	0.000020

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000075	0.000025	0.000021	0.000040	0.000017	0.000022	0.000021	0.000016	0.000009
LA3324-1-3	0.000083	0.000032	0.000022	0.000047	0.000017	0.000025	0.000020	0.000020	0.000009
LA3324-1-4	0.000248	0.000095	0.000059	0.000131	0.000051	0.000072	0.000064	0.000061	0.000028
LA3324-1-5	0.000146	0.000056	0.000043	0.000078	0.000029	0.000045	0.000038	0.000042	0.000017
LA3324-1-6	0.000201	0.000076	0.000054	0.000095	0.000041	0.000059	0.000050	0.000047	0.000022
LA3324-1-7	0.000136	0.000052	0.000035	0.000071	0.000031	0.000044	0.000038	0.000038	0.000017
LA3324-1-8	0.000209	0.000074	0.000048	0.000109	0.000041	0.000064	0.000053	0.000057	0.000024
LA3324-1-9	0.000307	0.000113	0.000065	0.000145	0.000057	0.000091	0.000070	0.000072	0.000035
LA3324-1-10	0.000451	0.000168	0.000085	0.000192	0.000086	0.000124	0.000093	0.000084	0.000036
LA3324-1-11	0.000305	0.000113	0.000064	0.000135	0.000054	0.000074	0.000059	0.000053	0.000020
LA3324-1-12	0.000349	0.000123	0.000063	0.000141	0.000063	0.000080	0.000063	0.000056	0.000028
LA3324-1-13	0.000237	0.000086	0.000046	0.000104	0.000040	0.000058	0.000043	0.000040	0.000018
LA3324-1-14	0.000273	0.000103	0.000050	0.000112	0.000049	0.000067	0.000047	0.000042	0.000020
LA3324-1-15	0.000242	0.000082	0.000039	0.000101	0.000044	0.000062	0.000042	0.000042	0.000017
LA3324-1-16	0.000133	0.000051	0.000026	0.000060	0.000025	0.000032	0.000024	0.000020	0.000011
LA3324-1-17	0.000137	0.000048	0.000027	0.000051	0.000022	0.000029	0.000020	0.000024	0.000008
LA3324-1-18	0.000130	0.000048	0.000024	0.000055	0.000023	0.000028	0.000022	0.000021	0.000008
SRM614-14	0.000094	0.000169	0.000380	0.000151	0.000584	0.000148	0.000559	0.000223	0.000622
SRM612-14	0.004573	0.008352	0.017935	0.007057	0.030503	0.007281	0.032308	0.010773	0.034619
SRM610-14	0.067411	0.124491	0.304989	0.103156	0.542858	0.111365	0.582508	0.162518	0.633219
AP1-14	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	0.000001
AP2-14	0.000025	0.000040	0.000082	0.000034	0.000136	0.000058	0.000222	0.000074	0.000162
AP3-14	0.000097	0.000151	0.000331	0.000123	0.000511	0.000198	0.000826	0.000269	0.000570
AP4-14	0.000147	0.000249	0.000536	0.000193	0.000820	0.000324	0.001336	0.000447	0.000934
standardize signal averages AP									
AP1	0.000002	0.000001	0.000003	0.000002	0.000004	0.000001	0.000003	0.000002	0.000004
AP2	0.000026	0.000042	0.000090	0.000038	0.000140	0.000056	0.000225	0.000077	0.000164
AP3	0.000094	0.000151	0.000338	0.000128	0.000502	0.000195	0.000812	0.000266	0.000570
AP4	0.000160	0.000264	0.000594	0.000218	0.000866	0.000343	0.001392	0.000463	0.000988
linest from std sig ave									
	0.058412	0.037242	0.016640	0.044494	0.011443	0.042727	0.010581	0.031837	0.010110
standardize signal averages SRM									
srm614-2	0.000082	0.000150	0.000355	0.000133	0.000509	0.000141	0.000505	0.000191	0.000547
srm612-2	0.004209	0.008037	0.017511	0.007025	0.028936	0.006936	0.030706	0.010243	0.033407
srm610-2	0.061568	0.118146	0.295574	0.101693	0.505864	0.105065	0.544729	0.153102	0.598814
linest from std sig ave									
	0.081662	0.044501	0.018206	0.048208	0.010220	0.047390	0.009635	0.032489	0.008195
concentration data									
SRM614-13	0.35	0.42	0.47	0.44	0.43	0.49	0.41	0.44	0.41
SRM612-13	19.26	24.67	24.39	26.69	26.86	24.16	26.41	26.52	27.91
SRM610-13	279.16	357.09	408.38	382.47	460.15	361.91	460.05	392.32	489.38
AP1-13	0.08	0.03	0.03	0.06	0.03	0.03	0.02	0.03	0.03
AP2-13	0.65	0.66	0.64	0.72	0.66	0.94	0.66	1.02	0.67
AP3-13	2.13	2.25	2.28	2.37	2.25	3.27	3.37	3.36	2.30
AP4-13	4.03	4.13	4.33	4.31	4.16	6.16	6.11	6.08	4.20
LA3324-1-1	3.15	0.92	0.22	1.55	0.16	0.84	0.15	0.43	0.08
LA3324-1-2	1.75	0.38	0.14	0.71	0.08	0.38	0.09	0.21	0.04
LA3324-1-3	1.93	0.48	0.14	0.83	0.08	0.43	0.09	0.25	0.04
LA3324-1-4	5.77	1.41	0.39	2.32	0.23	1.22	0.27	0.78	0.11
LA3324-1-5	3.40	0.84	0.28	1.39	0.13	0.76	0.16	0.53	0.07
LA3324-1-6	4.69	1.13	0.36	1.69	0.19	1.00	0.21	0.59	0.09
LA3324-1-7	3.16	0.77	0.23	1.26	0.14	0.76	0.16	0.48	0.07
LA3324-1-8	4.88	1.10	0.32	1.94	0.19	1.10	0.23	0.72	0.10
LA3324-1-9	7.15	1.67	0.43	2.58	0.26	1.56	0.30	0.91	0.14
LA3324-1-10	10.51	2.50	0.57	3.41	0.39	2.11	0.39	1.07	0.15
LA3324-1-11	7.11	1.68	0.42	2.40	0.25	1.26	0.25	0.67	0.08
LA3324-1-12	8.14	1.83	0.42	2.51	0.29	1.37	0.26	0.71	0.11
LA3324-1-13	5.53	1.28	0.31	1.85	0.18	0.98	0.18	0.51	0.07
LA3324-1-14	6.37	1.53	0.33	1.98	0.23	1.15	0.20	0.53	0.08
LA3324-1-15	5.65	1.22	0.26	1.79	0.20	1.05	0.18	0.54	0.07
LA3324-1-16	3.09	0.76	0.17	1.07	0.11	0.54	0.10	0.25	0.04
LA3324-1-17	3.20	0.71	0.18	0.91	0.10	0.49	0.08	0.31	0.03
LA3324-1-18	3.03	0.72	0.16	0.97	0.11	0.48	0.09	0.27	0.03
SRM614-14	0.47	0.54	0.54	0.58	0.57	0.54	0.51	0.61	0.54
SRM612-14	22.91	26.68	25.60	26.93	29.94	26.68	29.32	29.41	30.02
SRM610-14	337.70	397.62	435.25	393.64	532.77	408.09	528.62	443.74	549.04
AP1-14	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
AP2-14	0.58	0.59	0.55	0.61	0.62	0.98	0.94	0.94	0.65
AP3-14	2.27	2.24	2.20	2.19	2.33	3.38	3.49	3.41	2.30
AP4-14	3.42	3.70	3.56	3.43	3.74	5.52	5.64	5.67	3.77
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-11	2.76	8.16	15.28	1.44	1.20	0.56	2.28	3.04	2.32
SRM614-11	90.52	177.56	445.36	218.24	558.12	164.68	585.72	203.68	704.20
SRM612-11	4293.82	9539.41	23678.25	10801.94	31508.70	7868.80	34173.35	11504.02	38833.74
SRM610-11	31714.38	73990.41	206672.72	81904.14	279048.50	63008.88	304973.63	91320.52	356347.22
AP1-11	72.80	88.32	105.36	91.92	54.40	14.40	48.72	27.20	55.60
AP2-11	234.32	419.68	955.25	502.00	1120.21	439.88	1754.93	589.12	1400.89
AP3-11	1015.85	1937.33	4816.79	2302.93	5322.67	2132.57	8531.33	2887.98	6311.44
AP4-11	1430.93	2639.33	6496.88	3068.74	7626.20	3044.22	12467.59	4166.46	9211.69
M17-24-141-1	748.76	367.16	256.16	666.28	245.20	235.84	142.08	168.40	46.56
M17-24-141-2	720.68	374.80	265.76	580.72	214.00	239.88	168.68	176.12	56.04
M17-24-141-3	874.92	393.16	240.88	642.96	258.48	223.96	193.56	205.00	62.56
M17-24-141-4	1212.45	654.20	397.16	904.85	405.36	394.56	310.08	283.80	96.32
M17-24-141-5	1318.21	631.84	396.56	973.77	415.48	401.44	330.80	334.52	123.32
M17-24-141-6	1048.37	526.64	336.68	725.20	309.88	326.12	232.24	229.88	83.76
M17-24-141-7	679.12	322.88	214.60	501.00	189.04	168.16	146.80	130.12	61.00
M17-24-141-8	622.08	315.00	208.80	389.64	190.24	186.04	139.56	148.52	47.64
M17-24-141-9	703.28	322.40	221.36	497.40	218.84	243.24	163.00	166.96	70.40
M17-24-141-10	4990.95	2145.25	1282.25	3689.10	1400.13	1389.37	1115.53	1174.89	402.72
M17-24-141-11	12909.39	5162.11	2910.70	9073.17	3441.26	3778.54	2960.90	2847.30	1051.53
M17-24-141-12	22718.13	8755.13	4943.99	15167.21	5816.99	6614.04	5011.47	5180.03	1799.93
M17-24-141-13	32902.27	11978.15	6916.96	22474.73	8161.21	9903.18	8216.21	8467.37	3292.46
M17-24-141-14	37081.45	13745.72	7613.60	25793.43	9314.65	11010.10	8980.53	9440.09	3454.86
M17-24-141-15	40258.31	14932.92	8287.53	27265.75	9939.54	12125.07	9850.62	10051.98	3702.86
M17-24-141-16	3272.30	1359.49	998.65	2458.05	840.00	1016.45	875.00	889.81	390.56
M17-24-141-17	2413.25	1122.57	843.48	2027.17	696.96	825.28	693.56	712.80	292.88
M17-24-141-18	1948.29	958.09	717.64	1578.21	542.28	637.80	506.96	520.84	206.92
SRM614-12	113.12	216.08	473.96	197.84	697.64	198.80	701.48	248.92	723.56
SRM612-12	6708.44	12783.35	29686.53	12289.39	45583.90	10945.82	47943.03	16001.45	53164.86
SRM610-12	51813.45	107039.64	282410.69	100642.25	441601.28	92903.36	474782.13	135451.56	534881.50
AP1-12	12.24	15.68	30.00	12.12	68.88	13.36	5.48	3.80	4.96
AP2-12	247.60	407.40	971.41	446.80	1412.53	536.40	2187.93	766.84	1660.09
AP3-12	1345.29	2384.45	5688.15	2252.49	7252.28	2801.78	11667.95	3852.26	8540.81
AP4-12	2141.45	3896.18	9187.57	3666.34	12220.87	4838.51	19409.19	6334.88	13935.28
blank-12	5.96	9.68	16.92	2.44	2.56	4.00	0.60	3.64	4.88
blank average	4.36	8.92	16.10	1.94	1.88	2.28	1.44	3.34	3.60

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank subtraction									
SRM614-11	86.16	168.64	429.26	216.30	556.24	162.40	584.28	200.34	700.60
SRM612-11	4289.46	9530.49	23662.15	10800.00	31506.82	7866.52	34171.91	11500.68	38830.14
SRM610-11	31710.02	73981.49	206656.62	81902.20	279046.62	63006.59	304972.19	91317.18	356343.62
AP1-11	68.44	79.40	89.26	89.98	52.52	12.12	47.28	23.86	52.00
AP2-11	229.96	410.76	939.15	500.06	1118.33	437.60	1753.49	585.78	1397.29
AP3-11	1011.49	1928.41	4800.69	2300.99	5320.79	2130.29	8529.89	2884.64	6307.84
AP4-11	1426.57	2630.41	6480.78	3066.80	7624.32	3041.94	12466.15	4163.12	9208.09
M17-24-141-1	744.40	358.24	240.06	664.34	243.32	233.56	140.64	165.06	42.96
M17-24-141-2	716.32	365.88	249.66	578.78	212.12	237.60	167.24	172.78	52.44
M17-24-141-3	870.56	384.24	224.78	641.02	256.60	221.68	192.12	201.66	58.96
M17-24-141-4	1208.09	645.28	381.06	902.91	403.48	392.28	308.64	280.46	92.72
M17-24-141-5	1313.85	622.92	380.46	971.83	413.60	399.16	329.36	331.18	119.92
M17-24-141-6	1044.01	517.72	320.58	723.26	308.00	323.84	230.80	226.54	80.16
M17-24-141-7	674.76	313.96	198.50	499.06	187.16	165.88	145.36	126.78	57.40
M17-24-141-8	617.72	306.08	192.70	387.70	188.36	183.76	138.12	145.18	44.04
M17-24-141-9	698.92	313.48	205.26	495.46	216.96	240.96	161.56	163.62	66.80
M17-24-141-10	4986.59	2136.33	1266.15	3687.16	1398.25	1387.09	1114.09	1171.55	399.12
M17-24-141-11	12905.03	5153.19	2894.60	9071.23	3439.38	3776.26	2959.46	2843.96	1047.93
M17-24-141-12	22713.77	8746.21	4927.89	15165.26	5815.11	6611.76	5010.03	5176.69	1796.33
M17-24-141-13	32897.91	11969.23	6900.86	22472.79	8159.33	9900.90	8214.77	8464.03	3288.86
M17-24-141-14	37077.09	13736.80	7597.50	25791.49	9312.77	11007.82	8979.09	9436.75	3451.26
M17-24-141-15	40253.94	14924.00	8271.43	27263.81	9937.66	12122.79	9849.18	10048.64	3699.26
M17-24-141-16	3267.94	1350.57	982.55	2456.11	838.12	1014.17	873.56	886.47	386.96
M17-24-141-17	2408.89	1113.65	827.38	2025.23	695.08	823.00	692.12	709.46	289.28
M17-24-141-18	1943.93	949.17	701.54	1576.27	540.40	635.52	505.52	517.50	203.32
SRM614-12	108.76	207.16	457.86	195.90	695.76	196.52	700.04	245.58	719.96
SRM612-12	6704.08	12774.43	29670.43	12287.45	45582.02	10943.54	47941.59	15998.11	53161.26
SRM610-12	51809.09	107030.72	282394.59	100640.31	441599.40	92901.08	474780.69	135448.22	534877.90
AP1-12	7.88	6.76	13.90	10.18	67.00	11.08	4.04	0.46	1.36
AP2-12	243.24	398.48	955.31	444.86	1410.65	534.12	2186.49	763.50	1656.49
AP3-12	1340.93	2375.53	5672.05	2250.55	7250.40	2799.50	11666.50	3848.92	8537.21
AP4-12	2137.09	3887.26	9171.47	3664.40	12218.99	4836.23	19407.75	6331.54	13931.68

Appendix A. Raw trace element datasheets from laser ablation.

zero correction									
SRM614-11	86.16	168.64	429.26	216.30	556.24	162.40	584.28	200.34	700.60
SRM612-11	4289.46	9530.49	23662.15	10800.00	31506.82	7866.52	34171.91	11500.68	38830.14
SRM610-11	31710.02	73981.49	206656.62	81902.20	279046.62	63006.59	304972.19	91317.18	356343.62
AP1-11	68.44	79.40	89.26	89.98	52.52	12.12	47.28	23.86	52.00
AP2-11	229.96	410.76	939.15	500.06	1118.33	437.60	1753.49	585.78	1397.29
AP3-11	1011.49	1928.41	4800.69	2300.99	5320.79	2130.29	8529.89	2884.64	6307.84
AP4-11	1426.57	2630.41	6480.78	3066.80	7624.32	3041.94	12466.15	4163.12	9208.09
M17-24-141-1	744.40	358.24	240.06	664.34	243.32	233.56	140.64	165.06	42.96
M17-24-141-2	716.32	365.88	249.66	578.78	212.12	237.60	167.24	172.78	52.44
M17-24-141-3	870.56	384.24	224.78	641.02	256.60	221.68	192.12	201.66	58.96
M17-24-141-4	1208.09	645.28	381.06	902.91	403.48	392.28	308.64	280.46	92.72
M17-24-141-5	1313.85	622.92	380.46	971.83	413.60	399.16	329.36	331.18	119.92
M17-24-141-6	1044.01	517.72	320.58	723.26	308.00	323.84	230.80	226.54	80.16
M17-24-141-7	674.76	313.96	198.50	499.06	187.16	165.88	145.36	126.78	57.40
M17-24-141-8	617.72	306.08	192.70	387.70	188.36	183.76	138.12	145.18	44.04
M17-24-141-9	698.92	313.48	205.26	495.46	216.96	240.96	161.56	163.62	66.80
M17-24-141-10	4986.59	2136.33	1266.15	3687.16	1398.25	1387.09	1114.09	1171.55	399.12
M17-24-141-11	12905.03	5153.19	2894.60	9071.23	3439.38	3776.26	2959.46	2843.96	1047.93
M17-24-141-12	22713.77	8746.21	4927.89	15165.26	5815.11	6611.76	5010.03	5176.69	1796.33
M17-24-141-13	32897.91	11969.23	6900.86	22472.79	8159.33	9900.90	8214.77	8464.03	3288.86
M17-24-141-14	37077.09	13736.80	7597.50	25791.49	9312.77	11007.82	8979.09	9436.75	3451.26
M17-24-141-15	40253.94	14924.00	8271.43	27263.81	9937.66	12122.79	9849.18	10048.64	3699.26
M17-24-141-16	3267.94	1350.57	922.55	2456.11	838.12	1014.17	873.56	886.47	386.96
M17-24-141-17	2408.89	1113.65	827.38	2025.23	695.08	823.00	692.12	709.46	289.28
M17-24-141-18	1943.93	949.17	701.54	1576.27	540.40	635.52	505.52	517.50	203.32
SRM614-12	108.76	207.16	457.86	195.90	695.76	196.52	700.04	245.58	719.96
SRM612-12	6704.08	12774.43	29670.43	12287.45	45582.02	10943.54	47941.59	15998.11	53161.26
SRM610-12	51809.09	107030.72	282394.59	100640.31	441599.40	92901.08	474780.69	135448.22	534877.90
AP1-12	7.88	6.76	13.90	10.18	67.00	11.08	4.04	0.46	1.36
AP2-12	243.24	398.48	955.31	444.86	1410.65	534.12	2186.49	763.50	1656.49
AP3-12	1340.93	2375.53	5672.05	2250.55	7250.40	2799.50	11666.50	3848.92	8537.21
AP4-12	2137.09	3887.26	9171.47	3664.40	12218.99	4836.23	19407.75	6331.54	13931.68

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-11	0.000046	0.000091	0.000231	0.000116	0.000299	0.000087	0.000314	0.000108	0.000377
SRM612-11	0.002218	0.004928	0.012235	0.005585	0.016292	0.004068	0.017670	0.005947	0.020079
SRM610-11	0.031023	0.072379	0.202179	0.080128	0.273001	0.061641	0.298365	0.089339	0.348623
AP1-11	0.000006	0.000007	0.000008	0.000008	0.000005	0.000001	0.000004	0.000002	0.000005
AP2-11	0.000021	0.000038	0.000087	0.000047	0.000104	0.000041	0.000163	0.000055	0.000130
AP3-11	0.000071	0.000135	0.000337	0.000162	0.000374	0.000150	0.000599	0.000203	0.000443
AP4-11	0.000105	0.000194	0.000477	0.000226	0.000561	0.000224	0.000918	0.000307	0.000678
M17-24-141-1	0.000339	0.000163	0.000109	0.000302	0.000111	0.000106	0.000064	0.000075	0.000020
M17-24-141-2	0.000293	0.000150	0.000102	0.000237	0.000087	0.000097	0.000068	0.000071	0.000021
M17-24-141-3	0.000324	0.000143	0.000084	0.000239	0.000096	0.000083	0.000072	0.000075	0.000022
M17-24-141-4	0.000358	0.000191	0.000113	0.000268	0.000120	0.000116	0.000092	0.000083	0.000028
M17-24-141-5	0.000411	0.000195	0.000119	0.000304	0.000130	0.000125	0.000103	0.000104	0.000038
M17-24-141-6	0.000331	0.000164	0.000102	0.000229	0.000098	0.000103	0.000073	0.000072	0.000025
M17-24-141-7	0.000229	0.000106	0.000067	0.000169	0.000063	0.000056	0.000049	0.000043	0.000019
M17-24-141-8	0.000218	0.000108	0.000068	0.000137	0.000066	0.000065	0.000049	0.000051	0.000016
M17-24-141-9	0.000231	0.000103	0.000068	0.000163	0.000072	0.000079	0.000053	0.000054	0.000022
M17-24-141-10	0.001073	0.000460	0.000273	0.000794	0.000301	0.000299	0.000240	0.000252	0.000086
M17-24-141-11	0.002019	0.000806	0.000453	0.001419	0.000538	0.000591	0.000463	0.000445	0.000164
M17-24-141-12	0.003068	0.001181	0.000666	0.002048	0.000785	0.000893	0.000677	0.000699	0.000243
M17-24-141-13	0.001967	0.000716	0.000413	0.001343	0.000488	0.000592	0.000491	0.000506	0.000197
M17-24-141-14	0.002205	0.000817	0.000452	0.001534	0.000554	0.000655	0.000534	0.000561	0.000205
M17-24-141-15	0.002372	0.000880	0.000487	0.001607	0.000586	0.000714	0.000580	0.000592	0.000218
M17-24-141-16	0.000183	0.000076	0.000055	0.000138	0.000047	0.000057	0.000049	0.000050	0.000022
M17-24-141-17	0.000131	0.000061	0.000045	0.000110	0.000038	0.000045	0.000038	0.000039	0.000016

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000105	0.000051	0.000038	0.000085	0.000029	0.000034	0.000027	0.000028	0.000011
SRM614-12	0.000074	0.000141	0.000311	0.000133	0.000473	0.000133	0.000475	0.000167	0.000489
SRM612-12	0.003547	0.006759	0.015700	0.006502	0.024119	0.005791	0.025368	0.008465	0.028130
SRM610-12	0.051395	0.106174	0.280135	0.099835	0.438067	0.092158	0.470982	0.134365	0.530599
AP1-12	0.000001	0.000001	0.000001	0.000001	0.000006	0.000001	0.000000	0.000000	0.000000
AP2-12	0.000020	0.000033	0.000078	0.000037	0.000116	0.000044	0.000180	0.000063	0.000136
AP3-12	0.000081	0.000143	0.000342	0.000136	0.000437	0.000169	0.000704	0.000232	0.000515
AP4-12	0.000132	0.000241	0.000568	0.000227	0.000757	0.000299	0.001202	0.000392	0.000863

standardize signal averages AP

AP1	0.000003	0.000004	0.000004	0.000004	0.000005	0.000001	0.000002	0.000001	0.000002
AP2	0.000021	0.000035	0.000083	0.000042	0.000110	0.000042	0.000171	0.000059	0.000133
AP3	0.000076	0.000139	0.000340	0.000149	0.000406	0.000159	0.000652	0.000217	0.000479
AP4	0.000119	0.000217	0.000523	0.000226	0.000659	0.000262	0.001060	0.000349	0.000770

linest from std sig ave

	0.076825	0.043828	0.018221	0.041484	0.014794	0.055000	0.013707	0.041310	0.012709
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standardize signal averages SRM

srm614-2	0.000060	0.000116	0.000271	0.000125	0.000386	0.000110	0.000395	0.000137	0.000433
srm612-2	0.002883	0.005844	0.013968	0.006043	0.020206	0.004929	0.021519	0.007206	0.024104
srm610-2	0.041209	0.089277	0.241157	0.089981	0.355534	0.076900	0.384673	0.111852	0.439611

linest from std sig ave

	0.121996	0.058900	0.022316	0.054488	0.014542	0.064752	0.013644	0.044475	0.011164
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concentration data

SRM614-11	0.31	0.34	0.36	0.41	0.38	0.41	0.37	0.38	0.41
SRM612-11	14.61	18.52	19.12	19.87	20.67	19.19	20.77	21.07	21.89
SRM610-11	204.40	272.06	315.94	285.08	346.38	290.76	350.75	316.51	380.00
AP1-11	0.18	0.12	0.06	0.13	0.03	0.02	0.02	0.03	0.02
AP2-11	0.66	0.67	0.64	0.77	0.61	0.89	0.89	0.90	0.66
AP3-11	2.18	2.37	2.45	2.68	2.21	3.28	3.28	3.34	2.25
AP4-11	3.22	3.39	3.47	3.74	3.31	4.91	5.02	5.05	3.44
M17-24-141-1	10.39	2.85	0.79	5.01	0.65	2.33	0.35	1.24	0.10
M17-24-141-2	8.97	2.61	0.74	3.92	0.51	2.13	0.37	1.16	0.11
M17-24-141-3	9.93	2.50	0.61	3.95	0.56	1.81	0.39	1.24	0.11
M17-24-141-4	10.98	3.35	0.82	4.43	0.71	2.55	0.50	1.37	0.14
M17-24-141-5	12.61	3.41	0.87	5.04	0.76	2.74	0.56	1.71	0.19
M17-24-141-6	10.15	2.87	0.74	3.80	0.58	2.25	0.40	1.18	0.13
M17-24-141-7	7.01	1.86	0.49	2.80	0.37	1.23	0.27	0.71	0.10
M17-24-141-8	6.68	1.89	0.49	2.26	0.39	1.42	0.27	0.84	0.08
M17-24-141-9	7.07	1.81	0.49	2.71	0.42	1.74	0.29	0.89	0.11
M17-24-141-10	32.90	8.04	1.98	13.13	1.78	6.55	1.31	4.16	0.44
M17-24-141-11	61.88	14.10	3.29	23.49	3.18	12.96	2.53	7.33	0.83
M17-24-141-12	94.03	20.66	4.84	33.90	4.64	19.59	3.70	11.52	1.23
M17-24-141-13	60.27	12.51	3.00	22.23	2.88	12.99	2.69	8.34	1.00
M17-24-141-14	67.59	14.29	3.28	25.39	3.27	14.37	2.92	9.25	1.04
M17-24-141-15	72.71	15.38	3.54	26.59	3.46	15.68	3.17	9.76	1.11
M17-24-141-16	5.61	1.32	0.40	2.28	0.28	1.25	0.27	0.82	0.11
M17-24-141-17	4.02	1.06	0.33	1.82	0.22	0.98	0.21	0.64	0.08
M17-24-141-18	3.21	0.89	0.27	1.41	0.17	0.75	0.15	0.46	0.06
SRM614-12	0.49	0.53	0.49	0.47	0.60	0.63	0.56	0.59	0.53
SRM612-12	23.37	25.41	24.53	23.13	30.60	27.31	29.82	29.99	30.66
SRM610-12	338.62	399.09	437.76	355.20	555.81	434.70	553.68	476.03	578.35
AP1-12	0.02	0.01	0.01	0.01	0.03	0.02	0.00	0.00	0.00
AP2-12	0.61	0.57	0.57	0.60	0.68	0.96	0.98	1.03	0.69
AP3-12	2.48	2.51	2.49	2.25	2.58	3.71	3.85	3.83	2.61
AP4-12	4.06	4.21	4.13	3.76	4.47	6.57	6.57	6.46	4.37

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	
blank-9		4.24	8.40	7.48	4.12	5.64	0.64	3.56	1.16	2.24
SRM614-9		177.72	336.24	773.32	279.44	1009.89	282.60	1141.69	365.88	1191.93
SRM612-9		7000.12	13362.92	30383.09	12474.95	48553.20	11730.19	51332.09	16932.10	56071.40
SRM610-9		57994.81	115670.01	300588.81	103170.46	493297.16	102211.62	530680.88	148756.03	591430.69
AP1-9		42.32	36.52	87.00	37.00	105.40	23.48	91.24	34.32	75.00
AP2-9		377.28	612.60	1269.69	516.88	1915.09	716.00	2934.62	1044.85	2227.01
AP3-9		1634.17	2739.70	6342.72	2434.73	8996.81	3443.58	14228.76	4738.59	10303.30

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	2793.26	4570.63	10773.30	3937.82	14760.24	5689.07	23713.13	7982.56	17231.90
M17-24-97-1	52617.94	19950.91	9725.61	18321.18	10421.58	14639.76	10709.46	9219.17	3399.78
M17-24-97-2	42190.72	15745.89	7843.00	14716.04	8326.93	12098.87	9079.09	7649.56	2847.46
M17-24-97-3	41401.59	15044.69	7714.08	14396.64	8285.65	11876.27	8963.17	7764.72	2967.38
M17-24-97-4	253.60	95.48	80.80	130.80	48.72	52.56	64.72	42.20	29.44
M17-24-97-5	61.32	41.04	39.96	34.40	18.28	17.80	19.16	19.12	15.16
M17-24-97-6	92.72	61.96	61.52	48.08	22.28	29.64	25.00	15.20	10.80
M17-24-97-7	113.40	67.20	56.80	67.80	21.16	19.64	21.68	14.72	22.52
M17-24-97-8	67.04	39.16	33.48	32.28	18.56	21.16	15.36	17.92	14.08
M17-24-97-9	52.84	30.44	29.44	26.88	13.68	22.12	12.48	13.32	11.40
M17-24-97-10	125.24	76.00	74.00	45.68	35.44	27.28	32.20	14.36	28.72
M17-24-97-11	75.36	55.16	48.12	33.48	15.00	11.56	17.16	8.60	15.40
M17-24-97-12	98.24	42.92	52.40	26.44	12.48	14.16	12.16	16.68	12.20
M17-24-97-13	433.12	176.56	134.64	175.92	69.92	85.32	82.76	60.84	58.08
M17-24-97-14	130.36	74.28	80.48	57.36	22.36	26.84	22.12	21.72	10.88
M17-24-97-15	97.84	52.88	81.92	37.76	16.68	17.60	16.16	8.52	12.20
M17-24-97-16	420.16	180.48	190.24	140.12	70.28	62.20	76.80	52.56	49.08
M17-24-97-17	178.76	86.52	81.36	65.92	31.44	36.48	30.28	25.68	22.72
M17-24-97-18	354.28	149.44	124.16	117.36	46.16	69.48	48.76	44.00	41.12
SRM614-10	165.72	324.08	720.92	254.28	1107.05	267.28	1111.97	381.64	1197.69
SRM612-10	6415.20	11565.55	24434.90	9760.29	42574.68	10159.42	45275.45	14946.68	48638.56
SRM610-10	55735.31	101465.17	250254.38	84667.00	452803.00	91955.96	486529.97	134432.13	527390.75
AP1-10	13.92	12.32	20.88	8.20	32.36	6.28	11.32	11.40	7.92
AP2-10	262.40	438.76	939.37	366.48	1456.21	543.64	2296.17	765.96	1651.05
AP3-10	1472.37	2275.97	5404.67	1806.21	7520.16	2957.02	12072.23	3971.62	8557.05
AP4-10	2369.53	3794.42	8796.53	3006.94	12481.39	4872.91	20295.19	6526.76	14263.72
blank-10	5.92	24.24	31.40	3.48	4.24	4.24	2.52	4.36	4.52
blank average	5.08	16.32	19.44	3.80	4.94	2.44	3.04	2.76	3.38

blank subtraction									
SRM614-9	172.64	319.92	753.88	275.64	1004.95	280.16	1138.65	363.12	1188.55
SRM612-9	6995.04	13346.59	30363.65	12471.15	48548.25	11727.75	51329.05	16929.34	56068.01
SRM610-9	57989.72	115653.69	300569.37	103166.66	493292.22	102209.18	530677.84	148753.27	591427.31
AP1-9	37.24	20.20	67.56	33.20	100.46	21.04	88.20	31.56	71.62
AP2-9	372.20	596.28	1250.25	513.08	1910.15	713.56	2931.58	1042.09	2223.63
AP3-9	1629.09	2723.38	6323.28	2430.93	8991.87	3441.14	14225.72	4735.83	10299.92
AP4-9	2788.18	4554.31	10753.86	3934.02	14755.30	5686.63	23710.09	7979.80	17228.52
M17-24-97-1	52612.86	19934.59	9706.17	18317.38	10416.64	14637.32	10706.42	9216.41	3396.40
M17-24-97-2	42185.64	15729.57	7823.56	14712.24	8321.99	12096.43	9076.05	7646.80	2844.08
M17-24-97-3	41396.51	15028.36	7694.64	14392.84	8280.71	11873.83	8960.13	7761.96	2964.00
M17-24-97-4	248.52	79.16	61.36	127.00	43.78	50.12	61.68	39.44	26.06
M17-24-97-5	56.24	24.72	20.52	30.60	13.34	15.36	16.12	16.36	11.78
M17-24-97-6	87.64	45.64	42.08	44.28	17.34	27.20	21.96	12.44	7.42
M17-24-97-7	108.32	50.88	37.36	64.00	16.22	17.20	18.64	11.96	19.14
M17-24-97-8	61.96	22.84	14.04	28.48	13.62	18.72	12.32	15.16	10.70
M17-24-97-9	47.76	14.12	10.00	23.08	8.74	19.68	9.44	10.56	8.02
M17-24-97-10	120.16	59.68	54.56	41.88	30.50	24.84	29.16	11.60	25.34
M17-24-97-11	70.28	38.84	28.68	29.68	10.06	9.12	14.12	5.84	12.02
M17-24-97-12	93.16	26.60	32.96	22.64	7.54	11.72	9.12	13.92	8.82
M17-24-97-13	428.04	160.24	115.20	172.12	64.98	82.88	79.72	58.08	54.70
M17-24-97-14	125.28	57.96	61.04	53.56	17.42	24.40	19.08	18.96	7.50
M17-24-97-15	92.76	36.56	62.48	33.96	11.74	15.16	13.12	5.76	8.82
M17-24-97-16	415.08	164.16	170.80	136.32	65.34	59.76	73.76	49.80	45.70
M17-24-97-17	173.68	70.20	61.92	62.12	26.50	34.04	27.24	22.92	19.34
M17-24-97-18	349.20	133.12	104.72	113.56	41.22	67.04	45.72	41.24	37.74
SRM614-10	160.64	307.76	701.48	250.48	1102.11	264.84	1108.93	378.88	1194.31
SRM612-10	6410.12	11549.22	24415.46	9756.49	42569.74	10156.98	45272.41	14943.92	48635.17
SRM610-10	55730.23	101448.85	250234.94	84663.20	452798.06	91953.52	486526.93	134429.37	527387.37
AP1-10	8.84	-4.00	1.44	4.40	27.42	3.84	8.28	8.64	4.54
AP2-10	257.32	422.44	919.93	362.68	1451.27	541.20	2293.13	763.20	1647.67
AP3-10	1467.29	2259.65	5385.23	1802.41	7515.22	2954.58	12069.19	3968.86	8553.67
AP4-10	2364.45	3778.10	8777.09	3003.14	12476.45	4870.47	20292.15	6524.00	14260.34

zero correction									
SRM614-9	172.64	319.92	753.88	275.64	1004.95	280.16	1138.65	363.12	1188.55
SRM612-9	6995.04	13346.59	30363.65	12471.15	48548.25	11727.75	51329.05	16929.34	56068.01
SRM610-9	57989.72	115653.69	300569.37	103166.66	493292.22	102209.18	530677.84	148753.27	591427.31
AP1-9	37.24	20.20	67.56	33.20	100.46	21.04	88.20	31.56	71.62
AP2-9	372.20	596.28	1250.25	513.08	1910.15	713.56	2931.58	1042.09	2223.63
AP3-9	1629.09	2723.38	6323.28	2430.93	8991.87	3441.14	14225.72	4735.83	10299.92
AP4-9	2788.18	4554.31	10753.86	3934.02	14755.30	5686.63	23710.09	7979.80	17228.52
M17-24-97-1	52612.86	19934.59	9706.17	18317.38	10416.64	14637.32	10706.42	9216.41	3396.40
M17-24-97-2	42185.64	15729.57	7823.56	14712.24	8321.99	12096.43	9076.05	7646.80	2844.08
M17-24-97-3	41396.51	15028.36	7694.64	14392.84	8280.71	11873.83	8960.13	7761.96	2964.00
M17-24-97-4	248.52	79.16	61.36	127.00	43.78	50.12	61.68	39.44	26.06
M17-24-97-5	56.24	24.72	20.52	30.60	13.34	15.36	16.12	16.36	11.78
M17-24-97-6	87.64	45.64	42.08	44.28	17.34	27.20	21.96	12.44	7.42
M17-24-97-7	108.32	50.88	37.36	64.00	16.22	17.20	18.64	11.96	19.14

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	61.96	22.84	14.04	28.48	13.62	18.72	12.32	15.16	10.70
M17-24-97-9	47.76	14.12	10.00	23.08	8.74	19.68	9.44	10.56	8.02
M17-24-97-10	120.16	59.68	54.56	41.88	30.50	24.84	29.16	11.60	25.34
M17-24-97-11	70.28	38.84	28.68	29.68	10.06	9.12	14.12	5.84	12.02
M17-24-97-12	93.16	26.60	32.96	22.64	7.54	11.72	9.12	13.92	8.82
M17-24-97-13	428.04	160.24	115.20	172.12	64.98	82.88	79.72	58.08	54.70
M17-24-97-14	125.28	57.96	61.04	53.56	17.42	24.40	19.08	18.96	7.50
M17-24-97-15	92.76	36.56	62.48	33.96	11.74	15.16	13.12	5.76	8.82
M17-24-97-16	415.08	164.16	170.80	136.32	65.34	59.76	73.76	49.80	45.70
M17-24-97-17	173.68	70.20	61.92	62.12	26.50	34.04	27.24	22.92	19.34
M17-24-97-18	349.20	133.12	104.72	113.56	41.22	67.04	45.72	41.24	37.74
SRM614-10	160.64	307.76	701.48	250.48	1102.11	264.84	1108.93	378.88	1194.31
SRM612-10	6410.12	11549.22	24415.46	9756.49	42569.74	10156.98	45272.41	14943.92	48635.17
SRM610-10	55730.23	101448.85	250234.94	84663.20	452798.06	91953.52	486526.93	134429.37	527387.37
AP1-10	8.84	0.00	1.44	4.40	27.42	3.84	8.28	8.64	4.54
AP2-10	257.32	422.44	919.93	362.68	1451.27	541.20	2293.13	763.20	1647.67
AP3-10	1467.29	2259.65	5385.23	1802.41	7515.22	2954.58	12069.19	3968.86	8553.67
AP4-10	2364.45	3778.10	8777.09	3003.14	12476.45	4870.47	20292.15	6524.00	14260.34

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-9	0.000073	0.000136	0.000321	0.000117	0.000427	0.000119	0.000484	0.000154	0.000506
SRM612-9	0.003867	0.007378	0.016785	0.006894	0.026837	0.006483	0.028374	0.009358	0.030994
SRM610-9	0.057779	0.115234	0.299478	0.102792	0.491501	0.101838	0.528751	0.148213	0.589279
AP1-9	0.000003	0.000002	0.000005	0.000003	0.000008	0.000002	0.000007	0.000002	0.000006
AP2-9	0.000028	0.000044	0.000093	0.000038	0.000142	0.000053	0.000219	0.000078	0.000166
AP3-9	0.000091	0.000152	0.000354	0.000136	0.000503	0.000193	0.000796	0.000265	0.000576
AP4-9	0.000172	0.000281	0.000663	0.000242	0.000909	0.000350	0.001461	0.000492	0.001062
M17-24-97-1	0.007007	0.002655	0.001293	0.002440	0.001387	0.001949	0.001426	0.001227	0.000452
M17-24-97-2	0.006090	0.002271	0.001129	0.002124	0.001201	0.001746	0.001310	0.001104	0.000411
M17-24-97-3	0.005379	0.001953	0.001000	0.001870	0.001076	0.001543	0.001164	0.001009	0.000385
M17-24-97-4	0.000046	0.000015	0.000011	0.000024	0.000008	0.000009	0.000011	0.000007	0.000005
M17-24-97-5	0.000010	0.000005	0.000004	0.000006	0.000002	0.000003	0.000003	0.000003	0.000002
M17-24-97-6	0.000015	0.000008	0.000007	0.000008	0.000003	0.000005	0.000004	0.000002	0.000001
M17-24-97-7	0.000022	0.000010	0.000008	0.000013	0.000003	0.000003	0.000004	0.000002	0.000004
M17-24-97-8	0.000014	0.000005	0.000003	0.000006	0.000003	0.000004	0.000003	0.000003	0.000002
M17-24-97-9	0.000009	0.000003	0.000002	0.000004	0.000002	0.000004	0.000002	0.000002	0.000002
M17-24-97-10	0.000030	0.000015	0.000014	0.000010	0.000008	0.000006	0.000007	0.000003	0.000006
M17-24-97-11	0.000015	0.000008	0.000006	0.000006	0.000002	0.000002	0.000003	0.000001	0.000003
M17-24-97-12	0.000019	0.000005	0.000007	0.000005	0.000002	0.000002	0.000002	0.000003	0.000002
M17-24-97-13	0.000098	0.000037	0.000026	0.000040	0.000015	0.000019	0.000018	0.000013	0.000013
M17-24-97-14	0.000027	0.000012	0.000013	0.000011	0.000004	0.000005	0.000004	0.000004	0.000002
M17-24-97-15	0.000020	0.000008	0.000013	0.000007	0.000003	0.000003	0.000003	0.000001	0.000002
M17-24-97-16	0.000077	0.000031	0.000032	0.000025	0.000012	0.000011	0.000014	0.000009	0.000008
M17-24-97-17	0.000029	0.000012	0.000010	0.000010	0.000004	0.000006	0.000005	0.000004	0.000003
M17-24-97-18	0.000058	0.000022	0.000017	0.000019	0.000007	0.000011	0.000008	0.000007	0.000006
SRM614-10	0.000081	0.000156	0.000355	0.000127	0.000558	0.000134	0.000561	0.000192	0.000604
SRM612-10	0.004694	0.008457	0.017878	0.007144	0.031171	0.007437	0.033150	0.010942	0.035612
SRM610-10	0.069470	0.126461	0.311930	0.105537	0.564434	0.114624	0.606479	0.167573	0.657413
AP1-10	0.000001	0.000000	0.000000	0.000000	0.000003	0.000000	0.000001	0.000001	0.000000
AP2-10	0.000024	0.000039	0.000085	0.000034	0.000134	0.000050	0.000212	0.000071	0.000152
AP3-10	0.000100	0.000155	0.000368	0.000123	0.000514	0.000202	0.000826	0.000272	0.000585
AP4-10	0.000172	0.000275	0.000639	0.000219	0.000908	0.000355	0.001477	0.000475	0.001038

standardize signal averages AP

AP1	0.000002	0.000001	0.000003	0.000002	0.000005	0.000001	0.000004	0.000002	0.000003
AP2	0.000026	0.000042	0.000089	0.000036	0.000138	0.000052	0.000215	0.000074	0.000159
AP3	0.000096	0.000153	0.000361	0.000130	0.000509	0.000197	0.000811	0.000268	0.000581
AP4	0.000172	0.000278	0.000651	0.000231	0.000909	0.000352	0.001469	0.000483	0.001050

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.055165	0.035651	0.015287	0.042612	0.011003	0.041756	0.010168	0.030780	0.009620
standardize signal averages SRM									
srm614-2	0.000077	0.000146	0.000338	0.000122	0.000493	0.000127	0.000523	0.000173	0.000555
srm612-2	0.004280	0.007917	0.017331	0.007019	0.029004	0.006960	0.030762	0.010150	0.033303
srm610-2	0.063625	0.120847	0.305704	0.104164	0.527967	0.108231	0.567615	0.157893	0.623346
linest from std sig ave									
	0.079026	0.043512	0.017605	0.047068	0.009793	0.046007	0.009247	0.031507	0.007873
concentration data									
SRM614-9	0.35	0.42	0.42	0.43	0.40	0.43	0.42	0.41	0.42
SRM612-9	18.29	22.56	22.01	25.19	25.32	23.22	24.74	24.70	25.57
SRM610-9	273.36	352.33	392.65	375.66	463.79	364.70	461.11	391.25	486.16
AP1-9	0.06	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.02
AP2-9	0.61	0.63	0.57	0.65	0.63	0.89	0.89	0.95	0.64
AP3-9	2.01	2.17	2.16	2.31	2.21	3.21	3.23	3.25	2.21
AP4-9	3.78	3.99	4.04	4.12	3.99	5.84	5.93	6.04	4.07
M17-24-97-1	154.21	37.76	7.88	41.47	6.09	32.47	5.78	15.07	1.74
M17-24-97-2	134.03	32.30	6.89	36.11	5.27	29.09	5.32	13.56	1.58
M17-24-97-3	118.38	27.77	6.10	31.79	4.72	25.70	4.72	12.38	1.48
M17-24-97-4	1.01	0.21	0.07	0.40	0.04	0.15	0.05	0.09	0.02
M17-24-97-5	0.23	0.06	0.02	0.10	0.01	0.05	0.01	0.04	0.01
M17-24-97-6	0.34	0.11	0.04	0.13	0.01	0.08	0.02	0.03	0.00
M17-24-97-7	0.48	0.15	0.05	0.22	0.01	0.06	0.02	0.03	0.01
M17-24-97-8	0.30	0.07	0.02	0.11	0.01	0.07	0.01	0.04	0.01
M17-24-97-9	0.20	0.04	0.01	0.08	0.01	0.06	0.01	0.03	0.01
M17-24-97-10	0.66	0.21	0.08	0.18	0.03	0.10	0.03	0.04	0.02
M17-24-97-11	0.33	0.12	0.04	0.11	0.01	0.03	0.01	0.02	0.01
M17-24-97-12	0.41	0.08	0.04	0.08	0.01	0.04	0.01	0.03	0.01
M17-24-97-13	2.16	0.52	0.16	0.67	0.07	0.32	0.07	0.16	0.05
M17-24-97-14	0.58	0.17	0.08	0.19	0.02	0.09	0.02	0.05	0.01
M17-24-97-15	0.44	0.11	0.08	0.12	0.01	0.05	0.01	0.02	0.01
M17-24-97-16	1.70	0.43	0.19	0.43	0.05	0.19	0.06	0.11	0.03
M17-24-97-17	0.65	0.17	0.06	0.18	0.02	0.10	0.02	0.05	0.01
M17-24-97-18	1.28	0.32	0.11	0.32	0.03	0.19	0.03	0.08	0.02
SRM614-10	0.38	0.48	0.47	0.46	0.53	0.48	0.49	0.51	0.50
SRM612-10	22.21	25.86	23.44	26.11	29.41	26.63	28.91	28.89	29.38
SRM610-10	328.67	386.66	408.97	385.69	532.61	410.49	528.89	442.36	542.37
AP1-10	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00
AP2-10	0.52	0.56	0.52	0.57	0.59	0.83	0.86	0.87	0.59
AP3-10	2.21	2.20	2.25	2.10	2.26	3.37	3.35	3.33	2.25
AP4-10	3.79	3.91	3.90	3.72	3.99	5.91	5.99	5.83	3.98
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-7	3.20	7.12	4.12	6.96	1.56	1.40	0.00	0.56	1.68
SRM614-7	87.64	217.40	537.36	243.12	581.20	155.84	654.92	216.24	695.40
SRM612-7	3758.02	8626.33	21750.08	9968.58	29073.64	7124.12	31121.78	10577.66	35885.24
SRM610-7	27794.84	65969.33	183018.83	74078.09	249518.00	56205.92	272305.94	82887.11	318546.97
AP1-7	28.80	62.88	112.56	65.00	72.16	21.88	43.80	22.08	55.40
AP2-7	224.00	459.08	1061.53	548.12	1233.89	534.20	2028.57	723.64	1568.61
AP3-7	1279.33	2555.53	6506.56	2993.86	7011.12	2740.22	10919.90	3727.22	8073.85
AP4-7	1535.65	3218.06	7715.16	3503.22	9094.05	3569.98	14408.48	4806.15	10707.50
34HP45-837-1	2332.97	1158.09	682.88	3972.54	785.00	788.40	597.04	607.24	246.48
34HP45-837-2	2974.34	1382.33	785.04	4392.34	918.53	940.69	692.04	761.92	262.32
34HP45-837-3	2859.90	1383.05	764.40	4145.98	894.73	997.09	768.80	725.92	283.80
34HP45-837-4	5828.47	2705.26	1483.93	8413.37	1675.97	1783.37	1278.25	1380.05	562.88
34HP45-837-5	3657.02	1688.29	938.93	4789.23	986.57	1109.89	836.12	816.68	320.60
34HP45-837-6	3800.46	1745.09	1028.53	5003.75	1112.77	1183.17	913.81	925.01	344.60
34HP45-837-7	5484.83	2546.89	1521.89	6267.12	1586.21	1878.25	1433.65	1406.17	566.60
34HP45-837-8	7926.44	3866.42	2146.01	8864.81	2395.49	2899.30	2269.93	2286.93	874.32
34HP45-837-9	11142.06	5267.55	2815.18	11588.31	3445.34	4310.98	3158.54	3232.74	1364.29
34HP45-837-10	195.64	144.64	192.16	251.16	72.36	66.60	86.28	57.76	50.56
34HP45-837-11	197.84	160.48	178.12	170.44	57.04	55.12	54.88	54.40	39.88
34HP45-837-12	216.68	194.84	196.56	227.72	69.00	76.64	51.44	53.44	38.28
34HP45-837-13	259.88	174.40	240.36	361.56	83.96	50.84	49.40	39.84	40.72
34HP45-837-14	93.96	100.08	108.28	130.36	20.44	12.64	12.64	18.36	8.16
34HP45-837-15	102.20	94.56	132.12	106.96	27.00	26.36	23.20	26.36	24.12

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	157.72	307.32	675.68	258.04	949.61	262.36	1041.25	339.04	1074.17
SRM612-8	7134.28	13680.36	30410.33	12512.79	49623.88	11778.51	52068.17	17115.70	57969.29
SRM610-8	64355.28	130618.73	342775.66	116546.49	572756.81	115957.45	619247.13	170085.52	693964.25
AP1-8	17.88	22.44	23.76	10.52	16.32	5.60	11.12	6.44	6.88
AP2-8	365.84	635.20	1426.09	586.32	2079.81	863.72	3299.94	1177.73	2444.53
AP3-8	2089.57	3556.10	8400.69	3156.50	11074.46	4274.46	17671.18	5773.35	12673.75
AP4-8	2611.57	4539.95	10569.58	4121.02	14702.96	5562.23	23360.65	7598.28	16679.61
blank-8	3.44	14.20	17.24	2.12	7.84	1.76	5.92	0.76	2.60
blank average	3.32	10.66	10.68	4.54	4.70	1.58	2.96	0.66	2.14

blank subtraction									
SRM614-7	84.32	206.74	526.68	238.58	576.50	154.26	651.96	215.58	693.26
SRM612-7	3754.70	8615.67	21739.40	9964.04	29068.94	7122.54	31118.81	10577.00	35883.10
SRM610-7	27791.52	65958.67	183008.15	74073.55	249513.30	56204.34	272302.98	82886.45	318544.83
AP1-7	25.48	52.22	101.88	60.46	67.46	20.30	40.84	21.42	53.26
AP2-7	220.68	448.42	1050.85	543.58	1229.19	532.62	2025.61	722.98	1566.47
AP3-7	1276.01	2544.87	6495.88	2989.32	7006.42	2738.64	10916.94	3726.56	8071.71
AP4-7	1532.33	3207.40	7704.48	3498.68	9089.35	3568.40	14405.52	4805.49	10705.36
34HP45-837-1	2329.65	1147.43	672.20	3968.00	780.30	786.82	594.08	606.58	244.34
34HP45-837-2	2971.02	1371.67	774.36	4387.80	913.83	939.11	689.08	761.26	260.18
34HP45-837-3	2856.58	1372.39	753.72	4141.44	890.03	995.51	765.84	725.26	281.66
34HP45-837-4	5825.15	2694.60	1473.25	8408.83	1671.27	1781.79	1275.29	1379.39	560.74
34HP45-837-5	3653.70	1677.63	928.25	4784.69	981.87	1108.31	833.16	816.02	318.46
34HP45-837-6	3797.14	1734.43	1017.85	4999.21	1108.07	1181.59	910.85	924.35	342.46
34HP45-837-7	5481.51	2536.23	1511.21	6262.58	1581.51	1876.67	1430.69	1405.51	564.46
34HP45-837-8	7923.12	3855.76	2135.33	8860.27	2390.79	2897.72	2266.97	2286.27	872.18
34HP45-837-9	11138.74	5256.89	2804.50	11583.77	3440.64	4309.40	3155.58	3232.08	1362.15
34HP45-837-10	192.32	133.98	181.48	246.62	67.66	65.02	83.32	57.10	48.42
34HP45-837-11	194.52	149.82	167.44	165.90	52.34	53.54	51.92	53.74	37.74
34HP45-837-12	213.36	184.18	185.88	223.18	64.30	75.06	48.48	52.78	36.14
34HP45-837-13	256.56	163.74	229.68	357.02	79.26	49.26	46.44	39.18	38.58
34HP45-837-14	90.64	89.42	97.60	125.82	15.74	11.06	9.68	17.70	6.02
34HP45-837-15	98.88	83.90	121.44	102.42	22.30	24.78	20.24	25.70	21.98
SRM614-8	154.40	296.66	665.00	253.50	944.91	260.78	1038.29	338.38	1072.03
SRM612-8	7130.96	13669.70	30399.65	12508.25	49619.18	11776.93	52065.21	17115.03	57967.14
SRM610-8	64351.96	130608.07	342764.98	116541.95	572752.11	115955.87	619244.17	170084.86	693962.11
AP1-8	14.56	11.78	13.08	5.98	11.62	4.02	8.16	5.78	4.74
AP2-8	362.52	624.54	1415.41	581.78	2075.11	862.14	3296.98	1177.07	2442.39
AP3-8	2086.25	3545.44	8390.01	3151.96	11069.76	4272.88	17668.22	5772.69	12671.61
AP4-8	2608.25	4529.29	10558.90	4116.48	14698.26	5560.65	23357.69	7597.62	16677.47

zero correction									
SRM614-7	84.32	206.74	526.68	238.58	576.50	154.26	651.96	215.58	693.26
SRM612-7	3754.70	8615.67	21739.40	9964.04	29068.94	7122.54	31118.81	10577.00	35883.10
SRM610-7	27791.52	65958.67	183008.15	74073.55	249513.30	56204.34	272302.98	82886.45	318544.83
AP1-7	25.48	52.22	101.88	60.46	67.46	20.30	40.84	21.42	53.26
AP2-7	220.68	448.42	1050.85	543.58	1229.19	532.62	2025.61	722.98	1566.47
AP3-7	1276.01	2544.87	6495.88	2989.32	7006.42	2738.64	10916.94	3726.56	8071.71
AP4-7	1532.33	3207.40	7704.48	3498.68	9089.35	3568.40	14405.52	4805.49	10705.36
34HP45-837-1	2329.65	1147.43	672.20	3968.00	780.30	786.82	594.08	606.58	244.34
34HP45-837-2	2971.02	1371.67	774.36	4387.80	913.83	939.11	689.08	761.26	260.18
34HP45-837-3	2856.58	1372.39	753.72	4141.44	890.03	995.51	765.84	725.26	281.66
34HP45-837-4	5825.15	2694.60	1473.25	8408.83	1671.27	1781.79	1275.29	1379.39	560.74
34HP45-837-5	3653.70	1677.63	928.25	4784.69	981.87	1108.31	833.16	816.02	318.46
34HP45-837-6	3797.14	1734.43	1017.85	4999.21	1108.07	1181.59	910.85	924.35	342.46
34HP45-837-7	5481.51	2536.23	1511.21	6262.58	1581.51	1876.67	1430.69	1405.51	564.46
34HP45-837-8	7923.12	3855.76	2135.33	8860.27	2390.79	2897.72	2266.97	2286.27	872.18
34HP45-837-9	11138.74	5256.89	2804.50	11583.77	3440.64	4309.40	3155.58	3232.08	1362.15
34HP45-837-10	192.32	133.98	181.48	246.62	67.66	65.02	83.32	57.10	48.42
34HP45-837-11	194.52	149.82	167.44	165.90	52.34	53.54	51.92	53.74	37.74
34HP45-837-12	213.36	184.18	185.88	223.18	64.30	75.06	48.48	52.78	36.14
34HP45-837-13	256.56	163.74	229.68	357.02	79.26	49.26	46.44	39.18	38.58
34HP45-837-14	90.64	89.42	97.60	125.82	15.74	11.06	9.68	17.70	6.02
34HP45-837-15	98.88	83.90	121.44	102.42	22.30	24.78	20.24	25.70	21.98
SRM614-8	154.40	296.66	665.00	253.50	944.91	260.78	1038.29	338.38	1072.03
SRM612-8	7130.96	13669.70	30399.65	12508.25	49619.18	11776.93	52065.21	17115.03	57967.14
SRM610-8	64351.96	130608.07	342764.98	116541.95	572752.11	115955.87	619244.17	170084.86	693962.11
AP1-8	14.56	11.78	13.08	5.98	11.62	4.02	8.16	5.78	4.74
AP2-8	362.52	624.54	1415.41	581.78	2075.11	862.14	3296.98	1177.07	2442.39
AP3-8	2086.25	3545.44	8390.01	3151.96	11069.76	4272.88	17668.22	5772.69	12671.61
AP4-8	2608.25	4529.29	10558.90	4116.48	14698.26	5560.65	23357.69	7597.62	16677.47

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010
standardized signal									
SRM614-7	0.000038	0.000093	0.000237	0.000108	0.000260	0.000070	0.000294	0.000097	0.000312
SRM612-7	0.002020	0.004634	0.011694	0.005360	0.015636	0.003831	0.016739	0.005689	0.019302
SRM610-7	0.028703	0.068122	0.189010	0.076503	0.257696	0.058047	0.281233	0.085605	0.328991
AP1-7	0.000002	0.000005	0.000010	0.000006	0.000006	0.000002	0.000004	0.000002	0.000005
AP2-7	0.000018	0.000037	0.000087	0.000045	0.000102	0.000044	0.000168	0.000060	0.000130
AP3-7	0.000078	0.000155	0.000395	0.000182	0.000426	0.000166	0.000663	0.000226	0.000490
AP4-7	0.000106	0.000222	0.000532	0.000242	0.000628	0.000247	0.000996	0.000332	0.000740
34HP45-837-1	0.000572	0.000282	0.000165	0.000974	0.000191	0.000193	0.000146	0.000149	0.000060
34HP45-837-2	0.000747	0.000345	0.000195	0.001104	0.000230	0.000236	0.000173	0.000192	0.000065
34HP45-837-3	0.000863	0.000414	0.000228	0.001251	0.000269	0.000301	0.000231	0.000219	0.000085
34HP45-837-4	0.000633	0.000293	0.000160	0.000914	0.000182	0.000194	0.000139	0.000150	0.000061
34HP45-837-5	0.000428	0.000197	0.000109	0.000561	0.000115	0.000130	0.000098	0.000096	0.000037
34HP45-837-6	0.000479	0.000219	0.000128	0.000631	0.000140	0.000149	0.000115	0.000117	0.000043
34HP45-837-7	0.000692	0.000320	0.000191	0.000791	0.000200	0.000237	0.000181	0.000177	0.000071
34HP45-837-8	0.000988	0.000481	0.000266	0.001105	0.000298	0.000361	0.000283	0.000285	0.000109
34HP45-837-9	0.001727	0.000815	0.000435	0.001796	0.000534	0.000668	0.000489	0.000501	0.000211
34HP45-837-10	0.000040	0.000028	0.000037	0.000051	0.000014	0.000013	0.000017	0.000012	0.000010
34HP45-837-11	0.000037	0.000028	0.000032	0.000031	0.000010	0.000010	0.000010	0.000010	0.000007
34HP45-837-12	0.000037	0.000032	0.000033	0.000039	0.000011	0.000013	0.000008	0.000009	0.000006
34HP45-837-13	0.000071	0.000045	0.000064	0.000099	0.000022	0.000014	0.000013	0.000011	0.000011
34HP45-837-14	0.000025	0.000024	0.000026	0.000034	0.000004	0.000003	0.000003	0.000005	0.000002
34HP45-837-15	0.000025	0.000021	0.000030	0.000026	0.000006	0.000006	0.000005	0.000006	0.000005
SRM614-8	0.000086	0.000166	0.000371	0.000142	0.000527	0.000146	0.000580	0.000189	0.000598
SRM612-8	0.004369	0.008376	0.018627	0.007664	0.030403	0.007216	0.031902	0.010487	0.035518
SRM610-8	0.064987	0.131896	0.346145	0.117691	0.578401	0.117099	0.625351	0.171762	0.700806
AP1-8	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000	0.000000
AP2-8	0.000023	0.000040	0.000091	0.000037	0.000133	0.000055	0.000211	0.000076	0.000157
AP3-8	0.000107	0.000182	0.000431	0.000162	0.000568	0.000219	0.000907	0.000296	0.000651
AP4-8	0.000155	0.000268	0.000626	0.000244	0.000871	0.000330	0.001384	0.000450	0.000988
standardize signal averages AP									
AP1	0.000002	0.000003	0.000005	0.000003	0.000004	0.000001	0.000002	0.000001	0.000003
AP2	0.000021	0.000039	0.000089	0.000041	0.000118	0.000050	0.000190	0.000068	0.000143
AP3	0.000092	0.000168	0.000413	0.000172	0.000497	0.000193	0.000785	0.000261	0.000571
AP4	0.000130	0.000245	0.000579	0.000243	0.000750	0.000288	0.001190	0.000391	0.000864
linest from std sig ave									
	0.067765	0.038013	0.015936	0.037749	0.012725	0.048496	0.011955	0.036071	0.011133
standardize signal averages SRM									
srm614-2	0.000062	0.000129	0.000304	0.000125	0.000394	0.000108	0.000437	0.000143	0.000455
srm612-2	0.003194	0.006505	0.015160	0.006512	0.023019	0.005524	0.024320	0.008088	0.027410
srm610-2	0.046845	0.100009	0.267577	0.097097	0.418048	0.087573	0.453292	0.128683	0.514898
linest from std sig ave									
	0.107329	0.052580	0.020114	0.050495	0.012368	0.056863	0.011579	0.038660	0.009532
concentration data									
SRM614-7	0.22	0.30	0.32	0.35	0.28	0.29	0.30	0.30	0.30
SRM612-7	11.74	15.11	15.98	17.35	17.06	15.93	17.16	17.60	18.43
SRM610-7	166.81	222.09	258.32	247.67	281.23	241.43	288.34	264.83	314.13
AP1-7	0.07	0.08	0.06	0.09	0.03	0.04	0.02	0.03	0.02
AP2-7	0.49	0.56	0.55	0.68	0.52	0.85	0.80	0.86	0.58
AP3-7	2.10	2.34	2.51	2.74	2.16	3.22	3.16	3.26	2.18
AP4-7	2.86	3.36	3.38	3.64	3.19	4.77	4.75	4.78	3.29
34HP45-837-1	15.45	4.27	1.05	14.66	0.97	3.73	0.70	2.14	0.27
34HP45-837-2	20.20	5.23	1.24	16.62	1.17	4.57	0.83	2.76	0.29
34HP45-837-3	23.32	6.28	1.45	18.83	1.36	5.82	1.10	3.15	0.38
34HP45-837-4	17.11	4.44	1.02	13.76	0.92	3.75	0.66	2.16	0.27
34HP45-837-5	11.58	2.98	0.69	8.45	0.58	2.51	0.47	1.38	0.17
34HP45-837-6	12.95	3.32	0.82	9.50	0.71	2.88	0.55	1.68	0.19
34HP45-837-7	18.71	4.86	1.21	11.91	1.01	4.58	0.86	2.55	0.32
34HP45-837-8	26.72	7.29	1.69	16.64	1.51	6.99	1.35	4.10	0.48
34HP45-837-9	46.70	12.36	2.76	27.05	2.71	12.93	2.33	7.21	0.94
34HP45-837-10	1.07	0.42	0.24	0.76	0.07	0.26	0.08	0.17	0.04

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	0.99	0.43	0.20	0.47	0.05	0.20	0.05	0.15	0.03
34HP45-837-12	1.01	0.49	0.21	0.59	0.06	0.25	0.04	0.13	0.03
34HP45-837-13	1.92	0.69	0.40	1.49	0.11	0.26	0.06	0.16	0.05
34HP45-837-14	0.66	0.37	0.17	0.51	0.02	0.06	0.01	0.07	0.01
34HP45-837-15	0.67	0.32	0.19	0.39	0.03	0.12	0.02	0.09	0.02
SRM614-8	0.50	0.54	0.51	0.46	0.58	0.61	0.59	0.58	0.57
SRM612-8	25.39	27.31	25.46	24.81	33.18	30.01	32.71	32.44	33.91
SRM610-8	377.68	430.00	473.08	381.02	631.22	487.04	641.15	531.36	669.14
AP1-8	0.03	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00
AP2-8	0.63	0.61	0.58	0.56	0.68	1.07	1.01	1.09	0.70
AP3-8	2.90	2.76	2.74	2.44	2.89	4.24	4.33	4.27	2.89
AP4-8	4.18	4.07	3.98	3.67	4.42	6.38	6.60	6.48	4.39

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-5	5.56	6.68	6.36	1.68	3.56	1.92	3.08	3.12	2.44
SRM614-5	71.56	178.68	435.84	192.88	496.32	145.60	484.60	161.92	563.48
SRM612-5	3889.66	9483.41	22521.81	9623.85	29129.68	7059.96	31007.30	10648.78	35540.88
SRM610-5	32519.06	75632.43	207959.17	82284.38	282263.44	63172.08	305508.38	92417.16	353797.47
AP1-5	42.96	119.64	237.36	67.24	73.56	24.60	76.20	31.16	64.76
AP2-5	269.92	647.84	1417.01	589.92	1537.33	619.28	2412.17	840.44	1844.97
AP3-5	1507.73	3035.30	7521.04	3335.06	8171.97	3137.78	12956.79	4286.82	9510.57
AP4-5	1660.13	3320.94	7659.20	3490.54	9881.62	3897.14	15970.05	5313.23	11727.71
34HP45-718-1	2250.25	1546.65	1560.09	2111.21	556.00	652.48	492.40	592.64	250.28
34HP45-718-2	5433.15	2816.58	1966.61	4794.51	1487.85	1667.13	1404.61	1558.61	664.68
34HP45-718-3	5767.55	2843.02	2172.81	5282.99	1250.65	1318.41	1042.89	1120.85	474.40
34HP45-718-4	21752.12	10756.26	7996.61	21028.36	5431.99	6342.36	4985.51	5286.23	2077.17
34HP45-718-5	13614.76	6681.64	4916.11	12924.87	3306.54	3832.34	3059.90	3213.86	1301.13
34HP45-718-6	13348.32	6791.36	4858.07	12608.27	3111.98	3884.34	2951.94	3120.78	1228.37
34HP45-718-7	14861.20	8208.73	6792.72	12716.35	3546.94	4210.18	3444.54	3355.02	1307.57
34HP45-718-8	15507.57	8789.77	7182.92	12877.51	3689.58	4687.83	3730.94	3691.06	1537.21
34HP45-718-9	25566.38	13219.68	10590.94	19089.39	5642.27	6995.44	5456.15	5400.35	2192.01
34HP45-718-10	8749.29	8013.85	8774.97	6265.48	1977.57	2397.01	1905.05	1822.73	786.80
34HP45-718-11	7081.48	8131.93	9750.74	5094.47	1721.65	2130.37	1740.77	1613.53	669.92
34HP45-718-12	6506.80	5161.91	5075.11	4877.11	1523.61	1923.93	1604.89	1493.13	622.44
34HP45-718-13	15349.65	43308.29	62563.31	2738.78	1274.13	1268.89	968.69	874.80	555.24
34HP45-718-14	11089.90	30090.01	43095.97	2539.25	1004.97	1004.13	753.68	722.56	384.60
34HP45-718-15	5004.75	11189.74	15191.25	1718.05	602.60	698.48	562.96	487.40	270.20
34HP45-718-16	1483.37	1978.57	2117.41	1125.13	327.72	393.96	297.40	311.48	153.56
34HP45-718-17	850.56	1463.81	1737.77	615.48	195.04	221.00	163.48	175.64	102.00
34HP45-718-18	978.13	1295.97	1451.81	663.20	216.08	284.04	226.72	182.76	120.28
SRM614-6	122.72	632.48	999.05	213.28	688.68	177.04	666.76	254.28	777.80
SRM612-6	6331.76	11981.83	26696.51	10580.50	42336.32	10160.74	44837.25	14575.00	49135.08
SRM610-6	60151.90	119551.52	313397.84	103112.14	514820.97	103698.70	554450.75	150656.89	617276.75
AP1-6	9.60	294.04	342.36	12.44	26.32	5.40	12.92	6.04	18.88
AP2-6	327.20	775.60	1584.81	520.16	1822.69	702.48	3001.90	1022.29	2133.73
AP3-6	2188.81	3833.98	9023.29	3215.98	11535.39	4327.42	18334.62	5888.27	13017.71
AP4-6	2225.17	4201.06	9237.93	3434.14	13175.35	5100.31	21154.40	7095.36	15230.01
blank-6	12.20	637.00	724.48	8.12	13.24	2.96	1.20	4.20	12.80
blank average	8.88	321.84	365.42	4.90	8.40	2.44	2.14	3.66	7.62

blank subtraction

SRM614-5	62.68	-143.16	70.42	187.98	487.92	143.16	482.46	158.26	555.86
SRM612-5	3880.78	9161.57	22156.38	9618.95	29121.28	7057.52	31005.15	10645.12	35533.26
SRM610-5	32510.18	75310.59	207593.75	82279.48	282255.04	63169.64	305506.24	92413.50	353789.85
AP1-5	34.08	-202.20	-128.06	62.34	65.16	22.16	74.06	27.50	57.14
AP2-5	261.04	326.00	1051.59	585.02	1528.93	616.84	2410.03	836.78	1837.35
AP3-5	1498.85	2713.46	7155.62	3330.16	8163.57	3135.34	12954.65	4283.16	9502.95
AP4-5	1651.25	2999.10	7293.78	3485.64	9873.22	3894.70	15967.91	5309.57	11720.09
34HP45-718-1	2241.37	1224.81	1194.67	2106.31	547.60	650.04	490.26	588.98	242.66
34HP45-718-2	5424.27	2494.73	1601.19	4789.61	1479.45	1664.69	1402.47	1554.95	657.06
34HP45-718-3	5758.67	2521.17	1807.39	5278.09	1242.25	1315.97	1040.75	1117.19	466.78
34HP45-718-4	21743.24	10434.42	7631.18	21023.46	5423.59	6339.92	4983.37	5282.57	2069.55
34HP45-718-5	13605.88	6359.80	4550.69	12919.97	3298.14	3829.90	3057.76	3210.20	1293.51
34HP45-718-6	13339.43	6469.52	4492.65	12603.37	3103.58	3881.90	2949.80	3117.12	1220.75
34HP45-718-7	14852.32	7886.88	6427.30	12711.45	3538.54	4207.74	3442.40	3351.36	1299.95
34HP45-718-8	15498.69	8467.93	6817.50	12872.61	3681.18	4685.39	3728.80	3687.40	1529.59
34HP45-718-9	25557.50	12897.83	10225.52	19084.49	5633.87	6993.00	5454.01	5396.69	2184.39
34HP45-718-10	8740.41	7692.00	8409.55	6260.58	1969.17	2394.57	1902.91	1819.07	779.18

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	7072.60	7810.08	9385.31	5089.57	1713.25	2127.93	1738.63	1609.87	662.30
34HP45-718-12	6497.92	4840.07	4709.69	4872.21	1515.21	1921.49	1602.75	1489.47	614.82
34HP45-718-13	15340.77	42986.44	62197.89	2733.88	1265.73	1266.45	966.55	871.14	547.62
34HP45-718-14	11081.02	29768.17	42730.54	2534.35	996.57	1001.69	751.54	718.90	376.98
34HP45-718-15	4995.87	10867.90	14825.82	1713.15	594.20	696.04	560.82	483.74	262.58
34HP45-718-16	1474.49	1656.73	1751.99	1120.23	319.32	391.52	295.26	307.82	145.94
34HP45-718-17	841.68	1141.97	1372.35	610.58	186.64	218.56	161.34	171.98	94.38
34HP45-718-18	969.25	974.13	1086.39	658.30	207.68	281.60	224.58	179.10	112.66
SRM614-6	113.84	310.64	633.62	208.38	680.28	174.60	664.62	250.62	770.18
SRM612-6	6322.88	11659.99	26331.09	10575.60	42327.92	10158.30	44835.11	14571.34	49127.46
SRM610-6	60143.02	119229.68	313032.42	103107.24	514812.57	103696.26	554448.61	150653.23	617269.13
AP1-6	0.72	-27.80	-23.06	7.54	17.92	2.96	10.78	2.38	11.26
AP2-6	318.32	453.76	1219.39	515.26	1814.29	700.04	2999.76	1018.63	2126.11
AP3-6	2179.93	3512.14	8657.87	3211.08	11526.98	4324.98	18332.48	5884.61	13010.09
AP4-6	2216.29	3879.22	8872.51	3429.24	13166.95	5097.87	21152.26	7091.70	15222.39

zero correction

SRM614-5	62.68	0.00	70.42	187.98	487.92	143.16	482.46	158.26	555.86
SRM612-5	3880.78	9161.57	22156.38	9618.95	29121.28	7057.52	31005.15	10645.12	35533.26
SRM610-5	32510.18	75310.59	207593.75	82279.48	282255.04	63169.64	305506.24	92413.50	353789.85
AP1-5	34.08	0.00	0.00	62.34	65.16	22.16	74.06	27.50	57.14
AP2-5	261.04	326.00	1051.59	585.02	1528.93	616.84	2410.03	836.78	1837.35
AP3-5	1498.85	2713.46	7155.62	3330.16	8163.57	3135.34	12954.65	4283.16	9502.95
AP4-5	1651.25	2999.10	7293.78	3485.64	9873.22	3894.70	15967.91	5309.57	11720.09
34HP45-718-1	2241.37	1224.81	1194.67	2106.31	547.60	650.04	490.26	588.98	242.66
34HP45-718-2	5424.27	2494.73	1601.19	4789.61	1479.45	1664.69	1402.47	1554.95	657.06
34HP45-718-3	5758.67	2521.17	1807.39	5278.09	1242.25	1315.97	1040.75	1117.19	466.78
34HP45-718-4	21743.24	10434.42	7631.18	21023.46	5423.59	6339.92	4983.37	5282.57	2069.55
34HP45-718-5	13605.88	6359.80	4550.69	12919.97	3298.14	3829.90	3057.76	3210.20	1293.51
34HP45-718-6	13339.43	6469.52	4492.65	12603.37	3103.58	3881.90	2949.80	3117.12	1220.75
34HP45-718-7	14852.32	7886.88	6427.30	12711.45	3538.54	4207.74	3442.40	3351.36	1299.95
34HP45-718-8	15498.69	8467.93	6817.50	12872.61	3681.18	4685.39	3728.80	3687.40	1529.59
34HP45-718-9	25557.50	12897.83	10225.52	19084.49	5633.87	6993.00	5454.01	5396.69	2184.39
34HP45-718-10	8740.41	7692.00	8409.55	6260.58	1969.17	2394.57	1902.91	1819.07	779.18
34HP45-718-11	7072.60	7810.08	9385.31	5089.57	1713.25	2127.93	1738.63	1609.87	662.30
34HP45-718-12	6497.92	4840.07	4709.69	4872.21	1515.21	1921.49	1602.75	1489.47	614.82
34HP45-718-13	15340.77	42986.44	62197.89	2733.88	1265.73	1266.45	966.55	871.14	547.62
34HP45-718-14	11081.02	29768.17	42730.54	2534.35	996.57	1001.69	751.54	718.90	376.98
34HP45-718-15	4995.87	10867.90	14825.82	1713.15	594.20	696.04	560.82	483.74	262.58
34HP45-718-16	1474.49	1656.73	1751.99	1120.23	319.32	391.52	295.26	307.82	145.94
34HP45-718-17	841.68	1141.97	1372.35	610.58	186.64	218.56	161.34	171.98	94.38
34HP45-718-18	969.25	974.13	1086.39	658.30	207.68	281.60	224.58	179.10	112.66
SRM614-6	113.84	310.64	633.62	208.38	680.28	174.60	664.62	250.62	770.18
SRM612-6	6322.88	11659.99	26331.09	10575.60	42327.92	10158.30	44835.11	14571.34	49127.46
SRM610-6	60143.02	119229.68	313032.42	103107.24	514812.57	103696.26	554448.61	150653.23	617269.13
AP1-6	0.72	0.00	0.00	7.54	17.92	2.96	10.78	2.38	11.26
AP2-6	318.32	453.76	1219.39	515.26	1814.29	700.04	2999.76	1018.63	2126.11
AP3-6	2179.93	3512.14	8657.87	3211.08	11526.98	4324.98	18332.48	5884.61	13010.09
AP4-6	2216.29	3879.22	8872.51	3429.24	13166.95	5097.87	21152.26	7091.70	15222.39

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-5	0.000042	0.000000	0.000047	0.000125	0.000325	0.000095	0.000321	0.000105	0.000370
SRM612-5	0.002236	0.005278	0.012765	0.005542	0.016777	0.004066	0.017863	0.006133	0.020471
SRM610-5	0.030519	0.070698	0.194878	0.077240	0.264966	0.059300	0.286793	0.086753	0.332119
AP1-5	0.000003	0.000000	0.000000	0.000005	0.000005	0.000002	0.000006	0.000002	0.000004
AP2-5	0.000018	0.000023	0.000074	0.000041	0.000108	0.000044	0.000171	0.000059	0.000130
AP3-5	0.000087	0.000158	0.000416	0.000193	0.000474	0.000182	0.000753	0.000249	0.000552
AP4-5	0.000099	0.000180	0.000438	0.000210	0.000593	0.000234	0.000960	0.000319	0.000705
34HP45-718-1	0.000265	0.000145	0.000141	0.000249	0.000065	0.000077	0.000058	0.000070	0.000029
34HP45-718-2	0.000427	0.000196	0.000126	0.000377	0.000116	0.000131	0.000110	0.000122	0.000052

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000384	0.000168	0.000121	0.000352	0.000083	0.000088	0.000069	0.000075	0.000031
34HP45-718-4	0.001027	0.000493	0.000360	0.000993	0.000256	0.000299	0.000235	0.000249	0.000098
34HP45-718-5	0.000825	0.000386	0.000276	0.000783	0.000200	0.000232	0.000185	0.000195	0.000078
34HP45-718-6	0.000847	0.000411	0.000285	0.000800	0.000197	0.000247	0.000187	0.000198	0.000078
34HP45-718-7	0.000861	0.000457	0.000373	0.000737	0.000205	0.000244	0.000200	0.000194	0.000075
34HP45-718-8	0.000851	0.000465	0.000374	0.000707	0.000202	0.000257	0.000205	0.000203	0.000084
34HP45-718-9	0.001339	0.000676	0.000536	0.001000	0.000295	0.000366	0.000286	0.000283	0.000114
34HP45-718-10	0.000551	0.000485	0.000530	0.000394	0.000124	0.000151	0.000120	0.000115	0.000049
34HP45-718-11	0.000417	0.000460	0.000553	0.000300	0.000101	0.000125	0.000102	0.000095	0.000039
34HP45-718-12	0.000357	0.000266	0.000259	0.000268	0.000083	0.000106	0.000088	0.000082	0.000034
34HP45-718-13	0.000965	0.002704	0.003913	0.000172	0.000080	0.000080	0.000061	0.000055	0.000034
34HP45-718-14	0.000686	0.001842	0.002644	0.000157	0.000062	0.000062	0.000047	0.000044	0.000023
34HP45-718-15	0.000280	0.000609	0.000830	0.000096	0.000033	0.000039	0.000031	0.000027	0.000015
34HP45-718-16	0.000093	0.000104	0.000110	0.000070	0.000020	0.000025	0.000019	0.000019	0.000009
34HP45-718-17	0.000045	0.000061	0.000074	0.000033	0.000010	0.000012	0.000009	0.000009	0.000005
34HP45-718-18	0.000058	0.000058	0.000065	0.000039	0.000012	0.000017	0.000013	0.000011	0.000007
SRM614-6	0.000094	0.000256	0.000522	0.000172	0.000560	0.000144	0.000547	0.000206	0.000634
SRM612-6	0.004192	0.007730	0.017457	0.007011	0.028063	0.006735	0.029725	0.009661	0.032571
SRM610-6	0.060028	0.119002	0.312434	0.102910	0.513829	0.103498	0.553389	0.150365	0.616090
AP1-6	0.000000	0.000000	0.000000	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001
AP2-6	0.000021	0.000030	0.000080	0.000034	0.000119	0.000046	0.000197	0.000067	0.000140
AP3-6	0.000117	0.000188	0.000464	0.000172	0.000618	0.000232	0.000983	0.000316	0.000698
AP4-6	0.000130	0.000228	0.000522	0.000202	0.000775	0.000300	0.001245	0.000417	0.000896
standardize signal averages AP									
AP1	0.000001	0.000000	0.000000	0.000003	0.000003	0.000001	0.000003	0.000001	0.000003
AP2	0.000020	0.000026	0.000077	0.000038	0.000114	0.000045	0.000184	0.000063	0.000135
AP3	0.000102	0.000173	0.000440	0.000183	0.000546	0.000207	0.000868	0.000282	0.000625
AP4	0.000115	0.000204	0.000480	0.000206	0.000684	0.000267	0.001102	0.000368	0.000800
linest from std sig ave									
	0.069357	0.041778	0.017091	0.040182	0.012961	0.049480	0.012059	0.036395	0.011281
standardize signal averages SRM									
srm614-2	0.000068	0.000128	0.000284	0.000148	0.000442	0.000120	0.000434	0.000156	0.000502
srm612-2	0.003214	0.006504	0.015111	0.006277	0.022420	0.005400	0.023794	0.007897	0.026521
srm610-2	0.045273	0.094850	0.253656	0.090075	0.389398	0.081399	0.420091	0.118559	0.474105
linest from std sig ave									
	0.111036	0.055430	0.021215	0.054424	0.013277	0.061167	0.012493	0.041955	0.010351
concentration data									
SRM614-5	0.25	0.00	0.07	0.43	0.36	0.40	0.33	0.33	0.36
SRM612-5	13.30	18.91	18.71	19.10	18.65	17.25	18.47	19.14	19.81
SRM610-5	181.53	253.31	285.65	266.18	294.54	251.64	296.61	270.79	321.33
AP1-5	0.07	0.00	0.00	0.08	0.03	0.03	0.03	0.03	0.02
AP2-5	0.51	0.38	0.51	0.66	0.56	0.86	0.82	0.86	0.59
AP3-5	2.41	2.63	2.83	3.10	2.45	3.60	3.62	3.61	2.48
AP4-5	2.75	3.00	2.99	3.36	3.07	4.62	4.62	4.63	3.17
34HP45-718-1	7.33	2.41	0.96	3.99	0.33	1.52	0.28	1.01	0.13
34HP45-718-2	11.81	3.27	0.86	6.04	0.60	2.59	0.53	1.78	0.23
34HP45-718-3	10.63	2.80	0.82	5.64	0.43	1.73	0.33	1.08	0.14
34HP45-718-4	28.41	8.21	2.46	15.91	1.32	5.91	1.13	3.62	0.44
34HP45-718-5	22.83	6.43	1.88	12.56	1.03	4.58	0.89	2.83	0.35
34HP45-718-6	23.44	6.85	1.95	12.83	1.02	4.87	0.90	2.87	0.35
34HP45-718-7	23.83	7.62	2.54	11.82	1.06	4.82	0.96	2.82	0.34
34HP45-718-8	23.55	7.75	2.55	11.33	1.05	5.08	0.99	2.94	0.38
34HP45-718-9	37.06	11.26	3.65	16.03	1.53	7.23	1.37	4.11	0.52
34HP45-718-10	15.24	8.08	3.61	6.32	0.64	2.98	0.58	1.66	0.22
34HP45-718-11	11.53	7.67	3.77	4.81	0.52	2.47	0.49	1.38	0.18
34HP45-718-12	9.88	4.43	1.77	4.29	0.43	2.08	0.42	1.19	0.15
34HP45-718-13	26.70	45.07	26.68	2.76	0.41	1.57	0.29	0.80	0.16
34HP45-718-14	18.97	30.70	18.03	2.51	0.32	1.22	0.22	0.65	0.10
34HP45-718-15	7.74	10.15	5.66	1.54	0.17	0.77	0.15	0.39	0.07
34HP45-718-16	2.56	1.73	0.75	1.13	0.10	0.48	0.09	0.28	0.04
34HP45-718-17	1.25	1.02	0.50	0.53	0.05	0.23	0.04	0.13	0.02
34HP45-718-18	1.59	0.96	0.44	0.63	0.06	0.33	0.06	0.15	0.03
SRM614-6	0.56	0.92	0.76	0.59	0.62	0.61	0.57	0.64	0.61
SRM612-6	24.93	27.70	25.59	24.16	31.19	28.58	30.74	30.15	31.51
SRM610-6	357.06	426.38	457.96	354.65	571.18	439.20	572.33	469.34	596.07
AP1-6	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
AP2-6	0.58	0.50	0.55	0.54	0.62	0.91	0.95	0.97	0.63
AP3-6	3.23	3.14	3.17	2.76	3.20	4.58	4.73	4.58	3.14
AP4-6	3.61	3.80	3.56	3.24	4.01	5.92	5.99	6.06	4.03
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-3	7.48	10.96	3.80	2.68	0.84	0.84	2.88	2.40	2.16
SRM614-3	112.76	279.12	671.28	302.16	752.00	199.40	735.96	266.12	868.36
SRM612-3	5170.95	11387.58	28731.92	12387.71	37364.13	9143.53	39762.50	13487.92	45106.85
SRM610-3	35588.20	81619.98	223919.98	88532.78	309457.47	69550.03	334971.16	100483.61	387923.19
AP1-3	101.40	187.44	351.92	150.88	180.16	61.68	165.24	57.64	172.64
AP2-3	357.92	769.76	1640.85	783.32	1958.53	790.28	2910.74	1034.37	2247.89
AP3-3	2853.98	5441.03	13826.04	6007.39	14490.44	5763.11	22911.09	7725.68	16845.22
AP4-3	2142.77	4183.58	10142.54	4506.87	12292.59	4833.31	19315.43	6567.48	14274.60
34HP45-856-1	1552.21	2455.65	2899.02	1783.09	399.88	487.28	405.28	440.60	173.56
34HP45-856-2	1488.37	2420.85	3132.54	1541.33	389.68	421.60	319.48	351.24	143.60
34HP45-856-3	1166.61	3252.06	4385.74	993.17	250.92	256.68	216.12	226.36	101.00
34HP45-856-4	1437.33	1636.77	1906.41	1430.65	332.52	317.68	283.00	267.40	141.40
34HP45-856-5	1927.17	1612.97	1634.41	1885.57	466.92	456.04	319.32	340.08	144.64
34HP45-856-6	1943.33	2681.42	3267.02	1487.89	422.88	450.12	318.32	356.96	141.48
34HP45-856-7	1816.85	1663.45	1704.17	1682.21	394.44	461.40	366.60	376.28	149.80
34HP45-856-8	2456.81	1605.29	1481.21	2137.73	512.72	608.72	468.76	508.12	200.36
34HP45-856-9	2645.65	1837.41	1648.97	2014.93	458.36	586.96	394.12	368.12	181.84
34HP45-856-10	688.40	812.80	957.57	450.44	154.36	163.08	174.16	134.48	71.36
34HP45-856-11	772.00	825.84	886.96	542.84	157.48	188.40	136.16	141.44	54.28
34HP45-856-12	1280.57	981.41	1047.97	943.97	241.60	340.84	286.36	259.16	123.24
34HP45-856-13	607.32	643.16	791.08	435.48	156.84	202.32	169.24	140.08	99.84
34HP45-856-14	699.24	580.80	614.44	465.32	143.04	174.60	134.16	168.00	55.92
34HP45-856-15	461.84	389.04	436.92	361.08	114.72	134.80	130.96	112.84	63.56
34HP45-856-16	1545.25	728.72	465.08	1256.49	309.28	399.68	341.84	283.72	129.52
34HP45-856-17	775.68	381.60	268.64	623.80	159.92	179.96	147.88	152.88	74.32
34HP45-856-18	931.65	471.36	299.04	620.64	187.64	239.16	182.16	176.12	73.56
SRM614-4	159.96	309.12	628.72	240.52	862.04	226.48	926.21	297.56	1005.61
SRM612-4	8264.69	15299.61	34344.27	13380.24	54857.59	13120.19	58661.93	18828.91	63779.20
SRM610-4	76790.31	153262.94	407725.78	131912.98	669502.75	133888.95	720432.38	195355.50	802247.06
AP1-4	22.84	40.36	58.80	12.32	40.36	13.60	24.92	4.96	17.00
AP2-4	410.12	723.20	1577.93	586.92	2319.41	891.45	3609.62	1260.05	2611.53
AP3-4	3550.70	5779.19	14288.56	4981.59	17730.54	6957.16	28155.04	9290.01	20221.51
AP4-4	3588.30	6093.35	14006.24	5078.27	19416.59	7328.92	30499.41	10007.14	21645.36
blank-4	7.36	54.84	74.20	2.48	9.96	6.28	1.88	1.72	6.56
blank average	7.42	32.90	39.00	2.58	5.40	3.56	2.38	2.06	4.36

blank subtraction									
SRM614-3	105.34	246.22	632.28	299.58	746.60	195.84	733.58	264.06	864.00
SRM612-3	5163.53	11354.68	28692.92	12385.13	37358.73	9139.97	39760.12	13485.86	45102.49
SRM610-3	35580.78	81587.08	223880.98	88530.20	309452.07	69546.47	334968.78	100481.55	387918.83
AP1-3	93.98	154.54	312.92	148.30	174.76	58.12	162.86	55.58	168.28
AP2-3	350.50	736.86	1601.85	780.74	1953.13	786.72	2908.36	1032.31	2243.53
AP3-3	2846.56	5408.13	13787.04	6004.81	14485.04	5759.55	22908.71	7723.62	16840.85
AP4-3	2135.35	4150.68	10103.54	4504.29	12287.19	4829.75	19313.05	6565.42	14270.24
34HP45-856-1	1544.79	2422.75	2860.02	1780.51	394.48	483.72	402.90	438.54	169.20
34HP45-856-2	1480.95	2387.95	3093.54	1538.75	384.28	418.04	317.10	349.18	139.24
34HP45-856-3	1159.19	3219.16	4346.74	990.59	245.52	253.12	213.74	224.30	96.64
34HP45-856-4	1429.91	1603.87	1867.41	1428.07	327.12	314.12	280.62	265.34	137.04
34HP45-856-5	1919.75	1580.07	1595.41	1882.99	461.52	452.48	316.94	338.02	140.28
34HP45-856-6	1935.91	2648.51	3228.02	1485.31	417.48	446.56	315.94	354.90	137.12
34HP45-856-7	1809.43	1630.55	1665.17	1679.63	389.04	457.84	364.22	374.22	145.44
34HP45-856-8	2449.39	1572.39	1442.21	2135.15	507.32	605.16	466.38	506.06	196.00
34HP45-856-9	2638.23	1804.51	1609.97	2012.35	452.96	583.40	391.74	366.06	177.48
34HP45-856-10	680.98	779.90	918.57	447.86	148.96	159.52	171.78	132.42	67.00
34HP45-856-11	764.58	792.94	847.96	540.26	152.08	184.84	133.78	139.38	49.92
34HP45-856-12	1273.15	948.51	1008.97	941.39	236.20	337.28	283.98	257.10	118.88
34HP45-856-13	599.90	610.26	752.08	432.90	151.44	198.76	166.86	138.02	95.48
34HP45-856-14	691.82	547.90	575.44	462.74	137.64	171.04	131.78	165.94	51.56
34HP45-856-15	454.42	356.14	397.92	358.50	109.32	131.24	128.58	110.78	59.20
34HP45-856-16	1537.83	695.82	426.08	1253.91	303.88	396.12	339.46	281.66	125.16
34HP45-856-17	768.26	348.70	229.64	621.22	154.52	176.40	145.50	150.82	69.96
34HP45-856-18	924.23	438.46	260.04	618.06	182.24	235.60	179.78	174.06	69.20
SRM614-4	152.54	276.22	589.72	237.94	856.64	222.92	923.83	295.50	1001.25
SRM612-4	8257.27	15266.71	34305.27	13377.65	54852.19	13116.63	58659.55	18826.85	63774.84
SRM610-4	76782.89	153230.04	407686.78	131910.40	669497.35	133885.39	720430.00	195353.44	802242.70
AP1-4	15.42	7.46	19.80	9.74	32.00	10.04	22.54	2.90	12.64
AP2-4	402.70	690.30	1538.93	584.34	2314.01	887.88	3607.24	1257.99	2607.17
AP3-4	3543.28	5746.29	14249.56	4979.01	17725.14	6953.60	28152.66	9287.95	20217.15
AP4-4	3580.88	6060.45	13967.24	5075.69	19411.19	7325.36	30497.03	10005.08	21641.00

Appendix A. Raw trace element datasheets from laser ablation.

zero correction									
SRM614-3	105.34	246.22	632.28	299.58	746.60	195.84	733.58	264.06	864.00
SRM612-3	5163.53	11354.68	28692.92	12385.13	37358.73	9139.97	39760.12	13485.86	45102.49
SRM610-3	35580.78	81587.08	223880.98	88530.20	309452.07	69546.47	334968.78	100481.55	387918.83
AP1-3	93.98	154.54	312.92	148.30	174.76	58.12	162.86	55.58	168.28
AP2-3	350.50	736.86	1601.85	780.74	1953.13	786.72	2908.36	1032.31	2243.53
AP3-3	2846.56	5408.13	13787.04	6004.81	14485.04	5759.55	22908.71	7723.62	16840.85
AP4-3	2135.35	4150.68	10103.54	4504.29	12287.19	4829.75	19313.05	6565.42	14270.24
34HP45-856-1	1544.79	2422.75	2860.02	1780.51	394.48	483.72	402.90	438.54	169.20
34HP45-856-2	1480.95	2387.95	3093.54	1538.75	384.28	418.04	317.10	349.18	139.24
34HP45-856-3	1159.19	3219.16	4346.74	990.59	245.52	253.12	213.74	224.30	96.64
34HP45-856-4	1429.91	1603.87	1867.41	1428.07	327.12	314.12	280.62	265.34	137.04
34HP45-856-5	1919.75	1580.07	1595.41	1882.99	461.52	452.48	316.94	338.02	140.28
34HP45-856-6	1935.91	2648.51	3228.02	1485.31	417.48	446.56	315.94	354.90	137.12
34HP45-856-7	1809.43	1630.55	1665.17	1679.63	389.04	457.84	364.22	374.22	145.44
34HP45-856-8	2449.39	1572.39	1442.21	2135.15	507.32	605.16	466.38	506.06	196.00
34HP45-856-9	2638.23	1804.51	1609.97	2012.35	452.96	583.40	391.74	366.06	177.48
34HP45-856-10	680.98	779.90	918.57	447.86	148.96	159.52	171.78	132.42	67.00
34HP45-856-11	764.58	792.94	847.96	540.26	152.08	184.84	133.78	139.38	49.92
34HP45-856-12	1273.15	948.51	1008.97	941.39	236.20	337.28	283.98	257.10	118.88
34HP45-856-13	599.90	610.26	752.08	432.90	151.44	198.76	166.86	138.02	95.48
34HP45-856-14	691.82	547.90	575.44	462.74	137.64	171.04	131.78	165.94	51.56
34HP45-856-15	454.42	356.14	397.92	358.50	109.32	131.24	128.58	110.78	59.20
34HP45-856-16	1537.83	695.82	426.08	1253.91	303.88	396.12	339.46	281.66	125.16
34HP45-856-17	768.26	348.70	229.64	621.22	154.52	176.40	145.50	150.82	69.96
34HP45-856-18	924.23	438.46	260.04	618.06	182.24	235.60	179.78	174.06	69.20
SRM614-4	152.54	276.22	589.72	237.94	856.64	222.92	923.83	295.50	1001.25
SRM612-4	8257.27	15266.71	34305.27	13377.65	54852.19	13116.63	58659.55	18826.85	63774.84
SRM610-4	76782.89	153230.04	407686.78	131910.40	669497.35	133885.39	720430.00	195353.44	802242.70
AP1-4	15.42	7.46	19.80	9.74	32.00	10.04	22.54	2.90	12.64
AP2-4	402.70	690.30	1538.93	584.34	2314.01	887.88	3607.24	1257.99	2607.17
AP3-4	3543.28	5746.29	14249.56	4979.01	17725.14	6953.60	28152.66	9287.95	20217.15
AP4-4	3580.88	6060.45	13967.24	5075.69	19411.19	7325.36	30497.03	10005.08	21641.00

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration									
SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal									
SRM614-3	0.000044	0.000104	0.000267	0.000126	0.000315	0.000083	0.000310	0.000111	0.000365
SRM612-3	0.002089	0.004595	0.011610	0.005011	0.015117	0.003698	0.016088	0.005457	0.018250
SRM610-3	0.025727	0.058992	0.161880	0.064013	0.223753	0.050286	0.242203	0.072654	0.280489
AP1-3	0.000006	0.000010	0.000021	0.000010	0.000012	0.000004	0.000011	0.000004	0.000011
AP2-3	0.000022	0.000045	0.000098	0.000048	0.000120	0.000048	0.000179	0.000063	0.000138
AP3-3	0.000128	0.000242	0.000618	0.000269	0.000649	0.000258	0.001027	0.000346	0.000755
AP4-3	0.000113	0.000220	0.000537	0.000239	0.000653	0.000257	0.001026	0.000349	0.000758
34HP45-856-1	0.000091	0.000142	0.000168	0.000105	0.000023	0.000028	0.000024	0.000026	0.000010
34HP45-856-2	0.000090	0.000145	0.000188	0.000094	0.000023	0.000025	0.000019	0.000021	0.000008
34HP45-856-3	0.000077	0.000213	0.000287	0.000066	0.000016	0.000017	0.000014	0.000015	0.000006
34HP45-856-4	0.000112	0.000126	0.000147	0.000112	0.000026	0.000025	0.000022	0.000021	0.000011
34HP45-856-5	0.000133	0.000110	0.000111	0.000131	0.000032	0.000031	0.000022	0.000023	0.000010
34HP45-856-6	0.000124	0.000169	0.000206	0.000095	0.000027	0.000029	0.000020	0.000023	0.000009
34HP45-856-7	0.000134	0.000121	0.000123	0.000124	0.000029	0.000034	0.000027	0.000028	0.000011
34HP45-856-8	0.000176	0.000113	0.000104	0.000154	0.000037	0.000044	0.000034	0.000036	0.000014
34HP45-856-9	0.000196	0.000134	0.000120	0.000150	0.000034	0.000043	0.000029	0.000027	0.000013
34HP45-856-10	0.000046	0.000052	0.000062	0.000030	0.000010	0.000011	0.000012	0.000009	0.000005
34HP45-856-11	0.000050	0.000052	0.000056	0.000036	0.000010	0.000012	0.000009	0.000009	0.000003
34HP45-856-12	0.000083	0.000062	0.000066	0.000062	0.000015	0.000022	0.000019	0.000017	0.000008
34HP45-856-13	0.000038	0.000039	0.000048	0.000028	0.000010	0.000013	0.000011	0.000009	0.000006
34HP45-856-14	0.000048	0.000038	0.000040	0.000032	0.000010	0.000012	0.000009	0.000012	0.000004
34HP45-856-15	0.000036	0.000028	0.000032	0.000029	0.000009	0.000010	0.000010	0.000009	0.000005
34HP45-856-16	0.000163	0.000074	0.000045	0.000133	0.000032	0.000042	0.000036	0.000030	0.000013
34HP45-856-17	0.000080	0.000036	0.000024	0.000065	0.000016	0.000018	0.000015	0.000016	0.000007
34HP45-856-18	0.000117	0.000056	0.000033	0.000079	0.000023	0.000030	0.000023	0.000022	0.000009

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000103	0.000186	0.000397	0.000160	0.000576	0.000150	0.000622	0.000199	0.000674
SRM612-4	0.004380	0.008098	0.018196	0.007096	0.029095	0.006957	0.031114	0.009986	0.033827
SRM610-4	0.062009	0.123747	0.329244	0.106530	0.540680	0.108125	0.581813	0.157766	0.647884
AP1-4	0.000001	0.000000	0.000001	0.000001	0.000002	0.000001	0.000001	0.000000	0.000001
AP2-4	0.000024	0.000041	0.000092	0.000035	0.000138	0.000053	0.000215	0.000075	0.000155
AP3-4	0.000153	0.000249	0.000616	0.000215	0.000767	0.000301	0.001218	0.000402	0.000875
AP4-4	0.000174	0.000294	0.000678	0.000246	0.000942	0.000356	0.001481	0.000486	0.001051

standardize signal averages AP

AP1	0.000004	0.000005	0.000011	0.000005	0.000007	0.000002	0.000006	0.000002	0.000006
AP2	0.000023	0.000043	0.000095	0.000041	0.000129	0.000051	0.000197	0.000069	0.000146
AP3	0.000140	0.000245	0.000617	0.000242	0.000708	0.000279	0.001122	0.000374	0.000815
AP4	0.000144	0.000257	0.000607	0.000243	0.000798	0.000306	0.001253	0.000417	0.000904

linest from std sig ave

	0.052511	0.031072	0.012705	0.031858	0.010554	0.039823	0.009962	0.029795	0.009311
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standardize signal averages SRM

srM614-2	0.000074	0.000145	0.000332	0.000143	0.000446	0.000116	0.000466	0.000155	0.000519
srM612-2	0.003235	0.006346	0.014903	0.006054	0.022106	0.005328	0.023601	0.007721	0.026039
srM610-2	0.043868	0.091370	0.245562	0.085271	0.382216	0.079205	0.412008	0.115210	0.464186

linest from std sig ave

	0.114573	0.057538	0.021913	0.057486	0.013526	0.062858	0.012738	0.043174	0.010572
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concentration data

SRM614-3	0.20	0.28	0.29	0.35	0.29	0.28	0.26	0.28	0.29
SRM612-3	9.41	12.24	12.65	13.69	13.68	12.63	13.75	13.94	14.57
SRM610-3	115.86	157.20	176.38	174.90	202.53	171.75	206.93	185.65	223.97
AP1-3	0.13	0.13	0.10	0.12	0.05	0.06	0.04	0.04	0.04
AP2-3	0.45	0.56	0.50	0.61	0.50	0.77	0.71	0.75	0.51
AP3-3	2.67	3.00	3.13	3.42	2.73	4.10	4.08	4.11	2.80
AP4-3	2.38	2.73	2.72	3.04	2.75	4.08	4.08	4.14	2.82
34HP45-856-1	1.90	1.77	0.85	1.33	0.10	0.45	0.09	0.31	0.04
34HP45-856-2	1.89	1.80	0.95	1.19	0.10	0.40	0.08	0.25	0.03
34HP45-856-3	1.61	2.64	1.46	0.83	0.07	0.27	0.06	0.18	0.02
34HP45-856-4	2.36	1.56	0.74	1.43	0.11	0.39	0.09	0.25	0.04
34HP45-856-5	2.79	1.36	0.56	1.66	0.13	0.50	0.09	0.28	0.04
34HP45-856-6	2.59	2.10	1.05	1.21	0.11	0.45	0.08	0.27	0.03
34HP45-856-7	2.81	1.50	0.63	1.58	0.12	0.54	0.11	0.33	0.04
34HP45-856-8	3.69	1.40	0.53	1.95	0.15	0.69	0.13	0.43	0.05
34HP45-856-9	4.11	1.66	0.61	1.90	0.14	0.69	0.12	0.32	0.05
34HP45-856-10	0.96	0.65	0.31	0.38	0.04	0.17	0.05	0.11	0.02
34HP45-856-11	1.06	0.65	0.28	0.45	0.04	0.19	0.04	0.11	0.01
34HP45-856-12	1.75	0.77	0.34	0.78	0.07	0.35	0.07	0.20	0.03
34HP45-856-13	0.80	0.48	0.24	0.35	0.04	0.20	0.04	0.10	0.02
34HP45-856-14	1.01	0.47	0.20	0.41	0.04	0.19	0.04	0.14	0.01
34HP45-856-15	0.76	0.35	0.16	0.36	0.04	0.17	0.04	0.11	0.02
34HP45-856-16	3.42	0.91	0.23	1.69	0.14	0.67	0.14	0.35	0.05
34HP45-856-17	1.67	0.45	0.12	0.82	0.07	0.29	0.06	0.19	0.03
34HP45-856-18	2.46	0.69	0.17	1.00	0.10	0.48	0.09	0.26	0.03
SRM614-4	0.46	0.50	0.43	0.44	0.52	0.51	0.53	0.51	0.54
SRM612-4	19.72	21.58	19.83	19.39	26.33	23.76	26.58	25.52	27.01
SRM610-4	279.26	329.76	358.74	291.06	489.39	369.28	497.08	403.14	517.34
AP1-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-4	0.11	0.11	0.10	0.09	0.12	0.18	0.18	0.19	0.12
AP3-4	0.69	0.66	0.67	0.59	0.69	1.03	1.04	1.03	0.70
AP4-4	3.64	3.65	3.44	3.13	3.97	5.65	5.88	5.77	3.90

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

raw data

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	8.24	2.32	3.00	5.48	5.44	1.84	1.68	2.72	3.12
SRM614-1	109.80	217.00	620.80	250.28	716.04	201.44	748.96	232.72	821.04
SRM612-1	5758.83	12056.67	29308.25	12516.11	41943.59	10250.26	44638.41	14887.44	49761.48
SRM610-1	53656.86	117172.10	326110.75	117059.02	459996.56	97572.87	491449.66	141664.75	557345.38
AP1-1	38.04	48.36	92.56	42.00	69.84	21.96	67.24	23.88	55.80
AP2-1	418.96	663.00	1491.53	700.16	1970.45	792.88	3144.90	1061.69	2237.37
AP3-1	1916.49	3472.34	8406.05	3522.58	10012.78	3929.98	15862.93	5309.87	11498.79
AP4-1	3045.14	5397.35	12988.35	5315.47	16621.57	6317.04	25911.31	8614.29	18449.78

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM									
srM614-2	0.000074	0.000133	0.000345	0.000139	0.000467	0.000135	0.000501	0.000157	0.000543
srM612-2	0.003617	0.006996	0.015808	0.006471	0.025113	0.006010	0.026752	0.008669	0.029325
srM610-2	0.051447	0.103282	0.275256	0.093215	0.441710	0.090185	0.475576	0.132030	0.529598
lineest from std sig ave									
	0.097716	0.050907	0.019552	0.052592	0.011705	0.055207	0.011036	0.037676	0.009267
concentration data									
SRM614-1	0.24	0.27	0.37	0.39	0.33	0.35	0.32	0.30	0.33
SRM612-1	11.98	15.37	15.95	17.51	17.09	15.90	16.95	17.10	18.01
SRM610-1	167.99	224.97	267.08	246.31	281.83	227.52	280.56	244.63	303.31
AP1-1	0.04	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.01
AP2-1	0.52	0.49	0.48	0.59	0.48	0.74	0.72	0.74	0.49
AP3-1	1.91	2.11	2.19	2.36	1.96	2.92	2.89	2.93	2.00
AP4-1	3.00	3.26	3.35	3.53	3.22	4.65	4.67	4.70	3.17
34HP45-695-1	1.06	0.30	0.10	0.71	0.06	0.19	0.04	0.15	0.02
34HP45-695-2	1.14	0.31	0.11	0.75	0.04	0.25	0.04	0.14	0.01
34HP45-695-3	1.61	0.43	0.14	1.28	0.05	0.31	0.06	0.17	0.02
34HP45-695-4	1.67	0.59	0.25	0.77	0.05	0.22	0.04	0.14	0.02
34HP45-695-5	1.61	0.63	0.24	0.75	0.06	0.32	0.06	0.16	0.03
34HP45-695-6	2.21	0.69	0.28	0.92	0.07	0.27	0.06	0.17	0.03
34HP45-695-7	1.58	0.49	0.18	0.65	0.05	0.27	0.05	0.13	0.02
34HP45-695-8	1.21	0.43	0.17	0.59	0.04	0.19	0.04	0.14	0.02
34HP45-695-9	1.68	0.52	0.19	0.70	0.08	0.39	0.08	0.24	0.03
34HP45-695-10	1.20	0.43	0.15	0.51	0.05	0.21	0.06	0.11	0.03
34HP45-695-11	1.43	0.36	0.11	0.64	0.05	0.26	0.05	0.15	0.02
34HP45-695-12	2.23	0.56	0.15	1.00	0.08	0.39	0.07	0.21	0.04
34HP45-695-13	1.53	0.42	0.15	0.63	0.06	0.28	0.06	0.15	0.03
34HP45-695-14	0.95	0.24	0.09	0.39	0.03	0.15	0.03	0.09	0.01
34HP45-695-15	1.33	0.38	0.13	0.55	0.05	0.23	0.04	0.12	0.02
34HP45-695-16	1.35	0.59	0.29	0.44	0.04	0.18	0.04	0.11	0.02
34HP45-695-17	0.92	0.34	0.14	0.40	0.03	0.19	0.04	0.11	0.02
34HP45-695-18	1.10	0.39	0.17	0.40	0.03	0.18	0.03	0.09	0.01
SRM614-2	0.47	0.51	0.50	0.51	0.55	0.61	0.56	0.53	0.57
SRM612-2	22.80	25.89	23.80	24.30	30.15	27.14	29.95	28.87	30.99
SRM610-2	326.68	384.10	425.20	355.99	549.18	418.23	553.12	455.49	581.70
AP1-2	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
AP2-2	0.55	0.61	0.54	0.53	0.63	1.01	0.94	1.04	0.65
AP3-2	2.70	2.63	2.67	2.47	2.75	4.15	4.12	4.16	2.77
AP4-2	4.34	4.44	4.32	4.06	4.63	6.79	7.01	6.89	4.72
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	8.48	7.84	6.28	7.88	6.40	8.40	2.72	7.36	7.72
SRM614-1	436.56	715.28	1687.21	656.08	2276.09	602.48	2385.45	864.32	2415.09
SRM612-1	6555.88	11719.47	26084.55	10385.46	39693.31	9813.70	41487.63	13736.96	44698.81
SRM610-1	47837.39	88485.06	220263.56	77120.40	342922.16	77993.44	364900.00	111205.71	398206.16
AP1-1	170.64	235.08	630.68	155.56	600.80	169.12	577.76	189.64	617.16
AP2-1	590.64	936.89	2231.29	868.76	3087.42	1215.93	4704.15	1657.73	3476.26
AP3-1	2593.57	4076.02	9525.37	3587.22	13108.11	5093.47	20413.60	6797.48	14401.80
AP4-1	4832.67	7680.92	17772.58	6288.96	25184.78	9579.45	39335.50	13068.19	27985.88
MZ1-1	241.72	86.00	128.04	123.24	84.00	56.44	88.40	40.64	42.80
MZ1-2	177.36	55.08	35.32	73.40	34.76	43.12	31.52	25.44	18.32
MZ1-3	253.36	37.80	23.52	73.44	26.32	24.76	32.52	26.44	14.24
MZ1-4	181.64	58.24	69.76	69.48	55.60	28.44	45.76	25.24	44.12
MZ1-5	232.36	35.08	35.08	73.76	27.40	22.32	29.20	26.96	16.48
MZ1-6	113.96	47.80	29.24	54.72	29.96	18.64	21.64	25.48	19.76
MZ1-7	136.08	56.04	34.32	52.24	34.00	35.28	25.64	19.24	18.84
MZ1-8	111.68	49.20	28.92	44.72	26.36	27.40	25.36	19.64	16.32
MZ1-9	111.44	38.20	24.08	34.72	31.68	31.12	17.96	21.12	11.32
MZ1-10	134.44	40.84	35.84	43.76	23.72	15.24	15.32	15.40	10.04
MZ1-11	65.44	48.80	24.96	29.28	18.96	18.16	21.24	11.36	12.52
MZ1-12	93.68	36.56	18.60	36.92	17.52	16.40	16.16	13.44	11.32
MZ1-13	553.20	151.88	70.68	186.16	80.40	95.04	75.80	75.12	30.40
MZ1-14	525.96	166.20	76.72	200.92	74.32	108.20	99.56	88.04	44.88
MZ1-15	505.20	161.88	71.08	196.96	67.04	86.56	93.60	84.44	38.72
MZ1-16	105.68	46.16	44.00	39.40	36.92	32.00	48.00	24.84	34.84

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	92.64	26.88	26.76	25.64	14.20	18.04	17.76	12.72	13.00
MZ1-18	165.68	65.92	60.24	52.76	35.76	29.72	36.68	31.60	21.36
MZ1-19	128.16	54.16	75.60	32.48	42.32	29.48	31.68	14.36	15.28
MZ1-20	163.04	49.48	76.40	45.36	32.92	21.56	24.92	13.92	17.36
MZ1-21	134.16	56.36	69.76	31.08	26.72	22.44	15.56	23.40	15.52
srms614-2	298.84	550.88	1121.53	421.40	1798.17	468.52	1745.65	588.80	1872.81
srms612-2	4236.94	7022.16	15700.13	5629.11	25187.90	6048.27	26041.23	8701.73	28020.96
srms610-2	40247.55	70823.84	170458.41	57129.16	275594.50	61871.11	291597.66	88203.06	311068.06
AP1-2	10.88	34.12	23.04	12.48	39.92	17.68	29.00	7.28	20.60
AP2-2	294.08	468.20	964.25	370.16	1560.45	622.08	2622.85	896.77	1811.57
AP3-2	1670.21	2635.09	5910.79	2063.89	8565.09	3387.02	13628.12	4568.27	9537.69
AP4-2	3095.10	4733.15	11396.90	3743.54	16375.05	6278.36	25867.59	8539.81	18017.30
blank-2	3.68	8.84	12.12	5.64	6.64	1.44	1.68	1.40	4.12
blank ave	6.08	8.34	9.20	6.76	6.52	4.92	2.20	4.38	5.92

blank subtraction									
SRM614-1	430.48	706.94	1678.01	649.32	2269.57	597.56	2383.25	859.94	2409.17
SRM612-1	6549.80	11711.13	26075.35	10378.70	39686.78	9808.78	41485.43	13732.58	44692.89
SRM610-1	47831.31	88476.71	220254.36	77113.64	342915.64	77988.52	364897.80	111201.33	398200.24
AP1-1	164.56	226.74	621.48	148.80	594.28	164.20	575.56	185.26	611.24
AP2-1	584.56	928.55	2222.09	862.00	3080.90	1211.01	4701.95	1653.35	3470.34
AP3-1	2587.49	4067.68	9516.17	3580.46	13101.59	5088.55	20411.40	6793.10	14395.88
AP4-1	4826.59	7672.58	17763.38	6282.20	25178.26	9574.53	39333.30	13063.81	27979.96
MZ1-1	235.64	77.66	118.84	116.48	77.48	51.52	86.20	36.26	36.88
MZ1-2	171.28	46.74	26.12	66.64	28.24	38.20	29.32	21.06	12.40
MZ1-3	247.28	29.46	14.32	66.68	19.80	19.84	30.32	22.06	8.32
MZ1-4	175.56	49.90	60.56	62.72	49.08	23.52	43.56	20.86	38.20
MZ1-5	226.28	26.74	25.88	67.00	20.88	17.40	27.00	22.58	10.56
MZ1-6	107.88	39.46	20.04	47.96	23.44	13.72	19.44	21.10	13.84
MZ1-7	130.00	47.70	25.12	45.48	27.48	30.36	23.44	14.86	12.92
MZ1-8	105.60	40.86	19.72	37.96	19.84	22.48	23.16	15.26	10.40
MZ1-9	105.36	29.86	14.88	27.96	25.16	26.20	15.76	16.74	5.40
MZ1-10	128.36	32.50	26.64	37.00	17.20	10.32	13.12	11.02	4.12
MZ1-11	59.36	40.46	15.76	22.52	12.44	13.24	19.04	6.98	6.60
MZ1-12	87.60	28.22	9.40	30.16	11.00	11.48	13.96	9.06	5.40
MZ1-13	547.12	143.54	61.48	179.40	73.88	90.12	73.60	70.74	24.48
MZ1-14	519.88	157.86	67.52	194.16	67.80	103.28	97.36	83.66	38.96
MZ1-15	499.12	153.54	61.88	190.20	60.52	81.64	91.40	80.06	32.80
MZ1-16	99.60	37.82	34.80	32.64	30.40	27.08	45.80	20.46	28.92
MZ1-17	86.56	18.54	17.56	18.88	7.68	13.12	15.56	8.34	7.08
MZ1-18	159.60	57.58	51.04	46.00	29.24	24.80	34.48	27.22	15.44
MZ1-19	122.08	45.82	66.40	25.72	35.80	24.56	29.48	9.98	9.36
MZ1-20	156.96	41.14	67.20	38.60	26.40	16.64	22.72	9.54	11.44
MZ1-21	128.08	48.02	60.56	24.32	20.20	17.52	13.36	19.02	9.60
srms614-2	292.76	542.54	1112.33	414.64	1791.65	463.60	1743.45	584.42	1866.89
srms612-2	4230.86	7013.82	15690.93	5622.35	25181.38	6043.35	26039.03	8697.35	28015.04
srms610-2	40241.47	70815.50	170449.21	57122.40	275587.98	61866.19	291595.46	88198.67	311062.14
AP1-2	4.80	25.78	13.84	5.72	33.40	12.76	26.80	2.90	14.68
AP2-2	288.00	459.86	955.05	363.40	1553.93	617.16	2620.65	892.38	1805.65
AP3-2	1664.13	2626.75	5901.59	2057.13	8558.57	3382.10	13625.92	4563.89	9531.77
AP4-2	3089.02	4724.81	11387.70	3736.78	16368.53	6273.44	25865.39	8535.43	18011.38

zero correction									
SRM614-1	430.48	706.94	1678.01	649.32	2269.57	597.56	2383.25	859.94	2409.17
SRM612-1	6549.80	11711.13	26075.35	10378.70	39686.78	9808.78	41485.43	13732.58	44692.89
SRM610-1	47831.31	88476.71	220254.36	77113.64	342915.64	77988.52	364897.80	111201.33	398200.24
AP1-1	164.56	226.74	621.48	148.80	594.28	164.20	575.56	185.26	611.24
AP2-1	584.56	928.55	2222.09	862.00	3080.90	1211.01	4701.95	1653.35	3470.34
AP3-1	2587.49	4067.68	9516.17	3580.46	13101.59	5088.55	20411.40	6793.10	14395.88
AP4-1	4826.59	7672.58	17763.38	6282.20	25178.26	9574.53	39333.30	13063.81	27979.96
MZ1-1	235.64	77.66	118.84	116.48	77.48	51.52	86.20	36.26	36.88
MZ1-2	171.28	46.74	26.12	66.64	28.24	38.20	29.32	21.06	12.40
MZ1-3	247.28	29.46	14.32	66.68	19.80	19.84	30.32	22.06	8.32
MZ1-4	175.56	49.90	60.56	62.72	49.08	23.52	43.56	20.86	38.20
MZ1-5	226.28	26.74	25.88	67.00	20.88	17.40	27.00	22.58	10.56
MZ1-6	107.88	39.46	20.04	47.96	23.44	13.72	19.44	21.10	13.84
MZ1-7	130.00	47.70	25.12	45.48	27.48	30.36	23.44	14.86	12.92
MZ1-8	105.60	40.86	19.72	37.96	19.84	22.48	23.16	15.26	10.40
MZ1-9	105.36	29.86	14.88	27.96	25.16	26.20	15.76	16.74	5.40
MZ1-10	128.36	32.50	26.64	37.00	17.20	10.32	13.12	11.02	4.12
MZ1-11	59.36	40.46	15.76	22.52	12.44	13.24	19.04	6.98	6.60
MZ1-12	87.60	28.22	9.40	30.16	11.00	11.48	13.96	9.06	5.40
MZ1-13	547.12	143.54	61.48	179.40	73.88	90.12	73.60	70.74	24.48
MZ1-14	519.88	157.86	67.52	194.16	67.80	103.28	97.36	83.66	38.96
MZ1-15	499.12	153.54	61.88	190.20	60.52	81.64	91.40	80.06	32.80
MZ1-16	99.60	37.82	34.80	32.64	30.40	27.08	45.80	20.46	28.92
MZ1-17	86.56	18.54	17.56	18.88	7.68	13.12	15.56	8.34	7.08
MZ1-18	159.60	57.58	51.04	46.00	29.24	24.80	34.48	27.22	15.44

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	0.071341	0.128678	0.315032	0.107979	0.499745	0.112921	0.530276	0.160997	0.572187
linest from std sig ave	0.070448	0.040852	0.017077	0.045396	0.010343	0.044086	0.009895	0.030893	0.008575
concentration data									
SRM614-1	0.30	0.33	0.33	0.37	0.32	0.32	0.32	0.35	0.31
SRM612-1	16.04	19.11	18.22	20.79	19.62	18.61	19.43	19.34	20.12
SRM610-1	217.91	268.57	286.29	287.31	315.36	275.15	317.82	291.26	333.37
AP1-1	0.14	0.13	0.15	0.10	0.10	0.11	0.09	0.09	0.10
AP2-1	0.59	0.62	0.64	0.71	0.63	0.94	0.90	0.96	0.64
AP3-1	2.00	2.09	2.10	2.26	2.04	3.05	3.02	3.02	2.04
AP4-1	4.09	4.33	4.29	4.35	4.31	6.28	6.37	6.36	4.36
MZ1-1	0.29	0.06	0.04	0.12	0.02	0.05	0.02	0.03	0.01
MZ1-2	0.24	0.04	0.01	0.08	0.01	0.04	0.01	0.02	0.00
MZ1-3	0.40	0.03	0.01	0.09	0.01	0.03	0.01	0.02	0.00
MZ1-4	0.24	0.05	0.02	0.07	0.01	0.03	0.01	0.02	0.01
MZ1-5	0.33	0.03	0.01	0.08	0.01	0.02	0.01	0.02	0.00
MZ1-6	0.18	0.04	0.01	0.07	0.01	0.02	0.01	0.02	0.00
MZ1-7	0.16	0.04	0.01	0.05	0.01	0.03	0.01	0.01	0.00
MZ1-8	0.12	0.03	0.01	0.04	0.00	0.02	0.01	0.01	0.00
MZ1-9	0.14	0.03	0.01	0.03	0.01	0.03	0.00	0.01	0.00
MZ1-10	0.23	0.04	0.01	0.06	0.01	0.01	0.00	0.01	0.00
MZ1-11	0.10	0.05	0.01	0.03	0.00	0.02	0.01	0.01	0.00
MZ1-12	0.15	0.03	0.00	0.04	0.00	0.02	0.00	0.01	0.00
MZ1-13	0.81	0.14	0.03	0.22	0.02	0.10	0.02	0.06	0.01
MZ1-14	0.63	0.13	0.02	0.19	0.02	0.10	0.02	0.06	0.01
MZ1-15	0.60	0.12	0.02	0.19	0.01	0.08	0.02	0.06	0.01
MZ1-16	0.18	0.05	0.02	0.05	0.01	0.04	0.02	0.02	0.01
MZ1-17	0.14	0.02	0.01	0.02	0.00	0.02	0.00	0.01	0.00
MZ1-18	0.17	0.04	0.02	0.04	0.01	0.02	0.01	0.02	0.00
MZ1-19	0.10	0.02	0.02	0.02	0.01	0.02	0.00	0.00	0.00
MZ1-20	0.13	0.02	0.02	0.03	0.00	0.01	0.00	0.00	0.00
MZ1-21	0.10	0.02	0.01	0.02	0.00	0.01	0.00	0.01	0.00
srm614-2	0.32	0.40	0.35	0.38	0.40	0.40	0.37	0.37	0.38
srm612-2	17.28	19.08	18.28	18.78	20.76	19.11	20.33	20.42	21.02
srm610-2	228.53	267.96	276.18	265.29	315.92	272.08	316.59	287.96	324.62
AP1-2	0.01	0.03	0.01	0.01	0.01	0.02	0.01	0.00	0.00
AP2-2	0.52	0.55	0.49	0.53	0.56	0.86	0.90	0.92	0.59
AP3-2	1.95	2.05	1.97	1.97	2.02	3.06	3.05	3.07	2.05
AP4-2	3.61	3.68	3.80	3.57	3.86	5.68	5.78	5.74	3.87
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-5	7.80	12.76	13.20	6.40	6.56	2.60	4.56	4.76	3.56
SRM614-5	147.72	260.00	535.88	202.20	759.04	192.12	772.28	265.00	812.56
SRM612-5	7955.48	13897.32	31253.42	11148.66	47496.47	11568.23	50119.96	16471.25	53458.90
SRM610-5	54791.75	98686.23	234621.52	81203.81	395016.50	88547.30	423096.81	125417.46	454985.16
AP1-5	23.28	16.52	17.40	18.96	18.12	6.00	14.68	16.96	21.72
AP2-5	241.64	389.44	797.08	290.52	1245.01	493.44	2059.41	646.04	1470.97
AP3-5	926.05	1476.09	3396.50	1165.77	4699.51	1916.17	7638.68	2619.45	5418.91
AP4-5	1815.93	2989.46	6788.28	2343.81	9945.22	3870.82	15808.29	5349.27	11068.82
MZ2-1b	10.80	10.60	9.20	10.08	6.60	5.32	8.76	6.48	9.60
MZ2-2b	46.72	30.40	9.16	14.12	10.48	23.68	12.40	10.72	6.28
MZ2-3b	27.92	15.08	10.32	11.96	7.56	11.16	11.76	6.80	5.68
MZ2-4b	35.20	15.52	18.48	17.88	9.64	9.00	9.84	7.80	4.96
MZ2-5b	52.08	20.24	15.84	13.80	12.48	10.00	10.60	12.08	9.32
MZ2-6b	20.96	8.92	16.80	6.60	6.24	7.64	10.00	6.76	4.52
MZ2-7b	164.40	46.80	20.28	54.88	32.00	35.96	24.92	23.64	12.80
MZ2-8b	105.60	36.60	20.52	35.48	22.16	32.92	20.00	20.24	15.24
MZ2-9b	33.24	16.24	8.64	10.76	11.12	15.32	9.52	2.56	3.64
MZ2-10b	63.24	19.88	15.16	14.64	18.04	12.92	6.96	9.40	12.60
MZ2-11b	48.12	19.44	13.60	19.12	16.64	15.08	9.64	10.08	7.88
MZ2-12b	41.40	19.88	8.88	13.00	10.60	13.92	9.00	5.12	4.76
MZ2-13b	73.96	27.12	21.84	30.32	7.08	15.84	18.96	13.32	7.04
MZ2-14b	70.00	24.32	21.80	20.12	13.16	15.60	21.36	13.88	10.68
MZ2-15b	173.36	61.96	39.92	47.12	43.88	42.48	36.12	36.40	18.68
srm614-6	123.16	188.00	434.28	143.88	588.76	156.12	582.64	207.84	606.96
srm612-6	5805.47	9863.38	21796.92	7729.32	34135.87	8407.09	35574.48	11662.75	38033.09

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	45169.09	80291.25	185651.84	65333.93	318325.88	71233.77	339313.34	102251.77	362202.94
AP1-6	13.52	9.16	17.32	6.92	20.44	8.92	20.80	10.16	20.24
AP2-6	183.56	294.28	627.44	229.64	1007.93	382.04	1565.01	562.16	1056.57
AP3-6	792.68	1298.69	2838.78	1017.73	4199.98	1628.77	6545.16	2337.13	4727.59
AP4-6	1728.33	2620.41	6225.96	2235.33	9310.85	3577.38	14590.36	4857.35	10303.30
blank-6	7.12	9.28	8.40	2.84	9.24	5.20	2.48	3.68	4.12
blank ave	7.46	11.02	10.80	4.62	7.90	3.90	3.52	4.22	3.84
blank subtraction									
SRM614-5	140.26	248.98	525.08	197.58	751.14	188.22	768.76	260.78	808.72
SRM612-5	7948.02	13886.30	31242.62	11144.04	47488.57	11564.32	50116.44	16467.03	53455.06
SRM610-5	54784.29	98675.21	234610.72	81199.19	395008.60	88543.40	423093.29	125413.24	454981.32
AP1-5	15.82	5.50	6.60	14.34	10.22	2.10	11.16	12.74	17.88
AP2-5	234.18	378.42	786.28	285.90	1237.11	489.54	2055.89	641.82	1467.13
AP3-5	918.59	1465.07	3385.70	1161.15	4691.61	1912.27	7635.16	2615.23	5415.07
AP4-5	1808.47	2978.44	6777.48	2339.19	9937.32	3866.92	15804.77	5345.05	11064.98
MZ2-1b	3.34	-0.42	-1.60	5.46	-1.30	1.42	5.24	2.26	5.76
MZ2-2b	39.26	19.38	-1.64	9.50	2.58	19.78	8.88	6.50	2.44
MZ2-3b	20.46	4.06	-0.48	7.34	-0.34	7.26	8.24	2.58	1.84
MZ2-4b	27.74	4.50	7.68	13.26	1.74	5.10	6.32	3.58	1.12
MZ2-5b	44.62	9.22	5.04	9.18	4.58	6.10	7.08	7.86	5.48
MZ2-6b	13.50	-2.10	6.00	1.98	-1.66	3.74	6.48	2.54	0.68
MZ2-7b	156.94	35.78	9.48	50.26	24.10	32.06	21.40	19.42	8.96
MZ2-8b	98.14	25.58	9.72	30.86	14.26	29.02	16.48	16.02	11.40
MZ2-9b	25.78	5.22	-2.16	6.14	3.22	11.42	6.00	-1.66	-0.20
MZ2-10b	55.78	8.86	4.36	10.02	10.14	9.02	3.44	5.18	8.76
MZ2-11b	40.66	8.42	2.80	14.50	8.74	11.18	6.12	5.86	4.04
MZ2-12b	33.94	8.86	-1.92	8.38	2.70	10.02	5.48	0.90	0.92
MZ2-13b	66.50	16.10	11.04	25.70	-0.82	11.94	15.44	9.10	3.20
MZ2-14b	62.54	13.30	11.00	15.50	5.26	11.70	17.84	9.66	6.84
MZ2-15b	165.90	50.94	29.12	42.50	35.98	38.58	32.60	32.18	14.84
srm614-6	115.70	176.98	423.48	139.26	580.86	152.22	579.12	203.62	603.12
srm612-6	5798.01	9852.36	21786.12	7724.70	34127.97	8403.19	35570.96	11658.52	38029.25
srm610-6	45161.63	80280.23	185641.04	65329.31	318317.98	71229.87	339309.82	102247.55	362199.10
AP1-6	6.06	-1.86	6.52	2.30	12.54	5.02	17.28	5.94	16.40
AP2-6	176.10	283.26	616.64	225.02	1000.03	378.14	1561.49	557.94	1052.73
AP3-6	785.22	1287.67	2827.98	1013.11	4192.08	1624.87	6541.64	2332.91	4723.75
AP4-6	1720.87	2609.39	6215.16	2230.71	9302.95	3573.48	14586.84	4853.13	10299.46
zero correction									
SRM614-5	140.26	248.98	525.08	197.58	751.14	188.22	768.76	260.78	808.72
SRM612-5	7948.02	13886.30	31242.62	11144.04	47488.57	11564.32	50116.44	16467.03	53455.06
SRM610-5	54784.29	98675.21	234610.72	81199.19	395008.60	88543.40	423093.29	125413.24	454981.32
AP1-5	15.82	5.50	6.60	14.34	10.22	2.10	11.16	12.74	17.88
AP2-5	234.18	378.42	786.28	285.90	1237.11	489.54	2055.89	641.82	1467.13
AP3-5	918.59	1465.07	3385.70	1161.15	4691.61	1912.27	7635.16	2615.23	5415.07
AP4-5	1808.47	2978.44	6777.48	2339.19	9937.32	3866.92	15804.77	5345.05	11064.98
MZ2-1b	3.34	0.00	0.00	5.46	0.00	1.42	5.24	2.26	5.76
MZ2-2b	39.26	19.38	0.00	9.50	2.58	19.78	8.88	6.50	2.44
MZ2-3b	20.46	4.06	0.00	7.34	0.00	7.26	8.24	2.58	1.84
MZ2-4b	27.74	4.50	7.68	13.26	1.74	5.10	6.32	3.58	1.12
MZ2-5b	44.62	9.22	5.04	9.18	4.58	6.10	7.08	7.86	5.48
MZ2-6b	13.50	0.00	6.00	1.98	0.00	3.74	6.48	2.54	0.68
MZ2-7b	156.94	35.78	9.48	50.26	24.10	32.06	21.40	19.42	8.96
MZ2-8b	98.14	25.58	9.72	30.86	14.26	29.02	16.48	16.02	11.40
MZ2-9b	25.78	5.22	0.00	6.14	3.22	11.42	6.00	0.00	0.00
MZ2-10b	55.78	8.86	4.36	10.02	10.14	9.02	3.44	5.18	8.76
MZ2-11b	40.66	8.42	2.80	14.50	8.74	11.18	6.12	5.86	4.04
MZ2-12b	33.94	8.86	0.00	8.38	2.70	10.02	5.48	0.90	0.92
MZ2-13b	66.50	16.10	11.04	25.70	0.00	11.94	15.44	9.10	3.20
MZ2-14b	62.54	13.30	11.00	15.50	5.26	11.70	17.84	9.66	6.84
MZ2-15b	165.90	50.94	29.12	42.50	35.98	38.58	32.60	32.18	14.84
srm614-6	115.70	176.98	423.48	139.26	580.86	152.22	579.12	203.62	603.12
srm612-6	5798.01	9852.36	21786.12	7724.70	34127.97	8403.19	35570.96	11658.52	38029.25
srm610-6	45161.63	80280.23	185641.04	65329.31	318317.98	71229.87	339309.82	102247.55	362199.10
AP1-6	6.06	0.00	6.52	2.30	12.54	5.02	17.28	5.94	16.40
AP2-6	176.10	283.26	616.64	225.02	1000.03	378.14	1561.49	557.94	1052.73
AP3-6	785.22	1287.67	2827.98	1013.11	4192.08	1624.87	6541.64	2332.91	4723.75
AP4-6	1720.87	2609.39	6215.16	2230.71	9302.95	3573.48	14586.84	4853.13	10299.46
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	0.27	0.04	0.01	0.08	0.00	0.04	0.01	0.02	0.00
MZ2-14b	0.21	0.03	0.01	0.04	0.00	0.03	0.01	0.02	0.00
MZ2-15b	0.53	0.11	0.03	0.11	0.02	0.09	0.02	0.06	0.01
srm614-6	0.52	0.52	0.54	0.51	0.51	0.51	0.48	0.50	0.48
srm612-6	21.89	24.34	23.52	23.52	25.36	23.52	24.84	23.84	25.40
srm610-6	332.85	387.23	391.25	388.31	461.68	389.20	462.58	408.09	472.24
AP1-6	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
AP2-6	0.54	0.57	0.54	0.56	0.60	0.86	0.88	0.93	0.57
AP3-6	2.48	2.66	2.55	2.58	2.61	3.81	3.82	3.99	2.64
AP4-6	3.61	3.59	3.73	3.78	3.84	5.56	5.67	5.52	3.83

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
raw data									
blank-7	10.12	3.68	5.96	1.48	3.04	2.76	2.44	2.96	5.68
SRM614-7	210.72	346.32	898.41	331.36	1156.13	325.76	1280.17	424.60	1214.29
SRM612-7	9684.34	18789.91	42496.00	17635.02	65959.25	15713.65	69190.98	22786.69	75859.19
SRM610-7	90337.51	184953.77	489145.38	172038.48	799355.50	162082.70	851939.38	237710.17	937951.63
AP1-7	49.56	68.20	199.80	66.28	220.48	51.08	211.52	76.20	205.84
AP2-7	435.68	855.28	1813.57	699.28	2521.49	1030.01	4013.22	1377.89	2923.62
AP3-7	1955.73	3389.82	7813.52	3074.22	10854.42	4260.02	17601.18	5719.83	12574.03
AP4-7	2801.90	4809.71	11422.02	4521.71	16606.90	6392.76	26741.15	8792.17	19021.99
T1-1	106.68	142.00	208.72	22.84	43.44	16.16	32.72	16.00	33.88
T1-2	47.40	90.68	104.08	11.80	12.24	6.08	4.32	3.44	8.40
T1-3	31.56	48.12	61.88	13.08	12.72	7.60	5.48	4.28	10.72
T1-4	18.52	31.76	56.32	7.92	48.52	13.00	37.80	11.36	35.32
T1-5	24.68	31.48	32.44	9.44	21.20	6.12	16.68	7.28	20.40
T1-6	30.84	53.32	82.36	32.52	134.40	27.72	114.84	41.32	104.52
T1-7	27.84	40.24	84.12	8.40	51.00	15.32	46.72	20.00	48.04
T1-8	22.76	20.76	21.92	10.20	11.16	3.28	9.48	1.56	12.08
T1-9	22.76	25.80	30.00	9.40	22.32	5.68	13.68	13.12	23.28
T1-10	25.68	31.48	75.04	8.48	29.72	15.52	45.44	16.76	43.92
T1-11	11.68	26.24	36.84	8.52	9.16	3.92	17.92	10.08	9.12
T1-12	21.64	21.68	36.56	13.36	13.52	4.60	11.08	9.40	11.84
T1-13	26.12	25.92	59.44	18.32	37.32	10.04	31.32	10.88	33.24
T1-14	25.04	21.36	33.32	7.60	13.16	3.32	5.72	4.84	8.96
T1-15	18.80	26.80	45.36	9.84	10.44	15.44	5.88	3.48	12.12
T1-16	26.92	25.64	34.68	9.88	18.76	7.72	14.20	11.48	16.64
T1-17	24.28	30.56	33.28	7.08	14.64	5.64	6.12	6.84	11.56
T1-18	26.72	22.08	39.92	6.40	12.28	5.16	1.88	6.96	7.28
SRM614-8	172.96	320.44	691.60	243.32	1000.01	288.60	1022.53	370.92	1090.97
SRM612-8	9196.37	16318.69	35013.00	13749.00	59890.18	14344.88	63593.04	20830.12	68441.06
SRM610-8	80846.98	149881.16	374064.47	126374.51	679162.38	136581.81	731006.19	201783.73	792000.19
AP1-8	24.64	30.20	57.56	28.52	97.60	24.80	77.84	29.32	83.60
AP2-8	344.12	567.68	1293.53	494.88	2021.57	812.72	3326.62	1142.89	2335.61
AP3-8	1888.89	2942.86	6702.52	2383.57	9700.69	3780.62	15451.17	5116.83	10910.74
AP4-8	2383.13	3846.34	8504.25	3154.98	13062.95	5014.63	20934.40	7003.12	14603.76
blank-8	8.24	10.28	8.52	4.72	7.72	2.32	1.96	2.92	7.40
blank average	9.18	6.98	7.24	3.10	5.38	2.54	2.20	2.94	6.54

blank subtraction

SRM614-7	201.54	339.34	891.16	328.26	1150.75	323.22	1277.97	421.66	1207.75
SRM612-7	9675.15	18782.93	42488.76	17631.92	65953.87	15711.11	69188.78	22783.75	75852.65
SRM610-7	90328.33	184946.79	489138.14	172035.38	799350.12	162080.16	851937.18	237707.23	937945.09
AP1-7	40.38	61.22	192.56	63.18	215.10	48.54	209.32	73.26	199.30
AP2-7	426.50	848.30	1806.33	696.18	2516.11	1027.47	4011.02	1374.95	2917.08
AP3-7	1946.55	3382.84	7806.28	3071.12	10849.04	4257.48	17598.98	5716.89	12567.49
AP4-7	2792.72	4802.73	11414.78	4518.61	16601.51	6390.22	26738.95	8789.23	19015.45
T1-1	97.50	135.02	201.48	19.74	38.06	13.62	30.52	13.06	27.34
T1-2	38.22	83.70	96.84	8.70	6.86	3.54	2.12	0.50	1.86
T1-3	22.38	41.14	54.64	9.98	7.34	5.06	3.28	1.34	4.18
T1-4	9.34	24.78	49.08	4.82	43.14	10.46	35.60	8.42	28.78
T1-5	15.50	24.50	25.20	6.34	15.82	3.58	14.48	4.34	13.86
T1-6	21.66	46.34	75.12	29.42	129.02	25.18	112.64	38.38	97.98
T1-7	18.66	33.26	76.88	5.30	45.62	12.78	44.52	17.06	41.50
T1-8	13.58	13.78	14.68	7.10	5.78	0.74	7.28	-1.38	5.54
T1-9	13.58	18.82	22.76	6.30	16.94	3.14	11.48	10.18	16.74
T1-10	16.50	24.50	67.80	5.38	24.34	12.98	43.24	13.82	37.38
T1-11	2.50	19.26	29.60	5.42	3.78	1.38	15.72	7.14	2.58
T1-12	12.46	14.70	29.32	10.26	8.14	2.06	8.88	6.46	5.30

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	16.94	18.94	52.20	15.22	31.94	7.50	29.12	7.94	26.70
T1-14	15.86	14.38	26.08	4.50	7.78	0.78	3.52	1.90	2.42
T1-15	9.62	19.82	38.12	6.74	5.06	12.90	3.68	0.54	5.58
T1-16	17.74	18.66	27.44	6.78	13.38	5.18	12.00	8.54	10.10
T1-17	15.10	23.58	26.04	3.98	9.26	3.10	3.92	3.90	5.02
T1-18	17.54	15.10	32.68	3.30	6.90	2.62	-0.32	4.02	0.74
SRM614-8	163.78	313.46	684.36	240.22	994.63	286.06	1020.33	367.98	1084.43
SRM612-8	9187.19	16311.71	35005.76	13745.90	59884.80	14342.34	63590.84	20827.18	68434.52
SRM610-8	80837.80	149874.18	374057.23	126371.41	679157.00	136579.27	731003.99	201780.79	791993.65
AP1-8	15.46	23.22	50.32	25.42	92.22	22.26	75.64	26.38	77.06
AP2-8	334.94	560.70	1286.29	491.78	2016.19	810.18	3324.42	1139.95	2329.07
AP3-8	1879.71	2935.88	6695.28	2380.47	9695.31	3778.08	15448.97	5113.89	10904.20
AP4-8	2373.95	3839.36	8497.01	3151.88	13057.57	5012.09	20932.20	7000.18	14597.22

zero correction

SRM614-7	201.54	339.34	891.16	328.26	1150.75	323.22	1277.97	421.66	1207.75
SRM612-7	9675.15	18782.93	42488.76	17631.92	65953.87	15711.11	69188.78	22783.75	75852.65
SRM610-7	90328.33	184946.79	489138.14	172035.38	799350.12	162080.16	851937.18	237707.23	937945.09
AP1-7	40.38	61.22	192.56	63.18	215.10	48.54	209.32	73.26	199.30
AP2-7	426.50	848.30	1806.33	696.18	2516.11	1027.47	4011.02	1374.95	2917.08
AP3-7	1946.55	3382.84	7806.28	3071.12	10849.04	4257.48	17598.98	5716.89	12567.49
AP4-7	2792.72	4802.73	11414.78	4518.61	16601.51	6390.22	26738.95	8789.23	19015.45
T1-1	97.50	135.02	201.48	19.74	38.06	13.62	30.52	13.06	27.34
T1-2	38.22	83.70	96.84	8.70	6.86	3.54	2.12	0.50	1.86
T1-3	22.38	41.14	54.64	9.98	7.34	5.06	3.28	1.34	4.18
T1-4	9.34	24.78	49.08	4.82	43.14	10.46	35.60	8.42	28.78
T1-5	15.50	24.50	25.20	6.34	15.82	3.58	14.48	4.34	13.86
T1-6	21.66	46.34	75.12	29.42	129.02	25.18	112.64	38.38	97.98
T1-7	18.66	33.26	76.88	5.30	45.62	12.78	44.52	17.06	41.50
T1-8	13.58	13.78	14.68	7.10	5.78	0.74	7.28	0.00	5.54
T1-9	13.58	18.82	22.76	6.30	16.94	3.14	11.48	10.18	16.74
T1-10	16.50	24.50	67.80	5.38	24.34	12.98	43.24	13.82	37.38
T1-11	2.50	19.26	29.60	5.42	3.78	1.38	15.72	7.14	2.58
T1-12	12.46	14.70	29.32	10.26	8.14	2.06	8.88	6.46	5.30
T1-13	16.94	18.94	52.20	15.22	31.94	7.50	29.12	7.94	26.70
T1-14	15.86	14.38	26.08	4.50	7.78	0.78	3.52	1.90	2.42
T1-15	9.62	19.82	38.12	6.74	5.06	12.90	3.68	0.54	5.58
T1-16	17.74	18.66	27.44	6.78	13.38	5.18	12.00	8.54	10.10
T1-17	15.10	23.58	26.04	3.98	9.26	3.10	3.92	3.90	5.02
T1-18	17.54	15.10	32.68	3.30	6.90	2.62	0.00	4.02	0.74
SRM614-8	163.78	313.46	684.36	240.22	994.63	286.06	1020.33	367.98	1084.43
SRM612-8	9187.19	16311.71	35005.76	13745.90	59884.80	14342.34	63590.84	20827.18	68434.52
SRM610-8	80837.80	149874.18	374057.23	126371.41	679157.00	136579.27	731003.99	201780.79	791993.65
AP1-8	15.46	23.22	50.32	25.42	92.22	22.26	75.64	26.38	77.06
AP2-8	334.94	560.70	1286.29	491.78	2016.19	810.18	3324.42	1139.95	2329.07
AP3-8	1879.71	2935.88	6695.28	2380.47	9695.31	3778.08	15448.97	5113.89	10904.20
AP4-8	2373.95	3839.36	8497.01	3151.88	13057.57	5012.09	20932.20	7000.18	14597.22

certified concentration

SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

standardized concentration

SRM614	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000009	0.000008
SRM612	0.000411	0.000428	0.000402	0.000431	0.000419	0.000419	0.000442	0.000436	0.000438
SRM610	0.005023	0.005253	0.005376	0.004896	0.005163	0.004973	0.005240	0.004967	0.004898
STD AP1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
STD AP2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000002
STD AP3	0.000005	0.000006	0.000006	0.000006	0.000006	0.000008	0.000009	0.000009	0.000006
STD AP4	0.000009	0.000010	0.000010	0.000010	0.000010	0.000014	0.000015	0.000015	0.000010

standardized signal

SRM614-7	0.000071	0.000120	0.000314	0.000116	0.000405	0.000114	0.000450	0.000149	0.000426
SRM612-7	0.003518	0.006830	0.015451	0.006412	0.023984	0.005713	0.025160	0.008285	0.027583
SRM610-7	0.054663	0.111921	0.296004	0.104108	0.483731	0.098084	0.515554	0.143850	0.567602
AP1-7	0.000002	0.000004	0.000012	0.000004	0.000013	0.000003	0.000013	0.000005	0.000012
AP2-7	0.000025	0.000050	0.000107	0.000041	0.000149	0.000061	0.000237	0.000081	0.000172
AP3-7	0.000095	0.000165	0.000381	0.000150	0.000530	0.000208	0.000859	0.000279	0.000614
AP4-7	0.000161	0.000276	0.000657	0.000260	0.000955	0.000368	0.001538	0.000506	0.001094
T1-1	0.000006	0.000009	0.000013	0.000001	0.000003	0.000001	0.000002	0.000001	0.000002
T1-2	0.000003	0.000007	0.000009	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000
T1-3	0.000003	0.000005	0.000006	0.000001	0.000001	0.000001	0.000000	0.000000	0.000000
T1-4	0.000001	0.000002	0.000003	0.000000	0.000003	0.000001	0.000003	0.000001	0.000002

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000001	0.000002	0.000002	0.000000	0.000001	0.000000	0.000001	0.000000	0.000001
T1-6	0.000001	0.000003	0.000005	0.000002	0.000008	0.000002	0.000007	0.000003	0.000006
T1-7	0.000002	0.000003	0.000007	0.000000	0.000004	0.000001	0.000004	0.000002	0.000004
T1-8	0.000001	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001
T1-9	0.000001	0.000002	0.000002	0.000001	0.000001	0.000000	0.000001	0.000001	0.000001
T1-10	0.000001	0.000002	0.000006	0.000000	0.000002	0.000001	0.000004	0.000001	0.000003
T1-11	0.000000	0.000002	0.000002	0.000000	0.000000	0.000000	0.000001	0.000001	0.000000
T1-12	0.000001	0.000001	0.000002	0.000001	0.000001	0.000000	0.000001	0.000001	0.000000
T1-13	0.000001	0.000001	0.000004	0.000001	0.000002	0.000001	0.000002	0.000001	0.000002
T1-14	0.000001	0.000001	0.000002	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
T1-15	0.000001	0.000001	0.000003	0.000001	0.000000	0.000001	0.000000	0.000000	0.000000
T1-16	0.000002	0.000002	0.000002	0.000001	0.000001	0.000000	0.000001	0.000001	0.000001
T1-17	0.000001	0.000002	0.000002	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
T1-18	0.000001	0.000001	0.000002	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000
SRM614-8	0.000093	0.000177	0.000387	0.000136	0.000562	0.000162	0.000577	0.000208	0.000613
SRM612-8	0.004773	0.008475	0.018187	0.007142	0.031113	0.007451	0.033038	0.010821	0.035555
SRM610-8	0.068850	0.127649	0.318589	0.107632	0.578445	0.116326	0.622604	0.171859	0.674549
AP1-8	0.000001	0.000002	0.000004	0.000002	0.000008	0.000002	0.000006	0.000002	0.000007
AP2-8	0.000025	0.000042	0.000097	0.000037	0.000151	0.000061	0.000249	0.000086	0.000175
AP3-8	0.000116	0.000181	0.000414	0.000147	0.000599	0.000233	0.000955	0.000316	0.000674
AP4-8	0.000178	0.000287	0.000636	0.000236	0.000978	0.000375	0.001567	0.000524	0.001093
standardize signal averages AP									
AP1	0.000002	0.000003	0.000008	0.000003	0.000011	0.000002	0.000010	0.000003	0.000009
AP2	0.000025	0.000046	0.000102	0.000039	0.000150	0.000061	0.000243	0.000083	0.000174
AP3	0.000106	0.000173	0.000397	0.000149	0.000564	0.000221	0.000907	0.000298	0.000644
AP4	0.000169	0.000282	0.000646	0.000248	0.000966	0.000371	0.001553	0.000515	0.001093
linest from std sig ave									
	0.054452	0.034197	0.014979	0.039001	0.010241	0.039003	0.009488	0.028602	0.009099
standardize signal averages SRM									
srm614-2	0.000082	0.000148	0.000350	0.000126	0.000484	0.000138	0.000514	0.000178	0.000519
srm612-2	0.004146	0.007652	0.016819	0.006777	0.027548	0.006582	0.029099	0.009553	0.031569
srm610-2	0.061757	0.119785	0.307296	0.105870	0.531088	0.107205	0.569079	0.157854	0.621076
linest from std sig ave									
	0.081418	0.043901	0.017515	0.046317	0.009736	0.046453	0.009223	0.031519	0.007902
concentration data									
SRM614-7	0.33	0.35	0.40	0.39	0.36	0.38	0.37	0.36	0.33
SRM612-7	16.43	20.03	19.85	21.45	21.06	19.11	20.47	20.32	21.52
SRM610-7	255.27	328.25	380.25	348.22	424.86	328.09	419.53	352.87	442.92
AP1-7	0.05	0.05	0.07	0.06	0.05	0.05	0.05	0.05	0.04
AP2-7	0.55	0.68	0.64	0.64	0.61	0.94	0.90	0.93	0.63
AP3-7	2.06	2.25	2.28	2.33	2.16	3.23	3.25	3.18	2.23
AP4-7	3.49	3.77	3.92	4.04	3.90	5.72	5.82	5.77	3.97
T1-1	0.14	0.12	0.08	0.02	0.01	0.01	0.01	0.01	0.01
T1-2	0.07	0.10	0.05	0.01	0.00	0.00	0.00	0.00	0.00
T1-3	0.06	0.07	0.04	0.02	0.00	0.01	0.00	0.00	0.00
T1-4	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
T1-5	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
T1-6	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02
T1-7	0.04	0.04	0.04	0.01	0.02	0.02	0.02	0.02	0.01
T1-8	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
T1-9	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.01
T1-10	0.03	0.03	0.03	0.01	0.01	0.02	0.01	0.01	0.01
T1-11	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.00
T1-12	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.00
T1-13	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
T1-14	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
T1-15	0.02	0.02	0.02	0.01	0.00	0.01	0.00	0.00	0.00
T1-16	0.03	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.00
T1-17	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
T1-18	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
SRM614-8	0.43	0.52	0.50	0.45	0.49	0.54	0.47	0.51	0.48
SRM612-8	22.29	24.86	23.36	23.89	27.33	24.93	26.88	26.54	27.74
SRM610-8	321.53	374.38	409.27	360.01	508.04	389.11	506.64	421.57	526.38
AP1-8	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02
AP2-8	0.55	0.57	0.58	0.57	0.62	0.95	0.94	0.98	0.63
AP3-8	2.52	2.48	2.47	2.29	2.45	3.63	3.61	3.61	2.45
AP4-8	3.86	3.92	3.80	3.67	3.99	5.84	5.93	5.98	3.97
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.063632	0.117316	0.290486	0.097711	0.493558	0.103312	0.526890	0.150482	0.572764
AP1-6	0.000001	0.000001	0.000001	0.000000	0.000001	0.000000	0.000001	0.000001	0.000000
AP2-6	0.000027	0.000042	0.000093	0.000034	0.000148	0.000059	0.000236	0.000081	0.000175
AP3-6	0.000138	0.000206	0.000516	0.000168	0.000669	0.000257	0.001076	0.000355	0.000750
AP4-6	0.000180	0.000282	0.000646	0.000230	0.000969	0.000369	0.001503	0.000500	0.001070
standardize signal averages AP									
AP1	0.000004	0.000003	0.000006	0.000003	0.000006	0.000002	0.000006	0.000002	0.000007
AP2	0.000029	0.000046	0.000107	0.000041	0.000156	0.000062	0.000248	0.000084	0.000183
AP3	0.000145	0.000224	0.000565	0.000195	0.000700	0.000265	0.001108	0.000368	0.000778
AP4	0.000182	0.000293	0.000687	0.000255	0.000997	0.000379	0.001579	0.000520	0.001118
linest from std sig ave									
	0.046239	0.030473	0.012632	0.034848	0.009376	0.036356	0.008823	0.026620	0.008457
standardize signal averages SRM									
srm614-2	0.000080	0.000149	0.000323	0.000125	0.000468	0.000124	0.000473	0.000161	0.000501
srm612-2	0.004068	0.007428	0.016691	0.006586	0.026843	0.006398	0.028359	0.009251	0.030733
srm610-2	0.057112	0.109833	0.279829	0.094347	0.450297	0.095041	0.481004	0.137429	0.527563
linest from std sig ave									
	0.088019	0.047870	0.019231	0.051960	0.011481	0.052384	0.010910	0.036193	0.009302
concentration data									
SRM614-5	0.28	0.36	0.33	0.37	0.35	0.33	0.33	0.32	0.32
SRM612-5	14.48	18.30	17.59	19.48	19.87	18.42	19.77	19.50	20.70
SRM610-5	200.63	267.49	291.61	271.92	327.29	270.55	329.27	283.95	349.85
AP1-5	0.12	0.06	0.06	0.09	0.05	0.05	0.04	0.04	0.05
AP2-5	0.58	0.61	0.61	0.68	0.61	0.94	0.91	0.92	0.64
AP3-5	2.80	2.95	3.10	3.10	2.74	3.96	4.01	4.06	2.72
AP4-5	3.38	3.70	3.67	3.89	3.84	5.63	5.82	5.73	3.93
TGP12-1	0.19	0.05	0.03	0.13	0.03	0.04	0.02	0.02	0.02
TGP12-2	0.10	0.05	0.00	0.12	0.01	0.02	0.01	0.00	0.00
TGP12-3	0.09	0.03	0.03	0.09	0.01	0.01	0.01	0.01	0.00
TGP12-4	0.23	0.12	0.06	0.15	0.03	0.06	0.03	0.02	0.02
TGP12-5	0.13	0.07	0.02	0.05	0.01	0.02	0.01	0.02	0.00
TGP12-6	0.12	0.07	0.03	0.05	0.02	0.03	0.01	0.01	0.00
TGP12-7	0.23	0.12	0.06	0.08	0.02	0.06	0.01	0.03	0.01
TGP12-8	0.15	0.09	0.04	0.05	0.01	0.04	0.01	0.01	0.00
TGP12-9	0.11	0.08	0.05	0.03	0.01	0.02	0.01	0.01	0.00
TGP12-10	0.16	0.09	0.05	0.04	0.01	0.04	0.01	0.02	0.01
TGP12-11	0.11	0.08	0.03	0.02	0.01	0.02	0.00	0.01	0.00
TGP12-12	0.10	0.07	0.04	0.02	0.00	0.01	0.00	0.01	0.00
TGP12-13	0.06	0.04	0.02	0.02	0.01	0.00	0.00	0.00	0.01
TGP12-14	0.02	0.03	0.01	0.04	0.00	0.00	0.00	0.00	0.00
TGP12-15	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.00
TGP12-16	0.08	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.00
TGP12-17	0.08	0.04	0.01	0.03	0.01	0.01	0.00	0.01	0.00
TGP12-18	0.05	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00
SRM614-6	0.36	0.42	0.37	0.38	0.41	0.44	0.38	0.42	0.41
SRM612-6	17.78	20.53	18.58	19.89	23.30	21.48	23.15	22.74	23.88
SRM610-6	252.34	306.61	314.70	292.02	396.86	322.13	398.71	343.55	415.42
AP1-6	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
AP2-6	0.50	0.51	0.47	0.47	0.55	0.85	0.83	0.86	0.59
AP3-6	2.55	2.50	2.60	2.34	2.50	3.73	3.79	3.77	2.53
AP4-6	3.32	3.43	3.25	3.20	3.62	5.35	5.29	5.31	3.61
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-1	4.96	8.96	10.08	5.32	7.64	3.96	2.72	3.96	5.68
SRM614-1	329.48	633.40	1342.29	505.88	1862.57	450.88	1901.69	644.28	2028.53
SRM612-1	15929.61	29223.00	65010.84	25433.54	108394.25	25044.74	113384.16	36327.36	123026.93
SRM610-1	92819.08	178134.64	454122.84	150586.25	757554.75	154927.39	804319.69	223550.50	873304.13
AP1-1	96.40	142.88	314.80	109.16	369.72	98.80	364.56	134.88	366.40
AP2-1	875.76	1396.41	3171.10	1166.69	4713.51	1803.57	7248.60	2381.65	5230.75
AP3-1	4149.42	6705.08	15523.53	5419.63	20722.08	7886.84	32797.79	10598.02	22687.25
AP4-1	5963.39	9589.49	22430.81	7865.96	30433.13	11607.39	48619.43	15812.65	33919.19
TGP18-1	82.92	47.92	55.20	36.32	45.96	32.56	41.64	27.20	39.52
TGP18-2	54.96	39.76	48.00	28.24	20.20	20.20	18.52	12.24	22.60

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	70.24	31.32	28.96	24.76	23.40	15.92	16.00	18.92	13.56
TGP18-4	228.08	121.44	103.16	81.88	67.24	47.68	51.72	32.60	31.08
TGP18-5	238.32	86.64	80.96	86.48	53.28	48.68	33.52	23.40	22.04
TGP18-6	79.08	40.04	40.36	17.52	21.20	9.28	10.44	5.76	8.56
TGP18-7	74.64	51.24	56.64	27.12	33.20	15.08	27.36	17.68	21.24
TGP18-8	99.88	45.36	64.68	26.28	23.32	15.40	17.84	15.36	9.08
TGP18-9	101.84	56.76	47.88	25.20	38.32	25.64	14.68	10.04	9.96
TGP18-10	143.56	84.32	71.60	54.72	53.24	34.96	31.68	21.20	26.20
TGP18-11	163.84	97.00	76.20	36.92	57.16	32.56	23.80	15.80	14.92
TGP18-12	206.48	105.32	84.36	61.08	78.40	45.00	39.80	32.84	14.64
SRM614-2	181.04	333.36	720.76	269.48	1144.69	297.92	1131.41	431.36	1216.37
SRM612-2	12462.31	21882.76	47033.82	18451.70	81999.06	19338.11	87269.09	28035.08	93559.13
SRM610-2	74004.77	135340.36	338047.38	110991.78	592035.56	120505.00	634735.50	176038.44	682314.06
AP1-2	16.08	19.92	40.84	13.00	41.12	6.88	51.16	18.64	44.48
AP2-2	637.08	948.37	1930.57	789.80	3168.82	1319.05	5139.47	1763.73	3648.14
AP3-2	3478.90	5274.15	12527.55	3960.18	16820.46	6529.04	26859.51	8689.33	18950.71
AP4-2	5321.63	8356.61	19830.43	6407.96	27204.95	10226.78	42945.20	14145.84	30141.73
blank-2	5.52	6.96	7.72	5.52	4.96	7.16	8.92	6.88	3.64
blank ave	5.24	7.96	8.90	5.42	6.30	5.56	5.82	5.42	4.66

blank subtraction									
SRM614-1	324.24	625.44	1333.39	500.46	1856.27	445.32	1895.87	638.86	2023.87
SRM612-1	15924.37	29215.04	65001.94	25428.12	108387.95	25039.18	113378.34	36321.94	123022.27
SRM610-1	92813.84	178126.68	454113.94	150580.83	757548.45	154921.83	804313.87	223545.08	873299.47
AP1-1	91.16	134.92	305.90	103.74	363.42	93.24	358.74	129.46	361.74
AP2-1	870.52	1388.45	3162.20	1161.27	4707.21	1798.01	7242.78	2376.23	5226.09
AP3-1	4144.18	6697.12	15514.63	5414.21	20715.78	7881.28	32791.96	10592.60	22682.59
AP4-1	5958.15	9581.53	22421.91	7860.54	30426.83	11601.83	48613.61	15807.23	33914.53
TGP18-1	77.68	39.96	46.30	30.90	39.66	27.00	35.82	21.78	34.86
TGP18-2	49.72	31.80	39.10	22.82	13.90	14.64	12.70	6.82	17.94
TGP18-3	65.00	23.36	20.06	19.34	17.10	10.36	10.18	13.50	8.90
TGP18-4	222.84	113.48	94.26	76.46	60.94	42.12	45.90	27.18	26.42
TGP18-5	233.08	78.68	72.06	81.06	46.98	43.12	27.70	17.98	17.38
TGP18-6	73.84	32.08	31.46	12.10	14.90	3.72	4.62	0.34	3.90
TGP18-7	69.40	43.28	47.74	21.70	26.90	9.52	21.54	12.26	16.58
TGP18-8	94.64	37.40	55.78	20.86	17.02	9.84	12.02	9.94	4.42
TGP18-9	96.60	48.80	38.98	19.78	32.02	20.08	8.86	4.62	5.30
TGP18-10	138.32	76.36	62.70	49.30	46.94	29.40	25.86	15.78	21.54
TGP18-11	158.60	89.04	67.30	31.50	50.86	27.00	17.98	10.38	10.26
TGP18-12	201.24	97.36	75.46	55.66	72.10	39.44	33.98	27.42	9.98
SRM614-2	175.80	325.40	711.86	264.06	1138.39	292.36	1125.59	425.94	1211.71
SRM612-2	12457.07	21874.80	47024.92	18446.28	81992.76	19332.55	87263.27	28029.66	93554.46
SRM610-2	73999.53	135332.40	338038.48	110986.36	592029.26	120499.44	634729.68	176033.02	682309.40
AP1-2	10.84	11.96	31.94	7.58	34.82	1.32	45.34	13.22	39.82
AP2-2	631.84	940.41	1921.67	784.38	3162.52	1313.49	5133.65	1758.31	3643.48
AP3-2	3473.66	5266.19	12518.65	3954.76	16814.15	6523.48	26853.69	8683.91	18946.05
AP4-2	5316.39	8348.65	19821.53	6402.54	27198.65	10221.22	42939.38	14140.42	30137.07

zero correction									
SRM614-1	324.24	625.44	1333.39	500.46	1856.27	445.32	1895.87	638.86	2023.87
SRM612-1	15924.37	29215.04	65001.94	25428.12	108387.95	25039.18	113378.34	36321.94	123022.27
SRM610-1	92813.84	178126.68	454113.94	150580.83	757548.45	154921.83	804313.87	223545.08	873299.47
AP1-1	91.16	134.92	305.90	103.74	363.42	93.24	358.74	129.46	361.74
AP2-1	870.52	1388.45	3162.20	1161.27	4707.21	1798.01	7242.78	2376.23	5226.09
AP3-1	4144.18	6697.12	15514.63	5414.21	20715.78	7881.28	32791.96	10592.60	22682.59
AP4-1	5958.15	9581.53	22421.91	7860.54	30426.83	11601.83	48613.61	15807.23	33914.53
TGP18-1	77.68	39.96	46.30	30.90	39.66	27.00	35.82	21.78	34.86
TGP18-2	49.72	31.80	39.10	22.82	13.90	14.64	12.70	6.82	17.94
TGP18-3	65.00	23.36	20.06	19.34	17.10	10.36	10.18	13.50	8.90
TGP18-4	222.84	113.48	94.26	76.46	60.94	42.12	45.90	27.18	26.42
TGP18-5	233.08	78.68	72.06	81.06	46.98	43.12	27.70	17.98	17.38
TGP18-6	73.84	32.08	31.46	12.10	14.90	3.72	4.62	0.34	3.90
TGP18-7	69.40	43.28	47.74	21.70	26.90	9.52	21.54	12.26	16.58
TGP18-8	94.64	37.40	55.78	20.86	17.02	9.84	12.02	9.94	4.42
TGP18-9	96.60	48.80	38.98	19.78	32.02	20.08	8.86	4.62	5.30
TGP18-10	138.32	76.36	62.70	49.30	46.94	29.40	25.86	15.78	21.54
TGP18-11	158.60	89.04	67.30	31.50	50.86	27.00	17.98	10.38	10.26
TGP18-12	201.24	97.36	75.46	55.66	72.10	39.44	33.98	27.42	9.98
SRM614-2	175.80	325.40	711.86	264.06	1138.39	292.36	1125.59	425.94	1211.71
SRM612-2	12457.07	21874.80	47024.92	18446.28	81992.76	19332.55	87263.27	28029.66	93554.46
SRM610-2	73999.53	135332.40	338038.48	110986.36	592029.26	120499.44	634729.68	176033.02	682309.40
AP1-2	10.84	11.96	31.94	7.58	34.82	1.32	45.34	13.22	39.82
AP2-2	631.84	940.41	1921.67	784.38	3162.52	1313.49	5133.65	1758.31	3643.48
AP3-2	3473.66	5266.19	12518.65	3954.76	16814.15	6523.48	26853.69	8683.91	18946.05
AP4-2	5316.39	8348.65	19821.53	6402.54	27198.65	10221.22	42939.38	14140.42	30137.07

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.06	0.02	0.01	0.02	0.00	0.01	0.00	0.00	0.00
TGP18-11	0.06	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00
TGP18-12	0.08	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.00
SRM614-2	1.23	1.51	1.41	1.54	1.67	1.66	1.55	1.79	1.61
SRM612-2	13.94	16.14	14.80	17.17	19.15	17.48	19.11	18.77	19.81
SRM610-2	194.03	233.96	249.37	242.14	324.07	255.32	325.73	276.26	338.61
AP1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-2	0.46	0.45	0.39	0.47	0.48	0.77	0.73	0.76	0.50
AP3-2	2.41	2.41	2.44	2.28	2.44	3.66	3.65	3.61	2.49
AP4-2	3.82	3.95	4.00	3.82	4.08	5.93	6.03	6.08	4.09

certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

raw data	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-7b	11	8	8	3	12	5	6	5	6
SRM614-7b	166	242	603	213	836	243	835	325	904
SRM612-7	7997	13785	30908	11394	47691	11438	50360	16648	53590
SRM610-7	55401	99641	236825	82586	401843	89438	426109	127168	462398
AP1-7	21	23	30	20	59	17	51	25	47
AP2-7	245	384	840	319	1279	499	2019	694	1445
AP3-7	718	1173	2577	961	3977	1490	6198	2076	4463
AP4-7	1265	2007	4579	1592	6381	2483	10440	3453	7422
MZ3-1	154	48	38	54	53	40	42	37	25
MZ3-2	104	42	22	35	20	26	20	22	20
MZ3-3	71	29	20	34	22	21	27	27	12
MZ3-4	198	75	72	59	39	39	41	29	29
MZ3-5	134	57	46	36	28	18	33	24	9
MZ3-6	156	64	54	50	27	37	31	36	26
MZ3-7	204	68	65	62	37	33	39	35	23
MZ3-8	144	68	60	56	34	43	47	32	17
MZ3-9	118	53	68	43	34	20	23	23	14
srM614-8	118	202	412	126	600	145	602	181	652
srM612-8	5705	9736	21540	7746	33715	8052	35727	11660	37552
srM610-8	48288	85698	198622	70013	342981	76475	365035	109613	392402
AP1-8	19	14	11	10	12	6	10	5	6
AP2-8	184	338	707	244	1045	425	1632	623	1207
AP3-8	760	1152	2594	897	4092	1493	6291	2113	4408
AP4-8	1239	1962	4353	1577	6569	2476	10465	3510	7186
blank-8	7	13	6	4	6	6	2	4	6
blank ave	9	10	7	4	9	6	4	4	6

blank subtraction	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
SRM614-7b	157.48	232.00	595.94	209.34	827.00	237.26	831.26	320.10	898.11
SRM612-7	7987.85	13774.44	30901.31	11390.28	47681.71	11432.40	50356.06	16643.43	53584.32
SRM610-7	55392.03	99630.96	236818.19	82582.61	401834.04	89431.93	426104.98	127163.89	462391.94
AP1-7	11.56	12.64	22.58	16.70	50.52	11.54	46.82	20.86	41.58
AP2-7	236.04	373.88	833.42	315.38	1269.97	492.94	2014.39	689.94	1439.07
AP3-7	708.72	1162.29	2569.99	957.71	3968.10	1484.83	6194.13	2071.55	4457.45
AP4-7	1256.01	1996.41	4572.01	1588.07	6371.68	2477.31	10436.12	3448.72	7416.02
MZ3-1	145.12	37.84	31.10	50.70	43.76	33.94	37.50	32.58	19.62
MZ3-2	94.84	31.88	14.94	31.54	11.40	20.06	16.06	17.46	14.46
MZ3-3	62.12	18.64	13.42	30.06	13.16	15.50	22.42	23.02	5.86
MZ3-4	188.92	64.20	64.98	55.54	30.56	32.98	36.94	24.10	22.82
MZ3-5	125.52	46.12	38.50	32.74	18.80	12.18	28.54	19.26	2.78
MZ3-6	147.36	53.64	46.90	46.54	18.16	31.50	26.46	31.54	19.74
MZ3-7	194.72	57.76	58.14	58.34	27.76	27.14	34.34	30.10	17.46
MZ3-8	135.28	57.32	53.30	52.62	25.24	37.50	42.42	27.18	10.74
MZ3-9	109.16	42.76	60.98	39.42	25.04	14.50	19.10	18.38	8.26
srM614-8	108.72	191.36	405.06	122.30	591.28	139.50	597.42	176.30	646.22
srM612-8	5696.27	9725.10	21532.54	7742.70	33706.19	8045.95	35722.94	11655.85	37546.15
srM610-8	48278.55	85687.96	198614.97	70008.93	342972.29	76468.93	365031.26	109608.56	392395.91
AP1-8	10.12	3.44	4.42	6.10	3.48	0.06	5.86	0.50	0.42
AP2-8	175.24	327.76	699.46	240.58	1036.01	419.82	1627.51	618.42	1201.11
AP3-8	750.92	1141.09	2587.31	893.07	4083.58	1487.63	6287.06	2108.75	4401.93
AP4-8	1229.89	1951.97	4345.88	1573.67	6559.68	2470.71	10460.56	3506.08	7180.30

zero correction	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
SRM614-7b	157.48	232.00	595.94	209.34	827.00	237.26	831.26	320.10	898.11
SRM612-7	7987.85	13774.44	30901.31	11390.28	47681.71	11432.40	50356.06	16643.43	53584.32
SRM610-7	55392.03	99630.96	236818.19	82582.61	401834.04	89431.93	426104.98	127163.89	462391.94

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave									
	1.003946	1.010597	1.023157	1.017852	1.014407	1.013514	1.012564	1.009521	1.017288
concentration data									
SRM614-7b	0.54	0.52	0.60	0.59	0.57	0.63	0.53	0.61	0.56
SRM612-7	25.25	28.59	28.60	29.39	30.11	27.99	29.61	29.23	30.42
SRM610-7	380.80	449.75	476.71	463.50	552.01	476.33	544.98	485.85	571.04
AP1-7	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.02
AP2-7	0.64	0.66	0.66	0.70	0.69	1.03	1.01	1.04	0.70
AP3-7	1.92	2.07	2.04	2.12	2.15	3.12	3.13	3.12	2.17
AP4-7	3.65	3.81	3.89	3.77	3.70	5.57	5.64	5.57	3.87
MZ3-1	0.73	0.12	0.05	0.21	0.04	0.13	0.03	0.09	0.02
MZ3-2	0.47	0.10	0.02	0.13	0.01	0.08	0.01	0.05	0.01
MZ3-3	0.34	0.07	0.02	0.14	0.01	0.07	0.02	0.07	0.01
MZ3-4	0.32	0.07	0.03	0.08	0.01	0.04	0.01	0.02	0.01
MZ3-5	0.27	0.07	0.02	0.06	0.01	0.02	0.01	0.02	0.00
MZ3-6	0.26	0.06	0.02	0.07	0.01	0.04	0.01	0.03	0.01
MZ3-7	0.35	0.07	0.03	0.09	0.01	0.04	0.01	0.03	0.01
MZ3-8	0.25	0.07	0.03	0.08	0.01	0.05	0.01	0.03	0.00
MZ3-9	0.20	0.05	0.03	0.06	0.01	0.02	0.01	0.02	0.00
srm614-8	0.52	0.60	0.57	0.48	0.57	0.52	0.53	0.47	0.56
srm612-8	25.39	28.46	28.10	28.18	30.02	27.79	29.62	28.87	30.06
srm610-8	377.79	440.29	455.09	447.25	536.29	463.60	531.42	476.67	551.59
AP1-8	0.03	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00
AP2-8	0.56	0.69	0.66	0.63	0.67	1.05	0.67	1.10	0.69
AP3-8	2.20	2.20	2.22	2.14	2.40	3.38	3.43	3.44	2.32
AP4-8	3.96	4.13	4.10	4.14	4.22	6.16	6.26	6.27	4.15
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93
raw data									
	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
blank-5	15.72	5.92	7.32	16.12	8.28	5.08	7.32	8.24	4.48
SRM614-5	398.68	710.04	1646.49	600.12	2220.09	534.72	2379.09	794.84	2525.69
SRM612-5	16396.77	29514.33	66411.45	25037.42	105731.16	24932.58	111712.71	35722.92	120440.27
SRM610-5	74007.54	137336.17	337770.09	115016.80	553557.13	119776.31	584552.44	170514.36	635621.00
AP1-5	76.52	59.72	224.64	70.96	166.12	42.88	147.48	58.92	133.92
AP2-5	798.52	1221.65	2793.98	1044.61	4020.02	1590.53	6384.12	2190.53	4707.51
AP3-5	3045.66	4758.19	10991.66	3885.62	14837.16	5842.23	23660.77	7806.28	16904.18
AP4-5	6742.76	10337.82	25385.94	8125.09	31804.66	12065.23	50336.72	16716.69	35258.36
V1-1	543.40	223.44	187.72	229.68	153.56	152.20	160.48	157.48	90.00
V1-2	581.40	254.08	158.44	231.68	112.96	154.40	128.60	113.40	57.16
V1-3	678.84	238.64	156.04	228.44	106.68	113.08	89.32	62.16	46.84
V1-4	457.20	176.04	136.92	183.96	91.60	104.60	94.32	66.04	47.88
V1-5	232.80	99.24	81.28	92.40	53.96	60.48	54.32	49.36	39.76
V1-6	343.56	125.88	99.20	127.44	72.80	82.00	67.76	63.88	28.40
V1-7	514.52	196.88	150.00	211.72	129.28	110.60	120.56	83.68	72.96
V1-8	382.68	121.52	89.52	145.12	86.32	93.28	81.04	72.64	44.80
V1-9	925.09	380.80	240.72	395.68	187.40	280.16	206.68	194.40	70.64
V1-10	161.40	65.84	50.44	57.12	23.44	36.32	34.48	19.00	19.76
V1-11	174.64	58.68	61.16	81.92	34.56	26.84	33.28	25.16	26.36
V1-12	134.80	44.96	51.84	58.16	32.28	28.00	25.16	22.80	12.60
V1-13	245.88	101.40	89.28	113.48	45.72	53.96	48.24	39.44	34.12
V1-14	151.64	74.12	46.52	75.00	28.88	44.84	34.28	21.56	14.96
V1-15	150.16	76.36	78.40	73.56	28.08	36.44	30.68	24.32	13.76
SRM614-6	111.52	224.04	504.40	168.40	738.20	192.88	740.96	244.44	790.92
SRM612-6	11233.42	19293.63	42535.76	15985.97	69591.75	16606.41	72770.57	23654.45	78031.84
SRM610-6	77021.56	137830.89	333857.53	111835.67	570513.19	121172.20	603524.63	174012.45	647004.00
AP1-6	23.04	19.72	36.12	13.40	39.04	11.72	41.16	18.04	34.92
AP2-6	473.68	790.00	1638.85	660.00	2695.70	1096.69	4294.06	1439.81	2972.82
AP3-6	2377.29	3597.46	8271.65	2841.54	11693.83	4467.43	18562.15	6322.80	13077.31
AP4-6	3997.06	6310.00	14929.24	4867.39	19728.23	7571.44	31667.10	10234.22	21815.80
blank-6	8.44	12.24	4.44	6.52	6.68	4.92	5.32	4.76	6.84
blank average	12.08	9.08	5.88	11.32	7.48	5.00	6.32	6.50	5.66
blank subtraction									
SRM614-5	386.60	700.96	1640.61	588.80	2212.61	529.72	2372.77	788.34	2520.03
SRM612-5	16384.69	29505.25	66405.57	25026.10	105723.68	24927.58	111706.39	35716.42	120434.61
SRM610-5	73995.46	137327.09	337764.21	115005.48	553549.65	119771.31	584546.12	170507.86	635615.34
AP1-5	64.44	50.64	218.76	59.64	158.64	37.88	141.16	52.42	128.26
AP2-5	786.44	1212.57	2788.10	1033.29	4012.54	1585.53	6377.80	2184.03	4701.85

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	0.26	0.09	0.04	0.07	0.02	0.05	0.02	0.03	0.02
V3-5	0.26	0.07	0.03	0.03	0.01	0.02	0.01	0.01	0.01
V3-6	0.16	0.03	0.02	0.02	0.00	0.02	0.01	0.01	0.00
V3-7	0.21	0.09	0.05	0.07	0.02	0.08	0.02	0.03	0.01
V3-8	0.14	0.06	0.04	0.03	0.01	0.02	0.00	0.01	0.00
V3-9	0.14	0.07	0.04	0.02	0.01	0.02	0.01	0.01	0.00
SRM614-4	0.36	0.38	0.37	0.37	0.39	0.40	0.35	0.39	0.38
SRM612-4	16.50	19.34	18.11	20.08	21.76	19.54	21.52	20.85	21.95
SRM610-4	222.43	263.82	283.82	264.81	331.61	270.90	329.58	288.26	342.09
AP1-4	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP2-4	0.46	0.47	0.46	0.51	0.54	0.79	0.79	0.78	0.53
AP3-4	2.02	2.15	2.13	2.08	2.14	3.13	3.25	3.29	2.19
AP4-4	3.40	3.55	3.58	3.50	3.69	5.52	5.50	5.54	3.73
certified concentration									
SRM614	0.74	0.77	0.75	0.75	0.74	0.74	0.76	0.73	0.72
SRM612	35.24	36.72	34.44	36.95	35.92	35.97	37.87	37.43	37.55
SRM610	430.80	450.50	461.10	419.90	442.80	426.50	449.40	426.00	420.10
STD AP1	0.00	0.13	0.05	0.10	0.12	0.06	0.14	0.06	0.16
STD AP2	0.72	0.85	0.79	0.82	0.85	1.17	1.25	1.17	0.90
STD AP3	2.17	2.29	2.28	2.26	2.29	3.37	3.44	3.41	2.33
STD AP4	3.73	3.85	3.89	3.86	3.92	5.78	5.82	5.83	3.93

Appendix A. Raw trace element datasheets from laser ablation.

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-3	2.32	2.36	4.76	1.44	4.00	505.32	31.20
SRM614-3	543.88	1981.85	686.04	1886.57	1056.05	727.04	1137.97
SRM612-3	28334.16	111988.71	35098.20	100551.77	44866.13	868.92	59399.65
SRM610-3	161147.59	777531.25	204188.03	668894.75	242984.00	1093.81	77237.48
AP1-3	38.64	133.44	43.72	333.72	316.88	632.68	111.52
AP2-3	1477.37	4161.86	94.80	1756.89	4071.46	575.88	1591.45
AP3-3	6853.04	18694.51	78.56	9871.66	8950.13	701.80	5448.11
AP4-3	10007.02	27518.72	139.40	12960.55	17751.06	852.96	6692.16
EVA2.5-1	3.52	16.56	44.84	8.48	162.80	845.08	44.88
EVA2.5-2	11.92	39.52	52.04	20.56	138.04	930.93	44.52
EVA2.5-3	9.00	19.12	51.56	5.08	118.40	910.97	32.36
EVA2.5-4	8.08	17.68	25.12	9.32	73.08	803.08	34.20
EVA2.5-5	7.92	19.08	15.64	3.24	28.96	789.68	31.48
EVA2.5-6	6.76	11.16	5.80	1.16	32.32	762.48	29.00
EVA2.5-7	9.84	26.52	15.00	24.56	85.12	875.36	49.56
EVA2.5-8	6.40	12.84	6.48	4.56	34.52	826.32	33.56
EVA2.5-9	4.56	15.36	11.52	3.36	76.64	856.80	28.96
EVA2.5-10	7.40	9.64	11.88	10.04	44.44	877.64	50.60
EVA2.5-11	4.68	20.96	6.88	9.24	24.76	837.48	26.64
EVA2.5-12	1.52	10.52	14.04	9.80	29.28	864.84	22.80
EVA2.5-13	5.44	23.24	13.96	8.52	25.80	897.41	28.80
EVA2.5-14	3.24	3.68	5.12	2.84	13.52	802.76	29.04
EVA2.5-15	2.04	10.40	7.00	4.60	32.08	818.92	24.04
SRM614-4	331.32	1433.69	532.88	1464.41	752.24	647.64	830.68
SRM612-4	18991.75	80164.49	27627.28	76816.56	32835.63	743.40	35975.08
SRM610-4	114733.45	592316.00	168889.03	542633.25	198946.92	848.68	59599.86
AP1-4	4.96	13.88	14.56	221.24	140.28	561.92	36.72
AP2-4	897.37	2666.50	25.88	1339.37	2279.85	524.80	701.44
AP3-4	4633.71	13156.47	52.08	7063.12	6338.20	578.20	3670.90
AP4-4	5436.19	15850.81	56.76	7428.28	9168.21	710.72	2972.66
blank-4	2.92	4.08	4.04	2.76	7.52	516.20	21.48
blank average	2.62	3.22	4.40	2.10	5.76	510.76	26.34
blank subtraction							
SRM614-3	541.26	1978.63	681.64	1884.47	1050.29	216.28	1111.63
SRM612-3	28331.54	111985.49	35093.79	100549.67	44860.37	358.16	59373.31
SRM610-3	161144.97	777528.03	204183.63	668892.65	242978.24	583.04	77211.14
AP1-3	36.02	130.22	39.32	331.62	311.12	121.92	85.18
AP2-3	1474.75	4158.64	90.40	1754.79	4065.70	65.12	1565.11
AP3-3	6850.42	18691.29	74.16	9869.56	8944.37	191.04	5421.77
AP4-3	10004.40	27515.49	135.00	12958.45	17745.30	342.20	6665.82
EVA2.5-1	0.90	13.34	40.44	6.38	157.04	334.32	18.54
EVA2.5-2	9.30	36.30	47.64	18.46	132.28	420.16	18.18
EVA2.5-3	6.38	15.90	47.16	2.98	112.64	400.20	6.02
EVA2.5-4	5.46	14.46	20.72	7.22	67.32	292.32	7.86
EVA2.5-5	5.30	15.86	11.24	1.14	23.20	278.92	5.14
EVA2.5-6	4.14	7.94	1.40	-0.94	26.56	251.72	2.66
EVA2.5-7	7.22	23.30	10.60	22.46	79.36	364.60	23.22
EVA2.5-8	3.78	9.62	2.08	2.46	28.76	315.56	7.22
EVA2.5-9	1.94	12.14	7.12	1.26	70.88	346.04	2.62
EVA2.5-10	4.78	6.42	7.48	7.94	38.68	366.88	24.26
EVA2.5-11	2.06	17.74	2.48	7.14	19.00	326.72	0.30
EVA2.5-12	-1.10	7.30	9.64	7.70	23.52	354.08	-3.54
EVA2.5-13	2.82	20.02	9.56	6.42	20.04	386.64	2.46
EVA2.5-14	0.62	0.46	0.72	0.74	7.76	292.00	2.70
EVA2.5-15	-0.58	7.18	2.60	2.50	26.32	308.16	-2.30
SRM614-4	328.70	1430.47	528.48	1462.31	746.48	136.88	804.34
SRM612-4	18989.13	80161.27	27622.87	76814.45	32829.86	232.64	35948.74
SRM610-4	114730.83	592312.78	168884.63	542631.15	198941.16	337.92	59573.51
AP1-4	2.34	10.66	10.16	219.14	134.52	51.16	10.38
AP2-4	894.75	2663.28	21.48	1337.27	2274.09	14.04	675.10
AP3-4	4631.09	13153.25	47.68	7061.02	6332.44	67.44	3644.56
AP4-4	5433.57	15847.59	52.36	7426.18	9162.45	199.96	2946.32
zero correction							
SRM614-3	541.26	1978.63	681.64	1884.47	1050.29	216.28	1111.63
SRM612-3	28331.54	111985.49	35093.79	100549.67	44860.37	358.16	59373.31

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	161144.97	777528.03	204183.63	668892.65	242978.24	583.04	77211.14
AP1-3	36.02	130.22	39.32	331.62	311.12	121.92	85.18
AP2-3	1474.75	4158.64	90.40	1754.79	4065.70	65.12	1565.11
AP3-3	6850.42	18691.29	74.16	9869.56	8944.37	191.04	5421.77
AP4-3	10004.40	27515.49	135.00	12958.45	17745.30	342.20	6665.82
EVA2.5-1	0.90	13.34	40.44	6.38	157.04	334.32	18.54
EVA2.5-2	9.30	36.30	47.64	18.46	132.28	420.16	18.18
EVA2.5-3	6.38	15.90	47.16	2.98	112.64	400.20	6.02
EVA2.5-4	5.46	14.46	20.72	7.22	67.32	292.32	7.86
EVA2.5-5	5.30	15.86	11.24	1.14	23.20	278.92	5.14
EVA2.5-6	4.14	7.94	1.40	0.00	26.56	251.72	2.66
EVA2.5-7	7.22	23.30	10.60	22.46	79.36	364.60	23.22
EVA2.5-8	3.78	9.62	2.08	2.46	28.76	315.56	7.22
EVA2.5-9	1.94	12.14	7.12	1.26	70.88	346.04	2.62
EVA2.5-10	4.78	6.42	7.48	7.94	38.68	366.88	24.26
EVA2.5-11	2.06	17.74	2.48	7.14	19.00	326.72	0.30
EVA2.5-12	0.00	7.30	9.64	7.70	23.52	354.08	0.00
EVA2.5-13	2.82	20.02	9.56	6.42	20.04	386.64	2.46
EVA2.5-14	0.62	0.46	0.72	0.74	7.76	292.00	2.70
EVA2.5-15	0.00	7.18	2.60	2.50	26.32	308.16	0.00
SRM614-4	328.70	1430.47	528.48	1462.31	746.48	136.88	804.34
SRM612-4	18989.13	80161.27	27622.87	76814.45	32829.86	232.64	35948.74
SRM610-4	114730.83	592312.78	168884.63	542631.15	198941.16	337.92	59573.51
AP1-4	2.34	10.66	10.16	219.14	134.52	51.16	10.38
AP2-4	894.75	2663.28	21.48	1337.27	2274.09	14.04	675.10
AP3-4	4631.09	13153.25	47.68	7061.02	6332.44	67.44	3644.56
AP4-4	5433.57	15847.59	52.36	7426.18	9162.45	199.96	2946.32

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-3	0.000133	0.000486	0.000167	0.000463	0.000258	0.000053	0.000273
SRM612-3	0.007950	0.031425	0.009848	0.028216	0.012589	0.000101	0.016661
SRM610-3	0.125068	0.603457	0.158472	0.519143	0.188581	0.000453	0.059925
AP1-3	0.000002	0.000006	0.000002	0.000017	0.000016	0.000006	0.000004
AP2-3	0.000070	0.000198	0.000004	0.000084	0.000194	0.000003	0.000075
AP3-3	0.000293	0.000799	0.000003	0.000422	0.000382	0.000008	0.000232
AP4-3	0.000496	0.001364	0.000007	0.000642	0.000880	0.000017	0.000330
EVA2.5-1	0.000000	0.000001	0.000004	0.000001	0.000014	0.000029	0.000002
EVA2.5-2	0.000001	0.000005	0.000006	0.000002	0.000017	0.000053	0.000002
EVA2.5-3	0.000001	0.000002	0.000005	0.000000	0.000013	0.000046	0.000001
EVA2.5-4	0.000000	0.000001	0.000001	0.000000	0.000005	0.000020	0.000001
EVA2.5-5	0.000000	0.000001	0.000001	0.000000	0.000001	0.000016	0.000000
EVA2.5-6	0.000000	0.000000	0.000000	0.000000	0.000001	0.000013	0.000000
EVA2.5-7	0.000001	0.000002	0.000001	0.000002	0.000007	0.000031	0.000002
EVA2.5-8	0.000000	0.000001	0.000000	0.000000	0.000002	0.000025	0.000001
EVA2.5-9	0.000000	0.000001	0.000001	0.000000	0.000005	0.000026	0.000000
EVA2.5-10	0.000001	0.000001	0.000001	0.000001	0.000004	0.000039	0.000003
EVA2.5-11	0.000000	0.000002	0.000000	0.000001	0.000002	0.000029	0.000000
EVA2.5-12	0.000000	0.000001	0.000001	0.000001	0.000002	0.000030	0.000000
EVA2.5-13	0.000000	0.000002	0.000001	0.000001	0.000002	0.000033	0.000000
EVA2.5-14	0.000000	0.000000	0.000000	0.000000	0.000001	0.000023	0.000000

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000000	0.000001	0.000000	0.000000	0.000002	0.000024	0.000000
SRM614-4	0.000136	0.000592	0.000219	0.000605	0.000309	0.000057	0.000333
SRM612-4	0.008387	0.035404	0.012200	0.033926	0.014500	0.000103	0.015877
SRM610-4	0.121755	0.628574	0.179224	0.575851	0.211120	0.000359	0.063221
AP1-4	0.000000	0.000001	0.000001	0.000015	0.000009	0.000004	0.000001
AP2-4	0.000061	0.000182	0.000001	0.000091	0.000155	0.000001	0.000046
AP3-4	0.000278	0.000791	0.000003	0.000425	0.000381	0.000004	0.000219
AP4-4	0.000408	0.001191	0.000004	0.000558	0.000689	0.000015	0.000222

standardize signal averages AP

AP1	0.000001	0.000004	0.000001	0.000016	0.000012	0.000005	0.000002
AP2	0.000066	0.000190	0.000003	0.000087	0.000174	0.000002	0.000060
AP3	0.000286	0.000795	0.000003	0.000423	0.000382	0.000006	0.000225
AP4	0.000452	0.001278	0.000005	0.000600	0.000784	0.000016	0.000276

linest from std sig ave

0.031882	0.007877	2.603696	0.004134	0.024319	0.072667	0.010295
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standardize signal averages SRM

srm614-2	0.000134	0.000539	0.000193	0.000534	0.000283	0.000055	0.000303
srm612-2	0.008169	0.033415	0.011024	0.031071	0.013544	0.000102	0.016269
srm610-2	0.123411	0.616016	0.168848	0.547497	0.199851	0.000406	0.061573

linest from std sig ave

0.043662	0.008243	0.028879	0.008043	0.026017	0.000000	0.011538
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concentration data

SRM614-3	0.36	0.33	37.36	0.16	0.54	0.33	0.24
SRM612-3	21.74	21.23	2199.07	10.00	26.26	0.63	14.71
SRM610-3	341.97	407.68	35386.83	184.05	393.32	2.82	52.91
AP1-3	0.02	0.02	2.04	0.03	0.15	0.18	0.02
AP2-3	0.89	0.62	4.48	0.14	1.88	0.09	0.31
AP3-3	3.72	2.51	3.29	0.70	3.71	0.24	0.95
AP4-3	6.31	4.29	6.95	1.06	8.53	0.49	1.36
EVA2.5-1	0.00	0.00	3.64	0.00	0.13	0.84	0.01
EVA2.5-2	0.01	0.01	6.25	0.00	0.16	1.54	0.01
EVA2.5-3	0.01	0.01	5.62	0.00	0.13	1.33	0.00
EVA2.5-4	0.00	0.00	1.48	0.00	0.04	0.58	0.00
EVA2.5-5	0.00	0.00	0.66	0.00	0.01	0.46	0.00
EVA2.5-6	0.00	0.00	0.08	0.00	0.01	0.39	0.00
EVA2.5-7	0.01	0.01	0.93	0.00	0.07	0.89	0.01
EVA2.5-8	0.00	0.00	0.17	0.00	0.02	0.71	0.00
EVA2.5-9	0.00	0.00	0.55	0.00	0.05	0.74	0.00
EVA2.5-10	0.01	0.00	0.82	0.00	0.04	1.12	0.01
EVA2.5-11	0.00	0.01	0.23	0.00	0.02	0.85	0.00
EVA2.5-12	0.00	0.00	0.84	0.00	0.02	0.86	0.00
EVA2.5-13	0.00	0.01	0.85	0.00	0.02	0.96	0.00
EVA2.5-14	0.00	0.00	0.06	0.00	0.01	0.65	0.00
EVA2.5-15	0.00	0.00	0.21	0.00	0.02	0.70	0.00
SRM614-4	0.37	0.40	48.84	0.21	0.64	0.35	0.29
SRM612-4	22.93	23.92	2724.23	12.03	30.24	0.64	14.02
SRM610-4	332.91	424.65	40020.77	204.15	440.32	2.23	55.82
AP1-4	0.00	0.00	0.73	0.03	0.09	0.10	0.00
AP2-4	0.78	0.57	1.52	0.15	1.50	0.03	0.19
AP3-4	3.54	2.49	2.98	0.70	3.69	0.12	0.90
AP4-4	5.20	3.74	4.09	0.92	6.68	0.44	0.91

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Yb Lu Hf Ta W Hg Tl

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	1.00	2.88	2.52	3.24	3.64	401.60	28.96
SRM614-5	420.00	1571.69	500.08	1566.21	702.16	657.80	859.24
SRM612-5	24433.86	97927.63	31091.78	88606.18	38515.54	675.24	51444.37
SRM610-5	154845.44	745578.19	195237.17	631209.63	231726.86	852.40	81559.58
AP1-5	17.52	34.44	22.88	237.92	201.36	557.56	67.28
AP2-5	1099.61	3158.82	43.72	1437.09	3042.58	513.36	950.89
AP3-5	5308.63	14363.08	55.76	8104.93	5990.31	567.36	3177.70
AP4-5	7627.84	20972.28	81.96	14998.21	11895.39	670.44	4231.66
EVA3-1	25.32	24.16	29.16	16.12	45.68	712.52	46.48
EVA3-2	6.20	17.16	15.16	9.60	24.64	658.88	49.40
EVA3-3	16.00	13.84	31.44	11.20	59.20	780.28	36.88
SRM614-6	272.80	1113.53	380.24	1030.97	468.96	666.44	524.32
SRM612-6	18819.71	77082.63	25357.78	71830.48	29805.81	727.88	35974.52
SRM610-6	129342.05	656061.75	179312.66	581111.75	207675.84	801.12	72961.41
AP1-6	6.80	18.00	16.76	210.84	127.04	532.80	35.20
AP2-6	934.21	2711.18	24.20	1163.97	2467.17	538.88	806.16
AP3-6	4820.19	13216.56	51.60	7118.52	6135.99	605.60	3590.50
AP4-6	6873.04	19257.15	79.20	12014.67	12851.99	719.60	4611.99
blank-6	1.48	5.76	2.96	0.68	5.20	497.52	26.52
blank average	1.24	4.32	2.74	1.96	4.42	449.56	27.74
blank subtraction							
SRM614-5	418.76	1567.37	497.34	1564.25	697.74	208.24	831.50
SRM612-5	24432.62	97923.31	31089.03	88604.22	38511.11	225.68	51416.63
SRM610-5	154844.20	745573.87	195234.43	631207.67	231722.44	402.84	81531.84
AP1-5	16.28	30.12	20.14	235.96	196.94	108.00	39.54
AP2-5	1098.37	3154.50	40.98	1435.13	3038.16	63.80	923.15
AP3-5	5307.39	14358.76	53.02	8102.97	5985.89	117.80	3149.96
AP4-5	7626.60	20967.96	79.22	14996.24	11890.97	220.88	4203.92
EVA3-1	24.08	19.84	26.42	14.16	41.26	262.96	18.74
EVA3-2	4.96	12.84	12.42	7.64	20.22	209.32	21.66
EVA3-3	14.76	9.52	28.70	9.24	54.78	330.72	9.14
SRM614-6	271.56	1109.21	377.50	1029.01	464.54	216.88	496.58
SRM612-6	18818.46	77078.31	25355.04	71828.52	29801.39	278.32	35946.78
SRM610-6	129340.81	656057.43	179309.92	581109.79	207671.42	351.56	72933.67
AP1-6	5.56	13.68	14.02	208.88	122.62	83.24	7.46
AP2-6	932.97	2706.86	21.46	1162.01	2462.75	89.32	778.42
AP3-6	4818.95	13212.23	48.86	7116.56	6131.57	156.04	3562.76
AP4-6	6871.80	19252.83	76.46	12012.71	12847.57	270.04	4584.25
zero correction							
SRM614-5	418.76	1567.37	497.34	1564.25	697.74	208.24	831.50
SRM612-5	24432.62	97923.31	31089.03	88604.22	38511.11	225.68	51416.63
SRM610-5	154844.20	745573.87	195234.43	631207.67	231722.44	402.84	81531.84
AP1-5	16.28	30.12	20.14	235.96	196.94	108.00	39.54
AP2-5	1098.37	3154.50	40.98	1435.13	3038.16	63.80	923.15
AP3-5	5307.39	14358.76	53.02	8102.97	5985.89	117.80	3149.96
AP4-5	7626.60	20967.96	79.22	14996.24	11890.97	220.88	4203.92
EVA3-1	24.08	19.84	26.42	14.16	41.26	262.96	18.74
EVA3-2	4.96	12.84	12.42	7.64	20.22	209.32	21.66
EVA3-3	14.76	9.52	28.70	9.24	54.78	330.72	9.14
SRM614-6	271.56	1109.21	377.50	1029.01	464.54	216.88	496.58
SRM612-6	18818.46	77078.31	25355.04	71828.52	29801.39	278.32	35946.78
SRM610-6	129340.81	656057.43	179309.92	581109.79	207671.42	351.56	72933.67
AP1-6	5.56	13.68	14.02	208.88	122.62	83.24	7.46
AP2-6	932.97	2706.86	21.46	1162.01	2462.75	89.32	778.42
AP3-6	4818.95	13212.23	48.86	7116.56	6131.57	156.04	3562.76
AP4-6	6871.80	19252.83	76.46	12012.71	12847.57	270.04	4584.25
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000151	0.000566	0.000180	0.000565	0.000252	0.000075	0.000300
SRM612-5	0.008338	0.033418	0.010610	0.030238	0.013142	0.000077	0.017547
SRM610-5	0.129062	0.621433	0.162727	0.526109	0.193140	0.000336	0.067956
AP1-5	0.000001	0.000002	0.000001	0.000014	0.000012	0.000006	0.000002
AP2-5	0.000066	0.000188	0.000002	0.000086	0.000182	0.000004	0.000055
AP3-5	0.000260	0.000705	0.000003	0.000398	0.000294	0.000006	0.000155
AP4-5	0.000425	0.001169	0.000004	0.000836	0.000663	0.000012	0.000234
EVA3-1	0.000001	0.000001	0.000001	0.000001	0.000002	0.000014	0.000001
EVA3-2	0.000000	0.000001	0.000001	0.000000	0.000001	0.000012	0.000001
EVA3-3	0.000001	0.000001	0.000002	0.000001	0.000004	0.000022	0.000001
SRM614-6	0.000168	0.000687	0.000234	0.000637	0.000288	0.000134	0.000307
SRM612-6	0.008389	0.034361	0.011303	0.032021	0.013285	0.000124	0.016025
SRM610-6	0.121481	0.616190	0.168414	0.545797	0.195052	0.000330	0.068502
AP1-6	0.000000	0.000001	0.000001	0.000015	0.000009	0.000006	0.000001
AP2-6	0.000063	0.000182	0.000001	0.000078	0.000166	0.000006	0.000052
AP3-6	0.000267	0.000732	0.000003	0.000394	0.000340	0.000009	0.000197
AP4-6	0.000445	0.001248	0.000005	0.000779	0.000833	0.000018	0.000297

standardize signal averages AP

AP1	0.000001	0.000001	0.000001	0.000014	0.000010	0.000006	0.000001
AP2	0.000064	0.000185	0.000002	0.000082	0.000174	0.000005	0.000054
AP3	0.000264	0.000718	0.000003	0.000396	0.000317	0.000007	0.000176
AP4	0.000435	0.001209	0.000005	0.000807	0.000748	0.000015	0.000266

linest from std sig ave

	0.033509	0.008429	3.125283	0.003351	0.025989	0.073151	0.011489
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standardize signal averages SRM

srm614-2	0.000160	0.000626	0.000207	0.000601	0.000270	0.000105	0.000304
srm612-2	0.008364	0.033889	0.010956	0.031129	0.013214	0.000101	0.016786
srm610-2	0.125272	0.618812	0.165570	0.535953	0.194096	0.000333	0.068229

linest from std sig ave

	0.043012	0.008205	0.029449	0.008216	0.026788	0.000000	0.010459
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concentration data

SRM614-5	0.43	0.41	48.13	0.16	0.56	0.47	0.30
SRM612-5	23.96	24.16	2843.73	8.69	29.29	0.48	17.29
SRM610-5	370.90	449.26	43616.33	151.18	430.49	2.11	66.96
AP1-5	0.01	0.01	1.48	0.02	0.12	0.19	0.01
AP2-5	0.88	0.63	3.05	0.11	1.88	0.11	0.25
AP3-5	3.48	2.37	3.24	0.53	3.05	0.17	0.71
AP4-5	5.68	3.93	5.51	1.12	6.87	0.36	1.07
EVA3-1	0.02	0.00	1.78	0.00	0.02	0.42	0.00
EVA3-2	0.00	0.00	0.91	0.00	0.01	0.36	0.01
EVA3-3	0.01	0.00	2.37	0.00	0.04	0.64	0.00
SRM614-6	0.48	0.50	62.62	0.18	0.64	0.84	0.30
SRM612-6	24.11	24.84	3029.63	9.20	29.61	0.78	15.79
SRM610-6	349.11	445.47	45140.53	156.84	434.75	2.07	67.50
AP1-6	0.01	0.00	1.23	0.02	0.09	0.17	0.00
AP2-6	0.84	0.61	1.80	0.10	1.72	0.18	0.24
AP3-6	3.57	2.46	3.38	0.53	3.52	0.25	0.91
AP4-6	5.95	4.20	6.18	1.04	8.63	0.51	1.36

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Yb Lu Hf Ta W Hg Tl

raw data

blank-3	5.64	2.32	3.28	3.72	3.00	92.12	14.72
SRM614-3	174.72	779.64	274.80	749.28	420.00	6864.68	501.96
SRM612-3	161.96	634.48	236.76	649.92	322.48	5792.27	278.40
SRM610-3	68208.59	307359.41	96732.55	285936.97	114344.65	3535.14	17565.62
AP1-3	34.00	69.00	62.52	927.45	561.36	2817.54	123.04
AP2-3	1166.97	3406.86	71.44	1497.85	4372.66	2767.82	1999.77
AP3-3	5796.55	16307.97	56.52	7447.00	8626.29	2707.86	5838.55
AP4-3	10472.70	29591.09	153.00	14047.16	24362.22	2952.06	9406.37
MZ5-1	8.68	29.52	38.32	11.52	82.96	4827.03	58.44
MZ5-2	9.88	12.16	30.44	6.04	99.04	4248.22	50.20
MZ5-3	10.28	8.48	34.92	7.20	84.40	4193.34	49.04
MZ5-4	10.80	14.16	20.88	9.68	93.12	4890.15	46.16
MZ5-5	5.64	7.72	11.36	8.20	114.44	4335.22	32.76

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	7.60	5.68	15.04	3.48	97.76	4017.34	43.84
MZ5-7	9.24	10.08	5.68	4.84	96.64	4683.95	72.24
MZ5-8	6.88	10.44	10.88	4.08	99.16	4263.66	35.60
MZ5-9	7.16	9.72	15.20	1.16	94.72	4030.26	28.96
MZ5-10	24.72	17.48	33.36	21.96	143.28	4339.14	67.08
MZ5-11	9.48	17.52	20.36	7.80	81.48	4011.46	33.84
MZ5-12	7.80	19.88	15.60	7.96	67.92	3947.18	54.00
MZ5-13	5.72	17.76	13.76	10.76	60.20	4218.98	46.28
MZ5-14	19.24	20.08	20.00	6.80	59.80	4185.42	58.64
MZ5-15	12.04	12.60	24.36	13.88	40.56	3949.86	54.44
MZ5-16	3.92	11.04	23.68	8.92	135.60	3930.82	42.08
MZ5-17	8.00	5.72	27.00	2.84	100.08	3514.26	52.28
MZ5-18	11.28	7.20	24.08	5.88	77.76	3143.58	44.04
SRM614-4	126.32	505.40	181.96	483.44	273.32	2253.17	219.96
SRM612-4	5772.11	23875.49	8768.21	24104.22	15169.89	1943.25	14152.72
SRM610-4	49924.20	227703.59	74106.86	222258.61	109035.02	1762.21	22600.37
AP1-4	9.08	36.80	22.76	533.72	174.56	1425.49	40.24
AP2-4	596.88	1895.77	16.64	778.84	2092.17	1389.57	747.20
AP3-4	3079.70	8766.61	35.00	4513.63	4480.15	1491.05	2903.54
AP4-4	5534.59	15709.61	73.16	7185.56	11712.59	1705.61	4122.62
blank-4	6.44	3.40	6.80	3.24	9.32	1381.69	15.64
blank average	6.04	2.86	5.04	3.48	6.16	736.90	15.18

blank subtraction							
SRM614-3	168.68	776.78	269.76	745.80	413.84	6127.77	486.78
SRM612-3	155.92	631.62	231.72	646.44	316.32	5055.37	263.22
SRM610-3	68202.55	307356.55	96727.51	285933.49	114338.49	2798.24	17550.44
AP1-3	27.96	66.14	57.48	923.97	555.20	2080.63	107.86
AP2-3	1160.93	3404.00	66.40	1494.37	4366.50	2030.91	1984.59
AP3-3	5790.51	16305.11	51.48	7443.52	8620.13	1970.95	5823.37
AP4-3	10466.66	29588.23	147.96	14043.68	24356.06	2215.15	9391.19
MZ5-1	2.64	26.66	33.28	8.04	76.80	4090.12	43.26
MZ5-2	3.84	9.30	25.40	2.56	92.88	3511.32	35.02
MZ5-3	4.24	5.62	29.88	3.72	78.24	3456.44	33.86
MZ5-4	4.76	11.30	15.84	6.20	86.96	4153.24	30.98
MZ5-5	-0.40	4.86	6.32	4.72	108.28	3598.32	17.58
MZ5-6	1.56	2.82	10.00	0.00	91.60	3280.44	28.66
MZ5-7	3.20	7.22	0.64	1.36	90.48	3947.04	57.06
MZ5-8	0.84	7.58	5.84	0.60	93.00	3526.76	20.42
MZ5-9	1.12	6.86	10.16	-2.32	88.56	3293.36	13.78
MZ5-10	18.68	14.62	28.32	18.48	137.12	3602.24	51.90
MZ5-11	3.44	14.66	15.32	4.32	75.32	3274.56	18.66
MZ5-12	1.76	17.02	10.56	4.48	61.76	3210.28	38.82
MZ5-13	-0.32	14.90	8.72	7.28	54.04	3482.08	31.10
MZ5-14	13.20	17.22	14.96	3.32	53.64	3448.52	43.46
MZ5-15	6.00	9.74	19.32	10.40	34.40	3212.96	39.26
MZ5-16	-2.12	8.18	18.64	5.44	129.44	3193.92	26.90
MZ5-17	1.96	2.86	21.96	-0.64	93.92	2777.36	37.10
MZ5-18	5.24	4.34	19.04	2.40	71.60	2406.67	28.86
SRM614-4	120.28	502.54	176.92	479.96	267.16	1516.27	204.78
SRM612-4	5766.07	23872.63	8763.17	24100.73	15163.73	1206.35	14137.54
SRM610-4	49918.16	227700.73	74101.82	222255.13	109028.86	1025.31	22585.19
AP1-4	3.04	33.94	17.72	530.24	168.40	688.58	25.06
AP2-4	590.84	1892.91	11.60	775.36	2086.01	652.66	732.02
AP3-4	3073.66	8763.75	29.96	4510.15	4473.98	754.14	2888.36
AP4-4	5528.55	15706.75	68.12	7182.08	11706.43	968.71	4107.44

zero correction							
SRM614-3	168.68	776.78	269.76	745.80	413.84	6127.77	486.78
SRM612-3	155.92	631.62	231.72	646.44	316.32	5055.37	263.22
SRM610-3	68202.55	307356.55	96727.51	285933.49	114338.49	2798.24	17550.44
AP1-3	27.96	66.14	57.48	923.97	555.20	2080.63	107.86
AP2-3	1160.93	3404.00	66.40	1494.37	4366.50	2030.91	1984.59
AP3-3	5790.51	16305.11	51.48	7443.52	8620.13	1970.95	5823.37
AP4-3	10466.66	29588.23	147.96	14043.68	24356.06	2215.15	9391.19
MZ5-1	2.64	26.66	33.28	8.04	76.80	4090.12	43.26
MZ5-2	3.84	9.30	25.40	2.56	92.88	3511.32	35.02
MZ5-3	4.24	5.62	29.88	3.72	78.24	3456.44	33.86
MZ5-4	4.76	11.30	15.84	6.20	86.96	4153.24	30.98
MZ5-5	0.00	4.86	6.32	4.72	108.28	3598.32	17.58
MZ5-6	1.56	2.82	10.00	0.00	91.60	3280.44	28.66
MZ5-7	3.20	7.22	0.64	1.36	90.48	3947.04	57.06
MZ5-8	0.84	7.58	5.84	0.60	93.00	3526.76	20.42
MZ5-9	1.12	6.86	10.16	0.00	88.56	3293.36	13.78
MZ5-10	18.68	14.62	28.32	18.48	137.12	3602.24	51.90
MZ5-11	3.44	14.66	15.32	4.32	75.32	3274.56	18.66
MZ5-12	1.76	17.02	10.56	4.48	61.76	3210.28	38.82
MZ5-13	0.00	14.90	8.72	7.28	54.04	3482.08	31.10

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	13.20	17.22	14.96	3.32	53.64	3448.52	43.46
MZ5-15	6.00	9.74	19.32	10.40	34.40	3212.96	39.26
MZ5-16	0.00	8.18	18.64	5.44	129.44	3193.92	26.90
MZ5-17	1.96	2.86	21.96	0.00	93.92	2777.36	37.10
MZ5-18	5.24	4.34	19.04	2.40	71.60	2406.67	28.86
SRM614-4	120.28	502.54	176.92	479.96	267.16	1516.27	204.78
SRM612-4	5766.07	23872.63	8763.17	24100.73	15163.73	1206.35	14137.54
SRM610-4	49918.16	227700.73	74101.82	222255.13	109028.86	1025.31	22585.19
AP1-4	3.04	33.94	17.72	530.24	168.40	688.58	25.06
AP2-4	590.84	1892.91	11.60	775.36	2086.01	652.66	732.02
AP3-4	3073.66	8763.75	29.96	4510.15	4473.98	754.14	2888.36
AP4-4	5528.55	15706.75	68.12	7182.08	11706.43	968.71	4107.44

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-3	0.000144	0.000662	0.000230	0.000635	0.000352	0.005219	0.000415
SRM612-3	0.000181	0.000735	0.000270	0.000752	0.000368	0.005883	0.000306
SRM610-3	0.136860	0.616763	0.194100	0.573774	0.229440	0.005615	0.035218
AP1-3	0.000002	0.000005	0.000004	0.000070	0.000042	0.000159	0.000008
AP2-3	0.000080	0.000234	0.000005	0.000103	0.000301	0.000140	0.000137
AP3-3	0.000390	0.001098	0.000003	0.000501	0.000581	0.000133	0.000392
AP4-3	0.000641	0.001813	0.000009	0.000861	0.001493	0.000136	0.000576
MZ5-1	0.000000	0.000002	0.000003	0.000001	0.000006	0.000322	0.000003
MZ5-2	0.000000	0.000001	0.000002	0.000000	0.000007	0.000256	0.000003
MZ5-3	0.000000	0.000000	0.000003	0.000000	0.000007	0.000295	0.000003
MZ5-4	0.000001	0.000001	0.000002	0.000001	0.000010	0.000491	0.000004
MZ5-5	0.000000	0.000001	0.000001	0.000001	0.000012	0.000386	0.000002
MZ5-6	0.000000	0.000000	0.000001	0.000000	0.000009	0.000329	0.000003
MZ5-7	0.000000	0.000000	0.000000	0.000000	0.000006	0.000270	0.000004
MZ5-8	0.000000	0.000000	0.000000	0.000000	0.000006	0.000222	0.000001
MZ5-9	0.000000	0.000000	0.000001	0.000000	0.000006	0.000219	0.000001
MZ5-10	0.000001	0.000001	0.000002	0.000001	0.000008	0.000218	0.000003
MZ5-11	0.000000	0.000001	0.000001	0.000000	0.000004	0.000177	0.000001
MZ5-12	0.000000	0.000001	0.000001	0.000000	0.000004	0.000191	0.000002
MZ5-13	0.000000	0.000001	0.000001	0.000001	0.000004	0.000273	0.000002
MZ5-14	0.000001	0.000001	0.000001	0.000000	0.000004	0.000255	0.000003
MZ5-15	0.000000	0.000001	0.000001	0.000001	0.000002	0.000225	0.000003
MZ5-16	0.000000	0.000001	0.000001	0.000000	0.000009	0.000220	0.000002
MZ5-17	0.000000	0.000000	0.000001	0.000000	0.000006	0.000182	0.000002
MZ5-18	0.000000	0.000000	0.000001	0.000000	0.000005	0.000153	0.000002
SRM614-4	0.000181	0.000758	0.000267	0.000723	0.000403	0.002286	0.000309
SRM612-4	0.008125	0.033637	0.012347	0.033958	0.021366	0.001700	0.019920
SRM610-4	0.110843	0.505606	0.164542	0.493514	0.242097	0.002277	0.050150
AP1-4	0.000000	0.000004	0.000002	0.000057	0.000018	0.000073	0.000003
AP2-4	0.000059	0.000188	0.000001	0.000077	0.000207	0.000065	0.000073
AP3-4	0.000283	0.000807	0.000003	0.000415	0.000412	0.000069	0.000266
AP4-4	0.000494	0.001403	0.000006	0.000641	0.001046	0.000087	0.000367

standardize signal averages AP							
AP1	0.000001	0.000004	0.000003	0.000063	0.000030	0.000116	0.000005
AP2	0.000069	0.000211	0.000003	0.000090	0.000254	0.000102	0.000105
AP3	0.000337	0.000953	0.000003	0.000458	0.000496	0.000101	0.000329
AP4	0.000568	0.001608	0.000008	0.000751	0.001269	0.000111	0.000471

linest from std sig ave							
	0.025882	0.006347	1.902915	0.003475	0.015501	0.005710	0.006406

standardize signal averages SRM							
srM614-2	0.000162	0.000710	0.000248	0.000679	0.000378	0.003752	0.000362
srM612-2	0.004153	0.017186	0.006309	0.017355	0.010867	0.003792	0.010113
srM610-2	0.123851	0.561184	0.179321	0.533644	0.235768	0.003946	0.042684

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	0.043525	0.009048	0.027206	0.008248	0.022066	0.000000	0.016752
concentration data							
SRM614-3	0.32	0.36	37.49	0.19	0.47	2.56	0.23
SRM612-3	0.40	0.40	44.01	0.22	0.49	2.88	0.17
SRM610-3	303.79	335.74	31677.08	171.00	305.03	2.75	19.35
AP1-3	0.02	0.01	3.33	0.10	0.26	0.36	0.02
AP2-3	0.83	0.59	3.47	0.14	1.86	0.32	0.35
AP3-3	4.03	2.78	2.63	0.70	3.59	0.30	1.00
AP4-3	6.62	4.59	6.88	1.19	9.23	0.31	1.47
MZ5-1	0.00	0.01	1.99	0.00	0.04	0.73	0.01
MZ5-2	0.00	0.00	1.41	0.00	0.04	0.58	0.01
MZ5-3	0.00	0.00	1.94	0.00	0.04	0.67	0.01
MZ5-4	0.01	0.00	1.42	0.00	0.06	1.12	0.01
MZ5-5	0.00	0.00	0.52	0.00	0.07	0.88	0.00
MZ5-6	0.00	0.00	0.76	0.00	0.06	0.75	0.01
MZ5-7	0.00	0.00	0.03	0.00	0.04	0.61	0.01
MZ5-8	0.00	0.00	0.28	0.00	0.04	0.51	0.00
MZ5-9	0.00	0.00	0.51	0.00	0.04	0.50	0.00
MZ5-10	0.01	0.00	1.30	0.00	0.05	0.50	0.01
MZ5-11	0.00	0.00	0.63	0.00	0.03	0.40	0.00
MZ5-12	0.00	0.00	0.48	0.00	0.02	0.43	0.01
MZ5-13	0.00	0.00	0.52	0.00	0.03	0.62	0.01
MZ5-14	0.01	0.00	0.84	0.00	0.02	0.58	0.01
MZ5-15	0.00	0.00	1.03	0.00	0.01	0.51	0.01
MZ5-16	0.00	0.00	0.97	0.00	0.06	0.50	0.00
MZ5-17	0.00	0.00	1.09	0.00	0.04	0.41	0.01
MZ5-18	0.00	0.00	0.92	0.00	0.03	0.35	0.00
SRM614-4	0.40	0.41	43.52	0.22	0.54	1.12	0.17
SRM612-4	18.03	18.31	2015.11	10.12	28.40	0.83	10.94
SRM610-4	246.04	275.23	26853.19	147.08	321.86	1.11	27.55
AP1-4	0.00	0.01	1.43	0.08	0.11	0.17	0.01
AP2-4	0.61	0.48	0.87	0.11	1.28	0.15	0.19
AP3-4	2.92	2.04	2.09	0.58	2.55	0.16	0.68
AP4-4	5.10	3.55	4.62	0.89	6.47	0.20	0.94
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-1	7.12	5.88	4.36	3.60	9.68	912.33	39.32
SRM614-1	173.60	574.76	162.68	537.56	512.24	2108.01	389.92
SRM612-1	11905.03	44564.97	14926.00	43627.77	28546.28	1933.29	31841.86
SRM610-1	56984.44	239682.11	71271.08	215216.73	95935.86	1770.01	25532.06
AP1-1	43.24	141.28	75.28	680.60	444.80	1379.49	145.40
AP2-1	437.12	1260.69	80.92	743.56	2766.42	1238.73	611.84
AP3-1	1364.81	3814.58	49.32	1733.61	2014.65	1255.81	1009.13
AP4-1	3026.82	8680.25	57.52	3810.18	6084.47	1350.37	1603.05
MZ4-1	9.08	15.72	11.12	15.60	46.56	1218.89	44.60
MZ4-2	13.56	18.36	13.84	16.16	52.40	1207.93	52.40
MZ4-3	15.28	24.52	19.92	13.44	57.56	1201.45	67.80
MZ4-4	10.88	23.36	12.40	23.48	62.12	1256.93	48.20
MZ4-5	8.60	9.28	8.68	4.48	53.72	1270.65	55.92
MZ4-6	20.32	15.68	18.16	15.68	71.24	1235.29	57.20
MZ4-7	9.84	14.56	17.48	9.32	117.56	1271.41	41.96
MZ4-8	15.24	9.76	15.96	11.04	102.48	1218.21	43.96
MZ4-9	5.80	14.56	12.44	10.96	111.92	1217.17	53.12
MZ4-10	11.24	22.68	10.96	27.28	29.00	1110.25	46.20
MZ4-11	15.72	19.16	11.36	13.08	33.52	1025.21	42.92
MZ4-12	12.92	9.12	88.68	9.36	51.60	1031.25	39.72
SRM614-2	171.72	621.08	250.80	663.76	488.32	955.81	349.28
SRM612-2	8406.65	32776.31	11484.75	33739.63	21447.80	942.93	23470.89
SRM610-2	54382.39	239834.59	73987.73	222583.97	100593.56	926.53	26763.19
AP1-2	4.36	10.16	8.48	246.04	88.16	795.64	39.56
AP2-2	353.28	970.09	18.04	548.60	1705.57	768.00	394.16
AP3-2	1355.53	4001.34	23.00	1689.89	1837.73	802.40	898.81
AP4-2	2952.26	8209.33	33.56	3668.66	5545.27	941.73	1311.73
blank-2	6.12	4.44	7.92	3.32	4.80	730.76	35.12
blank average	6.62	5.16	6.14	3.46	7.24	821.54	37.22

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction							
SRM614-1	166.98	569.60	156.54	534.10	505.00	1286.47	352.70
SRM612-1	11898.41	44559.81	14919.86	43624.31	28539.04	1111.75	31804.64
SRM610-1	56977.82	239676.95	71264.94	215213.27	95928.62	948.47	25494.84
AP1-1	36.62	136.12	69.14	677.14	437.56	557.94	108.18
AP2-1	430.50	1255.53	74.78	740.10	2759.18	417.18	574.62
AP3-1	1358.19	3809.42	43.18	1730.15	2007.41	434.26	971.91
AP4-1	3020.20	8675.09	51.38	3806.72	6077.23	528.82	1565.83
MZ4-1	2.46	10.56	4.98	12.14	39.32	397.34	7.38
MZ4-2	6.94	13.20	7.70	12.70	45.16	386.38	15.18
MZ4-3	8.66	19.36	13.78	9.98	50.32	379.90	30.58
MZ4-4	4.26	18.20	6.26	20.02	54.88	435.38	10.98
MZ4-5	1.98	4.12	2.54	1.02	46.48	449.10	18.70
MZ4-6	13.70	10.52	12.02	12.22	64.00	413.74	19.98
MZ4-7	3.22	9.40	11.34	5.86	110.32	449.86	4.74
MZ4-8	8.62	4.60	9.82	7.58	95.24	396.66	6.74
MZ4-9	-0.82	9.40	6.30	7.50	104.68	395.62	15.90
MZ4-10	4.62	17.52	4.82	23.82	21.76	288.70	8.98
MZ4-11	9.10	14.00	5.22	9.62	26.28	203.66	5.70
MZ4-12	6.30	3.96	82.54	5.90	44.36	209.70	2.50
SRM614-2	165.10	615.92	244.66	660.30	481.08	134.26	312.06
SRM612-2	8400.03	32771.14	11478.60	33736.17	21440.56	121.38	23433.67
SRM610-2	54375.77	239829.43	73981.59	222580.51	100586.32	104.98	26725.97
AP1-2	-2.26	5.00	2.34	242.58	80.92	-25.90	2.34
AP2-2	346.66	964.93	11.90	545.14	1698.33	-53.54	356.94
AP3-2	1348.91	3996.18	16.86	1686.43	1830.49	-19.14	861.58
AP4-2	2945.64	8204.17	27.42	3665.20	5538.03	120.18	1274.51
zero correction							
SRM614-1	166.98	569.60	156.54	534.10	505.00	1286.47	352.70
SRM612-1	11898.41	44559.81	14919.86	43624.31	28539.04	1111.75	31804.64
SRM610-1	56977.82	239676.95	71264.94	215213.27	95928.62	948.47	25494.84
AP1-1	36.62	136.12	69.14	677.14	437.56	557.94	108.18
AP2-1	430.50	1255.53	74.78	740.10	2759.18	417.18	574.62
AP3-1	1358.19	3809.42	43.18	1730.15	2007.41	434.26	971.91
AP4-1	3020.20	8675.09	51.38	3806.72	6077.23	528.82	1565.83
MZ4-1	2.46	10.56	4.98	12.14	39.32	397.34	7.38
MZ4-2	6.94	13.20	7.70	12.70	45.16	386.38	15.18
MZ4-3	8.66	19.36	13.78	9.98	50.32	379.90	30.58
MZ4-4	4.26	18.20	6.26	20.02	54.88	435.38	10.98
MZ4-5	1.98	4.12	2.54	1.02	46.48	449.10	18.70
MZ4-6	13.70	10.52	12.02	12.22	64.00	413.74	19.98
MZ4-7	3.22	9.40	11.34	5.86	110.32	449.86	4.74
MZ4-8	8.62	4.60	9.82	7.58	95.24	396.66	6.74
MZ4-9	0.00	9.40	6.30	7.50	104.68	395.62	15.90
MZ4-10	4.62	17.52	4.82	23.82	21.76	288.70	8.98
MZ4-11	9.10	14.00	5.22	9.62	26.28	203.66	5.70
MZ4-12	6.30	3.96	82.54	5.90	44.36	209.70	2.50
SRM614-2	165.10	615.92	244.66	660.30	481.08	134.26	312.06
SRM612-2	8400.03	32771.14	11478.60	33736.17	21440.56	121.38	23433.67
SRM610-2	54375.77	239829.43	73981.59	222580.51	100586.32	104.98	26725.97
AP1-2	0.00	5.00	2.34	242.58	80.92	0.00	2.34
AP2-2	346.66	964.93	11.90	545.14	1698.33	0.00	356.94
AP3-2	1348.91	3996.18	16.86	1686.43	1830.49	0.00	861.58
AP4-2	2945.64	8204.17	27.42	3665.20	5538.03	120.18	1274.51
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-1	0.000209	0.000714	0.000196	0.000669	0.000633	0.001612	0.000442
SRM612-1	0.008563	0.032067	0.010737	0.031394	0.020538	0.000800	0.022888

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.130387	0.548473	0.163081	0.492490	0.219521	0.002170	0.058342
AP1-1	0.000004	0.000017	0.000008	0.000083	0.000053	0.000068	0.000013
AP2-1	0.000064	0.000186	0.000011	0.000109	0.000408	0.000062	0.000085
AP3-1	0.000210	0.000589	0.000007	0.000268	0.000311	0.000067	0.000150
AP4-1	0.000356	0.001022	0.000006	0.000448	0.000716	0.000062	0.000184
MZ4-1	0.000000	0.000002	0.000001	0.000002	0.000006	0.000063	0.000001
MZ4-2	0.000001	0.000002	0.000001	0.000002	0.000007	0.000059	0.000002
MZ4-3	0.000001	0.000003	0.000002	0.000002	0.000008	0.000058	0.000005
MZ4-4	0.000001	0.000003	0.000001	0.000003	0.000009	0.000069	0.000002
MZ4-5	0.000000	0.000001	0.000000	0.000000	0.000008	0.000073	0.000003
MZ4-6	0.000002	0.000002	0.000002	0.000002	0.000010	0.000067	0.000003
MZ4-7	0.000001	0.000002	0.000002	0.000001	0.000022	0.000090	0.000001
MZ4-8	0.000002	0.000001	0.000002	0.000002	0.000020	0.000082	0.000001
MZ4-9	0.000000	0.000002	0.000001	0.000002	0.000021	0.000080	0.000003
MZ4-10	0.000001	0.000004	0.000001	0.000005	0.000004	0.000059	0.000002
MZ4-11	0.000002	0.000002	0.000001	0.000002	0.000004	0.000034	0.000001
MZ4-12	0.000001	0.000001	0.000012	0.000001	0.000007	0.000031	0.000000
SRM614-2	0.000158	0.000589	0.000234	0.000631	0.000460	0.000128	0.000298
SRM612-2	0.008074	0.031498	0.011033	0.032425	0.020607	0.000117	0.022523
SRM610-2	0.121824	0.537317	0.165749	0.498673	0.225355	0.000235	0.059877
AP1-2	0.000000	0.000001	0.000000	0.000042	0.000014	0.000000	0.000000
AP2-2	0.000058	0.000162	0.000002	0.000091	0.000285	0.000000	0.000060
AP3-2	0.000210	0.000623	0.000003	0.000263	0.000285	0.000000	0.000134
AP4-2	0.000371	0.001034	0.000003	0.000462	0.000698	0.000015	0.000161
standardize signal averages AP							
AP1	0.000002	0.000009	0.000004	0.000063	0.000034	0.000034	0.000007
AP2	0.000061	0.000174	0.000007	0.000100	0.000346	0.000031	0.000072
AP3	0.000210	0.000606	0.000005	0.000265	0.000298	0.000034	0.000142
AP4	0.000363	0.001028	0.000005	0.000455	0.000707	0.000039	0.000172
linest from std sig ave							
	0.040562	0.009924	1.431348	0.005876	0.025646	0.018394	0.016644
standardize signal averages SRM							
srm614-2	0.000184	0.000651	0.000215	0.000650	0.000546	0.000870	0.000370
srm612-2	0.008318	0.031783	0.010885	0.031910	0.020573	0.000458	0.022706
srm610-2	0.126106	0.542895	0.164415	0.495581	0.222438	0.001203	0.059110
linest from std sig ave							
	0.042729	0.009352	0.029656	0.008884	0.023334	0.000000	0.011515
concentration data							
SRM614-1	0.73	0.61	24.09	0.34	1.39	2.54	0.63
SRM612-1	29.79	27.29	1318.05	15.82	45.17	1.26	32.67
SRM610-1	453.58	466.83	20019.35	248.21	482.83	3.42	83.28
AP1-1	0.07	0.07	4.82	0.19	0.55	0.50	0.09
AP2-1	1.03	0.73	6.31	0.26	4.17	0.45	0.56
AP3-1	3.40	2.33	3.82	0.63	3.18	0.49	1.00
AP4-1	5.76	4.04	3.45	1.05	7.32	0.46	1.22
MZ4-1	0.01	0.01	0.45	0.00	0.06	0.46	0.01
MZ4-2	0.02	0.01	0.67	0.00	0.07	0.43	0.02
MZ4-3	0.02	0.01	1.21	0.00	0.08	0.43	0.03
MZ4-4	0.01	0.01	0.57	0.01	0.09	0.51	0.01
MZ4-5	0.01	0.00	0.24	0.00	0.08	0.54	0.02
MZ4-6	0.04	0.01	1.12	0.00	0.11	0.49	0.02
MZ4-7	0.01	0.01	1.29	0.00	0.22	0.66	0.01
MZ4-8	0.03	0.00	1.17	0.00	0.20	0.60	0.01
MZ4-9	0.00	0.01	0.73	0.00	0.22	0.59	0.02
MZ4-10	0.02	0.01	0.57	0.01	0.05	0.44	0.01
MZ4-11	0.02	0.01	0.50	0.00	0.05	0.25	0.01
MZ4-12	0.02	0.00	6.97	0.00	0.07	0.23	0.00
SRM614-2	0.55	0.50	28.70	0.32	1.01	0.20	0.43
SRM612-2	28.09	26.81	1354.32	16.34	45.33	0.18	32.15
SRM610-2	423.80	457.34	20346.86	251.32	495.66	0.37	85.47
AP1-2	0.00	0.00	0.23	0.10	0.14	0.00	0.00
AP2-2	0.94	0.64	1.14	0.21	2.91	0.00	0.40
AP3-2	3.40	2.47	1.50	0.62	2.92	0.00	0.89
AP4-2	6.01	4.09	1.97	1.08	7.14	0.11	1.07
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-3		9.12	2.64	1.40	0.56	4.08	19.52
SRM614-3		398.84	1339.65	381.20	1159.49	705.76	498.72
SRM612-3		21575.40	77702.48	23300.41	66177.73	31966.58	660.12
SRM610-3		144639.09	627556.13	163016.56	524783.38	226256.44	852.84
AP1-3		60.76	228.48	96.28	432.72	504.32	605.44
AP2-3		1178.05	3207.18	100.00	1454.21	3421.14	578.84
AP3-3		5945.11	15873.17	100.84	6944.96	7268.68	681.36
AP4-3		10113.06	26377.91	146.76	12201.47	17579.54	942.61
TGP3-1		27.28	63.80	53.72	47.00	155.44	860.04
TGP3-2		21.36	41.00	42.96	15.16	76.08	869.00
TGP3-3		13.56	28.20	33.76	11.28	94.80	833.88
TGP3-4		43.04	64.72	40.16	29.40	107.36	932.25
TGP3-5		21.20	25.64	33.32	11.52	53.36	907.69
TGP3-6		27.48	38.60	24.32	17.84	70.28	874.76
TGP3-7		241.36	214.12	114.28	128.40	241.64	800.32
TGP3-8		115.20	102.88	60.28	41.64	68.48	777.64
TGP3-9		56.04	35.84	30.64	14.12	25.08	761.96
TGP3-10		66.84	80.80	58.28	54.44	188.36	816.72
TGP3-11		49.64	26.20	37.72	19.88	80.60	784.00
TGP3-12		23.84	25.88	22.88	11.80	74.16	714.08
TGP3-13		659.76	406.64	138.52	54.24	124.68	829.08
TGP3-14		319.72	185.24	92.16	13.04	58.08	724.40
TGP3-15		1138.57	701.92	156.32	20.60	101.80	730.52
SRM614-4		248.56	1039.85	381.20	1084.33	574.44	622.08
SRM612-4		16298.89	65773.73	22293.53	62167.55	27054.23	680.80
SRM610-4		103915.42	511246.78	143092.84	455476.72	172647.13	731.76
AP1-4		8.32	21.68	15.64	166.88	129.68	593.56
AP2-4		749.80	2164.37	21.96	947.93	2334.93	544.36
AP3-4		3291.30	9318.73	35.68	3968.30	4178.66	559.44
AP4-4		7117.36	19861.75	81.44	9190.73	13251.48	880.69
blank-4		2.88	4.16	5.20	2.96	13.68	509.20
blank average		6.00	3.40	3.30	1.76	8.88	418.86
blank subtraction							
SRM614-3		392.84	1336.25	377.90	1157.73	696.88	79.86
SRM612-3		21569.40	77699.08	23297.11	66175.97	31957.70	241.26
SRM610-3		144633.09	627552.73	163013.26	524781.62	226247.56	433.98
AP1-3		54.76	225.08	92.98	430.96	495.44	186.58
AP2-3		1172.05	3203.78	96.70	1452.45	3412.26	159.98
AP3-3		5939.11	15869.77	97.54	6943.20	7259.80	262.50
AP4-3		10107.06	26374.51	143.46	12199.71	17570.66	523.74
TGP3-1		21.28	60.40	50.42	45.24	146.56	441.18
TGP3-2		15.36	37.60	39.66	13.40	67.20	450.14
TGP3-3		7.56	24.80	30.46	9.52	85.92	415.02
TGP3-4		37.04	61.32	36.86	27.64	98.48	513.38
TGP3-5		15.20	22.24	30.02	9.76	44.48	488.82
TGP3-6		21.48	35.20	21.02	16.08	61.40	455.90
TGP3-7		235.36	210.72	110.98	126.64	232.76	381.46
TGP3-8		109.20	99.48	56.98	39.88	59.60	358.78
TGP3-9		50.04	32.44	27.34	12.36	16.20	343.10
TGP3-10		60.84	77.40	54.98	52.68	179.48	397.86
TGP3-11		43.64	22.80	34.42	18.12	71.72	365.14
TGP3-12		17.84	22.48	19.58	10.04	65.28	295.22
TGP3-13		653.76	403.24	135.22	52.48	115.80	410.22
TGP3-14		313.72	181.84	88.86	11.28	49.20	305.54
TGP3-15		1132.57	698.52	153.02	18.84	92.92	311.66
SRM614-4		242.56	1036.45	377.90	1082.57	565.56	203.22
SRM612-4		16292.89	65770.33	22290.22	62165.79	27045.35	261.94
SRM610-4		103909.42	511243.38	143089.54	455474.96	172638.25	312.90
AP1-4		2.32	18.28	12.34	165.12	120.80	174.70
AP2-4		743.80	2160.97	18.66	946.17	2326.05	125.50
AP3-4		3285.30	9315.33	32.38	3966.54	4169.78	140.58
AP4-4		7111.36	19858.35	78.14	9188.97	13242.59	461.82
zero correction							
SRM614-3		392.84	1336.25	377.90	1157.73	696.88	79.86
SRM612-3		21569.40	77699.08	23297.11	66175.97	31957.70	241.26
SRM610-3		144633.09	627552.73	163013.26	524781.62	226247.56	433.98
AP1-3		54.76	225.08	92.98	430.96	495.44	186.58
AP2-3		1172.05	3203.78	96.70	1452.45	3412.26	159.98
AP3-3		5939.11	15869.77	97.54	6943.20	7259.80	262.50
AP4-3		10107.06	26374.51	143.46	12199.71	17570.66	523.74
TGP3-1		21.28	60.40	50.42	45.24	146.56	441.18
TGP3-2		15.36	37.60	39.66	13.40	67.20	450.14
TGP3-3		7.56	24.80	30.46	9.52	85.92	415.02

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	37.04	61.32	36.86	27.64	98.48	513.38	51.58
TGP3-5	15.20	22.24	30.02	9.76	44.48	488.82	42.90
TGP3-6	21.48	35.20	21.02	16.08	61.40	455.90	43.02
TGP3-7	235.36	210.72	110.98	126.64	232.76	381.46	181.06
TGP3-8	109.20	99.48	56.98	39.88	59.60	358.78	44.98
TGP3-9	50.04	32.44	27.34	12.36	16.20	343.10	19.82
TGP3-10	60.84	77.40	54.98	52.68	179.48	397.86	83.42
TGP3-11	43.64	22.80	34.42	18.12	71.72	365.14	80.82
TGP3-12	17.84	22.48	19.58	10.04	65.28	295.22	21.62
TGP3-13	653.76	403.24	135.22	52.48	115.80	410.22	90.54
TGP3-14	313.72	181.84	88.86	11.28	49.20	305.54	24.46
TGP3-15	1132.57	698.52	153.02	18.84	92.92	311.66	39.06
SRM614-4	242.56	1036.45	377.90	1082.57	565.56	203.22	590.70
SRM612-4	16292.89	65770.33	22290.22	62165.79	27045.35	261.94	29938.23
SRM610-4	103909.42	511243.38	143089.54	455474.96	172638.25	312.90	48253.49
AP1-4	2.32	18.28	12.34	165.12	120.80	174.70	12.58
AP2-4	743.80	2160.97	18.66	946.17	2326.05	125.50	732.46
AP3-4	3285.30	9315.33	32.38	3966.54	4169.78	140.58	2241.75
AP4-4	7111.36	19858.35	78.14	9188.97	13242.59	461.82	4753.61

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-3	0.000121	0.000413	0.000117	0.000358	0.000216	0.000025	0.000232
SRM612-3	0.007040	0.025362	0.007604	0.021600	0.010431	0.000079	0.014300
SRM610-3	0.106299	0.461223	0.119807	0.385691	0.166282	0.000319	0.064808
AP1-3	0.000003	0.000013	0.000005	0.000024	0.000028	0.000010	0.000012
AP2-3	0.000068	0.000185	0.000006	0.000084	0.000197	0.000009	0.000081
AP3-3	0.000267	0.000713	0.000004	0.000312	0.000326	0.000012	0.000203
AP4-3	0.000515	0.001344	0.000007	0.000622	0.000895	0.000027	0.000361
TGP3-1	0.000001	0.000002	0.000002	0.000002	0.000006	0.000017	0.000002
TGP3-2	0.000001	0.000002	0.000002	0.000001	0.000003	0.000019	0.000001
TGP3-3	0.000000	0.000001	0.000001	0.000000	0.000004	0.000020	0.000002
TGP3-4	0.000001	0.000002	0.000001	0.000001	0.000004	0.000020	0.000002
TGP3-5	0.000001	0.000001	0.000001	0.000000	0.000002	0.000020	0.000002
TGP3-6	0.000001	0.000002	0.000001	0.000001	0.000003	0.000020	0.000002
TGP3-7	0.000011	0.000010	0.000005	0.000006	0.000011	0.000018	0.000008
TGP3-8	0.000005	0.000005	0.000003	0.000002	0.000003	0.000017	0.000002
TGP3-9	0.000002	0.000001	0.000001	0.000001	0.000001	0.000014	0.000001
TGP3-10	0.000003	0.000004	0.000003	0.000003	0.000009	0.000020	0.000004
TGP3-11	0.000002	0.000001	0.000002	0.000001	0.000003	0.000017	0.000004
TGP3-12	0.000001	0.000001	0.000001	0.000000	0.000003	0.000014	0.000001
TGP3-13	0.000058	0.000036	0.000012	0.000005	0.000010	0.000036	0.000008
TGP3-14	0.000027	0.000016	0.000008	0.000001	0.000004	0.000027	0.000002
TGP3-15	0.000077	0.000047	0.000010	0.000001	0.000006	0.000021	0.000003
SRM614-4	0.000123	0.000527	0.000192	0.000550	0.000288	0.000103	0.000300
SRM612-4	0.007526	0.030381	0.010297	0.028716	0.012493	0.000121	0.013829
SRM610-4	0.109957	0.540996	0.151417	0.481982	0.182685	0.000331	0.051062
AP1-4	0.000000	0.000001	0.000001	0.000013	0.000009	0.000014	0.000001
AP2-4	0.000056	0.000163	0.000001	0.000071	0.000175	0.000009	0.000055
AP3-4	0.000200	0.000568	0.000002	0.000242	0.000254	0.000009	0.000137
AP4-4	0.000462	0.001289	0.000005	0.000597	0.000860	0.000030	0.000309

standardize signal averages AP							
AP1	0.000002	0.000007	0.000003	0.000018	0.000019	0.000012	0.000007
AP2	0.000062	0.000174	0.000003	0.000078	0.000186	0.000009	0.000068
AP3	0.000234	0.000641	0.000003	0.000277	0.000290	0.000010	0.000170
AP4	0.000488	0.001317	0.000006	0.000609	0.000878	0.000028	0.000335

linest from std sig ave							
	0.031434	0.008075	2.059176	0.004525	0.022657	0.039298	0.009705

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srn614-2	0.000122	0.000470	0.000154	0.000454	0.000252	0.000064	0.000266
srn612-2	0.007283	0.027871	0.008950	0.025158	0.011462	0.000100	0.014065
srn610-2	0.108128	0.501109	0.135612	0.433836	0.174483	0.000325	0.057935

linest from std sig ave							
	0.049830	0.010132	0.035955	0.010150	0.029803	0.000000	0.012327

concentration data							
SRM614-3	0.33	0.29	20.64	0.14	0.42	0.08	0.19
SRM612-3	18.98	17.56	1342.94	8.38	20.27	0.27	11.90
SRM610-3	286.57	319.43	21158.13	149.66	323.11	1.07	53.94
AP1-3	0.04	0.04	4.24	0.04	0.25	0.16	0.05
AP2-3	0.85	0.60	4.59	0.15	1.78	0.15	0.31
AP3-3	3.35	2.30	3.60	0.56	2.95	0.18	0.78
AP4-3	6.46	4.33	6.01	1.12	8.09	0.42	1.40
TGP3-1	0.01	0.01	1.62	0.00	0.05	0.27	0.01
TGP3-2	0.01	0.01	1.40	0.00	0.03	0.30	0.00
TGP3-3	0.00	0.00	1.20	0.00	0.04	0.31	0.01
TGP3-4	0.02	0.01	1.18	0.00	0.03	0.31	0.01
TGP3-5	0.01	0.00	1.02	0.00	0.02	0.32	0.01
TGP3-6	0.01	0.00	0.75	0.00	0.02	0.31	0.01
TGP3-7	0.14	0.03	4.25	0.01	0.10	0.28	0.03
TGP3-8	0.06	0.02	2.22	0.00	0.03	0.27	0.01
TGP3-9	0.03	0.00	0.94	0.00	0.01	0.22	0.00
TGP3-10	0.04	0.01	2.26	0.00	0.08	0.31	0.02
TGP3-11	0.03	0.00	1.35	0.00	0.03	0.27	0.01
TGP3-12	0.01	0.00	0.75	0.00	0.03	0.21	0.00
TGP3-13	0.73	0.12	9.88	0.01	0.09	0.57	0.03
TGP3-14	0.34	0.05	6.36	0.00	0.04	0.42	0.01
TGP3-15	0.96	0.15	8.51	0.00	0.06	0.33	0.01
SRM614-4	0.33	0.36	33.93	0.21	0.56	0.35	0.25
SRM612-4	20.29	21.04	1818.38	11.14	24.28	0.41	11.51
SRM610-4	296.43	374.68	26740.37	187.03	354.99	1.12	42.50
AP1-4	0.00	0.00	0.80	0.02	0.09	0.22	0.00
AP2-4	0.70	0.52	1.15	0.13	1.58	0.15	0.21
AP3-4	2.51	1.83	1.62	0.44	2.30	0.13	0.53
AP4-4	5.79	4.15	4.17	1.08	7.77	0.47	1.19

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
raw data								
blank-1		1.64	2.20	3.88	6.04	9.72	335.04	18.48
SRM614-1		452.64	1502.89	516.84	1390.65	817.04	540.84	935.61
SRM612-1		23485.17	84012.23	25526.42	72238.01	35997.13	604.40	51806.65
SRM610-1		135127.48	581741.56	151767.05	476650.47	196650.34	821.88	67717.22
AP1-1		39.60	128.60	47.00	181.00	352.92	645.40	119.96
AP2-1		1373.97	3574.42	118.08	1660.45	3676.94	610.08	1741.77
AP3-1		7052.96	18474.47	90.76	9383.53	10338.38	751.80	6718.08
AP4-1		10208.94	26438.39	165.00	12483.91	19537.31	926.77	7394.52
TGP2-1		51.80	89.72	54.76	83.80	107.48	799.56	120.84
TGP2-2		39.48	35.32	18.24	30.52	41.40	751.52	66.32
TGP2-3		51.72	57.28	66.76	51.64	68.32	834.48	188.48
TGP2-4		17.80	38.76	21.80	46.48	93.48	817.92	89.28
TGP2-5		9.04	14.88	12.00	6.20	34.04	756.52	42.36
TGP2-6		4.72	13.84	8.12	13.56	37.16	723.60	36.88
TGP2-7		22.84	50.24	20.20	39.72	91.16	790.76	78.72
TGP2-8		10.40	10.04	7.24	8.52	33.36	778.40	44.56
TGP2-9		9.56	16.68	11.60	17.84	43.20	792.00	43.80
TGP2-10		8.00	11.08	4.16	4.00	30.40	737.92	26.96
TGP2-11		10.60	15.52	5.24	7.40	30.72	678.44	31.36
TGP2-12		12.36	15.28	10.92	11.16	46.32	682.88	29.96
TGP2-13		20.84	32.08	17.16	33.92	72.52	710.44	49.04
TGP2-14		8.76	13.40	10.08	13.56	25.48	693.48	38.88
TGP2-15		14.28	27.32	25.40	18.92	38.72	689.60	44.52
TGP2-16		8.88	27.16	19.48	21.56	78.08	807.96	33.16
TGP2-17		7.56	19.60	15.28	6.56	27.88	787.16	38.84
TGP2-18		9.76	29.44	20.16	12.32	31.16	788.92	31.20
SRM614-2		321.44	1241.93	417.68	1144.49	613.80	622.24	646.44
SRM612-2		16053.65	65461.45	22156.40	61286.42	27640.80	632.48	32102.82

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	96432.66	466332.31	131516.98	415859.09	161449.03	721.36	48385.39
AP1-2	4.68	5.92	11.04	287.76	148.72	531.96	28.72
AP2-2	826.48	2318.97	27.92	970.61	2186.29	496.24	934.01
AP3-2	5651.35	15935.09	59.76	8938.01	8205.53	636.92	5062.91
AP4-2	6123.95	17560.38	67.36	8001.33	10879.70	791.04	3771.22
blank-2	2.44	7.28	5.52	2.00	5.44	483.80	9.76
blank average	2.04	4.74	4.70	4.02	7.58	409.42	14.12
blank subtraction							
SRM614-1	450.60	1498.15	512.14	1386.63	809.46	131.42	921.49
SRM612-1	23483.13	84007.49	25521.72	72233.99	35989.54	194.98	51792.53
SRM610-1	135125.44	581736.82	151762.35	476646.45	196642.76	412.46	67703.10
AP1-1	37.56	123.86	42.30	176.98	345.34	235.98	105.84
AP2-1	1371.93	3569.68	113.38	1656.43	3669.36	200.66	1727.65
AP3-1	7050.92	18469.72	86.06	9379.51	10330.80	342.38	6703.96
AP4-1	10206.90	26433.65	160.30	12479.89	19529.73	517.34	7380.40
TGP2-1	49.76	84.98	50.06	79.78	99.90	390.14	106.72
TGP2-2	37.44	30.58	13.54	26.50	33.82	342.10	52.20
TGP2-3	49.68	52.54	62.06	47.62	60.74	425.06	174.36
TGP2-4	15.76	34.02	17.10	42.46	85.90	408.50	75.16
TGP2-5	7.00	10.14	7.30	2.18	26.46	347.10	28.24
TGP2-6	2.68	9.10	3.42	9.54	29.58	314.18	22.76
TGP2-7	20.80	45.50	15.50	35.70	83.58	381.34	64.60
TGP2-8	8.36	5.30	2.54	4.50	25.78	368.98	30.44
TGP2-9	7.52	11.94	6.90	13.82	35.62	382.58	29.68
TGP2-10	5.96	6.34	-0.54	-0.02	22.82	328.50	12.84
TGP2-11	8.56	10.78	0.54	3.38	23.14	269.02	17.24
TGP2-12	10.32	10.54	6.22	7.14	38.74	273.46	15.84
TGP2-13	18.80	27.34	12.46	29.90	64.94	301.02	34.92
TGP2-14	6.72	8.66	5.38	9.54	17.90	284.06	24.76
TGP2-15	12.24	22.58	20.70	14.90	31.14	280.18	30.40
TGP2-16	6.84	22.42	14.78	17.54	70.50	398.54	19.04
TGP2-17	5.52	14.86	10.58	2.54	20.30	377.74	24.72
TGP2-18	7.72	24.70	15.46	8.30	23.58	379.50	17.08
SRM614-2	319.40	1237.19	412.98	1140.47	606.22	212.82	632.32
SRM612-2	16051.61	65456.71	22151.70	61282.40	27633.21	223.06	32088.70
SRM610-2	96430.62	466327.57	131512.28	415855.07	161441.45	311.94	48371.27
AP1-2	2.64	1.18	6.34	283.74	141.14	122.54	14.60
AP2-2	824.44	2314.23	23.22	966.59	2178.71	86.82	919.89
AP3-2	5649.31	15930.35	55.06	8933.99	8197.95	227.50	5048.79
AP4-2	6121.91	17555.64	62.66	7997.31	10872.12	381.62	3757.10
zero correction							
SRM614-1	450.60	1498.15	512.14	1386.63	809.46	131.42	921.49
SRM612-1	23483.13	84007.49	25521.72	72233.99	35989.54	194.98	51792.53
SRM610-1	135125.44	581736.82	151762.35	476646.45	196642.76	412.46	67703.10
AP1-1	37.56	123.86	42.30	176.98	345.34	235.98	105.84
AP2-1	1371.93	3569.68	113.38	1656.43	3669.36	200.66	1727.65
AP3-1	7050.92	18469.72	86.06	9379.51	10330.80	342.38	6703.96
AP4-1	10206.90	26433.65	160.30	12479.89	19529.73	517.34	7380.40
TGP2-1	49.76	84.98	50.06	79.78	99.90	390.14	106.72
TGP2-2	37.44	30.58	13.54	26.50	33.82	342.10	52.20
TGP2-3	49.68	52.54	62.06	47.62	60.74	425.06	174.36
TGP2-4	15.76	34.02	17.10	42.46	85.90	408.50	75.16
TGP2-5	7.00	10.14	7.30	2.18	26.46	347.10	28.24
TGP2-6	2.68	9.10	3.42	9.54	29.58	314.18	22.76
TGP2-7	20.80	45.50	15.50	35.70	83.58	381.34	64.60
TGP2-8	8.36	5.30	2.54	4.50	25.78	368.98	30.44
TGP2-9	7.52	11.94	6.90	13.82	35.62	382.58	29.68
TGP2-10	5.96	6.34	0.00	0.00	22.82	328.50	12.84
TGP2-11	8.56	10.78	0.54	3.38	23.14	269.02	17.24
TGP2-12	10.32	10.54	6.22	7.14	38.74	273.46	15.84
TGP2-13	18.80	27.34	12.46	29.90	64.94	301.02	34.92
TGP2-14	6.72	8.66	5.38	9.54	17.90	284.06	24.76
TGP2-15	12.24	22.58	20.70	14.90	31.14	280.18	30.40
TGP2-16	6.84	22.42	14.78	17.54	70.50	398.54	19.04
TGP2-17	5.52	14.86	10.58	2.54	20.30	377.74	24.72
TGP2-18	7.72	24.70	15.46	8.30	23.58	379.50	17.08
SRM614-2	319.40	1237.19	412.98	1140.47	606.22	212.82	632.32
SRM612-2	16051.61	65456.71	22151.70	61282.40	27633.21	223.06	32088.70
SRM610-2	96430.62	466327.57	131512.28	415855.07	161441.45	311.94	48371.27
AP1-2	2.64	1.18	6.34	283.74	141.14	122.54	14.60
AP2-2	824.44	2314.23	23.22	966.59	2178.71	86.82	919.89
AP3-2	5649.31	15930.35	55.06	8933.99	8197.95	227.50	5048.79
AP4-2	6121.91	17555.64	62.66	7997.31	10872.12	381.62	3757.10
certified concentration							
SRM614	0.81	0.72	0.67	0.77			

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-1	0.000115	0.000383	0.000131	0.000355	0.000207	0.000034	0.000236
SRM612-1	0.006945	0.024846	0.007548	0.021364	0.010644	0.000058	0.015318
SRM610-1	0.121819	0.524449	0.136817	0.429708	0.177278	0.000372	0.061036
AP1-1	0.000002	0.000006	0.000002	0.000008	0.000016	0.000011	0.000005
AP2-1	0.000084	0.000218	0.000007	0.000101	0.000224	0.000012	0.000105
AP3-1	0.000335	0.000878	0.000004	0.000446	0.000491	0.000016	0.000319
AP4-1	0.000516	0.001336	0.000008	0.000631	0.000987	0.000026	0.000373
TGP2-1	0.000002	0.000003	0.000002	0.000003	0.000004	0.000015	0.000004
TGP2-2	0.000002	0.000001	0.000001	0.000001	0.000001	0.000014	0.000002
TGP2-3	0.000002	0.000002	0.000003	0.000002	0.000003	0.000018	0.000007
TGP2-4	0.000001	0.000003	0.000002	0.000004	0.000008	0.000037	0.000007
TGP2-5	0.000001	0.000001	0.000001	0.000000	0.000002	0.000030	0.000002
TGP2-6	0.000000	0.000001	0.000000	0.000001	0.000003	0.000032	0.000002
TGP2-7	0.000002	0.000005	0.000002	0.000004	0.000009	0.000042	0.000007
TGP2-8	0.000001	0.000001	0.000000	0.000000	0.000003	0.000038	0.000003
TGP2-9	0.000001	0.000001	0.000001	0.000001	0.000004	0.000039	0.000003
TGP2-10	0.000000	0.000000	0.000000	0.000000	0.000002	0.000026	0.000001
TGP2-11	0.000001	0.000001	0.000000	0.000000	0.000002	0.000019	0.000001
TGP2-12	0.000001	0.000001	0.000000	0.000001	0.000003	0.000022	0.000001
TGP2-13	0.000002	0.000002	0.000001	0.000003	0.000005	0.000025	0.000003
TGP2-14	0.000001	0.000001	0.000000	0.000001	0.000001	0.000021	0.000002
TGP2-15	0.000001	0.000001	0.000001	0.000001	0.000002	0.000018	0.000002
TGP2-16	0.000000	0.000001	0.000001	0.000001	0.000003	0.000018	0.000001
TGP2-17	0.000000	0.000001	0.000000	0.000000	0.000001	0.000017	0.000001
TGP2-18	0.000000	0.000001	0.000001	0.000000	0.000001	0.000017	0.000001
SRM614-2	0.000144	0.000558	0.000186	0.000514	0.000273	0.000096	0.000285
SRM612-2	0.007561	0.030835	0.010435	0.028868	0.013017	0.000105	0.015116
SRM610-2	0.112765	0.545321	0.153790	0.486299	0.188789	0.000365	0.056565
AP1-2	0.000000	0.000000	0.000000	0.000019	0.000009	0.000008	0.000001
AP2-2	0.000069	0.000195	0.000002	0.000081	0.000183	0.000007	0.000077
AP3-2	0.000309	0.000873	0.000003	0.000489	0.000449	0.000012	0.000277
AP4-2	0.000409	0.001174	0.000004	0.000535	0.000727	0.000026	0.000251

standardize signal averages AP							
AP1	0.000001	0.000003	0.000001	0.000014	0.000013	0.000010	0.000003
AP2	0.000076	0.000206	0.000004	0.000091	0.000203	0.000010	0.000091
AP3	0.000322	0.000876	0.000004	0.000468	0.000470	0.000014	0.000298
AP4	0.000463	0.001255	0.000006	0.000583	0.000857	0.000026	0.000312

linest from std sig ave							
	0.030127	0.007722	2.063500	0.004037	0.021686	0.041365	0.008513

standardize signal averages SRM							
srm614-2	0.000130	0.000470	0.000159	0.000434	0.000240	0.000065	0.000260
srm612-2	0.007253	0.027840	0.008992	0.025116	0.011831	0.000081	0.015217
srm610-2	0.117292	0.534885	0.145304	0.458003	0.183033	0.000368	0.058801

linest from std sig ave							
	0.045948	0.009493	0.033563	0.009614	0.028412	0.000000	0.012099

concentration data							
SRM614-1	0.30	0.25	23.19	0.12	0.39	0.12	0.17
SRM612-1	17.95	16.45	1335.83	7.40	19.80	0.20	11.18
SRM610-1	314.75	347.30	24212.82	148.77	329.72	1.32	44.56
AP1-1	0.02	0.02	1.62	0.01	0.14	0.18	0.02
AP2-1	1.01	0.67	5.69	0.16	1.94	0.20	0.36
AP3-1	4.03	2.71	3.37	0.72	4.25	0.27	1.08
AP4-1	6.20	4.12	6.67	1.02	8.54	0.43	1.27
TGP2-1	0.02	0.01	1.61	0.01	0.03	0.25	0.01
TGP2-2	0.02	0.00	0.47	0.00	0.01	0.24	0.01
TGP2-3	0.02	0.01	2.13	0.00	0.02	0.29	0.02

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	0.02	0.01	1.28	0.01	0.07	0.61	0.02
TGP2-5	0.01	0.00	0.52	0.00	0.02	0.49	0.01
TGP2-6	0.00	0.00	0.29	0.00	0.03	0.53	0.01
TGP2-7	0.03	0.02	1.40	0.01	0.08	0.69	0.02
TGP2-8	0.01	0.00	0.21	0.00	0.02	0.62	0.01
TGP2-9	0.01	0.00	0.57	0.00	0.03	0.64	0.01
TGP2-10	0.01	0.00	0.00	0.00	0.02	0.42	0.00
TGP2-11	0.01	0.00	0.03	0.00	0.01	0.31	0.00
TGP2-12	0.01	0.00	0.40	0.00	0.03	0.36	0.00
TGP2-13	0.02	0.01	0.87	0.00	0.05	0.42	0.01
TGP2-14	0.01	0.00	0.33	0.00	0.01	0.35	0.01
TGP2-15	0.01	0.00	1.09	0.00	0.02	0.30	0.01
TGP2-16	0.00	0.00	0.56	0.00	0.03	0.30	0.00
TGP2-17	0.00	0.00	0.40	0.00	0.01	0.29	0.00
TGP2-18	0.00	0.00	0.58	0.00	0.01	0.29	0.00
SRM614-2	0.37	0.37	32.94	0.18	0.51	0.34	0.21
SRM612-2	19.54	20.42	1846.70	9.99	24.21	0.37	11.04
SRM610-2	291.36	361.12	27216.47	168.36	351.13	1.29	41.30
AP1-2	0.00	0.00	0.35	0.03	0.08	0.14	0.00
AP2-2	0.83	0.60	1.61	0.13	1.58	0.12	0.26
AP3-2	3.72	2.69	2.48	0.79	3.89	0.21	0.94
AP4-2	4.92	3.62	3.45	0.86	6.29	0.42	0.85

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-11	0.56	4.56	6.92	3.20	9.96	463.04	19.60
SRM614-11	510.60	1763.01	532.84	1669.01	956.17	676.56	1025.65
SRM612-11	24118.18	90016.19	28065.96	80678.98	40324.07	751.92	53850.78
SRM610-11	171729.72	766979.94	202414.91	672706.44	313786.63	911.61	127663.48
AP1-11	79.76	321.12	102.76	462.00	621.80	591.96	269.80
AP2-11	1400.25	3844.58	123.52	1698.37	4632.71	513.40	1809.77
AP3-11	6886.56	18283.70	96.92	8401.57	9536.29	673.88	5979.11
AP4-11	15540.05	42289.00	233.28	20767.80	35145.16	1054.45	13536.76
GCK4-1	15.80	49.80	20.32	39.72	90.76	715.48	71.08
GCK4-2	6.36	26.76	11.28	24.36	63.40	614.20	45.40
GCK4-3	8.12	42.32	27.64	26.68	47.72	599.40	44.16
GCK4-4	22.88	82.16	26.12	63.64	139.36	685.28	86.76
GCK4-5	7.08	38.08	11.72	11.88	46.44	677.80	37.96
GCK4-6	9.64	35.84	15.44	29.68	43.16	710.92	39.04
GCK4-7	11.00	30.76	22.44	34.64	118.36	752.68	65.88
GCK4-8	4.12	11.00	8.76	6.84	57.00	696.60	26.68
GCK4-9	8.88	19.72	7.96	19.04	86.28	668.04	33.44
GCK4-10	15.96	53.00	16.72	65.76	116.96	647.60	63.16
GCK4-11	4.32	7.04	9.08	7.80	46.84	666.20	29.28
GCK4-12	4.72	23.40	10.64	11.08	73.12	670.96	35.72
GCK4-13	11.84	47.44	15.40	43.60	111.12	640.52	68.56
GCK4-14	12.76	11.04	5.16	11.48	52.08	601.60	24.04
GCK4-15	12.36	23.72	17.92	16.60	71.24	632.28	30.48
GCK4-16	0.40	9.16	3.92	4.76	36.52	516.12	12.48
GCK4-17	1.52	13.72	5.84	3.80	44.80	551.00	12.80
GCK4-18	2.28	9.44	4.48	5.72	31.36	521.92	16.72
SRM614-11	179.32	617.80	230.48	642.36	312.28	577.88	345.08
SRM612-11	10816.02	44178.65	15494.21	42953.68	18307.30	678.32	22071.00
SRM610-11	72480.84	340538.19	102391.26	320604.00	141609.19	743.72	41069.55
AP1-11	17.08	47.28	15.48	169.56	190.40	590.32	44.40
AP2-11	892.65	2316.33	42.80	1028.29	2493.57	544.32	834.04
AP3-11	3407.58	9514.49	47.16	5036.39	4763.39	569.92	2752.58
AP4-11	6833.76	19710.55	78.32	9490.21	14763.04	784.60	5755.75
blank-11	3.68	6.36	2.16	1.84	8.08	434.12	14.04
blank average	2.12	5.46	4.54	2.52	9.02	448.58	16.82

blank subtraction							
SRM614-11	508.48	1757.55	528.30	1666.49	947.15	227.98	1008.83
SRM612-11	24116.06	90010.73	28061.42	80676.46	40315.05	303.34	53833.96
SRM610-11	171727.60	766974.48	202410.37	672703.92	313777.61	463.02	127646.66
AP1-11	77.64	315.66	98.22	459.48	612.78	143.38	252.98
AP2-11	1398.13	3839.12	118.98	1695.85	4623.69	64.82	1792.95
AP3-11	6884.44	18278.24	92.38	8399.05	9527.27	225.30	5962.29
AP4-11	15537.93	42283.54	228.74	20765.28	35136.14	605.86	13519.94

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	13.68	44.34	15.78	37.20	81.74	266.90	54.26
GCK4-2	4.24	21.30	6.74	21.84	54.38	165.62	28.58
GCK4-3	6.00	36.86	23.10	24.16	38.70	150.82	27.34
GCK4-4	20.76	76.70	21.58	61.12	130.34	236.70	69.94
GCK4-5	4.96	32.62	7.18	9.36	37.42	229.22	21.14
GCK4-6	7.52	30.38	10.90	27.16	34.14	262.34	22.22
GCK4-7	8.88	25.30	17.90	32.12	109.34	304.10	49.06
GCK4-8	2.00	5.54	4.22	4.32	47.98	248.02	9.86
GCK4-9	6.76	14.26	3.42	16.52	77.26	219.46	16.62
GCK4-10	13.84	47.54	12.18	63.24	107.94	199.02	46.34
GCK4-11	2.20	1.58	4.54	5.28	37.82	217.62	12.46
GCK4-12	2.60	17.94	6.10	8.56	64.10	222.38	18.90
GCK4-13	9.72	41.98	10.86	41.08	102.10	191.94	51.74
GCK4-14	10.64	5.58	0.62	8.96	43.06	153.02	7.22
GCK4-15	10.24	18.26	13.38	14.08	62.22	183.70	13.66
GCK4-16	-1.72	3.70	-0.62	2.24	27.50	67.54	-4.34
GCK4-17	-0.60	8.26	1.30	1.28	35.78	102.42	-4.02
GCK4-18	0.16	3.98	-0.06	3.20	22.34	73.34	-0.10
SRM614-11	177.20	612.34	225.94	639.84	303.26	129.30	328.26
SRM612-11	10813.90	44173.19	15489.67	42951.16	18298.28	229.74	22054.18
SRM610-11	72478.72	340532.73	102386.72	320601.48	141600.17	295.14	41052.73
AP1-11	14.96	41.82	10.94	167.04	181.38	141.74	27.58
AP2-11	890.53	2310.87	38.26	1025.77	2484.55	95.74	817.22
AP3-11	3405.46	9509.03	42.62	5033.87	4754.37	121.34	2735.76
AP4-11	6831.64	19705.09	73.78	9487.69	14754.02	336.02	5738.93

zero correction

SRM614-11	508.48	1757.55	528.30	1666.49	947.15	227.98	1008.83
SRM612-11	24116.06	90010.73	28061.42	80676.46	40315.05	303.34	53833.96
SRM610-11	171727.60	766974.48	202410.37	672703.92	313777.61	463.02	127646.66
AP1-11	77.64	315.66	98.22	459.48	612.78	143.38	252.98
AP2-11	1398.13	3839.12	118.98	1695.85	4623.69	64.82	1792.95
AP3-11	6884.44	18278.24	92.38	8399.05	9527.27	225.30	5962.29
AP4-11	15537.93	42283.54	228.74	20765.28	35136.14	605.86	13519.94
GCK4-1	13.68	44.34	15.78	37.20	81.74	266.90	54.26
GCK4-2	4.24	21.30	6.74	21.84	54.38	165.62	28.58
GCK4-3	6.00	36.86	23.10	24.16	38.70	150.82	27.34
GCK4-4	20.76	76.70	21.58	61.12	130.34	236.70	69.94
GCK4-5	4.96	32.62	7.18	9.36	37.42	229.22	21.14
GCK4-6	7.52	30.38	10.90	27.16	34.14	262.34	22.22
GCK4-7	8.88	25.30	17.90	32.12	109.34	304.10	49.06
GCK4-8	2.00	5.54	4.22	4.32	47.98	248.02	9.86
GCK4-9	6.76	14.26	3.42	16.52	77.26	219.46	16.62
GCK4-10	13.84	47.54	12.18	63.24	107.94	199.02	46.34
GCK4-11	2.20	1.58	4.54	5.28	37.82	217.62	12.46
GCK4-12	2.60	17.94	6.10	8.56	64.10	222.38	18.90
GCK4-13	9.72	41.98	10.86	41.08	102.10	191.94	51.74
GCK4-14	10.64	5.58	0.62	8.96	43.06	153.02	7.22
GCK4-15	10.24	18.26	13.38	14.08	62.22	183.70	13.66
GCK4-16	0.00	3.70	0.00	2.24	27.50	67.54	0.00
GCK4-17	0.00	8.26	1.30	1.28	35.78	102.42	0.00
GCK4-18	0.16	3.98	0.00	3.20	22.34	73.34	0.00
SRM614-11	177.20	612.34	225.94	639.84	303.26	129.30	328.26
SRM612-11	10813.90	44173.19	15489.67	42951.16	18298.28	229.74	22054.18
SRM610-11	72478.72	340532.73	102386.72	320601.48	141600.17	295.14	41052.73
AP1-11	14.96	41.82	10.94	167.04	181.38	141.74	27.58
AP2-11	890.53	2310.87	38.26	1025.77	2484.55	95.74	817.22
AP3-11	3405.46	9509.03	42.62	5033.87	4754.37	121.34	2735.76
AP4-11	6831.64	19705.09	73.78	9487.69	14754.02	336.02	5738.93

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000140	0.000485	0.000146	0.000460	0.000261	0.000063	0.000278
SRM612-11	0.007630	0.028480	0.008879	0.025526	0.012756	0.000096	0.017033
SRM610-11	0.105535	0.471343	0.124391	0.413409	0.192831	0.000285	0.078445
AP1-11	0.000004	0.000016	0.000005	0.000023	0.000030	0.000007	0.000013
AP2-11	0.000076	0.000208	0.000006	0.000092	0.000250	0.000004	0.000097
AP3-11	0.000320	0.000850	0.000004	0.000391	0.000443	0.000010	0.000277
AP4-11	0.000698	0.001901	0.000010	0.000933	0.001579	0.000027	0.000608
GCK4-1	0.000001	0.000002	0.000001	0.000002	0.000005	0.000015	0.000003
GCK4-2	0.000000	0.000001	0.000000	0.000001	0.000003	0.000009	0.000002
GCK4-3	0.000000	0.000002	0.000001	0.000001	0.000002	0.000008	0.000001
GCK4-4	0.000001	0.000003	0.000001	0.000002	0.000005	0.000009	0.000003
GCK4-5	0.000000	0.000001	0.000000	0.000000	0.000001	0.000008	0.000001
GCK4-6	0.000000	0.000001	0.000000	0.000001	0.000001	0.000010	0.000001
GCK4-7	0.000001	0.000003	0.000002	0.000003	0.000011	0.000032	0.000005
GCK4-8	0.000000	0.000001	0.000001	0.000001	0.000006	0.000032	0.000001
GCK4-9	0.000001	0.000001	0.000000	0.000001	0.000007	0.000019	0.000001
GCK4-10	0.000001	0.000004	0.000001	0.000006	0.000010	0.000019	0.000004
GCK4-11	0.000000	0.000000	0.000001	0.000001	0.000007	0.000040	0.000002
GCK4-12	0.000000	0.000003	0.000001	0.000001	0.000011	0.000037	0.000003
GCK4-13	0.000001	0.000003	0.000001	0.000003	0.000008	0.000015	0.000004
GCK4-14	0.000001	0.000000	0.000000	0.000001	0.000003	0.000012	0.000001
GCK4-15	0.000001	0.000001	0.000001	0.000001	0.000005	0.000014	0.000001
GCK4-16	0.000000	0.000000	0.000000	0.000000	0.000002	0.000004	0.000000
GCK4-17	0.000000	0.000001	0.000000	0.000000	0.000002	0.000006	0.000000
GCK4-18	0.000000	0.000000	0.000000	0.000000	0.000001	0.000005	0.000000
SRM614-11	0.000185	0.000639	0.000236	0.000668	0.000316	0.000135	0.000343
SRM612-11	0.008613	0.035181	0.012336	0.034208	0.014573	0.000183	0.017565
SRM610-11	0.116990	0.549662	0.165265	0.517491	0.228560	0.000476	0.066264
AP1-11	0.000001	0.000003	0.000001	0.000014	0.000015	0.000012	0.000002
AP2-11	0.000076	0.000197	0.000003	0.000088	0.000212	0.000008	0.000070
AP3-11	0.000256	0.000716	0.000003	0.000379	0.000358	0.000009	0.000206
AP4-11	0.000523	0.001509	0.000006	0.000727	0.001130	0.000026	0.000440
standardize signal averages AP							
AP1	0.000003	0.000010	0.000003	0.000018	0.000023	0.000009	0.000007
AP2	0.000076	0.000203	0.000005	0.000090	0.000231	0.000006	0.000083
AP3	0.000288	0.000783	0.000004	0.000385	0.000400	0.000010	0.000242
AP4	0.000611	0.001705	0.000008	0.000830	0.001355	0.000026	0.000524
linest from std sig ave							
	0.025187	0.006292	1.662416	0.003295	0.014764	0.043510	0.006218
standardize signal averages SRM							
srm614-2	0.000163	0.000562	0.000191	0.000564	0.000289	0.000099	0.000310
srm612-2	0.008121	0.031830	0.010608	0.029867	0.013665	0.000139	0.017299
srm610-2	0.111262	0.510503	0.144828	0.465450	0.210696	0.000380	0.072355
linest from std sig ave							
	0.048412	0.009944	0.033653	0.009459	0.024681	0.000000	0.009878
concentration data							
SRM614-11	0.30	0.26	20.78	0.13	0.33	0.23	0.15
SRM612-11	16.48	15.37	1265.88	7.21	16.15	0.36	9.08
SRM610-11	227.97	254.35	17734.88	116.83	244.16	1.06	41.83
AP1-11	0.04	0.04	3.23	0.03	0.18	0.12	0.03
AP2-11	0.76	0.52	4.27	0.12	1.47	0.06	0.24
AP3-11	3.22	2.13	2.85	0.51	2.61	0.18	0.69
AP4-11	7.02	4.77	6.82	1.23	9.30	0.47	1.51
GCK4-1	0.01	0.01	0.58	0.00	0.03	0.26	0.01
GCK4-2	0.00	0.00	0.25	0.00	0.02	0.16	0.00
GCK4-3	0.00	0.00	0.78	0.00	0.01	0.13	0.00
GCK4-4	0.01	0.01	0.53	0.00	0.03	0.15	0.01
GCK4-5	0.00	0.00	0.18	0.00	0.01	0.15	0.00
GCK4-6	0.00	0.00	0.27	0.00	0.01	0.17	0.00
GCK4-7	0.01	0.01	1.24	0.00	0.07	0.55	0.01
GCK4-8	0.00	0.00	0.36	0.00	0.04	0.55	0.00
GCK4-9	0.01	0.00	0.20	0.00	0.04	0.33	0.00
GCK4-10	0.01	0.01	0.75	0.01	0.06	0.32	0.01
GCK4-11	0.00	0.00	0.55	0.00	0.04	0.69	0.01
GCK4-12	0.00	0.01	0.67	0.00	0.06	0.64	0.01
GCK4-13	0.01	0.01	0.56	0.00	0.05	0.26	0.01
GCK4-14	0.01	0.00	0.03	0.00	0.02	0.21	0.00
GCK4-15	0.01	0.00	0.70	0.00	0.03	0.25	0.00
GCK4-16	0.00	0.00	0.00	0.00	0.01	0.07	0.00
GCK4-17	0.00	0.00	0.05	0.00	0.01	0.11	0.00
GCK4-18	0.00	0.00	0.00	0.00	0.01	0.08	0.00
SRM614-11	0.40	0.34	33.62	0.19	0.40	0.50	0.18

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	18.60	18.98	1758.86	9.67	18.45	0.68	9.37
SRM610-11	252.71	296.62	23562.44	146.24	289.40	1.78	35.34
AP1-11	0.01	0.01	0.60	0.02	0.09	0.20	0.01
AP2-11	0.76	0.50	2.17	0.12	1.25	0.14	0.17
AP3-11	2.58	1.80	2.13	0.50	2.11	0.16	0.51
AP4-11	5.26	3.79	3.75	0.96	6.65	0.45	1.09

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-9	0.84	1.76	2.80	1.56	4.68	404.76	24.92
SRM614-9	413.80	1368.37	416.00	1146.17	657.68	668.44	797.68
SRM612-9	24021.50	84905.59	24989.58	71975.24	34879.16	824.40	52253.86
SRM610-9	172731.61	716029.81	177260.11	586786.06	276994.06	1175.33	114563.13
AP1-9	34.24	136.24	39.56	246.84	307.44	638.64	120.24
AP2-9	1428.01	3690.38	82.64	1555.21	3608.90	714.12	1651.77
AP3-9	7158.76	18047.82	102.32	8701.41	8723.41	708.28	4490.95
AP4-9	10534.14	26985.83	132.92	11989.51	17417.54	962.61	6324.80
GCK3-1	5.00	9.88	5.60	3.20	39.28	883.84	40.16
GCK3-2	21.00	33.92	26.32	8.32	44.92	883.28	106.12
GCK3-3	17.56	23.48	19.76	16.24	55.20	880.96	120.96
GCK3-4	19.96	49.44	10.68	37.68	74.76	1027.61	115.56
GCK3-5	7.64	11.36	4.40	13.92	22.20	1004.65	42.84
GCK3-6	7.08	12.48	8.20	10.60	33.28	987.33	62.80
GCK3-7	15.08	80.68	23.64	54.40	106.72	1033.65	105.60
GCK3-8	5.04	14.00	9.12	5.56	37.40	966.81	56.32
GCK3-9	9.72	29.00	10.44	23.04	61.68	991.41	62.64
GCK3-10	120.64	105.16	21.04	74.64	112.08	1022.29	103.76
GCK3-11	17.40	30.84	5.36	22.20	31.80	1021.45	34.88
GCK3-12	7.04	20.80	8.24	15.28	31.56	933.25	51.20
GCK3-13	22.56	83.20	24.12	79.64	154.12	940.37	118.56
GCK3-14	12.96	12.80	15.40	10.72	27.44	880.60	48.28
GCK3-15	4.88	12.52	13.88	17.36	35.36	884.89	34.52
GCK3-16	13.24	33.32	17.56	32.72	81.36	896.41	83.04
GCK3-17	9.56	11.88	8.56	8.96	14.24	876.04	55.84
GCK3-18	10.36	16.88	5.76	11.52	24.80	857.20	49.28
SRM614-10	288.16	1212.53	406.52	1085.97	585.92	800.60	608.60
SRM612-10	17042.54	67461.46	22351.77	62986.79	28446.76	847.16	34860.80
SRM610-10	122852.97	587348.19	162357.59	523020.22	213873.64	937.49	64574.45
AP1-10	4.80	11.60	10.16	166.76	171.08	658.08	28.92
AP2-10	769.64	2171.81	28.08	904.01	2268.77	701.00	805.28
AP3-10	4820.19	13579.84	54.60	6621.80	6363.44	684.92	3323.86
AP4-10	7555.52	21132.88	83.68	10001.02	13836.48	943.73	5217.27
blank-10	3.48	8.00	4.56	1.92	4.88	591.84	16.88
blank average	2.16	4.88	3.68	1.74	4.78	498.30	20.90

blank subtraction							
SRM614-9	411.64	1363.49	412.32	1144.43	652.90	170.14	776.78
SRM612-9	24019.34	84900.71	24985.90	71973.50	34874.38	326.10	52232.95
SRM610-9	172729.45	716024.93	177256.43	586784.32	276989.28	677.02	114542.23
AP1-9	32.08	131.36	35.88	245.10	302.66	140.34	99.34
AP2-9	1425.85	3685.50	78.96	1553.47	3604.12	215.82	1630.87
AP3-9	7156.60	18042.94	98.64	8699.67	8718.63	209.98	4470.05
AP4-9	10531.98	26980.95	129.24	11987.77	17412.76	464.30	6303.90
GCK3-1	2.84	5.00	1.92	1.46	34.50	385.54	19.26
GCK3-2	18.84	29.04	22.64	6.58	40.14	384.98	85.22
GCK3-3	15.40	18.60	16.08	14.50	50.42	382.66	100.06
GCK3-4	17.80	44.56	7.00	35.94	69.98	529.30	94.66
GCK3-5	5.48	6.48	0.72	12.18	17.42	506.34	21.94
GCK3-6	4.92	7.60	4.52	8.86	28.50	489.02	41.90
GCK3-7	12.92	75.80	19.96	52.66	101.94	535.34	84.70
GCK3-8	2.88	9.12	5.44	3.82	32.62	468.50	35.42
GCK3-9	7.56	24.12	6.76	21.30	56.90	493.10	41.74
GCK3-10	118.48	100.28	17.36	72.90	107.30	523.98	82.86
GCK3-11	15.24	25.96	1.68	20.46	27.02	523.14	13.98
GCK3-12	4.88	15.92	4.56	13.54	26.78	434.94	30.30
GCK3-13	20.40	78.32	20.44	77.90	149.34	442.06	97.66
GCK3-14	10.80	7.92	11.72	8.98	22.66	382.30	27.38
GCK3-15	2.72	7.64	10.20	15.62	30.58	386.58	13.62
GCK3-16	11.08	28.44	13.88	30.98	76.58	398.10	62.14

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	7.40	7.00	4.88	7.22	9.46	377.74	34.94
GCK3-18	8.20	12.00	2.08	9.78	20.02	358.90	28.38
SRM614-10	286.00	1207.65	402.84	1084.23	581.14	302.30	587.70
SRM612-10	17040.37	67456.58	22348.09	62985.05	28441.98	348.86	34839.90
SRM610-10	122850.81	587343.31	162353.91	523018.48	213868.86	439.18	64553.54
AP1-10	2.64	6.72	6.48	165.02	166.30	159.78	8.02
AP2-10	767.48	2166.93	24.40	902.27	2263.99	202.70	784.38
AP3-10	4818.03	13574.96	50.92	6620.06	6358.66	186.62	3302.96
AP4-10	7553.36	21128.00	80.00	9999.28	13831.70	445.42	5196.37

zero correction

SRM614-9	411.64	1363.49	412.32	1144.43	652.90	170.14	776.78
SRM612-9	24019.34	84900.71	24985.90	71973.50	34874.38	326.10	52232.95
SRM610-9	172729.45	716024.93	177256.43	586784.32	276989.28	677.02	114542.23
AP1-9	32.08	131.36	35.88	245.10	302.66	140.34	99.34
AP2-9	1425.85	3685.50	78.96	1553.47	3604.12	215.82	1630.87
AP3-9	7156.60	18042.94	98.64	8699.67	8718.63	209.98	4470.05
AP4-9	10531.98	26980.95	129.24	11987.77	17412.76	464.30	6303.90
GCK3-1	2.84	5.00	1.92	1.46	34.50	385.54	19.26
GCK3-2	18.84	29.04	22.64	6.58	40.14	384.98	85.22
GCK3-3	15.40	18.60	16.08	14.50	50.42	382.66	100.06
GCK3-4	17.80	44.56	7.00	35.94	69.98	529.30	94.66
GCK3-5	5.48	6.48	0.72	12.18	17.42	506.34	21.94
GCK3-6	4.92	7.60	4.52	8.86	28.50	489.02	41.90
GCK3-7	12.92	75.80	19.96	52.66	101.94	535.34	84.70
GCK3-8	2.88	9.12	5.44	3.82	32.62	468.50	35.42
GCK3-9	7.56	24.12	6.76	21.30	56.90	493.10	41.74
GCK3-10	118.48	100.28	17.36	72.90	107.30	523.98	82.86
GCK3-11	15.24	25.96	1.68	20.46	27.02	523.14	13.98
GCK3-12	4.88	15.92	4.56	13.54	26.78	434.94	30.30
GCK3-13	20.40	78.32	20.44	77.90	149.34	442.06	97.66
GCK3-14	10.80	7.92	11.72	8.98	22.66	382.30	27.38
GCK3-15	2.72	7.64	10.20	15.62	30.58	386.58	13.62
GCK3-16	11.08	28.44	13.88	30.98	76.58	398.10	62.14
GCK3-17	7.40	7.00	4.88	7.22	9.46	377.74	34.94
GCK3-18	8.20	12.00	2.08	9.78	20.02	358.90	28.38
SRM614-10	286.00	1207.65	402.84	1084.23	581.14	302.30	587.70
SRM612-10	17040.37	67456.58	22348.09	62985.05	28441.98	348.86	34839.90
SRM610-10	122850.81	587343.31	162353.91	523018.48	213868.86	439.18	64553.54
AP1-10	2.64	6.72	6.48	165.02	166.30	159.78	8.02
AP2-10	767.48	2166.93	24.40	902.27	2263.99	202.70	784.38
AP3-10	4818.03	13574.96	50.92	6620.06	6358.66	186.62	3302.96
AP4-10	7553.36	21128.00	80.00	9999.28	13831.70	445.42	5196.37

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-9	0.000120	0.000398	0.000120	0.000334	0.000191	0.000050	0.000227
SRM612-9	0.006461	0.022839	0.006721	0.019362	0.009382	0.000088	0.014051
SRM610-9	0.095967	0.397819	0.098482	0.326013	0.153893	0.000376	0.063639
AP1-9	0.000001	0.000006	0.000002	0.000010	0.000013	0.000006	0.000004
AP2-9	0.000072	0.000187	0.000004	0.000079	0.000182	0.000011	0.000083
AP3-9	0.000268	0.000675	0.000004	0.000326	0.000326	0.000008	0.000167
AP4-9	0.000472	0.001210	0.000006	0.000537	0.000781	0.000021	0.000283
GCK3-1	0.000000	0.000000	0.000000	0.000000	0.000002	0.000017	0.000001
GCK3-2	0.000001	0.000001	0.000001	0.000000	0.000002	0.000015	0.000003
GCK3-3	0.000001	0.000001	0.000001	0.000001	0.000002	0.000017	0.000004
GCK3-4	0.000002	0.000005	0.000001	0.000004	0.000008	0.000059	0.000011
GCK3-5	0.000001	0.000001	0.000000	0.000001	0.000002	0.000054	0.000002
GCK3-6	0.000001	0.000001	0.000000	0.000001	0.000003	0.000053	0.000005
GCK3-7	0.000001	0.000005	0.000001	0.000003	0.000006	0.000033	0.000005
GCK3-8	0.000000	0.000001	0.000000	0.000000	0.000002	0.000030	0.000002

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000000	0.000002	0.000000	0.000001	0.000004	0.000031	0.000003
GCK3-10	0.000009	0.000008	0.000001	0.000006	0.000008	0.000040	0.000006
GCK3-11	0.000001	0.000002	0.000000	0.000001	0.000002	0.000038	0.000001
GCK3-12	0.000000	0.000001	0.000000	0.000001	0.000002	0.000033	0.000002
GCK3-13	0.000001	0.000005	0.000001	0.000005	0.000010	0.000030	0.000007
GCK3-14	0.000001	0.000001	0.000001	0.000001	0.000002	0.000026	0.000002
GCK3-15	0.000000	0.000000	0.000001	0.000001	0.000002	0.000025	0.000001
GCK3-16	0.000001	0.000002	0.000001	0.000002	0.000004	0.000022	0.000003
GCK3-17	0.000000	0.000000	0.000000	0.000000	0.000001	0.000021	0.000002
GCK3-18	0.000000	0.000001	0.000000	0.000000	0.000001	0.000018	0.000001
SRM614-10	0.000151	0.000636	0.000212	0.000571	0.000306	0.000159	0.000309
SRM612-10	0.008027	0.031777	0.010527	0.029670	0.013398	0.000164	0.016412
SRM610-10	0.113744	0.543805	0.150319	0.484249	0.198015	0.000407	0.059768
AP1-10	0.000000	0.000000	0.000000	0.000010	0.000010	0.000009	0.000000
AP2-10	0.000063	0.000177	0.000002	0.000074	0.000185	0.000017	0.000064
AP3-10	0.000241	0.000680	0.000003	0.000332	0.000319	0.000009	0.000166
AP4-10	0.000443	0.001240	0.000005	0.000587	0.000812	0.000026	0.000305
standardize signal averages AP							
AP1	0.000001	0.000003	0.000001	0.000010	0.000011	0.000008	0.000002
AP2	0.000068	0.000182	0.000003	0.000076	0.000184	0.000014	0.000073
AP3	0.000255	0.000678	0.000003	0.000329	0.000322	0.000009	0.000166
AP4	0.000458	0.001225	0.000005	0.000562	0.000796	0.000023	0.000294
linest from std sig ave							
	0.032552	0.008464	2.614447	0.004667	0.024537	0.044894	0.010875
standardize signal averages SRM							
srm614-2	0.000135	0.000517	0.000166	0.000453	0.000248	0.000104	0.000268
srm612-2	0.007244	0.027308	0.008624	0.024516	0.011390	0.000126	0.015232
srm610-2	0.104856	0.470812	0.124401	0.405131	0.175954	0.000391	0.061704
linest from std sig ave							
	0.051381	0.010784	0.039188	0.010868	0.029555	0.000000	0.011563
concentration data							
SRM614-9	0.34	0.29	27.00	0.13	0.40	0.19	0.21
SRM612-9	18.04	16.58	1507.10	7.75	19.74	0.34	13.10
SRM610-9	267.92	288.78	22082.03	130.48	323.85	1.45	59.35
AP1-9	0.02	0.02	1.58	0.02	0.13	0.11	0.02
AP2-9	0.94	0.63	4.17	0.15	1.79	0.20	0.36
AP3-9	3.48	2.28	3.85	0.61	3.19	0.14	0.73
AP4-9	6.13	4.08	6.04	1.00	7.64	0.37	1.23
GCK3-1	0.00	0.00	0.09	0.00	0.02	0.31	0.00
GCK3-2	0.01	0.00	0.94	0.00	0.02	0.27	0.01
GCK3-3	0.01	0.00	0.73	0.00	0.02	0.30	0.02
GCK3-4	0.03	0.02	0.82	0.01	0.08	1.07	0.05
GCK3-5	0.01	0.00	0.08	0.00	0.02	0.96	0.01
GCK3-6	0.01	0.00	0.51	0.00	0.03	0.95	0.02
GCK3-7	0.01	0.02	1.30	0.01	0.06	0.60	0.02
GCK3-8	0.00	0.00	0.36	0.00	0.02	0.53	0.01
GCK3-9	0.01	0.01	0.45	0.00	0.04	0.56	0.01
GCK3-10	0.12	0.03	1.39	0.01	0.08	0.72	0.03
GCK3-11	0.01	0.01	0.13	0.00	0.02	0.69	0.00
GCK3-12	0.00	0.00	0.37	0.00	0.02	0.60	0.01
GCK3-13	0.02	0.02	1.46	0.01	0.10	0.54	0.03
GCK3-14	0.01	0.00	0.82	0.00	0.01	0.46	0.01
GCK3-15	0.00	0.00	0.69	0.00	0.02	0.45	0.00
GCK3-16	0.01	0.01	0.79	0.00	0.04	0.39	0.01
GCK3-17	0.01	0.00	0.28	0.00	0.01	0.37	0.01
GCK3-18	0.01	0.00	0.11	0.00	0.01	0.32	0.01
SRM614-10	0.42	0.46	47.56	0.23	0.64	0.61	0.29
SRM612-10	22.41	23.07	2360.50	11.87	28.19	0.63	15.31
SRM610-10	317.55	394.75	33704.98	193.81	416.70	1.57	55.74
AP1-10	0.00	0.00	0.40	0.02	0.10	0.17	0.00
AP2-10	0.82	0.60	2.08	0.14	1.81	0.30	0.28
AP3-10	3.14	2.30	2.66	0.62	3.12	0.17	0.72
AP4-10	5.76	4.19	4.90	1.09	7.95	0.47	1.32
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-7	4.12	5.44	2.76	1.52	33.28	753.68	36.16
SRM614-7	410.16	1554.57	574.24	1578.01	850.24	1036.13	791.88
SRM612-7	20633.84	84198.71	28782.96	79151.13	35274.92	1025.13	40981.71
SRM610-7	114884.57	555854.31	161168.63	505702.28	214931.77	1148.01	60240.54
AP1-7	62.80	174.32	89.36	410.16	455.56	775.64	139.84
AP2-7	1193.25	3568.58	117.32	1489.45	4545.63	749.32	1382.17
AP3-7	5851.51	16808.86	76.08	8240.29	8035.29	738.56	4212.38
AP4-7	8395.37	23774.57	114.20	11382.94	15842.69	948.77	5668.27
GCK2-1	8.40	34.60	16.72	24.08	75.52	1238.81	46.68
GCK2-2	8.56	6.24	7.88	6.12	21.12	1076.41	30.56
GCK2-3	6.48	7.48	14.44	13.12	42.20	1092.65	22.84
GCK2-4	12.08	34.64	23.04	31.72	160.00	1426.77	46.88
GCK2-5	5.16	2.32	13.28	9.28	148.28	1150.53	25.04
GCK2-6	5.68	9.88	14.56	3.84	178.80	1134.01	26.48
GCK2-7	16.24	48.84	32.96	58.68	218.64	1583.97	53.56
GCK2-8	5.32	10.04	7.08	4.36	198.32	1268.25	42.24
GCK2-9	5.80	14.96	12.72	13.16	173.64	1188.89	29.96
GCK2-10	12.84	17.92	14.64	8.72	45.96	1204.45	34.80
GCK2-11	8.68	21.32	14.24	5.84	105.80	1092.85	36.68
GCK2-12	8.40	13.44	9.20	6.48	47.60	1086.65	34.60
GCK2-13	9.44	27.92	25.80	6.16	109.68	1114.29	41.16
GCK2-14	11.72	16.64	20.20	2.80	129.36	1032.61	31.48
GCK2-15	6.36	18.04	18.72	11.92	102.32	1084.89	23.16
GCK2-16	4.48	8.20	29.72	4.24	153.08	1036.65	33.96
GCK2-17	2.60	10.04	17.96	4.72	197.88	1014.17	24.68
GCK2-18	5.60	7.80	19.92	6.12	270.48	993.41	18.76
SRM614-8	211.72	902.65	306.28	937.25	470.12	782.32	424.08
SRM612-8	12863.91	54224.59	19466.39	53409.30	23158.97	811.40	24383.66
SRM610-8	84144.84	418713.56	130127.85	402300.94	174012.22	799.56	46147.06
AP1-8	7.84	6.12	23.92	158.64	177.40	609.56	23.88
AP2-8	740.00	2162.85	28.56	958.77	2569.29	597.20	834.00
AP3-8	4312.18	12630.27	45.00	7006.68	6403.24	617.16	3081.54
AP4-8	5063.07	15177.97	59.96	7788.64	9184.45	654.40	2839.06
blank-8	3.28	3.68	6.12	5.60	4.68	590.16	12.96
blank average	3.70	4.56	4.44	3.56	18.98	671.92	24.56
blank subtraction							
SRM614-7	406.46	1550.01	569.80	1574.45	831.26	364.20	767.32
SRM612-7	20630.14	84194.15	28778.52	79147.56	35255.94	353.20	40957.15
SRM610-7	114880.87	555849.75	161164.19	505698.72	214912.79	476.08	60215.98
AP1-7	59.10	169.76	84.92	406.60	436.58	103.72	115.28
AP2-7	1189.55	3564.02	112.88	1485.89	4526.65	77.40	1357.61
AP3-7	5847.81	16804.29	71.64	8236.73	8016.31	66.64	4187.82
AP4-7	8391.67	23770.01	109.76	11379.38	15823.71	276.84	5643.71
GCK2-1	4.70	30.04	12.28	20.52	56.54	566.88	22.12
GCK2-2	4.86	1.68	3.44	2.56	2.14	404.48	6.00
GCK2-3	2.78	2.92	10.00	9.56	23.22	420.72	-1.72
GCK2-4	8.38	30.08	18.60	28.16	141.02	754.84	22.32
GCK2-5	1.46	-2.24	8.84	5.72	129.30	478.60	0.48
GCK2-6	1.98	5.32	10.12	0.28	159.82	462.08	1.92
GCK2-7	12.54	44.28	28.52	55.12	199.66	912.05	29.00
GCK2-8	1.62	5.48	2.64	0.80	179.34	596.32	17.68
GCK2-9	2.10	10.40	8.28	9.60	154.66	516.96	5.40
GCK2-10	9.14	13.36	10.20	5.16	26.98	532.52	10.24
GCK2-11	4.98	16.76	9.80	2.28	86.82	420.92	12.12
GCK2-12	4.70	8.88	4.76	2.92	28.62	414.72	10.04
GCK2-13	5.74	23.36	21.36	2.60	90.70	442.36	16.60
GCK2-14	8.02	12.08	15.76	-0.76	110.38	360.68	6.92
GCK2-15	2.66	13.48	14.28	8.36	83.34	412.96	-1.40
GCK2-16	0.78	3.64	25.28	0.68	134.10	364.72	9.40
GCK2-17	-1.10	5.48	13.52	1.16	178.90	342.24	0.12
GCK2-18	1.90	3.24	15.48	2.56	251.50	321.48	-5.80
SRM614-8	208.02	898.09	301.84	933.69	451.14	110.40	399.52
SRM612-8	12860.21	54220.03	19461.95	53405.74	23139.99	139.48	24359.10
SRM610-8	84141.14	418709.00	130123.41	402297.38	173993.24	127.64	46122.50
AP1-8	4.14	1.56	19.48	155.08	158.42	-62.36	-0.68
AP2-8	736.30	2158.29	24.12	955.21	2550.31	-74.72	809.44
AP3-8	4308.48	12625.71	40.56	7003.12	6384.26	-54.76	3056.98
AP4-8	5059.37	15173.40	55.52	7785.08	9165.47	-17.52	2814.50
zero correction							
SRM614-7	406.46	1550.01	569.80	1574.45	831.26	364.20	767.32
SRM612-7	20630.14	84194.15	28778.52	79147.56	35255.94	353.20	40957.15
SRM610-7	114880.87	555849.75	161164.19	505698.72	214912.79	476.08	60215.98
AP1-7	59.10	169.76	84.92	406.60	436.58	103.72	115.28
AP2-7	1189.55	3564.02	112.88	1485.89	4526.65	77.40	1357.61

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	5847.81	16804.29	71.64	8236.73	8016.31	66.64	4187.82
AP4-7	8391.67	23770.01	109.76	11379.38	15823.71	276.84	5643.71
GCK2-1	4.70	30.04	12.28	20.52	56.54	566.88	22.12
GCK2-2	4.86	1.68	3.44	2.56	2.14	404.48	6.00
GCK2-3	2.78	2.92	10.00	9.56	23.22	420.72	0.00
GCK2-4	8.38	30.08	18.60	28.16	141.02	754.84	22.32
GCK2-5	1.46	0.00	8.84	5.72	129.30	478.60	0.48
GCK2-6	1.98	5.32	10.12	0.28	159.82	462.08	1.92
GCK2-7	12.54	44.28	28.52	55.12	199.66	912.05	29.00
GCK2-8	1.62	5.48	2.64	0.80	179.34	596.32	17.68
GCK2-9	2.10	10.40	8.28	9.60	154.66	516.96	5.40
GCK2-10	9.14	13.36	10.20	5.16	26.98	532.52	10.24
GCK2-11	4.98	16.76	9.80	2.28	86.82	420.92	12.12
GCK2-12	4.70	8.88	4.76	2.92	28.62	414.72	10.04
GCK2-13	5.74	23.36	21.36	2.60	90.70	442.36	16.60
GCK2-14	8.02	12.08	15.76	0.00	110.38	360.68	6.92
GCK2-15	2.66	13.48	14.28	8.36	83.34	412.96	0.00
GCK2-16	0.78	3.64	25.28	0.68	134.10	364.72	9.40
GCK2-17	0.00	5.48	13.52	1.16	178.90	342.24	0.12
GCK2-18	1.90	3.24	15.48	2.56	251.50	321.48	0.00
SRM614-8	208.02	898.09	301.84	933.69	451.14	110.40	399.52
SRM612-8	12860.21	54220.03	19461.95	53405.74	23139.99	139.48	24359.10
SRM610-8	84141.14	418709.00	130123.41	402297.38	173993.24	127.64	46122.50
AP1-8	4.14	1.56	19.48	155.08	158.42	0.00	0.00
AP2-8	736.30	2158.29	24.12	955.21	2550.31	0.00	809.44
AP3-8	4308.48	12625.71	40.56	7003.12	6384.26	0.00	3056.98
AP4-8	5059.37	15173.40	55.52	7785.08	9165.47	0.00	2814.50

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-7	0.000163	0.000622	0.000228	0.000631	0.000333	0.000146	0.000308
SRM612-7	0.008679	0.035419	0.012107	0.033296	0.014832	0.000149	0.017230
SRM610-7	0.119033	0.575939	0.166989	0.523975	0.222680	0.000493	0.062392
AP1-7	0.000003	0.000009	0.000005	0.000022	0.000024	0.000006	0.000006
AP2-7	0.000079	0.000238	0.000008	0.000099	0.000302	0.000005	0.000091
AP3-7	0.000287	0.000825	0.000004	0.000405	0.000394	0.000003	0.000206
AP4-7	0.000489	0.001386	0.000006	0.000663	0.000922	0.000016	0.000329
GCK2-1	0.000001	0.000005	0.000002	0.000004	0.000010	0.000100	0.000004
GCK2-2	0.000001	0.000000	0.000001	0.000000	0.000000	0.000079	0.000001
GCK2-3	0.000001	0.000001	0.000002	0.000002	0.000005	0.000083	0.000000
GCK2-4	0.000001	0.000005	0.000003	0.000005	0.000024	0.000130	0.000004
GCK2-5	0.000000	0.000000	0.000001	0.000001	0.000021	0.000079	0.000000
GCK2-6	0.000000	0.000001	0.000001	0.000000	0.000023	0.000067	0.000000
GCK2-7	0.000002	0.000007	0.000005	0.000009	0.000032	0.000148	0.000005
GCK2-8	0.000000	0.000001	0.000000	0.000000	0.000026	0.000087	0.000003
GCK2-9	0.000000	0.000002	0.000001	0.000001	0.000024	0.000080	0.000001
GCK2-10	0.000001	0.000001	0.000001	0.000000	0.000002	0.000039	0.000001
GCK2-11	0.000000	0.000001	0.000001	0.000000	0.000007	0.000032	0.000001
GCK2-12	0.000000	0.000001	0.000000	0.000000	0.000002	0.000032	0.000001
GCK2-13	0.000000	0.000002	0.000002	0.000000	0.000007	0.000033	0.000001
GCK2-14	0.000001	0.000001	0.000001	0.000000	0.000009	0.000029	0.000001
GCK2-15	0.000000	0.000001	0.000001	0.000001	0.000006	0.000030	0.000000
GCK2-16	0.000000	0.000000	0.000002	0.000000	0.000012	0.000032	0.000001
GCK2-17	0.000000	0.000001	0.000001	0.000000	0.000016	0.000032	0.000000
GCK2-18	0.000000	0.000000	0.000002	0.000000	0.000030	0.000038	0.000000
SRM614-8	0.000153	0.000663	0.000223	0.000689	0.000333	0.000081	0.000295
SRM612-8	0.008561	0.036095	0.012956	0.035553	0.015405	0.000093	0.016216
SRM610-8	0.118639	0.590381	0.183474	0.567241	0.245331	0.000180	0.065033
AP1-8	0.000000	0.000000	0.000001	0.000012	0.000012	0.000000	0.000000
AP2-8	0.000067	0.000196	0.000002	0.000087	0.000231	0.000000	0.000073
AP3-8	0.000261	0.000766	0.000002	0.000425	0.000387	0.000000	0.000186

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.000409	0.001227	0.000004	0.000629	0.000741	0.000000	0.000228
standardize signal averages AP							
AP1	0.000002	0.000005	0.000003	0.000017	0.000018	0.000003	0.000003
AP2	0.000073	0.000217	0.000005	0.000093	0.000267	0.000003	0.000082
AP3	0.000274	0.000796	0.000003	0.000415	0.000391	0.000002	0.000196
AP4	0.000449	0.001306	0.000005	0.000646	0.000832	0.000008	0.000278
linest from std sig ave							
	0.032372	0.007743	1.916338	0.003964	0.022730	0.142682	0.010898
standardize signal averages SRM							
srM614-2	0.000158	0.000642	0.000226	0.000660	0.000333	0.000114	0.000301
srM612-2	0.008620	0.035757	0.012531	0.034425	0.015118	0.000121	0.016723
srM610-2	0.118836	0.583160	0.175232	0.545608	0.234006	0.000337	0.063713
linest from std sig ave							
	0.045328	0.008705	0.027817	0.008070	0.022223	0.000000	0.011155
concentration data							
SRM614-7	0.45	0.41	37.55	0.21	0.65	1.79	0.29
SRM612-7	24.10	23.52	1989.76	11.32	28.91	1.82	16.10
SRM610-7	330.47	382.45	27444.77	178.13	434.09	6.04	58.31
AP1-7	0.04	0.03	3.53	0.03	0.22	0.32	0.03
AP2-7	1.03	0.74	5.76	0.16	2.74	0.29	0.39
AP3-7	3.71	2.55	2.69	0.64	3.57	0.19	0.89
AP4-7	6.32	4.28	4.89	1.05	8.36	0.92	1.43
GCK2-1	0.01	0.02	1.66	0.01	0.09	5.71	0.02
GCK2-2	0.01	0.00	0.51	0.00	0.00	4.47	0.01
GCK2-3	0.01	0.00	1.50	0.00	0.04	4.71	0.00
GCK2-4	0.02	0.02	2.45	0.01	0.22	7.41	0.02
GCK2-5	0.00	0.00	1.11	0.00	0.19	4.48	0.00
GCK2-6	0.00	0.00	1.12	0.00	0.21	3.81	0.00
GCK2-7	0.03	0.02	3.54	0.01	0.29	8.44	0.02
GCK2-8	0.00	0.00	0.29	0.00	0.24	4.92	0.01
GCK2-9	0.00	0.00	0.98	0.00	0.22	4.55	0.00
GCK2-10	0.01	0.00	0.57	0.00	0.02	2.23	0.00
GCK2-11	0.00	0.00	0.57	0.00	0.06	1.82	0.00
GCK2-12	0.00	0.00	0.28	0.00	0.02	1.82	0.00
GCK2-13	0.01	0.01	1.21	0.00	0.06	1.87	0.01
GCK2-14	0.01	0.00	0.95	0.00	0.08	1.63	0.00
GCK2-15	0.00	0.00	0.80	0.00	0.06	1.72	0.00
GCK2-16	0.00	0.00	1.72	0.00	0.11	1.85	0.00
GCK2-17	0.00	0.00	0.95	0.00	0.15	1.80	0.00
GCK2-18	0.00	0.00	1.39	0.00	0.27	2.15	0.00
SRM614-8	0.43	0.44	36.60	0.23	0.65	1.00	0.28
SRM612-8	23.77	23.97	2129.35	12.09	30.03	1.14	15.16
SRM610-8	329.38	392.04	30154.18	192.83	478.24	2.20	60.78
AP1-8	0.00	0.00	1.13	0.02	0.11	0.00	0.00
AP2-8	0.86	0.60	1.67	0.14	2.10	0.00	0.32
AP3-8	3.38	2.37	1.88	0.67	3.51	0.00	0.81
AP4-8	5.28	3.79	3.43	1.00	6.72	0.00	0.99
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-5	3.00	2.84	3.56	3.72	17.68	2640.21	206.44
SRM614-5	410.60	1581.61	612.52	1604.17	1309.29	2328.53	781.04
SRM612-5	19403.35	81057.90	28442.80	79002.73	36351.05	2219.17	37834.37
SRM610-5	124738.23	608146.44	181916.50	581301.94	261294.11	2176.45	70668.36
AP1-5	44.28	149.20	75.28	487.80	432.88	1423.25	134.60
AP2-5	1079.81	3392.94	89.88	1548.21	4210.82	1292.81	1341.05
AP3-5	8489.13	24643.46	112.16	13853.80	13155.48	1300.29	7784.48
AP4-5	13026.51	37648.73	224.92	20951.68	31872.90	1643.65	10749.66
GCK1-1	18.76	45.84	17.32	43.88	211.04	1333.97	84.60
GCK1-2	12.84	24.24	13.72	12.40	102.68	1307.09	43.36
GCK1-3	16.68	23.20	15.40	13.84	192.48	1247.41	48.88
GCK1-4	12.52	33.16	30.80	33.60	139.40	1341.37	103.88
GCK1-5	11.84	32.68	16.72	30.20	89.72	1260.93	62.84
GCK1-6	10.56	18.52	18.88	12.68	84.32	1293.41	30.28

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	17.88	44.20	18.44	52.16	271.76	1482.29	80.64
GCK1-8	3.52	9.92	3.28	7.24	101.16	1339.73	31.28
GCK1-9	3.04	22.68	9.56	20.44	93.20	1293.25	47.88
GCK1-10	13.48	26.16	18.68	21.72	77.88	1168.93	53.60
GCK1-11	12.52	35.16	11.76	23.72	36.44	1133.57	31.52
GCK1-12	4.08	14.20	13.28	12.24	31.36	1052.21	68.84
GCK1-13	18.56	39.92	19.76	32.88	180.84	1127.69	75.12
GCK1-14	11.48	17.16	10.20	10.36	127.36	1144.77	27.92
GCK1-15	7.44	13.32	9.52	6.68	123.76	1033.01	20.40
GCK1-16	11.96	30.48	16.68	20.64	145.80	1141.25	93.32
GCK1-17	15.28	33.92	26.32	19.48	91.44	1032.09	37.84
GCK1-18	7.88	17.68	20.08	18.72	74.72	1044.41	41.76
SRM614-6	217.72	881.28	305.48	946.53	514.88	1017.05	368.44
SRM612-6	12581.71	52721.22	18911.99	52101.65	21869.44	1027.01	21288.20
SRM610-6	88211.38	442176.88	138120.02	425584.50	173091.66	1042.09	41008.39
AP1-6	5.56	8.76	13.08	143.48	154.16	719.28	35.92
AP2-6	680.08	2051.37	17.08	891.21	2347.25	719.72	722.80
AP3-6	4807.67	14130.48	65.64	7919.56	7178.04	790.84	4034.42
AP4-6	5540.15	16285.05	68.60	7596.68	11539.51	922.49	3860.50
blank-6	1.52	3.00	4.36	7.20	8.68	805.16	18.68
blank average	2.26	2.92	3.96	5.46	13.18	1722.69	112.56
blank subtraction							
SRM614-5	408.34	1578.69	608.56	1598.71	1296.11	605.84	668.48
SRM612-5	19401.09	81054.98	28438.84	78997.27	36337.87	496.48	37721.81
SRM610-5	124735.97	608143.52	181912.54	581296.48	261280.93	453.76	70555.80
AP1-5	42.02	146.28	71.32	482.34	419.70	-299.44	22.04
AP2-5	1077.55	3390.02	85.92	1542.75	4197.64	-429.88	1228.49
AP3-5	8486.87	24640.54	108.20	13848.34	13142.29	-422.40	7671.92
AP4-5	13024.25	37645.81	220.96	20946.22	31859.72	-79.04	10637.10
GCK1-1	16.50	42.92	13.36	38.42	197.86	-388.72	-27.96
GCK1-2	10.58	21.32	9.76	6.94	89.50	-415.60	-69.20
GCK1-3	14.42	20.28	11.44	8.38	179.30	-475.28	-63.68
GCK1-4	10.26	30.24	26.84	28.14	126.22	-381.32	-8.68
GCK1-5	9.58	29.76	12.76	24.74	76.54	-461.76	-49.72
GCK1-6	8.30	15.60	14.92	7.22	71.14	-429.28	-82.28
GCK1-7	15.62	41.28	14.48	46.70	258.58	-240.40	-31.92
GCK1-8	1.26	7.00	-0.68	1.78	87.98	-382.96	-81.28
GCK1-9	0.78	19.76	5.60	14.98	80.02	-429.44	-64.68
GCK1-10	11.22	23.24	14.72	16.26	64.70	-553.76	-58.96
GCK1-11	10.26	32.24	7.80	18.26	23.26	-589.12	-81.04
GCK1-12	1.82	11.28	9.32	6.78	18.18	-670.48	-43.72
GCK1-13	16.30	37.00	15.80	27.42	167.66	-595.00	-37.44
GCK1-14	9.22	14.24	6.24	4.90	114.18	-577.92	-84.64
GCK1-15	5.18	10.40	5.56	1.22	110.58	-689.68	-92.16
GCK1-16	9.70	27.56	12.72	15.18	132.62	-581.44	-19.24
GCK1-17	13.02	31.00	22.36	14.02	78.26	-690.60	-74.72
GCK1-18	5.62	14.76	16.12	13.26	61.54	-678.28	-70.80
SRM614-6	215.46	878.36	301.52	941.07	501.70	-705.64	255.88
SRM612-6	12579.45	52718.30	18908.03	52096.19	21856.26	-695.68	21175.64
SRM610-6	88209.11	442173.96	138116.06	425579.04	173078.48	-680.60	40895.83
AP1-6	3.30	5.84	9.12	138.02	140.98	-1003.41	-76.64
AP2-6	677.82	2048.45	13.12	885.74	2334.07	-1002.97	610.24
AP3-6	4805.41	14127.56	61.68	7914.10	7164.86	-931.85	3921.86
AP4-6	5537.89	16282.13	64.64	7591.22	11526.32	-800.20	3747.94
zero correction							
SRM614-5	408.34	1578.69	608.56	1598.71	1296.11	605.84	668.48
SRM612-5	19401.09	81054.98	28438.84	78997.27	36337.87	496.48	37721.81
SRM610-5	124735.97	608143.52	181912.54	581296.48	261280.93	453.76	70555.80
AP1-5	42.02	146.28	71.32	482.34	419.70	0.00	22.04
AP2-5	1077.55	3390.02	85.92	1542.75	4197.64	0.00	1228.49
AP3-5	8486.87	24640.54	108.20	13848.34	13142.29	0.00	7671.92
AP4-5	13024.25	37645.81	220.96	20946.22	31859.72	0.00	10637.10
GCK1-1	16.50	42.92	13.36	38.42	197.86	0.00	0.00
GCK1-2	10.58	21.32	9.76	6.94	89.50	0.00	0.00
GCK1-3	14.42	20.28	11.44	8.38	179.30	0.00	0.00
GCK1-4	10.26	30.24	26.84	28.14	126.22	0.00	0.00
GCK1-5	9.58	29.76	12.76	24.74	76.54	0.00	0.00
GCK1-6	8.30	15.60	14.92	7.22	71.14	0.00	0.00
GCK1-7	15.62	41.28	14.48	46.70	258.58	0.00	0.00
GCK1-8	1.26	7.00	0.00	1.78	87.98	0.00	0.00
GCK1-9	0.78	19.76	5.60	14.98	80.02	0.00	0.00
GCK1-10	11.22	23.24	14.72	16.26	64.70	0.00	0.00
GCK1-11	10.26	32.24	7.80	18.26	23.26	0.00	0.00
GCK1-12	1.82	11.28	9.32	6.78	18.18	0.00	0.00
GCK1-13	16.30	37.00	15.80	27.42	167.66	0.00	0.00
GCK1-14	9.22	14.24	6.24	4.90	114.18	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	5.18	10.40	5.56	1.22	110.58	0.00	0.00
GCK1-16	9.70	27.56	12.72	15.18	132.62	0.00	0.00
GCK1-17	13.02	31.00	22.36	14.02	78.26	0.00	0.00
GCK1-18	5.62	14.76	16.12	13.26	61.54	0.00	0.00
SRM614-6	215.46	878.36	301.52	941.07	501.70	0.00	255.88
SRM612-6	12579.45	52718.30	18908.03	52096.19	21856.26	0.00	21175.64
SRM610-6	88209.11	442173.96	138116.06	425579.04	173078.48	0.00	40895.83
AP1-6	3.30	5.84	9.12	138.02	140.98	0.00	0.00
AP2-6	677.82	2048.45	13.12	885.74	2334.07	0.00	610.24
AP3-6	4805.41	14127.56	61.68	7914.10	7164.86	0.00	3921.86
AP4-6	5537.89	16282.13	64.64	7591.22	11526.32	0.00	3747.94

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-5	0.000166	0.000640	0.000247	0.000649	0.000526	0.000246	0.000271
SRM612-5	0.008700	0.036348	0.012753	0.035425	0.016295	0.000223	0.016916
SRM610-5	0.115982	0.565463	0.169146	0.540500	0.242944	0.000422	0.065604
AP1-5	0.000002	0.000008	0.000004	0.000028	0.000024	0.000000	0.000001
AP2-5	0.000076	0.000239	0.000006	0.000109	0.000296	0.000000	0.000087
AP3-5	0.000418	0.001214	0.000005	0.000683	0.000648	0.000000	0.000378
AP4-5	0.000711	0.002054	0.000012	0.001143	0.001738	0.000000	0.000580
GCK1-1	0.000001	0.000002	0.000001	0.000002	0.000011	0.000000	0.000000
GCK1-2	0.000001	0.000001	0.000000	0.000000	0.000005	0.000000	0.000000
GCK1-3	0.000001	0.000001	0.000001	0.000001	0.000012	0.000000	0.000000
GCK1-4	0.000001	0.000002	0.000001	0.000002	0.000007	0.000000	0.000000
GCK1-5	0.000001	0.000002	0.000001	0.000001	0.000004	0.000000	0.000000
GCK1-6	0.000001	0.000001	0.000001	0.000000	0.000005	0.000000	0.000000
GCK1-7	0.000002	0.000005	0.000002	0.000006	0.000031	0.000000	0.000000
GCK1-8	0.000000	0.000001	0.000000	0.000000	0.000011	0.000000	0.000000
GCK1-9	0.000000	0.000002	0.000001	0.000002	0.000010	0.000000	0.000000
GCK1-10	0.000001	0.000001	0.000001	0.000001	0.000003	0.000000	0.000000
GCK1-11	0.000001	0.000002	0.000000	0.000001	0.000001	0.000000	0.000000
GCK1-12	0.000000	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000
GCK1-13	0.000001	0.000003	0.000001	0.000002	0.000015	0.000000	0.000000
GCK1-14	0.000001	0.000001	0.000001	0.000000	0.000010	0.000000	0.000000
GCK1-15	0.000000	0.000001	0.000001	0.000000	0.000010	0.000000	0.000000
GCK1-16	0.000001	0.000003	0.000002	0.000002	0.000016	0.000000	0.000000
GCK1-17	0.000001	0.000003	0.000002	0.000001	0.000008	0.000000	0.000000
GCK1-18	0.000001	0.000002	0.000002	0.000002	0.000008	0.000000	0.000000
SRM614-6	0.000160	0.000651	0.000224	0.000698	0.000372	0.000000	0.000190
SRM612-6	0.008864	0.037146	0.013323	0.036708	0.015400	0.000000	0.014921
SRM610-6	0.120192	0.602498	0.188194	0.579886	0.235834	0.000000	0.055724
AP1-6	0.000000	0.000000	0.000001	0.000012	0.000012	0.000000	0.000000
AP2-6	0.000066	0.000200	0.000001	0.000087	0.000228	0.000000	0.000060
AP3-6	0.000315	0.000926	0.000004	0.000519	0.000469	0.000000	0.000257
AP4-6	0.000501	0.001472	0.000006	0.000686	0.001042	0.000000	0.000339

standardize signal averages AP							
AP1	0.000001	0.000004	0.000002	0.000020	0.000018	0.000000	0.000001
AP2	0.000071	0.000220	0.000004	0.000098	0.000262	0.000000	0.000073
AP3	0.000367	0.001070	0.000005	0.000601	0.000559	0.000000	0.000318
AP4	0.000606	0.001763	0.000009	0.000915	0.001390	0.000000	0.000460

linest from std sig ave							
	0.024126	0.005753	1.643010	0.002761	0.014106	0.000000	0.006494

standardize signal averages SRM							
srM614-2	0.000163	0.000646	0.000235	0.000673	0.000449	0.000123	0.000230
srM612-2	0.008782	0.036747	0.013038	0.036066	0.015848	0.000111	0.015918
srM610-2	0.118087	0.583981	0.178670	0.560193	0.239389	0.000211	0.060664

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave	0.045610	0.008692	0.027280	0.007859	0.021722	0.000000	0.011716
concentration data							
SRM614-5	0.34	0.32	34.79	0.15	0.64	0.00	0.15
SRM612-5	18.00	17.93	1797.00	8.39	19.71	0.00	9.42
SRM610-5	239.98	279.00	23834.23	128.00	293.92	0.00	36.54
AP1-5	0.02	0.02	2.71	0.03	0.14	0.00	0.00
AP2-5	0.73	0.55	3.97	0.12	1.67	0.00	0.22
AP3-5	4.03	2.79	3.50	0.75	3.65	0.00	0.98
AP4-5	6.84	4.71	7.90	1.26	9.78	0.00	1.50
GCK1-1	0.01	0.01	0.49	0.00	0.06	0.00	0.00
GCK1-2	0.01	0.00	0.32	0.00	0.03	0.00	0.00
GCK1-3	0.01	0.00	0.50	0.00	0.07	0.00	0.00
GCK1-4	0.01	0.00	0.94	0.00	0.04	0.00	0.00
GCK1-5	0.00	0.00	0.44	0.00	0.02	0.00	0.00
GCK1-6	0.01	0.00	0.62	0.00	0.03	0.00	0.00
GCK1-7	0.02	0.01	1.14	0.01	0.18	0.00	0.00
GCK1-8	0.00	0.00	0.00	0.00	0.06	0.00	0.00
GCK1-9	0.00	0.01	0.44	0.00	0.05	0.00	0.00
GCK1-10	0.01	0.00	0.50	0.00	0.02	0.00	0.00
GCK1-11	0.01	0.00	0.32	0.00	0.01	0.00	0.00
GCK1-12	0.00	0.00	0.37	0.00	0.01	0.00	0.00
GCK1-13	0.01	0.01	0.93	0.00	0.08	0.00	0.00
GCK1-14	0.01	0.00	0.36	0.00	0.06	0.00	0.00
GCK1-15	0.00	0.00	0.34	0.00	0.06	0.00	0.00
GCK1-16	0.01	0.01	1.02	0.00	0.09	0.00	0.00
GCK1-17	0.01	0.01	1.55	0.00	0.05	0.00	0.00
GCK1-18	0.01	0.00	1.34	0.00	0.04	0.00	0.00
SRM614-6	0.33	0.32	31.51	0.17	0.45	0.00	0.11
SRM612-6	18.34	18.33	1877.33	8.69	18.63	0.00	8.31
SRM610-6	248.69	297.27	26518.37	137.33	285.31	0.00	31.03
AP1-6	0.00	0.00	0.50	0.01	0.07	0.00	0.00
AP2-6	0.64	0.46	0.84	0.10	1.28	0.00	0.15
AP3-6	3.03	2.12	2.65	0.57	2.64	0.00	0.67
AP4-6	4.82	3.38	3.83	0.76	5.87	0.00	0.88
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-1	2.88	5.44	6.32	1.96	15.44	107.04	15.92
SRM614-1	449.28	1540.13	546.36	1583.41	2467.09	5277.83	591.72
SRM612-1	21434.64	85741.72	28499.52	81132.38	34789.00	4411.38	34190.39
SRM610-1	137078.73	648276.63	191316.84	608692.81	256054.48	4177.22	43132.88
AP1-1	57.44	162.56	83.80	570.80	531.68	2922.30	134.28
AP2-1	1444.37	4214.14	68.56	1854.37	5671.35	2585.41	1625.21
AP3-1	10242.50	29079.96	119.20	14025.08	14415.84	2684.46	8646.29
AP4-1	12861.31	36676.61	149.92	16223.05	26779.87	2677.70	8907.25
V2-1	21.40	29.76	13.00	16.40	52.40	2306.49	45.28
V2-2	5.28	4.88	9.48	6.40	26.28	2247.41	37.16
V2-3	4.00	10.60	10.16	4.56	21.08	2214.73	34.00
V2-4	41.48	88.44	39.76	93.52	166.72	2253.05	102.80
V2-5	14.20	11.84	13.44	10.04	48.72	2154.05	56.24
V2-6	12.96	35.08	17.76	21.80	102.72	2087.97	42.88
V2-7	36.40	85.88	20.04	75.08	164.28	2407.85	124.52
V2-8	9.04	16.48	9.08	16.80	58.76	2196.49	53.36
V2-9	11.28	24.24	11.40	25.84	67.68	2021.49	54.20
V2-10	25.56	61.00	26.40	62.84	124.68	2136.01	83.80
V2-11	4.52	10.16	8.56	8.92	43.52	2047.01	36.72
V2-12	13.48	23.28	15.60	21.56	88.76	1928.17	48.48
V2-13	35.12	39.24	36.00	27.88	123.68	1728.61	88.28
V2-14	35.84	26.44	16.64	10.84	32.16	1570.69	68.44
V2-15	21.72	25.48	20.12	9.64	41.96	1553.49	54.16
SRM614-2	258.04	1003.53	340.36	967.25	715.92	1637.53	450.24
SRM612-2	15438.49	64009.04	22365.45	62064.71	27860.04	1692.21	27031.83
SRM610-2	107560.32	523204.31	157963.77	496075.47	213766.05	1663.01	44459.77
AP1-2	15.68	28.28	21.48	273.20	172.88	1225.29	39.68
AP2-2	888.80	2598.37	27.84	1137.41	3371.42	1151.53	911.41
AP3-2	3922.70	11173.90	39.28	5445.03	5376.11	1278.81	2941.42
AP4-2	7349.28	21461.72	91.40	14115.96	18136.66	1494.81	5184.67

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	0.28	5.88	7.00	2.40	7.28	1264.25	17.96
blank average	1.58	5.66	6.66	2.18	11.36	685.64	16.94
blank subtraction							
SRM614-1	447.70	1534.47	539.70	1581.23	2455.73	4592.19	574.78
SRM612-1	21433.06	85736.06	28492.86	81130.19	34777.64	3725.74	34173.45
SRM610-1	137077.15	648270.97	191310.18	608690.63	256043.12	3491.58	43115.94
AP1-1	55.86	156.90	77.14	568.62	520.32	2236.65	117.34
AP2-1	1442.79	4208.48	61.90	1852.19	5659.99	1899.77	1608.27
AP3-1	10240.92	29074.30	112.54	14022.90	14404.48	1998.81	8629.35
AP4-1	12859.73	36670.94	143.26	16220.87	26768.51	1992.05	8890.31
V2-1	19.82	24.10	6.34	14.22	41.04	1620.85	28.34
V2-2	3.70	-0.78	2.82	4.22	14.92	1561.77	20.22
V2-3	2.42	4.94	3.50	2.38	9.72	1529.09	17.06
V2-4	39.90	82.78	33.10	91.34	155.36	1567.41	85.86
V2-5	12.62	6.18	6.78	7.86	37.36	1468.41	39.30
V2-6	11.38	29.42	11.10	19.62	91.36	1402.33	25.94
V2-7	34.82	80.22	13.38	72.90	152.92	1722.21	107.58
V2-8	7.46	10.82	2.42	14.62	47.40	1510.85	36.42
V2-9	9.70	18.58	4.74	23.66	56.32	1335.85	37.26
V2-10	23.98	55.34	19.74	60.66	113.32	1450.37	66.86
V2-11	2.94	4.50	1.90	6.74	32.16	1361.37	19.78
V2-12	11.90	17.62	8.94	19.38	77.40	1242.53	31.54
V2-13	33.54	33.58	29.34	25.70	112.32	1042.97	71.34
V2-14	34.26	20.78	9.98	8.66	20.80	885.04	51.50
V2-15	20.14	19.82	13.46	7.46	30.60	867.84	37.22
SRM614-2	256.46	997.87	333.70	965.07	704.56	951.89	433.30
SRM612-2	15436.91	64003.38	22358.78	62062.53	27848.68	1006.57	27014.89
SRM610-2	107558.74	523198.65	157957.11	496073.29	213754.69	977.37	44442.83
AP1-2	14.10	22.62	14.82	271.02	161.52	539.64	22.74
AP2-2	887.22	2592.71	21.18	1135.23	3360.06	465.88	894.47
AP3-2	3921.12	11168.24	32.62	5442.85	5364.75	593.16	2924.48
AP4-2	7347.70	21456.06	84.74	14113.78	18125.30	809.16	5167.73
zero correction							
SRM614-1	447.70	1534.47	539.70	1581.23	2455.73	4592.19	574.78
SRM612-1	21433.06	85736.06	28492.86	81130.19	34777.64	3725.74	34173.45
SRM610-1	137077.15	648270.97	191310.18	608690.63	256043.12	3491.58	43115.94
AP1-1	55.86	156.90	77.14	568.62	520.32	2236.65	117.34
AP2-1	1442.79	4208.48	61.90	1852.19	5659.99	1899.77	1608.27
AP3-1	10240.92	29074.30	112.54	14022.90	14404.48	1998.81	8629.35
AP4-1	12859.73	36670.94	143.26	16220.87	26768.51	1992.05	8890.31
V2-1	19.82	24.10	6.34	14.22	41.04	1620.85	28.34
V2-2	3.70	0.00	2.82	4.22	14.92	1561.77	20.22
V2-3	2.42	4.94	3.50	2.38	9.72	1529.09	17.06
V2-4	39.90	82.78	33.10	91.34	155.36	1567.41	85.86
V2-5	12.62	6.18	6.78	7.86	37.36	1468.41	39.30
V2-6	11.38	29.42	11.10	19.62	91.36	1402.33	25.94
V2-7	34.82	80.22	13.38	72.90	152.92	1722.21	107.58
V2-8	7.46	10.82	2.42	14.62	47.40	1510.85	36.42
V2-9	9.70	18.58	4.74	23.66	56.32	1335.85	37.26
V2-10	23.98	55.34	19.74	60.66	113.32	1450.37	66.86
V2-11	2.94	4.50	1.90	6.74	32.16	1361.37	19.78
V2-12	11.90	17.62	8.94	19.38	77.40	1242.53	31.54
V2-13	33.54	33.58	29.34	25.70	112.32	1042.97	71.34
V2-14	34.26	20.78	9.98	8.66	20.80	885.04	51.50
V2-15	20.14	19.82	13.46	7.46	30.60	867.84	37.22
SRM614-2	256.46	997.87	333.70	965.07	704.56	951.89	433.30
SRM612-2	15436.91	64003.38	22358.78	62062.53	27848.68	1006.57	27014.89
SRM610-2	107558.74	523198.65	157957.11	496073.29	213754.69	977.37	44442.83
AP1-2	14.10	22.62	14.82	271.02	161.52	539.64	22.74
AP2-2	887.22	2592.71	21.18	1135.23	3360.06	465.88	894.47
AP3-2	3921.12	11168.24	32.62	5442.85	5364.75	593.16	2924.48
AP4-2	7347.70	21456.06	84.74	14113.78	18125.30	809.16	5167.73
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-1	0.000179	0.000612	0.000215	0.000631	0.000979	0.001831	0.000229
SRM612-1	0.009590	0.038362	0.012749	0.036301	0.015561	0.001667	0.015291
SRM610-1	0.131207	0.620509	0.183117	0.582624	0.245078	0.003342	0.041270
AP1-1	0.000003	0.000009	0.000005	0.000033	0.000031	0.000131	0.000007
AP2-1	0.000084	0.000244	0.000004	0.000107	0.000328	0.000110	0.000093
AP3-1	0.000487	0.001384	0.000005	0.000667	0.000686	0.000095	0.000411
AP4-1	0.000641	0.001827	0.000007	0.000808	0.001333	0.000099	0.000443
V2-1	0.000002	0.000003	0.000001	0.000002	0.000005	0.000180	0.000003
V2-2	0.000000	0.000000	0.000000	0.000001	0.000002	0.000196	0.000003
V2-3	0.000000	0.000001	0.000001	0.000000	0.000001	0.000232	0.000003
V2-4	0.000005	0.000010	0.000004	0.000011	0.000019	0.000187	0.000010
V2-5	0.000001	0.000001	0.000001	0.000001	0.000004	0.000163	0.000004
V2-6	0.000001	0.000003	0.000001	0.000002	0.000010	0.000156	0.000003
V2-7	0.000006	0.000013	0.000002	0.000012	0.000025	0.000279	0.000017
V2-8	0.000001	0.000002	0.000000	0.000002	0.000008	0.000253	0.000006
V2-9	0.000002	0.000004	0.000001	0.000004	0.000011	0.000252	0.000007
V2-10	0.000005	0.000011	0.000004	0.000012	0.000022	0.000284	0.000013
V2-11	0.000001	0.000001	0.000000	0.000001	0.000007	0.000293	0.000004
V2-12	0.000003	0.000004	0.000002	0.000004	0.000017	0.000278	0.000007
V2-13	0.000002	0.000002	0.000002	0.000001	0.000006	0.000058	0.000004
V2-14	0.000002	0.000001	0.000001	0.000000	0.000001	0.000048	0.000003
V2-15	0.000001	0.000001	0.000001	0.000000	0.000002	0.000044	0.000002
SRM614-2	0.000170	0.000660	0.000221	0.000638	0.000466	0.000629	0.000287
SRM612-2	0.008994	0.037291	0.013027	0.036160	0.016226	0.000586	0.015740
SRM610-2	0.120210	0.584738	0.176536	0.554422	0.238897	0.001092	0.049670
AP1-2	0.000001	0.000002	0.000001	0.000022	0.000013	0.000044	0.000002
AP2-2	0.000071	0.000208	0.000002	0.000091	0.000269	0.000037	0.000072
AP3-2	0.000304	0.000866	0.000003	0.000422	0.000416	0.000046	0.000227
AP4-2	0.000495	0.001446	0.000006	0.000951	0.001222	0.000055	0.000348
standardize signal averages AP							
AP1	0.000002	0.000006	0.000003	0.000028	0.000022	0.000088	0.000004
AP2	0.000077	0.000226	0.000003	0.000099	0.000299	0.000074	0.000082
AP3	0.000396	0.001125	0.000004	0.000545	0.000551	0.000071	0.000319
AP4	0.000568	0.001636	0.000006	0.000880	0.001278	0.000077	0.000396
linest from std sig ave							
	0.024589	0.005961	2.096966	0.002932	0.015185	0.007822	0.007217
standardize signal averages SRM							
srm614-2	0.000174	0.000636	0.000218	0.000634	0.000723	0.001230	0.000258
srm612-2	0.009292	0.037826	0.012888	0.036230	0.015893	0.001127	0.015515
srm610-2	0.125708	0.602623	0.179827	0.568523	0.241987	0.002217	0.045470
linest from std sig ave							
	0.042846	0.008424	0.027106	0.007744	0.021489	0.000000	0.015238
concentration data							
SRM614-1	0.38	0.31	38.71	0.16	1.28	1.23	0.14
SRM612-1	20.22	19.61	2292.77	9.13	20.26	1.12	9.46
SRM610-1	276.69	317.21	32932.22	146.49	319.17	2.24	25.55
AP1-1	0.03	0.02	3.79	0.04	0.19	0.41	0.02
AP2-1	0.82	0.58	3.00	0.13	1.99	0.34	0.27
AP3-1	4.78	3.29	4.48	0.78	4.15	0.30	1.18
AP4-1	6.28	4.34	5.97	0.95	8.08	0.31	1.28
V2-1	0.02	0.01	0.59	0.00	0.03	0.56	0.01
V2-2	0.00	0.00	0.30	0.00	0.01	0.61	0.01
V2-3	0.00	0.00	0.44	0.00	0.01	0.72	0.01
V2-4	0.05	0.02	3.31	0.01	0.11	0.58	0.03
V2-5	0.01	0.00	0.63	0.00	0.03	0.51	0.01
V2-6	0.01	0.01	1.03	0.00	0.06	0.49	0.01
V2-7	0.06	0.03	1.81	0.01	0.15	0.87	0.05
V2-8	0.01	0.00	0.34	0.00	0.05	0.79	0.02
V2-9	0.02	0.01	0.75	0.01	0.06	0.79	0.02
V2-10	0.05	0.03	3.23	0.01	0.13	0.89	0.04
V2-11	0.01	0.00	0.34	0.00	0.04	0.91	0.01
V2-12	0.03	0.01	1.67	0.01	0.10	0.87	0.02
V2-13	0.02	0.00	1.37	0.00	0.04	0.18	0.01
V2-14	0.02	0.00	0.45	0.00	0.01	0.15	0.01
V2-15	0.01	0.00	0.57	0.00	0.01	0.14	0.01
SRM614-2	0.36	0.34	39.68	0.16	0.61	0.42	0.18
SRM612-2	18.97	19.06	2342.83	9.09	21.13	0.39	9.74

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	253.50	298.92	31748.63	139.40	311.12	0.73	30.75
AP1-2	0.01	0.00	1.01	0.03	0.08	0.14	0.01
AP2-2	0.70	0.49	1.42	0.11	1.63	0.12	0.21
AP3-2	2.98	2.06	2.12	0.49	2.52	0.14	0.65
AP4-2	4.86	3.44	4.78	1.11	7.40	0.17	1.00

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-23	1.12	4.12	2.92	2.40	1.32	571.88	8.64
SRM614-23	265.48	910.89	280.68	774.16	412.96	704.12	491.60
SRM612-23	13899.08	48510.19	15053.33	41466.23	18683.27	1004.01	27196.15
SRM610-23	79772.29	324329.78	87143.49	262239.41	99662.32	1185.21	38175.98
AP1-23	30.04	71.96	22.04	124.32	117.92	785.76	51.88
AP2-23	1027.49	2551.41	34.88	1056.41	3072.14	795.44	1290.81
AP3-23	3441.26	8853.65	36.48	4451.71	4168.54	944.29	2645.37
AP4-23	5777.95	15024.04	75.36	6259.16	8202.77	1077.53	2942.18
34HP45-494-1	3952.74	2318.93	287.08	27.32	241.32	3142.38	84.28
34HP45-494-2	2476.57	1424.01	126.60	25.16	133.32	3409.38	71.56
34HP45-494-3	3694.62	2172.29	191.36	57.40	243.48	4114.58	111.68
34HP45-494-4	1297.65	787.44	589.88	186.72	440.20	2985.06	306.64
34HP45-494-5	2379.01	1390.57	146.80	71.48	129.28	2294.33	135.04
34HP45-494-6	1719.97	981.97	128.16	110.16	200.20	2164.81	164.60
34HP45-494-7	2087.57	1226.33	380.76	91.60	588.36	2308.17	164.36
34HP45-494-8	1004.41	664.56	360.64	159.36	811.00	2537.85	266.48
34HP45-494-9	1261.65	697.56	304.36	145.24	531.28	2492.29	311.92
34HP45-494-10	5941.03	3566.58	544.36	145.80	832.44	6091.35	315.68
34HP45-494-11	5390.59	3148.42	450.36	65.32	569.44	6590.48	198.36
34HP45-494-12	6011.67	3642.90	485.92	97.40	715.48	7249.12	241.48
34HP45-494-13	1792.61	1086.21	311.80	141.20	409.00	2550.09	287.68
34HP45-494-14	1666.69	1085.73	344.84	146.44	1770.29	2683.86	289.12
34HP45-494-15	1800.17	1087.69	231.04	183.32	274.80	2321.13	286.72
34HP45-494-16	109.92	62.72	111.32	56.48	440.88	1226.93	216.80
34HP45-494-17	93.92	72.88	143.20	97.24	595.36	1123.45	317.80
34HP45-494-18	86.00	56.48	107.84	47.20	207.24	1146.13	166.72
SRM614-24	187.36	800.20	287.96	808.00	393.88	836.40	406.40
SRM612-24	11120.70	43906.57	14760.28	41055.35	17273.26	881.96	19758.27
SRM610-24	68877.55	328785.16	95801.62	292245.38	108166.45	992.77	33894.83
AP1-24	9.72	6.84	11.00	116.00	86.44	646.04	20.72
AP2-24	728.88	1939.25	20.88	837.44	2353.57	646.48	938.01
AP3-24	2876.30	8247.17	35.44	4266.30	3861.30	814.60	2235.17
AP4-24	4601.87	12948.27	43.92	6543.36	7693.20	800.44	2461.01
blank-24	1.72	1.68	4.40	2.12	4.24	691.68	13.40
blank average	1.42	2.90	3.66	2.26	2.78	631.78	11.02

blank subtraction							
SRM614-23	264.06	907.99	277.02	771.90	410.18	72.34	480.58
SRM612-23	13897.66	48507.29	15049.66	41463.97	18680.49	372.22	27185.13
SRM610-23	79770.87	324326.88	87139.83	262237.15	99659.54	553.42	38164.96
AP1-23	28.62	69.06	18.38	122.06	115.14	153.98	40.86
AP2-23	1026.07	2548.51	31.22	1054.15	3069.36	163.66	1279.79
AP3-23	3439.84	8850.75	32.82	4449.45	4165.76	312.50	2634.35
AP4-23	5776.53	15021.14	71.70	6256.90	8199.99	445.74	2931.16
34HP45-494-1	3951.32	2316.03	283.42	25.06	238.54	2510.59	73.26
34HP45-494-2	2475.15	1421.11	122.94	22.90	130.54	2777.60	60.54
34HP45-494-3	3693.20	2169.39	187.70	55.14	240.70	3482.80	100.66
34HP45-494-4	1296.23	784.54	586.22	184.46	437.42	2353.27	295.62
34HP45-494-5	2377.59	1387.67	143.14	69.22	126.50	1662.55	124.02
34HP45-494-6	1718.55	979.07	124.50	107.90	197.42	1533.03	153.58
34HP45-494-7	2086.15	1223.43	377.10	89.34	585.58	1676.39	153.34
34HP45-494-8	1002.99	661.66	356.98	157.10	808.22	1906.07	255.46
34HP45-494-9	1260.23	694.66	300.70	142.98	528.50	1860.51	300.90
34HP45-494-10	5939.61	3563.68	540.70	143.54	829.66	5459.57	304.66
34HP45-494-11	5389.17	3145.52	446.70	63.06	566.66	5958.69	187.34
34HP45-494-12	6010.25	3640.00	482.26	95.14	712.70	6617.34	230.46
34HP45-494-13	1791.19	1083.31	308.14	138.94	406.22	1918.31	276.66
34HP45-494-14	1665.27	1082.83	341.18	144.18	1767.51	2052.07	278.10
34HP45-494-15	1798.75	1084.79	227.38	181.06	272.02	1689.35	275.70
34HP45-494-16	108.50	59.82	107.66	54.22	438.10	595.14	205.78
34HP45-494-17	92.50	69.98	139.54	94.98	592.58	491.66	306.78

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	84.58	53.58	104.18	44.94	204.46	514.34	155.70
SRM614-24	185.94	797.30	284.30	805.74	391.10	204.62	395.38
SRM612-24	11119.28	43903.67	14756.62	41053.09	17270.48	250.18	19747.25
SRM610-24	68876.13	328782.26	95797.96	292243.12	108163.67	360.98	33883.81
AP1-24	8.30	3.94	7.34	113.74	83.66	14.26	9.70
AP2-24	727.46	1936.35	17.22	835.18	2350.79	14.70	926.99
AP3-24	2874.88	8244.27	31.78	4264.04	3858.52	182.82	2224.15
AP4-24	4600.45	12945.37	40.26	6541.10	7690.42	168.66	2449.99

zero correction							
SRM614-23	264.06	907.99	277.02	771.90	410.18	72.34	480.58
SRM612-23	13897.66	48507.29	15049.66	41463.97	18680.49	372.22	27185.13
SRM610-23	79770.87	324326.88	87139.83	262237.15	99659.54	553.42	38164.96
AP1-23	28.62	69.06	18.38	122.06	115.14	153.98	40.86
AP2-23	1026.07	2548.51	31.22	1054.15	3069.36	163.66	1279.79
AP3-23	3439.84	8850.75	32.82	4449.45	4165.76	312.50	2634.35
AP4-23	5776.53	15021.14	71.70	6256.90	8199.99	445.74	2931.16
34HP45-494-1	3951.32	2316.03	283.42	25.06	238.54	2510.59	73.26
34HP45-494-2	2475.15	1421.11	122.94	22.90	130.54	2777.60	60.54
34HP45-494-3	3693.20	2169.39	187.70	55.14	240.70	3482.80	100.66
34HP45-494-4	1296.23	784.54	586.22	184.46	437.42	2353.27	295.62
34HP45-494-5	2377.59	1387.67	143.14	69.22	126.50	1662.55	124.02
34HP45-494-6	1718.55	979.07	124.50	107.90	197.42	1533.03	153.58
34HP45-494-7	2086.15	1223.43	377.10	89.34	585.58	1676.39	153.34
34HP45-494-8	1002.99	661.66	356.98	157.10	808.22	1906.07	255.46
34HP45-494-9	1260.23	694.66	300.70	142.98	528.50	1860.51	300.90
34HP45-494-10	5939.61	3563.68	540.70	143.54	829.66	5459.57	304.66
34HP45-494-11	5389.17	3145.52	446.70	63.06	566.66	5958.69	187.34
34HP45-494-12	6010.25	3640.00	482.26	95.14	712.70	6617.34	230.46
34HP45-494-13	1791.19	1083.31	308.14	138.94	406.22	1918.31	276.66
34HP45-494-14	1665.27	1082.83	341.18	144.18	1767.51	2052.07	278.10
34HP45-494-15	1798.75	1084.79	227.38	181.06	272.02	1689.35	275.70
34HP45-494-16	108.50	59.82	107.66	54.22	438.10	595.14	205.78
34HP45-494-17	92.50	69.98	139.54	94.98	592.58	491.66	306.78
34HP45-494-18	84.58	53.58	104.18	44.94	204.46	514.34	155.70
SRM614-24	185.94	797.30	284.30	805.74	391.10	204.62	395.38
SRM612-24	11119.28	43903.67	14756.62	41053.09	17270.48	250.18	19747.25
SRM610-24	68876.13	328782.26	95797.96	292243.12	108163.67	360.98	33883.81
AP1-24	8.30	3.94	7.34	113.74	83.66	14.26	9.70
AP2-24	727.46	1936.35	17.22	835.18	2350.79	14.70	926.99
AP3-24	2874.88	8244.27	31.78	4264.04	3858.52	182.82	2224.15
AP4-24	4600.45	12945.37	40.26	6541.10	7690.42	168.66	2449.99

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-23	0.000127	0.000437	0.000133	0.000371	0.000197	0.000035	0.000231
SRM612-23	0.007139	0.024916	0.007730	0.021298	0.009595	0.000191	0.013964
SRM610-23	0.110077	0.447542	0.120245	0.361864	0.137521	0.000764	0.052664
AP1-23	0.000003	0.000007	0.000002	0.000012	0.000011	0.000015	0.000004
AP2-23	0.000076	0.000188	0.000002	0.000078	0.000226	0.000012	0.000094
AP3-23	0.000228	0.000587	0.000002	0.000295	0.000276	0.000021	0.000175
AP4-23	0.000386	0.001005	0.000005	0.000418	0.000548	0.000030	0.000196
34HP45-494-1	0.000260	0.000153	0.000019	0.000002	0.000016	0.000165	0.000005
34HP45-494-2	0.000186	0.000107	0.000009	0.000002	0.000010	0.000209	0.000005
34HP45-494-3	0.000294	0.000173	0.000015	0.000004	0.000019	0.000278	0.000008
34HP45-494-4	0.000092	0.000056	0.000042	0.000013	0.000031	0.000167	0.000021
34HP45-494-5	0.000169	0.000099	0.000010	0.000005	0.000009	0.000118	0.000009
34HP45-494-6	0.000137	0.000078	0.000010	0.000009	0.000016	0.000123	0.000012
34HP45-494-7	0.000184	0.000108	0.000033	0.000008	0.000052	0.000148	0.000014
34HP45-494-8	0.000098	0.000065	0.000035	0.000015	0.000079	0.000187	0.000025
34HP45-494-9	0.000129	0.000071	0.000031	0.000015	0.000054	0.000190	0.000031

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.000470	0.000282	0.000043	0.000011	0.000066	0.000432	0.000024
34HP45-494-11	0.000394	0.000230	0.000033	0.000005	0.000041	0.000436	0.000014
34HP45-494-12	0.000433	0.000262	0.000035	0.000007	0.000051	0.000476	0.000017
34HP45-494-13	0.000146	0.000088	0.000025	0.000011	0.000033	0.000156	0.000022
34HP45-494-14	0.000129	0.000084	0.000026	0.000011	0.000137	0.000159	0.000022
34HP45-494-15	0.000134	0.000081	0.000017	0.000014	0.000020	0.000126	0.000021
34HP45-494-16	0.000010	0.000005	0.000010	0.000005	0.000040	0.000054	0.000019
34HP45-494-17	0.000008	0.000006	0.000012	0.000008	0.000049	0.000041	0.000025
34HP45-494-18	0.000006	0.000004	0.000008	0.000003	0.000015	0.000038	0.000012
SRM614-24	0.000139	0.000598	0.000213	0.000604	0.000293	0.000153	0.000297
SRM612-24	0.008581	0.033880	0.011388	0.031681	0.013328	0.000193	0.015239
SRM610-24	0.131051	0.625578	0.182276	0.556055	0.205804	0.000687	0.064471
AP1-24	0.000001	0.000000	0.000001	0.000013	0.000010	0.000002	0.000001
AP2-24	0.000063	0.000168	0.000001	0.000072	0.000204	0.000001	0.000080
AP3-24	0.000222	0.000635	0.000002	0.000329	0.000297	0.000014	0.000171
AP4-24	0.000358	0.001007	0.000003	0.000509	0.000598	0.000013	0.000191

standardize signal averages AP

AP1	0.000002	0.000004	0.000001	0.000013	0.000011	0.000008	0.000003
AP2	0.000069	0.000178	0.000002	0.000075	0.000215	0.000007	0.000087
AP3	0.000225	0.000611	0.000002	0.000312	0.000287	0.000017	0.000173
AP4	0.000372	0.001006	0.000004	0.000464	0.000573	0.000021	0.000193

linest from std sig ave

0.039088	0.010053	3.493761	0.005455	0.032184	0.044563	0.014200
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standardize signal averages SRM

srn614-2	0.000133	0.000517	0.000173	0.000488	0.000245	0.000094	0.000264
srn612-2	0.007860	0.029398	0.009559	0.026489	0.011461	0.000192	0.014601
srn610-2	0.120564	0.536560	0.151261	0.458959	0.171663	0.000725	0.058568

linest from std sig ave

0.044695	0.009463	0.032239	0.009594	0.030291	0.000000	0.012175
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concentration data

SRM614-23	0.43	0.38	39.94	0.17	0.54	0.13	0.28
SRM612-23	23.93	21.48	2316.26	9.96	26.48	0.73	17.01
SRM610-23	369.01	385.85	36029.72	169.29	379.58	2.92	64.14
AP1-23	0.04	0.03	2.54	0.03	0.15	0.27	0.02
AP2-23	1.18	0.75	3.21	0.17	2.91	0.21	0.53
AP3-23	3.56	2.36	3.04	0.64	3.55	0.37	0.99
AP4-23	6.02	4.03	6.68	0.91	7.04	0.53	1.11
34HP45-494-1	4.06	0.61	26.01	0.00	0.20	2.94	0.03
34HP45-494-2	2.91	0.43	12.90	0.00	0.13	3.72	0.03
34HP45-494-3	4.59	0.69	20.85	0.01	0.25	4.94	0.05
34HP45-494-4	1.44	0.22	58.13	0.03	0.40	2.98	0.12
34HP45-494-5	2.64	0.40	14.20	0.01	0.12	2.10	0.05
34HP45-494-6	2.14	0.31	13.88	0.02	0.20	2.18	0.07
34HP45-494-7	2.88	0.43	46.46	0.02	0.66	2.63	0.08
34HP45-494-8	1.54	0.26	48.84	0.03	1.02	3.33	0.14
34HP45-494-9	2.01	0.28	42.76	0.03	0.69	3.37	0.17
34HP45-494-10	7.33	1.13	59.64	0.02	0.84	7.68	0.14
34HP45-494-11	6.15	0.92	45.57	0.01	0.53	7.75	0.08
34HP45-494-12	6.75	1.05	48.39	0.01	0.66	8.47	0.09
34HP45-494-13	2.27	0.35	34.93	0.02	0.42	2.77	0.13
34HP45-494-14	2.01	0.34	36.79	0.02	1.76	2.82	0.12
34HP45-494-15	2.10	0.33	23.70	0.03	0.26	2.25	0.12
34HP45-494-16	0.15	0.02	13.56	0.01	0.51	0.96	0.11
34HP45-494-17	0.12	0.02	16.14	0.02	0.63	0.73	0.14
34HP45-494-18	0.10	0.02	10.86	0.01	0.20	0.68	0.07
SRM614-24	0.47	0.52	63.89	0.28	0.81	0.59	0.36
SRM612-24	28.77	29.21	3412.14	14.82	36.79	0.74	18.56
SRM610-24	439.33	539.34	54616.32	260.13	568.06	2.63	78.52
AP1-24	0.01	0.00	1.18	0.03	0.12	0.03	0.01
AP2-24	0.98	0.67	2.08	0.16	2.61	0.02	0.45
AP3-24	3.45	2.55	3.41	0.71	3.82	0.25	0.97
AP4-24	5.58	4.04	4.37	1.11	7.68	0.23	1.08

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Yb Lu Hf Ta W Hg Tl

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-21	0.56	0.60	0.84	3.28	5.12	316.84	12.36
SRM614-21	164.00	526.64	143.80	471.12	303.16	465.76	335.48
SRM612-21	11244.50	37848.90	11220.66	31626.10	16814.65	535.80	27649.00
SRM610-21	93427.45	368963.88	95303.85	293555.22	128239.20	717.84	69616.75
AP1-21	109.16	297.00	92.92	475.60	268.80	469.12	162.04
AP2-21	831.76	2078.93	35.36	920.45	2460.57	495.60	950.41
AP3-21	734.00	1877.81	20.76	675.44	2137.97	559.12	775.48
AP4-21	7726.76	19070.39	81.60	9483.65	14226.12	821.16	5143.11
34HP45-671-1	8307.89	4584.19	131.96	42.76	192.28	1089.29	118.52
34HP45-671-2	9990.70	5751.19	111.60	29.88	193.68	1035.41	92.88
34HP45-671-3	3270.30	2034.41	70.36	19.08	136.16	1119.37	74.36
34HP45-671-4	944.49	586.92	89.20	53.36	219.88	1399.73	173.72
34HP45-671-5	670.40	411.40	73.20	14.76	106.96	1116.97	67.24
34HP45-671-6	546.92	319.04	82.00	86.44	144.64	1235.33	109.60
34HP45-671-7	2252.93	1478.33	107.28	37.12	229.80	1425.97	186.20
34HP45-671-8	1830.25	1228.45	84.52	10.04	120.08	1217.25	77.84
34HP45-671-9	1800.61	1172.49	52.16	18.28	311.56	1295.09	103.84
34HP45-671-10	6577.20	3876.78	35662.76	160.80	245.20	2297.65	319.68
34HP45-671-11	4589.95	2623.97	182.04	22.84	129.32	1878.53	108.36
34HP45-671-12	5080.07	2997.38	113.04	28.68	173.88	1903.25	131.08
34HP45-671-13	115.96	92.40	33.20	48.64	207.60	1432.09	105.92
34HP45-671-14	33.24	30.36	21.64	24.84	116.64	1345.05	51.52
34HP45-671-15	10.96	21.04	14.92	11.80	79.28	1281.53	21.36
34HP45-671-16	23.44	37.60	17.24	28.24	163.60	1382.17	41.92
34HP45-671-17	18.12	25.00	28.88	6.08	97.64	1282.29	19.40
34HP45-671-18	33.80	19.64	16.56	6.00	112.92	1232.81	28.76
SRM614-22	190.04	654.56	233.48	638.24	301.64	732.72	302.16
SRM612-22	10224.86	39315.10	13371.36	36322.41	15966.13	730.00	18539.15
SRM610-22	86131.16	403364.66	113982.32	353606.19	134341.36	819.32	48989.00
AP1-22	6.16	18.84	16.60	101.00	149.52	670.52	25.24
AP2-22	580.44	1589.69	14.68	635.80	2039.01	577.60	602.24
AP3-22	3257.90	8931.05	47.08	4292.14	4115.54	692.44	2531.01
AP4-22	4806.63	13082.87	62.00	5986.23	8621.29	821.48	2865.62
blank-22	3.32	1.60	10.72	2.96	7.08	550.08	14.80
blank average	1.94	1.10	5.78	3.12	6.10	433.46	13.58

blank subtraction							
SRM614-21	162.06	525.54	138.02	468.00	297.06	32.30	321.90
SRM612-21	11242.56	37847.79	11214.88	31622.98	16808.55	102.34	27635.42
SRM610-21	93425.50	368962.78	95298.07	293552.10	128233.10	284.38	69603.17
AP1-21	107.22	295.90	87.14	472.48	262.70	35.66	148.46
AP2-21	829.82	2077.83	29.58	917.33	2454.47	62.14	936.83
AP3-21	732.06	1876.71	14.98	672.32	2131.87	125.66	761.90
AP4-21	7724.82	19069.29	75.82	9480.53	14220.02	387.70	5129.53
34HP45-671-1	8305.95	4583.09	126.18	39.64	186.18	655.82	104.94
34HP45-671-2	9988.76	5750.09	105.82	26.76	187.58	601.94	79.30
34HP45-671-3	3268.36	2033.31	64.58	15.96	130.06	685.90	60.78
34HP45-671-4	942.55	585.82	83.42	50.24	213.78	966.27	160.14
34HP45-671-5	668.46	410.30	67.42	11.64	100.86	683.50	53.66
34HP45-671-6	544.98	317.94	76.22	83.32	138.54	801.86	96.02
34HP45-671-7	2250.99	1477.23	101.50	34.00	223.70	992.51	172.62
34HP45-671-8	1828.31	1227.35	78.74	6.92	113.98	783.78	64.26
34HP45-671-9	1798.67	1171.39	46.38	15.16	305.46	861.62	90.26
34HP45-671-10	6575.26	3875.68	35656.98	157.68	239.10	1864.19	306.10
34HP45-671-11	4588.01	2622.87	176.26	19.72	123.22	1445.07	94.78
34HP45-671-12	5078.13	2996.28	107.26	25.56	167.78	1469.79	117.50
34HP45-671-13	114.02	91.30	27.42	45.52	201.50	998.63	92.34
34HP45-671-14	31.30	29.26	15.86	21.72	110.54	911.59	37.94
34HP45-671-15	9.02	19.94	9.14	8.68	73.18	848.06	7.78
34HP45-671-16	21.50	36.50	11.46	25.12	157.50	948.71	28.34
34HP45-671-17	16.18	23.90	23.10	2.96	91.54	848.82	5.82
34HP45-671-18	31.86	18.54	10.78	2.88	106.82	799.34	15.18
SRM614-22	188.10	653.46	227.70	635.12	295.54	299.26	288.58
SRM612-22	10222.92	39314.00	13365.57	36319.29	15960.03	296.54	18525.56
SRM610-22	86129.22	403363.56	113976.54	353603.07	134335.26	385.86	48975.42
AP1-22	4.22	17.74	10.82	97.88	143.42	237.06	11.66
AP2-22	578.50	1588.59	8.90	632.68	2032.91	144.14	588.66
AP3-22	3255.96	8929.95	41.30	4289.02	4109.44	258.98	2517.43
AP4-22	4804.69	13081.77	56.22	5983.11	8615.19	388.02	2852.04

zero correction							
SRM614-21	162.06	525.54	138.02	468.00	297.06	32.30	321.90
SRM612-21	11242.56	37847.79	11214.88	31622.98	16808.55	102.34	27635.42
SRM610-21	93425.50	368962.78	95298.07	293552.10	128233.10	284.38	69603.17
AP1-21	107.22	295.90	87.14	472.48	262.70	35.66	148.46
AP2-21	829.82	2077.83	29.58	917.33	2454.47	62.14	936.83
AP3-21	732.06	1876.71	14.98	672.32	2131.87	125.66	761.90

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	7724.82	19069.29	75.82	9480.53	14220.02	387.70	5129.53
34HP45-671-1	8305.95	4583.09	126.18	39.64	186.18	655.82	104.94
34HP45-671-2	9988.76	5750.09	105.82	26.76	187.58	601.94	79.30
34HP45-671-3	3268.36	2033.31	64.58	15.96	130.06	685.90	60.78
34HP45-671-4	942.55	585.82	83.42	50.24	213.78	966.27	160.14
34HP45-671-5	668.46	410.30	67.42	11.64	100.86	683.50	53.66
34HP45-671-6	544.98	317.94	76.22	83.32	138.54	801.86	96.02
34HP45-671-7	2250.99	1477.23	101.50	34.00	223.70	992.51	172.62
34HP45-671-8	1828.31	1227.35	78.74	6.92	113.98	783.78	64.26
34HP45-671-9	1798.67	1171.39	46.38	15.16	305.46	861.62	90.26
34HP45-671-10	6575.26	3875.68	35656.98	157.68	239.10	1864.19	306.10
34HP45-671-11	4588.01	2622.87	176.26	19.72	123.22	1445.07	94.78
34HP45-671-12	5078.13	2996.28	107.26	25.56	167.78	1469.79	117.50
34HP45-671-13	114.02	91.30	27.42	45.52	201.50	998.63	92.34
34HP45-671-14	31.30	29.26	15.86	21.72	110.54	911.59	37.94
34HP45-671-15	9.02	19.94	9.14	8.68	73.18	848.06	7.78
34HP45-671-16	21.50	36.50	11.46	25.12	157.50	948.71	28.34
34HP45-671-17	16.18	23.90	23.10	2.96	91.54	848.82	5.82
34HP45-671-18	31.86	18.54	10.78	2.88	106.82	799.34	15.18
SRM614-22	188.10	653.46	227.70	635.12	295.54	299.26	288.58
SRM612-22	10222.92	39314.00	13365.57	36319.29	15960.03	296.54	18525.56
SRM610-22	86129.22	403363.56	113976.54	353603.07	134335.26	385.86	48975.42
AP1-22	4.22	17.74	10.82	97.88	143.42	237.06	11.66
AP2-22	578.50	1588.59	8.90	632.68	2032.91	144.14	588.66
AP3-22	3255.96	8929.95	41.30	4289.02	4109.44	258.98	2517.43
AP4-22	4804.69	13081.77	56.22	5983.11	8615.19	388.02	2852.04

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-21	0.000121	0.000392	0.000103	0.000349	0.000221	0.000024	0.000240
SRM612-21	0.005697	0.019180	0.005683	0.016026	0.008518	0.000052	0.014005
SRM610-21	0.090981	0.359310	0.092805	0.285872	0.124878	0.000277	0.067782
AP1-21	0.000010	0.000028	0.000008	0.000045	0.000025	0.000003	0.000014
AP2-21	0.000063	0.000157	0.000002	0.000070	0.000186	0.000005	0.000071
AP3-21	0.000060	0.000154	0.000001	0.000055	0.000174	0.000010	0.000062
AP4-21	0.000454	0.001121	0.000004	0.000557	0.000836	0.000023	0.000302
34HP45-671-1	0.000432	0.000238	0.000007	0.000002	0.000010	0.000034	0.000005
34HP45-671-2	0.000571	0.000329	0.000006	0.000002	0.000011	0.000034	0.000005
34HP45-671-3	0.000196	0.000122	0.000004	0.000001	0.000008	0.000041	0.000004
34HP45-671-4	0.000051	0.000032	0.000005	0.000003	0.000012	0.000052	0.000009
34HP45-671-5	0.000040	0.000025	0.000004	0.000001	0.000006	0.000041	0.000003
34HP45-671-6	0.000039	0.000023	0.000005	0.000006	0.000010	0.000057	0.000007
34HP45-671-7	0.000123	0.000081	0.000006	0.000002	0.000012	0.000054	0.000009
34HP45-671-8	0.000104	0.000070	0.000004	0.000000	0.000006	0.000044	0.000004
34HP45-671-9	0.000099	0.000065	0.000003	0.000001	0.000017	0.000048	0.000005
34HP45-671-10	0.000430	0.000253	0.002331	0.000010	0.000016	0.000122	0.000020
34HP45-671-11	0.000318	0.000182	0.000012	0.000001	0.000009	0.000100	0.000007
34HP45-671-12	0.000363	0.000214	0.000008	0.000002	0.000012	0.000105	0.000008
34HP45-671-13	0.000018	0.000014	0.000004	0.000007	0.000031	0.000156	0.000014
34HP45-671-14	0.000006	0.000006	0.000003	0.000004	0.000021	0.000173	0.000007
34HP45-671-15	0.000002	0.000004	0.000002	0.000002	0.000014	0.000167	0.000002
34HP45-671-16	0.000004	0.000008	0.000002	0.000005	0.000033	0.000198	0.000006
34HP45-671-17	0.000003	0.000004	0.000004	0.000000	0.000015	0.000142	0.000001
34HP45-671-18	0.000005	0.000003	0.000002	0.000000	0.000017	0.000126	0.000002
SRM614-22	0.000182	0.000633	0.000221	0.000615	0.000286	0.000290	0.000280
SRM612-22	0.008474	0.032590	0.011080	0.030107	0.013230	0.000246	0.015357
SRM610-22	0.128201	0.600398	0.169652	0.526330	0.199955	0.000574	0.072899
AP1-22	0.000000	0.000002	0.000001	0.000010	0.000015	0.000024	0.000001
AP2-22	0.000056	0.000154	0.000001	0.000061	0.000197	0.000014	0.000057
AP3-22	0.000248	0.000680	0.000003	0.000327	0.000313	0.000020	0.000192
AP4-22	0.000366	0.000997	0.000004	0.000456	0.000657	0.000030	0.000217

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP							
AP1	0.000005	0.000015	0.000005	0.000028	0.000020	0.000014	0.000008
AP2	0.000059	0.000156	0.000002	0.000065	0.000192	0.000009	0.000064
AP3	0.000154	0.000417	0.000002	0.000191	0.000244	0.000015	0.000127
AP4	0.000410	0.001059	0.000004	0.000507	0.000746	0.000026	0.000260

linest from std sig ave							
	0.038354	0.010281	2.102359	0.005565	0.026522	0.038665	0.012692

standardize signal averages SRM							
srms614-2	0.000152	0.000512	0.000162	0.000482	0.000254	0.000157	0.000260
srms612-2	0.007086	0.025885	0.008382	0.023067	0.010874	0.000149	0.014681
srms610-2	0.109591	0.479854	0.131228	0.406101	0.162417	0.000426	0.070341

linest from std sig ave							
	0.049171	0.010581	0.037160	0.010843	0.032015	0.000000	0.010221

concentration data							
SRM614-21	0.40	0.35	18.55	0.17	0.50	0.08	0.26
SRM612-21	18.74	16.91	1024.76	7.65	19.38	0.17	15.24
SRM610-21	299.27	316.83	16733.15	136.44	284.05	0.92	73.78
AP1-21	0.16	0.12	7.03	0.10	0.27	0.05	0.07
AP2-21	0.96	0.65	1.88	0.15	1.97	0.07	0.36
AP3-21	0.92	0.63	1.03	0.12	1.85	0.16	0.32
AP4-21	6.95	4.60	3.74	1.24	8.85	0.35	1.53
34HP45-671-1	6.61	0.98	5.50	0.00	0.10	0.53	0.03
34HP45-671-2	8.74	1.35	5.07	0.00	0.11	0.53	0.02
34HP45-671-3	3.00	0.50	3.25	0.00	0.08	0.64	0.02
34HP45-671-4	0.78	0.13	3.78	0.01	0.12	0.81	0.04
34HP45-671-5	0.61	0.10	3.39	0.00	0.06	0.63	0.02
34HP45-671-6	0.59	0.09	4.53	0.01	0.10	0.88	0.03
34HP45-671-7	1.88	0.33	4.65	0.00	0.13	0.84	0.05
34HP45-671-8	1.59	0.29	3.74	0.00	0.07	0.69	0.02
34HP45-671-9	1.52	0.27	2.15	0.00	0.18	0.73	0.03
34HP45-671-10	6.58	1.04	1955.35	0.02	0.17	1.88	0.10
34HP45-671-11	4.87	0.75	10.25	0.00	0.09	1.55	0.03
34HP45-671-12	5.56	0.88	6.44	0.00	0.13	1.62	0.04
34HP45-671-13	0.27	0.06	3.59	0.02	0.33	2.40	0.07
34HP45-671-14	0.09	0.02	2.53	0.01	0.22	2.67	0.04
34HP45-671-15	0.03	0.02	1.51	0.00	0.15	2.58	0.01
34HP45-671-16	0.07	0.03	2.01	0.01	0.35	3.06	0.03
34HP45-671-17	0.04	0.02	3.25	0.00	0.16	2.19	0.00
34HP45-671-18	0.08	0.01	1.43	0.00	0.18	1.95	0.01
SRM614-22	0.60	0.56	39.77	0.29	0.65	0.96	0.30
SRM612-22	27.88	28.74	1997.69	14.37	30.09	0.82	16.72
SRM610-22	421.70	529.41	30588.97	251.21	454.82	1.90	79.35
AP1-22	0.01	0.01	0.92	0.02	0.15	0.37	0.01
AP2-22	0.86	0.63	0.72	0.14	2.09	0.22	0.29
AP3-22	3.80	2.79	2.64	0.73	3.31	0.30	0.97
AP4-22	5.61	4.09	3.60	1.01	6.95	0.46	1.10

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
blank-19		2.20	2.28	1.00	0.56	1.68	573.44	9.92
SRM614-19		286.68	1100.49	338.92	916.77	846.68	813.96	553.00
SRM612-19		13848.68	47754.99	14559.84	40962.63	20135.03	958.97	30990.70
SRM610-19		102146.90	418978.78	109176.21	341223.06	132311.94	1145.61	50570.81
AP1-19		7.36	14.12	11.20	125.44	90.24	819.48	26.92
AP2-19		1108.49	2897.42	162.44	1165.17	4227.10	1231.77	1508.21
AP3-19		7437.28	18667.67	114.04	9475.33	9680.57	1327.13	6448.72
AP4-19		10887.38	27228.27	129.64	12550.47	20432.07	1388.97	7941.60
34HP60-102-1		1616.37	898.01	27.16	5.40	56.40	1680.49	30.68
34HP60-102-2		628.32	351.12	6.92	1.00	20.48	1668.21	20.32
34HP60-102-3		186.88	116.84	12.08	2.80	22.48	1662.33	20.76
34HP60-102-4		56.28	30.28	5.04	2.80	14.92	1927.33	13.00
34HP60-102-5		448.04	265.28	30.92	35.44	41.04	1967.77	26.40
34HP60-102-6		1617.25	975.73	28.20	13.36	41.60	2746.46	48.68
34HP60-102-7		233.48	137.08	6.56	2.76	30.72	1925.49	18.96

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	1038.97	564.68	28.80	2.96	58.60	1855.21	28.20
34HP60-102-9	1411.73	775.88	47.24	15.24	107.00	1819.81	39.16
34HP60-102-10	946.33	547.24	50.40	7.24	120.04	1781.33	42.84
34HP60-102-11	709.40	451.80	47.16	7.76	88.96	1612.21	43.48
34HP60-102-12	939.57	594.52	65.04	7.08	125.84	1570.05	60.32
34HP60-102-13	948.33	592.80	74.24	9.24	79.36	1584.29	55.48
34HP60-102-14	777.48	464.20	38.08	4.84	124.08	1428.89	66.36
34HP60-102-15	615.36	360.88	32.64	7.12	66.60	1422.45	41.80
34HP60-102-16	203.12	125.92	25.84	5.88	64.92	1392.65	48.04
34HP60-102-17	232.96	98.36	21.04	3.56	48.52	1278.89	32.80
34HP60-102-18	61.24	46.76	8.48	2.72	65.92	1268.57	13.72
SRM614-20	215.80	812.32	280.48	760.08	438.56	890.25	394.12
SRM612-20	11571.91	45310.70	14717.92	40764.83	17920.82	888.48	21470.04
SRM610-20	89535.50	414673.19	114857.05	360225.03	141616.39	996.61	49397.32
AP1-20	3.24	17.88	10.24	127.40	74.68	748.12	27.64
AP2-20	642.52	1760.05	26.80	680.48	2147.93	728.20	731.40
AP3-20	3351.26	9187.45	27.72	4302.46	4302.66	831.48	2716.98
AP4-20	6683.32	18187.38	68.08	9100.33	12603.87	1069.21	4587.35
blank-20	0.92	6.60	5.84	2.08	5.72	753.32	14.44
blank average	1.56	4.44	3.42	1.32	3.70	663.38	12.18
blank subtraction							
SRM614-19	285.12	1096.05	335.50	915.45	842.98	150.58	540.82
SRM612-19	13847.12	47750.55	14556.42	40961.31	20131.33	295.58	30978.51
SRM610-19	102145.34	418974.34	109172.79	341221.74	132308.24	482.22	50558.62
AP1-19	5.80	9.68	7.78	124.12	86.54	156.10	14.74
AP2-19	1106.93	2892.98	159.02	1163.85	4223.40	568.38	1496.03
AP3-19	7435.72	18663.23	110.62	9474.01	9676.87	663.74	6436.54
AP4-19	10885.82	27223.83	126.22	12549.15	20428.37	725.58	7929.42
34HP60-102-1	1614.81	893.57	23.74	4.08	52.70	1017.11	18.50
34HP60-102-2	626.76	346.68	3.50	-0.32	16.78	1004.83	8.14
34HP60-102-3	185.32	112.40	8.66	1.48	18.78	998.95	8.58
34HP60-102-4	54.72	25.84	1.62	1.48	11.22	1263.95	0.82
34HP60-102-5	446.48	260.84	27.50	34.12	37.34	1304.39	14.22
34HP60-102-6	1615.69	971.29	24.78	12.04	37.90	2083.07	36.50
34HP60-102-7	231.92	132.64	3.14	1.44	27.02	1262.11	6.78
34HP60-102-8	1037.41	560.24	25.38	1.64	54.90	1191.83	16.02
34HP60-102-9	1410.17	771.44	43.82	13.92	103.30	1156.43	26.98
34HP60-102-10	944.77	542.80	46.98	5.92	116.34	1117.95	30.66
34HP60-102-11	707.84	447.36	43.74	6.44	85.26	948.83	31.30
34HP60-102-12	938.01	590.08	61.62	5.76	122.14	906.67	48.14
34HP60-102-13	946.77	588.36	70.82	7.92	75.66	920.91	43.30
34HP60-102-14	775.92	459.76	34.66	3.52	120.38	765.50	54.18
34HP60-102-15	613.80	356.44	29.22	5.80	62.90	759.06	29.62
34HP60-102-16	201.56	121.48	22.42	4.56	61.22	729.26	35.86
34HP60-102-17	231.40	93.92	17.62	2.24	44.82	615.50	20.62
34HP60-102-18	59.68	42.32	5.06	1.40	62.22	605.18	1.54
SRM614-20	214.24	807.88	277.06	758.76	434.86	226.86	381.94
SRM612-20	11570.34	45306.25	14714.50	40763.51	17917.12	225.10	21457.86
SRM610-20	89533.94	414668.75	114853.63	360223.71	141612.69	333.22	49385.14
AP1-20	1.68	13.44	6.82	126.08	70.98	84.74	15.46
AP2-20	640.96	1755.61	23.38	679.16	2144.23	64.82	719.22
AP3-20	3349.70	9183.01	24.30	4301.14	4298.96	168.10	2704.80
AP4-20	6681.76	18182.94	64.66	9099.01	12600.17	405.82	4575.17
zero correction							
SRM614-19	285.12	1096.05	335.50	915.45	842.98	150.58	540.82
SRM612-19	13847.12	47750.55	14556.42	40961.31	20131.33	295.58	30978.51
SRM610-19	102145.34	418974.34	109172.79	341221.74	132308.24	482.22	50558.62
AP1-19	5.80	9.68	7.78	124.12	86.54	156.10	14.74
AP2-19	1106.93	2892.98	159.02	1163.85	4223.40	568.38	1496.03
AP3-19	7435.72	18663.23	110.62	9474.01	9676.87	663.74	6436.54
AP4-19	10885.82	27223.83	126.22	12549.15	20428.37	725.58	7929.42
34HP60-102-1	1614.81	893.57	23.74	4.08	52.70	1017.11	18.50
34HP60-102-2	626.76	346.68	3.50	0.00	16.78	1004.83	8.14
34HP60-102-3	185.32	112.40	8.66	1.48	18.78	998.95	8.58
34HP60-102-4	54.72	25.84	1.62	1.48	11.22	1263.95	0.82
34HP60-102-5	446.48	260.84	27.50	34.12	37.34	1304.39	14.22
34HP60-102-6	1615.69	971.29	24.78	12.04	37.90	2083.07	36.50
34HP60-102-7	231.92	132.64	3.14	1.44	27.02	1262.11	6.78
34HP60-102-8	1037.41	560.24	25.38	1.64	54.90	1191.83	16.02
34HP60-102-9	1410.17	771.44	43.82	13.92	103.30	1156.43	26.98
34HP60-102-10	944.77	542.80	46.98	5.92	116.34	1117.95	30.66
34HP60-102-11	707.84	447.36	43.74	6.44	85.26	948.83	31.30
34HP60-102-12	938.01	590.08	61.62	5.76	122.14	906.67	48.14
34HP60-102-13	946.77	588.36	70.82	7.92	75.66	920.91	43.30
34HP60-102-14	775.92	459.76	34.66	3.52	120.38	765.50	54.18
34HP60-102-15	613.80	356.44	29.22	5.80	62.90	759.06	29.62

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	201.56	121.48	22.42	4.56	61.22	729.26	35.86
34HP60-102-17	231.40	93.92	17.62	2.24	44.82	615.50	20.62
34HP60-102-18	59.68	42.32	5.06	1.40	62.22	605.18	1.54
SRM614-20	214.24	807.88	277.06	758.76	434.86	226.86	381.94
SRM612-20	11570.34	45306.25	14714.50	40763.51	17917.12	225.10	21457.86
SRM610-20	89533.94	414668.75	114853.63	360223.71	141612.69	333.22	49385.14
AP1-20	1.68	13.44	6.82	126.08	70.98	84.74	15.46
AP2-20	640.96	1755.61	23.38	679.16	2144.23	64.82	719.22
AP3-20	3349.70	9183.01	24.30	4301.14	4298.96	168.10	2704.80
AP4-20	6681.76	18182.94	64.66	9099.01	12600.17	405.82	4575.17

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-19	0.000120	0.000463	0.000142	0.000386	0.000356	0.000064	0.000228
SRM612-19	0.007356	0.025366	0.007733	0.021759	0.010694	0.000157	0.016456
SRM610-19	0.106264	0.435868	0.113575	0.354980	0.137643	0.000502	0.052597
AP1-19	0.000001	0.000001	0.000001	0.000011	0.000007	0.000013	0.000001
AP2-19	0.000068	0.000178	0.000010	0.000072	0.000260	0.000035	0.000092
AP3-19	0.000359	0.000902	0.000005	0.000458	0.000467	0.000032	0.000311
AP4-19	0.000531	0.001329	0.000006	0.000613	0.000997	0.000035	0.000387
34HP60-102-1	0.000135	0.000074	0.000002	0.000000	0.000004	0.000085	0.000002
34HP60-102-2	0.000078	0.000043	0.000000	0.000000	0.000002	0.000125	0.000001
34HP60-102-3	0.000032	0.000019	0.000002	0.000000	0.000003	0.000173	0.000001
34HP60-102-4	0.000014	0.000007	0.000000	0.000000	0.000003	0.000332	0.000000
34HP60-102-5	0.000079	0.000046	0.000005	0.000006	0.000007	0.000232	0.000003
34HP60-102-6	0.000137	0.000082	0.000002	0.000001	0.000003	0.000177	0.000003
34HP60-102-7	0.000055	0.000032	0.000001	0.000000	0.000006	0.000302	0.000002
34HP60-102-8	0.000179	0.000097	0.000004	0.000000	0.000009	0.000206	0.000003
34HP60-102-9	0.000212	0.000116	0.000007	0.000002	0.000016	0.000174	0.000004
34HP60-102-10	0.000082	0.000047	0.000004	0.000001	0.000010	0.000097	0.000003
34HP60-102-11	0.000067	0.000042	0.000004	0.000001	0.000008	0.000090	0.000003
34HP60-102-12	0.000082	0.000051	0.000005	0.000001	0.000011	0.000079	0.000004
34HP60-102-13	0.000075	0.000047	0.000006	0.000001	0.000006	0.000073	0.000003
34HP60-102-14	0.000061	0.000036	0.000003	0.000000	0.000009	0.000060	0.000004
34HP60-102-15	0.000052	0.000030	0.000002	0.000000	0.000005	0.000064	0.000002
34HP60-102-16	0.000024	0.000015	0.000003	0.000001	0.000007	0.000087	0.000004
34HP60-102-17	0.000026	0.000011	0.000002	0.000000	0.000005	0.000070	0.000002
34HP60-102-18	0.000009	0.000006	0.000001	0.000000	0.000009	0.000091	0.000000
SRM614-20	0.000149	0.000560	0.000192	0.000526	0.000301	0.000157	0.000265
SRM612-20	0.007758	0.030378	0.009866	0.027332	0.012014	0.000151	0.014388
SRM610-20	0.113449	0.525429	0.145532	0.456442	0.179438	0.000422	0.062576
AP1-20	0.000000	0.000001	0.000001	0.000012	0.000007	0.000008	0.000002
AP2-20	0.000059	0.000161	0.000002	0.000062	0.000197	0.000006	0.000066
AP3-20	0.000239	0.000655	0.000002	0.000307	0.000307	0.000012	0.000193
AP4-20	0.000427	0.001163	0.000004	0.000582	0.000806	0.000026	0.000293

standardize signal averages AP

AP1	0.000000	0.000001	0.000001	0.000012	0.000007	0.000011	0.000001
AP2	0.000064	0.000170	0.000006	0.000067	0.000229	0.000020	0.000079
AP3	0.000299	0.000778	0.000004	0.000382	0.000387	0.000022	0.000252
AP4	0.000479	0.001246	0.000005	0.000597	0.000902	0.000031	0.000340

linest from std sig ave

	0.030203	0.008071	1.834803	0.004265	0.021455	0.030054	0.008695
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standardize signal averages SRM

srm614-2	0.000134	0.000511	0.000167	0.000456	0.000329	0.000110	0.000247
srm612-2	0.007557	0.027872	0.008799	0.024546	0.011354	0.000154	0.015422
srm610-2	0.109856	0.480648	0.129553	0.405711	0.158541	0.000462	0.057587

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.049043	0.010563	0.037633	0.010853	0.032790	0.000000	0.012325
concentration data							
SRM614-19	0.31	0.32	22.28	0.14	0.65	0.16	0.17
SRM612-19	19.05	17.56	1216.78	7.96	19.68	0.40	12.27
SRM610-19	275.25	301.72	17871.91	129.85	253.26	1.29	39.22
AP1-19	0.01	0.00	0.49	0.02	0.06	0.16	0.00
AP2-19	0.82	0.57	7.17	0.12	2.23	0.42	0.32
AP3-19	4.33	2.90	3.91	0.78	4.00	0.38	1.08
AP4-19	6.40	4.28	4.51	1.04	8.53	0.42	1.34
34HP60-102-1	1.62	0.24	1.45	0.00	0.04	1.02	0.01
34HP60-102-2	0.94	0.14	0.32	0.00	0.02	1.50	0.00
34HP60-102-3	0.39	0.06	1.10	0.00	0.03	2.08	0.01
34HP60-102-4	0.17	0.02	0.31	0.00	0.03	3.98	0.00
34HP60-102-5	0.96	0.15	3.58	0.01	0.06	2.78	0.01
34HP60-102-6	1.65	0.27	1.54	0.00	0.03	2.12	0.01
34HP60-102-7	0.67	0.10	0.55	0.00	0.06	3.62	0.01
34HP60-102-8	2.16	0.31	3.21	0.00	0.08	2.47	0.01
34HP60-102-9	2.55	0.37	4.82	0.00	0.13	2.08	0.01
34HP60-102-10	0.98	0.15	2.97	0.00	0.09	1.16	0.01
34HP60-102-11	0.80	0.14	3.02	0.00	0.07	1.07	0.01
34HP60-102-12	0.99	0.17	3.94	0.00	0.09	0.95	0.01
34HP60-102-13	0.91	0.15	4.12	0.00	0.05	0.88	0.01
34HP60-102-14	0.73	0.12	1.98	0.00	0.08	0.72	0.01
34HP60-102-15	0.62	0.10	1.80	0.00	0.05	0.76	0.01
34HP60-102-16	0.29	0.05	1.97	0.00	0.06	1.05	0.01
34HP60-102-17	0.32	0.03	1.47	0.00	0.04	0.84	0.01
34HP60-102-18	0.11	0.02	0.56	0.00	0.08	1.09	0.00
SRM614-20	0.38	0.39	30.22	0.19	0.55	0.41	0.20
SRM612-20	20.10	21.03	1552.53	10.00	22.11	0.39	10.73
SRM610-20	293.86	363.72	22900.62	166.97	330.17	1.09	46.66
AP1-20	0.00	0.00	0.49	0.02	0.06	0.10	0.01
AP2-20	0.71	0.52	1.57	0.11	1.69	0.07	0.23
AP3-20	2.88	2.11	1.27	0.52	2.63	0.14	0.67
AP4-20	5.15	3.75	3.03	0.99	6.90	0.31	1.02
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-17	2.64	2.32	3.24	4.60	7.36	344.12	8.92
SRM614-17	207.24	732.12	220.40	559.24	520.60	512.56	434.04
SRM612-17	9723.81	30345.65	8400.81	23881.33	14945.69	605.56	22808.57
SRM610-17	91337.67	336726.94	80973.70	260367.22	125336.47	895.97	78172.04
AP1-17	19.20	38.04	26.48	109.88	261.12	607.12	58.84
AP2-17	927.81	2187.77	124.88	968.05	3840.22	728.00	1305.97
AP3-17	4065.18	9829.10	93.52	4967.83	4873.35	867.36	3811.54
AP4-17	9232.65	22620.45	191.24	10583.10	17321.94	1022.33	7018.56
34HP60-24-1	220.88	120.84	13.68	4.80	50.20	2418.29	28.68
34HP60-24-2	138.48	90.36	14.76	2.96	30.76	1980.33	25.68
34HP60-24-3	227.72	132.00	13.40	0.56	51.28	2166.37	24.00
34HP60-24-4	809.24	435.04	35.00	2.80	64.96	2308.41	27.92
34HP60-24-5	2089.17	1235.17	70.68	4.36	112.56	2115.89	57.08
34HP60-24-6	2407.57	1458.41	82.48	13.04	87.96	2243.65	52.48
34HP60-24-7	681.24	379.96	42.48	5.52	115.84	2531.81	31.96
34HP60-24-8	312.36	195.20	47.08	2.28	121.36	2312.53	56.64
34HP60-24-9	488.44	316.64	68.40	2.52	102.00	2179.01	54.12
34HP60-24-10	1299.93	788.32	90.84	25.08	61.12	1879.97	44.52
34HP60-24-11	1399.89	883.53	124.12	8.68	65.00	1687.61	41.00
34HP60-24-12	1631.85	991.93	153.32	8.40	63.76	1509.49	57.08
SRM614-18	199.32	705.60	241.24	719.52	414.00	901.21	361.24
SRM612-18	11926.55	45430.57	14823.80	41828.52	19513.27	1003.65	21604.60
SRM610-18	97417.95	452255.91	125269.27	396828.47	148056.95	1076.41	53589.94
AP1-18	5.52	10.72	22.56	154.72	160.48	772.64	21.04
AP2-18	811.32	2307.77	24.68	946.57	2654.86	859.56	845.80
AP3-18	3509.98	9480.13	27.80	4067.38	4246.86	951.93	2569.25
AP4-18	7433.24	20076.71	65.60	9038.01	14597.68	1202.73	4805.67
blank-18	1.16	3.40	2.00	3.96	4.80	755.12	18.48
blank average	1.90	2.86	2.62	4.28	6.08	549.62	13.70
blank subtraction							

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	205.34	729.26	217.78	554.96	514.52	-37.06	420.34
SRM612-17	9721.91	30342.79	8398.19	23877.05	14939.60	55.94	22794.87
SRM610-17	91335.77	336724.08	80971.07	260362.94	125330.39	346.34	78158.34
AP1-17	17.30	35.18	23.86	105.60	255.04	57.50	45.14
AP2-17	925.91	2184.91	122.26	963.77	3834.14	178.38	1292.27
AP3-17	4063.28	9826.24	90.90	4963.55	4867.27	317.74	3797.84
AP4-17	9230.75	22617.59	188.62	10578.82	17315.86	472.70	7004.86
34HP60-24-1	218.98	117.98	11.06	0.52	44.12	1868.67	14.98
34HP60-24-2	136.58	87.50	12.14	-1.32	24.68	1430.71	11.98
34HP60-24-3	225.82	129.14	10.78	-3.72	45.20	1616.75	10.30
34HP60-24-4	807.34	432.18	32.38	-1.48	58.88	1758.79	14.22
34HP60-24-5	2087.27	1232.31	68.06	0.08	106.48	1566.27	43.38
34HP60-24-6	2405.67	1455.55	79.86	8.76	81.88	1694.03	38.78
34HP60-24-7	679.34	377.10	39.86	1.24	109.76	1982.19	18.26
34HP60-24-8	310.46	192.34	44.46	-2.00	115.28	1762.91	42.94
34HP60-24-9	486.54	313.78	65.78	-1.76	95.92	1629.39	40.42
34HP60-24-10	1298.03	785.46	88.22	20.80	55.04	1330.35	30.82
34HP60-24-11	1397.99	880.67	121.50	4.40	58.92	1137.99	27.30
34HP60-24-12	1629.95	989.07	150.70	4.12	57.68	959.87	43.38
SRM614-18	197.42	702.74	238.62	715.24	407.92	351.58	347.54
SRM612-18	11924.65	45427.71	14821.18	41824.24	19507.19	454.02	21590.90
SRM610-18	97416.04	452253.05	125266.65	396824.19	148050.87	526.78	53576.24
AP1-18	3.62	7.86	19.94	150.44	154.40	223.02	7.34
AP2-18	809.42	2304.91	22.06	942.29	2648.77	309.94	832.10
AP3-18	3508.08	9477.27	25.18	4063.10	4240.78	402.30	2555.55
AP4-18	7431.34	20073.85	62.98	9033.73	14591.60	653.10	4791.97
zero correction							
SRM614-17	205.34	729.26	217.78	554.96	514.52	0.00	420.34
SRM612-17	9721.91	30342.79	8398.19	23877.05	14939.60	55.94	22794.87
SRM610-17	91335.77	336724.08	80971.07	260362.94	125330.39	346.34	78158.34
AP1-17	17.30	35.18	23.86	105.60	255.04	57.50	45.14
AP2-17	925.91	2184.91	122.26	963.77	3834.14	178.38	1292.27
AP3-17	4063.28	9826.24	90.90	4963.55	4867.27	317.74	3797.84
AP4-17	9230.75	22617.59	188.62	10578.82	17315.86	472.70	7004.86
34HP60-24-1	218.98	117.98	11.06	0.52	44.12	1868.67	14.98
34HP60-24-2	136.58	87.50	12.14	0.00	24.68	1430.71	11.98
34HP60-24-3	225.82	129.14	10.78	0.00	45.20	1616.75	10.30
34HP60-24-4	807.34	432.18	32.38	0.00	58.88	1758.79	14.22
34HP60-24-5	2087.27	1232.31	68.06	0.08	106.48	1566.27	43.38
34HP60-24-6	2405.67	1455.55	79.86	8.76	81.88	1694.03	38.78
34HP60-24-7	679.34	377.10	39.86	1.24	109.76	1982.19	18.26
34HP60-24-8	310.46	192.34	44.46	0.00	115.28	1762.91	42.94
34HP60-24-9	486.54	313.78	65.78	0.00	95.92	1629.39	40.42
34HP60-24-10	1298.03	785.46	88.22	20.80	55.04	1330.35	30.82
34HP60-24-11	1397.99	880.67	121.50	4.40	58.92	1137.99	27.30
34HP60-24-12	1629.95	989.07	150.70	4.12	57.68	959.87	43.38
SRM614-18	197.42	702.74	238.62	715.24	407.92	351.58	347.54
SRM612-18	11924.65	45427.71	14821.18	41824.24	19507.19	454.02	21590.90
SRM610-18	97416.04	452253.05	125266.65	396824.19	148050.87	526.78	53576.24
AP1-18	3.62	7.86	19.94	150.44	154.40	223.02	7.34
AP2-18	809.42	2304.91	22.06	942.29	2648.77	309.94	832.10
AP3-18	3508.08	9477.27	25.18	4063.10	4240.78	402.30	2555.55
AP4-18	7431.34	20073.85	62.98	9033.73	14591.60	653.10	4791.97
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-17	0.000095	0.000339	0.000101	0.000258	0.000239	0.000000	0.000195
SRM612-17	0.004963	0.015491	0.004287	0.012190	0.007627	0.000029	0.011637
SRM610-17	0.070754	0.260846	0.062725	0.201692	0.097088	0.000268	0.060546
AP1-17	0.000001	0.000002	0.000001	0.000007	0.000016	0.000004	0.000003

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000060	0.000142	0.000008	0.000063	0.000250	0.000012	0.000084
AP3-17	0.000245	0.000592	0.000005	0.000299	0.000293	0.000019	0.000229
AP4-17	0.000452	0.001108	0.000009	0.000518	0.000848	0.000023	0.000343
34HP60-24-1	0.000046	0.000025	0.000002	0.000000	0.000009	0.000389	0.000003
34HP60-24-2	0.000026	0.000017	0.000002	0.000000	0.000005	0.000276	0.000002
34HP60-24-3	0.000040	0.000023	0.000002	0.000000	0.000008	0.000287	0.000002
34HP60-24-4	0.000099	0.000053	0.000004	0.000000	0.000007	0.000216	0.000002
34HP60-24-5	0.000185	0.000109	0.000006	0.000000	0.000009	0.000139	0.000004
34HP60-24-6	0.000207	0.000125	0.000007	0.000001	0.000007	0.000146	0.000003
34HP60-24-7	0.000070	0.000039	0.000004	0.000000	0.000011	0.000204	0.000002
34HP60-24-8	0.000030	0.000019	0.000004	0.000000	0.000011	0.000173	0.000004
34HP60-24-9	0.000043	0.000028	0.000006	0.000000	0.000008	0.000144	0.000004
34HP60-24-10	0.000122	0.000074	0.000008	0.000002	0.000005	0.000125	0.000003
34HP60-24-11	0.000119	0.000075	0.000010	0.000000	0.000005	0.000097	0.000002
34HP60-24-12	0.000126	0.000077	0.000012	0.000000	0.000004	0.000074	0.000003
SRM614-18	0.000161	0.000572	0.000194	0.000583	0.000332	0.000286	0.000283
SRM612-18	0.007869	0.029978	0.009780	0.027600	0.012873	0.000300	0.014248
SRM610-18	0.119882	0.556551	0.154155	0.488339	0.182194	0.000648	0.065932
AP1-18	0.000000	0.000001	0.000002	0.000013	0.000014	0.000020	0.000001
AP2-18	0.000064	0.000182	0.000002	0.000074	0.000209	0.000024	0.000066
AP3-18	0.000252	0.000680	0.000002	0.000291	0.000304	0.000029	0.000183
AP4-18	0.000458	0.001237	0.000004	0.000557	0.000899	0.000040	0.000295

standardize signal averages AP

AP1	0.000001	0.000001	0.000002	0.000010	0.000015	0.000012	0.000002
AP2	0.000062	0.000162	0.000005	0.000069	0.000230	0.000018	0.000075
AP3	0.000248	0.000636	0.000004	0.000295	0.000299	0.000024	0.000206
AP4	0.000455	0.001173	0.000007	0.000538	0.000874	0.000032	0.000319

linest from std sig ave

	0.032909	0.008884	1.905326	0.004949	0.022564	0.029582	0.009681
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standardize signal averages SRM

srm614-2	0.000128	0.000456	0.000148	0.000420	0.000286	0.000143	0.000239
srm612-2	0.006416	0.022734	0.007034	0.019895	0.010250	0.000164	0.012943
srm610-2	0.095318	0.408699	0.108440	0.345016	0.139641	0.000458	0.063239

linest from std sig ave

	0.056527	0.012423	0.044967	0.012763	0.037224	0.000000	0.011376
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concentration data

SRM614-17	0.27	0.26	16.55	0.11	0.46	0.00	0.16
SRM612-17	14.01	11.80	700.60	5.17	14.76	0.07	9.66
SRM610-17	199.69	198.75	10249.66	85.60	187.88	0.68	50.27
AP1-17	0.01	0.01	1.14	0.01	0.14	0.04	0.01
AP2-17	0.79	0.50	6.06	0.12	2.25	0.14	0.33
AP3-17	3.21	2.10	4.16	0.59	2.64	0.23	0.88
AP4-17	5.94	3.93	7.02	1.02	7.64	0.27	1.33
34HP60-24-1	0.60	0.09	1.75	0.00	0.08	4.60	0.01
34HP60-24-2	0.35	0.06	1.78	0.00	0.04	3.25	0.01
34HP60-24-3	0.53	0.08	1.45	0.00	0.07	3.39	0.01
34HP60-24-4	1.30	0.19	3.02	0.00	0.06	2.55	0.01
34HP60-24-5	2.43	0.39	4.59	0.00	0.09	1.64	0.01
34HP60-24-6	2.72	0.44	5.23	0.00	0.06	1.72	0.01
34HP60-24-7	0.92	0.14	3.11	0.00	0.10	2.40	0.01
34HP60-24-8	0.40	0.07	3.32	0.00	0.10	2.04	0.02
34HP60-24-9	0.56	0.10	4.41	0.00	0.08	1.70	0.01
34HP60-24-10	1.60	0.26	6.31	0.00	0.05	1.48	0.01
34HP60-24-11	1.56	0.27	7.86	0.00	0.05	1.14	0.01
34HP60-24-12	1.66	0.27	8.87	0.00	0.04	0.88	0.01
SRM614-18	0.45	0.44	31.76	0.25	0.64	0.73	0.24
SRM612-18	22.21	22.84	1598.19	11.71	24.91	0.76	11.83
SRM610-18	338.35	424.06	25189.99	207.25	352.57	1.64	54.74
AP1-18	0.00	0.00	1.34	0.03	0.12	0.23	0.00
AP2-18	0.84	0.65	1.33	0.15	1.88	0.29	0.25
AP3-18	3.30	2.41	1.37	0.58	2.74	0.34	0.71
AP4-18	6.01	4.39	2.95	1.10	8.10	0.48	1.14

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Yb Lu Hf Ta W Hg Tl

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-15	3.44	5.80	4.40	5.16	4.64	346.16	18.40
SRM614-15	300.84	1022.49	289.44	901.73	756.64	543.28	607.68
SRM612-15	16261.37	55803.11	16136.89	47080.59	28675.96	714.80	49614.84
SRM610-15	152368.70	612636.19	150269.92	510959.50	267656.56	1147.37	153418.22
AP1-15	9.64	21.36	9.00	107.24	91.56	698.76	34.48
AP2-15	719.36	1902.49	20.00	780.60	1678.29	581.80	842.72
AP3-15	4720.99	11674.71	39.44	6112.83	5353.35	663.92	3493.82
AP4-15	6945.00	17586.90	65.36	7110.92	9390.77	890.21	4970.47
34BV166-1	18.68	17.36	2.72	3.92	41.40	1427.57	32.52
34BV166-2	11.80	14.08	7.04	1.40	55.76	1428.57	27.44
34BV166-3	9.68	9.68	4.16	4.36	86.56	1509.17	25.12
34BV166-4	16.00	11.48	2.52	2.88	163.92	3414.98	20.12
34BV166-5	11.24	9.20	4.92	0.64	173.16	3934.18	24.40
34BV166-6	20.72	9.52	2.52	4.84	294.88	3832.82	29.84
SRM614-16	252.28	992.25	330.32	925.33	459.16	932.57	515.48
SRM612-16	18075.74	70054.39	22473.57	63282.32	27928.84	1056.09	33501.47
SRM610-16	130708.34	627740.44	164571.73	536418.94	191894.00	1168.21	70337.84
AP1-16	6.96	10.52	9.80	113.84	83.08	728.72	26.56
AP2-16	622.68	1894.53	15.68	783.12	1740.97	676.04	723.20
AP3-16	3750.34	10322.70	40.32	4746.63	4567.67	720.12	2610.73
AP4-16	5577.11	14946.60	61.24	6730.44	8049.53	869.64	3113.18
blank-16	0.96	1.28	1.36	0.84	1.36	572.16	18.44
blank average	2.20	3.54	2.88	3.00	3.00	459.16	18.42
blank subtraction							
SRM614-15	298.64	1018.95	286.56	898.73	753.64	84.12	589.26
SRM612-15	16259.17	55799.57	16134.01	47077.59	28672.96	255.64	49596.42
SRM610-15	152366.50	612632.65	150267.04	510956.50	267653.56	688.20	153399.80
AP1-15	7.44	17.82	6.12	104.24	88.56	239.60	16.06
AP2-15	717.16	1898.95	17.12	777.60	1675.29	122.64	824.30
AP3-15	4718.79	11671.17	36.56	6109.83	5350.35	204.76	3475.40
AP4-15	6942.80	17583.36	62.48	7107.92	9387.77	431.04	4952.05
34BV166-1	16.48	13.82	-0.16	0.92	38.40	968.41	14.10
34BV166-2	9.60	10.54	4.16	-1.60	52.76	969.41	9.02
34BV166-3	7.48	6.14	1.28	1.36	83.56	1050.01	6.70
34BV166-4	13.80	7.94	-0.36	-0.12	160.92	2955.82	1.70
34BV166-5	9.04	5.66	2.04	-2.36	170.16	3475.02	5.98
34BV166-6	18.52	5.98	-0.36	1.84	291.88	3373.66	11.42
SRM614-16	250.08	988.71	327.44	922.33	456.16	473.40	497.06
SRM612-16	18073.54	70050.85	22470.69	63279.32	27925.84	596.92	33483.05
SRM610-16	130706.14	627736.90	164568.85	536415.94	191891.00	709.04	70319.42
AP1-16	4.76	6.98	6.92	110.84	80.08	269.56	8.14
AP2-16	620.48	1890.99	12.80	780.12	1737.97	216.88	704.78
AP3-16	3748.14	10319.16	37.44	4743.63	4564.67	260.96	2592.31
AP4-16	5574.91	14943.06	58.36	6727.44	8046.53	410.48	3094.76
zero correction							
SRM614-15	298.64	1018.95	286.56	898.73	753.64	84.12	589.26
SRM612-15	16259.17	55799.57	16134.01	47077.59	28672.96	255.64	49596.42
SRM610-15	152366.50	612632.65	150267.04	510956.50	267653.56	688.20	153399.80
AP1-15	7.44	17.82	6.12	104.24	88.56	239.60	16.06
AP2-15	717.16	1898.95	17.12	777.60	1675.29	122.64	824.30
AP3-15	4718.79	11671.17	36.56	6109.83	5350.35	204.76	3475.40
AP4-15	6942.80	17583.36	62.48	7107.92	9387.77	431.04	4952.05
34BV166-1	16.48	13.82	0.00	0.92	38.40	968.41	14.10
34BV166-2	9.60	10.54	4.16	0.00	52.76	969.41	9.02
34BV166-3	7.48	6.14	1.28	1.36	83.56	1050.01	6.70
34BV166-4	13.80	7.94	0.00	0.00	160.92	2955.82	1.70
34BV166-5	9.04	5.66	2.04	0.00	170.16	3475.02	5.98
34BV166-6	18.52	5.98	0.00	1.84	291.88	3373.66	11.42
SRM614-16	250.08	988.71	327.44	922.33	456.16	473.40	497.06
SRM612-16	18073.54	70050.85	22470.69	63279.32	27925.84	596.92	33483.05
SRM610-16	130706.14	627736.90	164568.85	536415.94	191891.00	709.04	70319.42
AP1-16	4.76	6.98	6.92	110.84	80.08	269.56	8.14
AP2-16	620.48	1890.99	12.80	780.12	1737.97	216.88	704.78
AP3-16	3748.14	10319.16	37.44	4743.63	4564.67	260.96	2592.31
AP4-16	5574.91	14943.06	58.36	6727.44	8046.53	410.48	3094.76
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-15	0.000105	0.000358	0.000101	0.000316	0.000265	0.000030	0.000207
SRM612-15	0.005329	0.018287	0.005288	0.015429	0.009397	0.000084	0.016254
SRM610-15	0.081840	0.329062	0.080713	0.274449	0.143764	0.000370	0.082395
AP1-15	0.000001	0.000001	0.000000	0.000008	0.000007	0.000018	0.000001
AP2-15	0.000051	0.000134	0.000001	0.000055	0.000118	0.000009	0.000058
AP3-15	0.000253	0.000625	0.000002	0.000327	0.000286	0.000011	0.000186
AP4-15	0.000409	0.001036	0.000004	0.000419	0.000553	0.000025	0.000292
34BV166-1	0.000004	0.000003	0.000000	0.000000	0.000009	0.000233	0.000003
34BV166-2	0.000003	0.000003	0.000001	0.000000	0.000015	0.000273	0.000003
34BV166-3	0.000002	0.000002	0.000000	0.000000	0.000026	0.000323	0.000002
34BV166-4	0.000005	0.000003	0.000000	0.000000	0.000055	0.001015	0.000001
34BV166-5	0.000003	0.000002	0.000001	0.000000	0.000055	0.001130	0.000002
34BV166-6	0.000004	0.000001	0.000000	0.000000	0.000069	0.000795	0.000003
SRM614-16	0.000145	0.000574	0.000190	0.000536	0.000265	0.000275	0.000289
SRM612-16	0.007803	0.030244	0.009701	0.027320	0.012057	0.000258	0.014456
SRM610-16	0.117258	0.563150	0.147637	0.481225	0.172148	0.000636	0.063084
AP1-16	0.000000	0.000001	0.000001	0.000009	0.000007	0.000022	0.000001
AP2-16	0.000052	0.000158	0.000001	0.000065	0.000145	0.000018	0.000059
AP3-16	0.000230	0.000633	0.000002	0.000291	0.000280	0.000016	0.000159
AP4-16	0.000384	0.001029	0.000004	0.000463	0.000554	0.000028	0.000213
standardize signal averages AP							
AP1	0.000000	0.000001	0.000001	0.000009	0.000007	0.000020	0.000001
AP2	0.000051	0.000146	0.000001	0.000060	0.000132	0.000013	0.000058
AP3	0.000241	0.000629	0.000002	0.000309	0.000283	0.000013	0.000173
AP4	0.000396	0.001032	0.000004	0.000441	0.000554	0.000027	0.000252
linest from std sig ave							
	0.036788	0.009810	4.019161	0.005625	0.034074	0.033430	0.012029
standardize signal averages SRM							
srM614-2	0.000125	0.000466	0.000145	0.000426	0.000265	0.000152	0.000248
srM612-2	0.006566	0.024265	0.007495	0.021374	0.010727	0.000171	0.015355
srM610-2	0.099549	0.446106	0.114175	0.377837	0.157956	0.000503	0.072740
linest from std sig ave							
	0.054128	0.011382	0.042707	0.011654	0.032918	0.000000	0.009880
concentration data							
SRM614-15	0.33	0.30	34.68	0.15	0.77	0.08	0.21
SRM612-15	16.81	15.38	1822.61	7.44	27.46	0.24	16.77
SRM610-15	258.21	276.84	27821.23	132.40	420.12	1.06	85.00
AP1-15	0.01	0.01	0.73	0.02	0.09	0.24	0.01
AP2-15	0.74	0.52	1.94	0.12	1.61	0.12	0.28
AP3-15	3.71	2.45	3.14	0.73	3.89	0.15	0.89
AP4-15	6.00	4.05	5.90	0.94	7.52	0.34	1.40
34BV166-1	0.06	0.01	0.00	0.00	0.13	3.11	0.02
34BV166-2	0.04	0.01	1.88	0.00	0.20	3.65	0.01
34BV166-3	0.03	0.01	0.63	0.00	0.35	4.31	0.01
34BV166-4	0.07	0.01	0.00	0.00	0.75	13.54	0.00
34BV166-5	0.04	0.01	1.06	0.00	0.75	15.07	0.01
34BV166-6	0.06	0.01	0.00	0.00	0.94	10.61	0.01
SRM614-16	0.46	0.48	65.55	0.26	0.77	0.79	0.30
SRM612-16	24.62	25.44	3344.06	13.18	35.23	0.74	14.91
SRM610-16	369.96	473.78	50889.62	232.15	503.07	1.82	65.08
AP1-16	0.01	0.00	0.93	0.02	0.09	0.30	0.00
AP2-16	0.76	0.62	1.71	0.15	1.97	0.24	0.28
AP3-16	3.38	2.48	3.68	0.65	3.81	0.21	0.76
AP4-16	5.63	4.03	6.44	1.04	7.53	0.38	1.02
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

	Yb	Lu	Hf	Ta	W	Hg	Tl	
raw data								
blank-13		3.44	2.16	2.32	1.48	20.36	857.04	10.00
SRM614-13		330.24	1049.29	306.96	953.41	505.48	1633.01	751.24
SRM612-13		18066.02	62776.00	18458.15	52724.06	25487.38	2006.57	38669.62
SRM610-13		127578.76	540977.94	135634.28	430470.94	183285.88	3022.58	82245.98
AP1-13		45.76	209.56	66.28	328.76	246.04	1282.21	133.32
AP2-13		960.77	2411.13	49.68	935.09	2433.97	1498.37	1070.49
AP3-13		4267.54	10599.78	66.72	4751.31	4458.54	1834.49	3006.86
AP4-13		6467.60	16635.05	67.60	6562.16	9182.01	2239.73	4519.23
W3-1		27.76	36.08	15.04	18.84	41.04	6456.40	48.56
W3-2		17.64	22.80	9.84	8.68	19.40	6612.52	40.76
W3-3		21.40	17.92	11.56	36.32	78.04	6826.12	52.24
W3-4		27.20	13.52	6.08	6.52	50.60	8617.53	79.92
W3-5		23.00	20.64	10.60	3.36	18.08	8106.93	56.40
W3-6		16.20	16.12	12.68	3.36	40.08	7737.84	41.12
W3-7		34.64	13.68	10.36	3.84	32.28	8164.25	34.32
W3-8		38.32	21.76	7.40	6.40	12.88	7799.60	42.24
W3-9		31.12	25.08	3.56	2.68	13.80	7552.92	37.28
W3-10		80.68	63.80	18.32	19.92	34.44	11106.54	73.48
W3-11		71.84	52.12	17.76	16.20	44.48	10388.06	66.12
W3-12		69.16	31.08	20.12	8.72	11.04	9911.90	44.56
SRM614-14		354.32	1301.45	446.16	1167.69	662.00	2603.93	813.64
SRM612-14		19099.91	75861.19	24626.18	69576.63	32990.23	3069.62	44314.65
SRM610-14		107047.28	522995.03	141154.36	453143.72	174864.55	3462.22	61873.31
AP1-14		7.24	20.64	13.40	179.56	114.00	1288.53	28.72
AP2-14		728.68	1960.69	20.80	818.44	2009.49	1486.17	661.88
AP3-14		3555.70	9665.01	34.92	5122.67	4425.22	1845.77	2736.38
AP4-14		5412.79	14878.20	45.24	6446.76	8135.21	2018.09	3631.22
blank-14		2.56	2.44	4.80	0.96	8.36	1505.09	23.84
blank average		3.00	2.30	3.56	1.22	14.36	1181.07	16.92
blank subtraction								
SRM614-13		327.24	1046.99	303.40	952.19	491.12	451.94	734.32
SRM612-13		18063.02	62773.70	18454.58	52722.84	25473.02	825.50	38652.70
SRM610-13		127575.76	540975.64	135630.72	430469.72	183271.52	1841.51	82229.06
AP1-13		42.76	207.26	62.72	327.54	231.68	101.14	116.40
AP2-13		957.77	2408.83	46.12	933.87	2419.61	317.30	1053.57
AP3-13		4264.54	10597.48	63.16	4750.09	4444.18	653.42	2989.94
AP4-13		6464.60	16632.75	64.04	6560.94	9167.65	1058.67	4502.31
W3-1		24.76	33.78	11.48	17.62	26.68	5275.33	31.64
W3-2		14.64	20.50	6.28	7.46	5.04	5431.45	23.84
W3-3		18.40	15.62	8.00	35.10	63.68	5645.05	35.32
W3-4		24.20	11.22	2.52	5.30	36.24	7436.46	63.00
W3-5		20.00	18.34	7.04	2.14	3.72	6925.86	39.48
W3-6		13.20	13.82	9.12	2.14	25.72	6556.78	24.20
W3-7		31.64	11.38	6.80	2.62	17.92	6983.18	17.40
W3-8		35.32	19.46	3.84	5.18	-1.48	6618.54	25.32
W3-9		28.12	22.78	0.00	1.46	-0.56	6371.86	20.36
W3-10		77.68	61.50	14.76	18.70	20.08	9925.48	56.56
W3-11		68.84	49.82	14.20	14.98	30.12	9206.99	49.20
W3-12		66.16	28.78	16.56	7.50	-3.32	8730.83	27.64
SRM614-14		351.32	1299.15	442.60	1166.47	647.64	1422.87	796.72
SRM612-14		19096.91	75858.89	24622.62	69575.41	32975.87	1888.55	44297.73
SRM610-14		107044.28	522992.73	141150.80	453142.50	174850.19	2281.15	61856.39
AP1-14		4.24	18.34	9.84	178.34	99.64	107.46	11.80
AP2-14		725.68	1958.39	17.24	817.22	1995.13	305.10	644.96
AP3-14		3552.70	9662.71	31.36	5121.45	4410.86	664.70	2719.46
AP4-14		5409.79	14875.90	41.68	6445.54	8120.85	837.02	3614.30
zero correction								
SRM614-13		327.24	1046.99	303.40	952.19	491.12	451.94	734.32
SRM612-13		18063.02	62773.70	18454.58	52722.84	25473.02	825.50	38652.70
SRM610-13		127575.76	540975.64	135630.72	430469.72	183271.52	1841.51	82229.06
AP1-13		42.76	207.26	62.72	327.54	231.68	101.14	116.40
AP2-13		957.77	2408.83	46.12	933.87	2419.61	317.30	1053.57
AP3-13		4264.54	10597.48	63.16	4750.09	4444.18	653.42	2989.94
AP4-13		6464.60	16632.75	64.04	6560.94	9167.65	1058.67	4502.31
W3-1		24.76	33.78	11.48	17.62	26.68	5275.33	31.64
W3-2		14.64	20.50	6.28	7.46	5.04	5431.45	23.84
W3-3		18.40	15.62	8.00	35.10	63.68	5645.05	35.32
W3-4		24.20	11.22	2.52	5.30	36.24	7436.46	63.00
W3-5		20.00	18.34	7.04	2.14	3.72	6925.86	39.48
W3-6		13.20	13.82	9.12	2.14	25.72	6556.78	24.20
W3-7		31.64	11.38	6.80	2.62	17.92	6983.18	17.40
W3-8		35.32	19.46	3.84	5.18	0.00	6618.54	25.32
W3-9		28.12	22.78	0.00	1.46	0.00	6371.86	20.36

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	77.68	61.50	14.76	18.70	20.08	9925.48	56.56
W3-11	68.84	49.82	14.20	14.98	30.12	9206.99	49.20
W3-12	66.16	28.78	16.56	7.50	0.00	8730.83	27.64
SRM614-14	351.32	1299.15	442.60	1166.47	647.64	1422.87	796.72
SRM612-14	19096.91	75858.89	24622.62	69575.41	32975.87	1888.55	44297.73
SRM610-14	107044.28	522992.73	141150.80	453142.50	174850.19	2281.15	61856.39
AP1-14	4.24	18.34	9.84	178.34	99.64	107.46	11.80
AP2-14	725.68	1958.39	17.24	817.22	1995.13	305.10	644.96
AP3-14	3552.70	9662.71	31.36	5121.45	4410.86	664.70	2719.46
AP4-14	5409.79	14875.90	41.68	6445.54	8120.85	837.02	3614.30
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-13	0.000112	0.000359	0.000104	0.000327	0.000169	0.000155	0.000252
SRM612-13	0.006202	0.021554	0.006337	0.018103	0.008746	0.000283	0.013272
SRM610-13	0.107787	0.457063	0.114593	0.363698	0.154844	0.001556	0.069474
AP1-13	0.000003	0.000013	0.000004	0.000021	0.000015	0.000006	0.000007
AP2-13	0.000058	0.000147	0.000003	0.000057	0.000148	0.000019	0.000064
AP3-13	0.000247	0.000613	0.000004	0.000275	0.000257	0.000038	0.000173
AP4-13	0.000370	0.000951	0.000004	0.000375	0.000524	0.000061	0.000257
W3-1	0.000004	0.000006	0.000002	0.000003	0.000004	0.000075	0.000005
W3-2	0.000002	0.000003	0.000001	0.000001	0.000001	0.000841	0.000004
W3-3	0.000003	0.000002	0.000001	0.000006	0.000010	0.000900	0.000006
W3-4	0.000004	0.000002	0.000000	0.000001	0.000006	0.001287	0.000011
W3-5	0.000003	0.000003	0.000001	0.000000	0.000001	0.001099	0.000006
W3-6	0.000002	0.000002	0.000001	0.000000	0.000004	0.001022	0.000004
W3-7	0.000006	0.000002	0.000001	0.000000	0.000003	0.001326	0.000003
W3-8	0.000006	0.000003	0.000001	0.000001	0.000000	0.001101	0.000004
W3-9	0.000005	0.000004	0.000000	0.000000	0.000000	0.001023	0.000003
W3-10	0.000009	0.000007	0.000002	0.000002	0.000002	0.001135	0.000006
W3-11	0.000008	0.000006	0.000002	0.000002	0.000003	0.001049	0.000006
W3-12	0.000007	0.000003	0.000002	0.000001	0.000000	0.000978	0.000003
SRM614-14	0.000149	0.000550	0.000188	0.000494	0.000274	0.000603	0.000338
SRM612-14	0.007614	0.030244	0.009817	0.027739	0.013147	0.000753	0.017661
SRM610-14	0.114700	0.560398	0.151246	0.485552	0.187356	0.002444	0.066280
AP1-14	0.000000	0.000001	0.000001	0.000014	0.000008	0.000008	0.000001
AP2-14	0.000054	0.000146	0.000001	0.000061	0.000149	0.000023	0.000048
AP3-14	0.000244	0.000664	0.000002	0.000352	0.000303	0.000046	0.000187
AP4-14	0.000368	0.001012	0.000003	0.000439	0.000553	0.000057	0.000246
standardize signal averages AP							
AP1	0.000002	0.000007	0.000002	0.000017	0.000011	0.000007	0.000004
AP2	0.000056	0.000147	0.000002	0.000059	0.000148	0.000021	0.000056
AP3	0.000245	0.000638	0.000003	0.000313	0.000280	0.000042	0.000180
AP4	0.000369	0.000982	0.000003	0.000407	0.000538	0.000059	0.000252
linest from std sig ave							
	0.038438	0.010118	3.112500	0.005900	0.034784	0.017534	0.011923
standardize signal averages SRM							
srm614-2	0.000131	0.000455	0.000146	0.000410	0.000221	0.000379	0.000295
srm612-2	0.006908	0.025899	0.008077	0.022921	0.010947	0.000518	0.015467
srm610-2	0.111244	0.508731	0.132919	0.424625	0.171100	0.002000	0.067877
linest from std sig ave							
	0.048446	0.009981	0.036692	0.010370	0.030394	0.000000	0.010555
concentration data							
SRM614-13	0.37	0.31	27.79	0.17	0.50	0.23	0.26
SRM612-13	20.45	18.70	1691.48	9.16	26.09	0.43	13.57
SRM610-13	355.33	396.63	30589.05	184.04	461.93	2.34	71.04

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.04	0.05	4.98	0.05	0.21	0.05	0.04
AP2-13	0.90	0.59	3.50	0.13	2.05	0.14	0.31
AP3-13	3.78	2.47	4.53	0.65	3.57	0.26	0.82
AP4-13	5.67	3.84	4.55	0.88	7.28	0.42	1.22
W3-1	0.06	0.02	2.36	0.01	0.06	6.12	0.02
W3-2	0.03	0.01	1.21	0.00	0.01	5.88	0.02
W3-3	0.04	0.01	1.58	0.01	0.14	6.30	0.03
W3-4	0.06	0.01	0.54	0.00	0.09	9.00	0.05
W3-5	0.05	0.01	1.39	0.00	0.01	7.69	0.03
W3-6	0.03	0.01	1.76	0.00	0.06	7.15	0.02
W3-7	0.09	0.01	1.60	0.00	0.05	9.28	0.02
W3-8	0.09	0.01	0.79	0.00	0.00	7.70	0.02
W3-9	0.07	0.01	0.00	0.00	0.00	7.16	0.02
W3-10	0.14	0.03	2.09	0.01	0.03	7.94	0.03
W3-11	0.12	0.02	2.01	0.00	0.05	7.34	0.03
W3-12	0.11	0.01	2.30	0.00	0.00	6.84	0.01
SRM614-14	0.49	0.48	50.06	0.25	0.82	0.91	0.35
SRM612-14	25.10	26.25	2620.49	14.04	39.22	1.13	18.06
SRM610-14	378.12	486.30	40373.22	245.71	558.92	3.68	67.77
AP1-14	0.01	0.01	0.95	0.03	0.11	0.06	0.00
AP2-14	0.83	0.59	1.60	0.14	2.07	0.16	0.23
AP3-14	3.74	2.68	2.68	0.83	4.21	0.32	0.89
AP4-14	5.64	4.09	3.52	1.03	7.67	0.40	1.17

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-11	2.68	3.80	3.16	2.88	13.60	2808.34	39.92
SRM614-11	485.44	1676.01	558.76	1607.57	902.57	3102.66	965.89
SRM612-11	23022.49	88490.78	27115.31	76831.95	32912.91	3014.70	42197.60
SRM610-11	152673.63	716830.56	184763.41	592204.75	216987.98	3340.86	79628.89
AP1-11	86.24	201.92	77.32	456.80	296.80	1914.73	146.92
AP2-11	1198.25	3340.58	94.52	1603.29	3129.38	1819.05	1485.69
AP3-11	6015.83	15886.37	111.56	8910.37	8624.49	2035.13	5249.47
AP4-11	6845.96	18148.50	103.92	7796.12	10347.02	2173.85	5101.75
W1-1	20.88	28.60	21.60	16.48	34.04	4092.78	46.80
W1-2	6.84	16.16	8.84	4.92	19.08	3900.70	29.80
W1-3	4.20	12.00	15.24	5.48	12.44	4012.54	23.36
W1-4	25.08	65.44	58.16	30.92	52.76	6656.24	65.72
W1-5	8.64	15.80	23.28	5.68	18.92	6068.27	31.60
W1-6	8.72	19.12	8.24	12.92	23.48	6013.91	40.44
W1-7	41.56	68.92	48.00	48.16	103.00	6833.52	93.12
W1-8	20.40	26.12	24.12	17.60	28.96	6252.84	47.04
W1-9	27.32	30.08	21.40	18.68	37.04	6477.80	53.12
W1-10	36.56	48.64	14.76	45.44	79.24	7098.32	79.64
W1-11	14.92	36.16	7.64	10.84	17.40	6917.12	52.68
W1-12	21.24	25.32	17.48	6.96	28.20	6768.32	51.04
W1-13	21.08	37.40	32.60	34.76	46.52	7658.88	64.80
W1-14	9.76	23.48	21.56	9.76	17.04	7168.80	48.40
W1-15	5.20	18.52	15.96	5.36	19.40	7044.32	43.64
W1-16	12.04	28.76	37.16	25.96	55.08	9924.66	67.48
W1-17	3.12	12.84	12.60	9.32	17.44	8764.21	40.48
W1-18	4.04	21.20	28.80	12.32	14.04	8815.41	44.52
SRM614-12	316.60	1302.13	431.52	1304.05	665.64	2299.09	699.08
SRM612-12	17249.14	71212.56	23938.30	66980.09	29150.89	2134.93	33026.07
SRM610-12	115606.01	591898.00	164551.89	524254.16	188634.14	2251.05	60466.22
AP1-12	13.32	19.32	11.12	171.68	129.12	1371.45	31.68
AP2-12	690.68	1946.93	21.28	833.80	2011.09	1266.45	793.24
AP3-12	3327.90	9429.13	42.00	5796.15	4500.43	1381.57	2731.06
AP4-12	5461.07	15348.21	71.16	7209.16	9613.93	1500.29	4393.50
blank-12	0.84	5.56	5.20	4.40	4.16	1854.49	18.48
blank average	1.76	4.68	4.18	3.64	8.88	2331.41	29.20

blank subtraction

SRM614-11	483.68	1671.33	554.58	1603.93	893.69	771.24	936.69
SRM612-11	23020.73	88486.10	27111.13	76828.31	32904.03	683.28	42168.40
SRM610-11	152671.87	716825.88	184759.23	592201.11	216979.10	1009.45	79599.69
AP1-11	84.48	197.24	73.14	453.16	287.92	-416.68	117.72
AP2-11	1196.49	3335.90	90.34	1599.65	3120.50	-512.36	1456.49
AP3-11	6014.07	15881.69	107.38	8906.73	8615.61	-296.28	5220.27

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	6844.20	18143.82	99.74	7792.48	10338.14	-157.56	5072.55
W1-1	19.12	23.92	17.42	12.84	25.16	1761.37	17.60
W1-2	5.08	11.48	4.66	1.28	10.20	1569.29	0.60
W1-3	2.44	7.32	11.06	1.84	3.56	1681.13	-5.84
W1-4	23.32	60.76	53.98	27.28	43.88	4324.82	36.52
W1-5	6.88	11.12	19.10	2.04	10.04	3736.86	2.40
W1-6	6.96	14.44	4.06	9.28	14.60	3682.50	11.24
W1-7	39.80	64.24	43.82	44.52	94.12	4502.11	63.92
W1-8	18.64	21.44	19.94	13.96	20.08	3921.42	17.84
W1-9	25.56	25.40	17.22	15.04	28.16	4146.38	23.92
W1-10	34.80	43.96	10.58	41.80	70.36	4766.91	50.44
W1-11	13.16	31.48	3.46	7.20	8.52	4585.71	23.48
W1-12	19.48	20.64	13.30	3.32	19.32	4436.91	21.84
W1-13	19.32	32.72	28.42	31.12	37.64	5327.47	35.60
W1-14	8.00	18.80	17.38	6.12	8.16	4837.39	19.20
W1-15	3.44	13.84	11.78	1.72	10.52	4712.91	14.44
W1-16	10.28	24.08	32.98	22.32	46.20	7593.24	38.28
W1-17	1.36	8.16	8.42	5.68	8.56	6432.80	11.28
W1-18	2.28	16.52	24.62	8.68	5.16	6484.00	15.32
SRM614-12	314.84	1297.45	427.34	1300.41	656.76	-32.32	669.88
SRM612-12	17247.38	71207.88	23934.11	66976.45	29142.00	-196.48	32996.87
SRM610-12	115604.25	591893.32	164547.71	524250.52	188625.26	-80.36	60437.02
AP1-12	11.56	14.64	6.94	168.04	120.24	-959.97	2.48
AP2-12	688.92	1942.25	17.10	830.16	2002.21	-1064.97	764.04
AP3-12	3326.14	9424.45	37.82	5792.51	4491.55	-949.85	2701.86
AP4-12	5459.31	15343.53	66.98	7205.52	9605.05	-831.12	4364.30

zero correction

SRM614-11	483.68	1671.33	554.58	1603.93	893.69	771.24	936.69
SRM612-11	23020.73	88486.10	27111.13	76828.31	32904.03	683.28	42168.40
SRM610-11	152671.87	716825.88	184759.23	592201.11	216979.10	1009.45	79599.69
AP1-11	84.48	197.24	73.14	453.16	287.92	0.00	117.72
AP2-11	1196.49	3335.90	90.34	1599.65	3120.50	0.00	1456.49
AP3-11	6014.07	15881.69	107.38	8906.73	8615.61	0.00	5220.27
AP4-11	6844.20	18143.82	99.74	7792.48	10338.14	0.00	5072.55
W1-1	19.12	23.92	17.42	12.84	25.16	1761.37	17.60
W1-2	5.08	11.48	4.66	1.28	10.20	1569.29	0.60
W1-3	2.44	7.32	11.06	1.84	3.56	1681.13	0.00
W1-4	23.32	60.76	53.98	27.28	43.88	4324.82	36.52
W1-5	6.88	11.12	19.10	2.04	10.04	3736.86	2.40
W1-6	6.96	14.44	4.06	9.28	14.60	3682.50	11.24
W1-7	39.80	64.24	43.82	44.52	94.12	4502.11	63.92
W1-8	18.64	21.44	19.94	13.96	20.08	3921.42	17.84
W1-9	25.56	25.40	17.22	15.04	28.16	4146.38	23.92
W1-10	34.80	43.96	10.58	41.80	70.36	4766.91	50.44
W1-11	13.16	31.48	3.46	7.20	8.52	4585.71	23.48
W1-12	19.48	20.64	13.30	3.32	19.32	4436.91	21.84
W1-13	19.32	32.72	28.42	31.12	37.64	5327.47	35.60
W1-14	8.00	18.80	17.38	6.12	8.16	4837.39	19.20
W1-15	3.44	13.84	11.78	1.72	10.52	4712.91	14.44
W1-16	10.28	24.08	32.98	22.32	46.20	7593.24	38.28
W1-17	1.36	8.16	8.42	5.68	8.56	6432.80	11.28
W1-18	2.28	16.52	24.62	8.68	5.16	6484.00	15.32
SRM614-12	314.84	1297.45	427.34	1300.41	656.76	0.00	669.88
SRM612-12	17247.38	71207.88	23934.11	66976.45	29142.00	0.00	32996.87
SRM610-12	115604.25	591893.32	164547.71	524250.52	188625.26	0.00	60437.02
AP1-12	11.56	14.64	6.94	168.04	120.24	0.00	2.48
AP2-12	688.92	1942.25	17.10	830.16	2002.21	0.00	764.04
AP3-12	3326.14	9424.45	37.82	5792.51	4491.55	0.00	2701.86
AP4-12	5459.31	15343.53	66.98	7205.52	9605.05	0.00	4364.30

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000138	0.000478	0.000159	0.000459	0.000256	0.000221	0.000268
SRM612-11	0.007501	0.028830	0.008833	0.025032	0.010721	0.000223	0.013739
SRM610-11	0.114858	0.539284	0.138998	0.445526	0.163238	0.000759	0.059885
AP1-11	0.000005	0.000011	0.000004	0.000025	0.000016	0.000000	0.000006
AP2-11	0.000068	0.000190	0.000005	0.000091	0.000178	0.000000	0.000083
AP3-11	0.000326	0.000860	0.000006	0.000482	0.000466	0.000000	0.000283
AP4-11	0.000422	0.001118	0.000006	0.000480	0.000637	0.000000	0.000313
W1-1	0.000001	0.000002	0.000001	0.000001	0.000002	0.000136	0.000001
W1-2	0.000000	0.000001	0.000000	0.000000	0.000001	0.000153	0.000000
W1-3	0.000000	0.000001	0.000001	0.000000	0.000000	0.000199	0.000000
W1-4	0.000001	0.000003	0.000003	0.000001	0.000002	0.000237	0.000002
W1-5	0.000000	0.000001	0.000001	0.000000	0.000001	0.000225	0.000000
W1-6	0.000000	0.000001	0.000000	0.000001	0.000001	0.000218	0.000001
W1-7	0.000002	0.000003	0.000002	0.000002	0.000005	0.000243	0.000003
W1-8	0.000001	0.000001	0.000001	0.000001	0.000001	0.000228	0.000001
W1-9	0.000001	0.000001	0.000001	0.000001	0.000002	0.000237	0.000001
W1-10	0.000002	0.000002	0.000001	0.000002	0.000003	0.000231	0.000002
W1-11	0.000001	0.000002	0.000000	0.000000	0.000000	0.000220	0.000001
W1-12	0.000001	0.000001	0.000001	0.000000	0.000001	0.000228	0.000001
W1-13	0.000001	0.000002	0.000002	0.000002	0.000002	0.000284	0.000002
W1-14	0.000000	0.000001	0.000001	0.000000	0.000000	0.000248	0.000001
W1-15	0.000000	0.000001	0.000001	0.000000	0.000001	0.000250	0.000001
W1-16	0.000001	0.000002	0.000002	0.000002	0.000003	0.000550	0.000003
W1-17	0.000000	0.000001	0.000001	0.000000	0.000001	0.000466	0.000001
W1-18	0.000000	0.000001	0.000002	0.000001	0.000000	0.000482	0.000001
SRM614-12	0.000137	0.000563	0.000186	0.000565	0.000285	0.000000	0.000291
SRM612-12	0.007828	0.032320	0.010863	0.030399	0.013227	0.000000	0.014977
SRM610-12	0.117731	0.602784	0.167575	0.533897	0.192096	0.000000	0.061549
AP1-12	0.000001	0.000001	0.000001	0.000013	0.000009	0.000000	0.000000
AP2-12	0.000056	0.000159	0.000001	0.000068	0.000164	0.000000	0.000063
AP3-12	0.000255	0.000722	0.000003	0.000444	0.000344	0.000000	0.000207
AP4-12	0.000400	0.001125	0.000005	0.000528	0.000704	0.000000	0.000320
standardize signal averages AP							
AP1	0.000003	0.000006	0.000002	0.000019	0.000012	0.000000	0.000003
AP2	0.000062	0.000174	0.000003	0.000079	0.000171	0.000000	0.000073
AP3	0.000290	0.000791	0.000004	0.000463	0.000405	0.000000	0.000245
AP4	0.000411	0.001121	0.000006	0.000504	0.000670	0.000000	0.000316
linest from std sig ave							
	0.033792	0.008614	2.189377	0.004365	0.027009	0.000000	0.009207
standardize signal averages SRM							
srM614-2	0.000138	0.000521	0.000172	0.000512	0.000270	0.000110	0.000279
srM612-2	0.007664	0.030575	0.009848	0.027715	0.011974	0.000111	0.014358
srM610-2	0.116295	0.571034	0.153287	0.489711	0.177667	0.000380	0.060717
linest from std sig ave							
	0.046334	0.008892	0.031812	0.008992	0.029266	0.000000	0.011778
concentration data							
SRM614-11	0.40	0.35	29.80	0.17	0.59	0.00	0.21
SRM612-11	21.74	21.30	1658.60	9.37	24.83	0.00	10.85
SRM610-11	332.88	398.41	26099.38	166.77	378.12	0.00	47.29
AP1-11	0.06	0.04	3.48	0.04	0.17	0.00	0.02
AP2-11	0.92	0.65	4.49	0.16	1.91	0.00	0.30
AP3-11	4.39	2.95	5.08	0.84	5.03	0.00	1.04
AP4-11	5.68	3.84	5.37	0.84	6.86	0.00	1.15
W1-1	0.02	0.01	1.17	0.00	0.02	0.00	0.00
W1-2	0.01	0.00	0.40	0.00	0.01	0.00	0.00
W1-3	0.00	0.00	1.14	0.00	0.00	0.00	0.00
W1-4	0.02	0.01	2.58	0.00	0.03	0.00	0.01
W1-5	0.01	0.00	1.00	0.00	0.01	0.00	0.00
W1-6	0.01	0.00	0.21	0.00	0.01	0.00	0.00
W1-7	0.03	0.01	2.07	0.00	0.05	0.00	0.01
W1-8	0.01	0.00	1.01	0.00	0.01	0.00	0.00
W1-9	0.02	0.00	0.86	0.00	0.02	0.00	0.01
W1-10	0.02	0.01	0.45	0.00	0.04	0.00	0.01
W1-11	0.01	0.01	0.14	0.00	0.00	0.00	0.00
W1-12	0.01	0.00	0.60	0.00	0.01	0.00	0.00
W1-13	0.01	0.01	1.32	0.00	0.02	0.00	0.01
W1-14	0.01	0.00	0.78	0.00	0.00	0.00	0.00
W1-15	0.00	0.00	0.55	0.00	0.01	0.00	0.00
W1-16	0.01	0.01	2.08	0.00	0.04	0.00	0.01
W1-17	0.00	0.00	0.53	0.00	0.01	0.00	0.00
W1-18	0.00	0.00	1.60	0.00	0.00	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.40	0.42	34.84	0.21	0.66	0.00	0.23
SRM612-12	22.69	23.88	2039.74	11.38	30.64	0.00	11.83
SRM610-12	341.20	445.32	31465.22	199.85	444.96	0.00	48.60
AP1-12	0.01	0.00	0.46	0.02	0.10	0.00	0.00
AP2-12	0.76	0.55	1.22	0.12	1.77	0.00	0.23
AP3-12	3.43	2.48	2.53	0.77	3.71	0.00	0.76
AP4-12	5.39	3.86	4.29	0.92	7.58	0.00	1.17

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
raw data								
blank-9		1.52	0.28	0.88	3.84	3.12	414.68	24.92
SRM614-9		379.52	1355.45	474.96	1229.37	650.68	638.68	743.96
SRM612-9		23326.61	86373.57	26543.63	74575.86	32916.95	690.88	42936.40
SRM610-9		162138.31	739932.06	187344.81	597501.94	199387.95	888.16	65947.77
AP1-9		71.88	301.52	105.08	1030.17	368.52	552.56	155.88
AP2-9		1322.85	3681.74	91.24	1712.77	3460.14	537.64	1667.73
AP3-9		5245.19	13914.56	87.24	7095.08	6590.84	581.44	4231.66
AP4-9		8440.21	22804.77	127.96	9898.06	12881.99	832.68	6045.23
T2-1		19.32	62.40	39.28	47.72	311.88	938.45	47.32
T2-2		9.64	21.16	15.40	10.48	46.88	878.12	37.48
T2-3		6.92	29.24	32.00	15.04	47.44	905.73	36.32
T2-4		7.32	37.80	72.20	19.64	69.68	1178.53	36.36
T2-5		3.48	14.04	9.36	4.96	15.72	1383.13	44.36
T2-6		5.44	18.28	9.48	5.72	7.56	1423.97	41.72
T2-7		17.24	42.72	45.68	33.48	159.64	1167.09	50.00
T2-8		3.56	12.52	47.84	5.80	82.96	1185.49	35.00
T2-9		8.92	20.48	16.24	8.84	35.36	1094.45	37.20
T2-10		7.08	22.64	82.84	28.80	166.64	1258.49	43.12
T2-11		6.72	14.24	62.80	9.32	137.60	1124.49	24.92
T2-12		4.68	9.40	17.32	5.36	35.28	1133.73	33.72
T2-13		23.52	80.24	113.36	75.20	227.24	1152.57	66.28
T2-14		4.92	9.80	79.84	10.68	146.80	1094.29	35.56
T2-15		5.40	11.64	61.44	21.36	125.16	1068.93	20.12
T2-16		29.36	75.92	80.80	72.24	263.48	1137.69	88.16
T2-17		7.76	18.68	34.32	11.84	93.60	1071.65	47.12
T2-18		9.96	30.48	51.28	24.88	105.80	982.21	35.28
SRM614-10		269.12	1145.73	420.60	1078.01	459.64	706.72	576.96
SRM612-10		17228.58	69462.63	23171.61	64819.88	28405.92	685.96	33757.27
SRM610-10		120813.04	611507.81	168232.14	539108.88	191771.77	776.04	57697.72
AP1-10		8.12	12.88	11.16	273.20	132.64	556.84	30.76
AP2-10		880.56	2556.89	22.40	1660.13	2443.69	494.64	888.16
AP3-10		3663.10	10340.50	53.00	5405.91	4842.19	589.44	2849.34
AP4-10		5651.47	16151.21	60.56	7060.12	9507.57	729.24	4469.11
blank-10		1.32	5.40	7.24	1.32	4.12	455.40	20.60
blank average		1.42	2.84	4.06	2.58	3.62	435.04	22.76

blank subtraction							
SRM614-9	378.10	1352.61	470.90	1226.79	647.06	203.64	721.20
SRM612-9	23325.19	86370.73	26539.57	74573.28	32913.32	255.84	42913.64
SRM610-9	162136.89	739929.22	187340.75	597499.36	199384.33	453.12	65925.01
AP1-9	70.46	298.68	101.02	1027.59	364.90	117.52	133.12
AP2-9	1321.43	3678.90	87.18	1710.19	3456.52	102.60	1644.97
AP3-9	5243.77	13911.72	83.18	7092.50	6587.22	146.40	4208.90
AP4-9	8438.79	22801.93	123.90	9895.48	12878.37	397.64	6022.47
T2-1	17.90	59.56	35.22	45.14	308.26	503.40	24.56
T2-2	8.22	18.32	11.34	7.90	43.26	443.08	14.72
T2-3	5.50	26.40	27.94	12.46	43.82	470.68	13.56
T2-4	5.90	34.96	68.14	17.06	66.06	743.48	13.60
T2-5	2.06	11.20	5.30	2.38	12.10	948.09	21.60
T2-6	4.02	15.44	5.42	3.14	3.94	988.93	18.96
T2-7	15.82	39.88	41.62	30.90	156.02	732.04	27.24
T2-8	2.14	9.68	43.78	3.22	79.34	750.44	12.24
T2-9	7.50	17.64	12.18	6.26	31.74	659.40	14.44
T2-10	5.66	19.80	78.78	26.22	163.02	823.44	20.36
T2-11	5.30	11.40	58.74	6.74	133.98	689.44	2.16
T2-12	3.26	6.56	13.26	2.78	31.66	698.68	10.96
T2-13	22.10	77.40	109.30	72.62	223.62	717.52	43.52
T2-14	3.50	6.96	75.78	8.10	143.18	659.24	12.80
T2-15	3.98	8.80	57.38	18.78	121.54	633.88	-2.64

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	27.94	73.08	76.74	69.66	259.86	702.64	65.40
T2-17	6.34	15.84	30.26	9.26	89.98	636.60	24.36
T2-18	8.54	27.64	47.22	22.30	102.18	547.16	12.52
SRM614-10	267.70	1142.89	416.54	1075.43	456.02	271.68	554.20
SRM612-10	17227.16	69459.79	23167.55	64817.30	28402.30	250.92	33734.51
SRM610-10	120811.62	611504.97	168228.08	539106.30	191768.15	341.00	57674.96
AP1-10	6.70	10.04	7.10	270.62	129.02	121.80	8.00
AP2-10	879.14	2554.05	18.34	1657.55	2440.07	59.60	865.40
AP3-10	3661.68	10337.66	48.94	5403.33	4838.57	154.40	2826.58
AP4-10	5650.05	16148.37	56.50	7057.54	9503.95	294.20	4446.34

zero correction

SRM614-9	378.10	1352.61	470.90	1226.79	647.06	203.64	721.20
SRM612-9	23325.19	86370.73	26539.57	74573.28	32913.32	255.84	42913.64
SRM610-9	162136.89	739929.22	187340.75	597499.36	199384.33	453.12	65925.01
AP1-9	70.46	298.68	101.02	1027.59	364.90	117.52	133.12
AP2-9	1321.43	3678.90	87.18	1710.19	3456.52	102.60	1644.97
AP3-9	5243.77	13911.72	83.18	7092.50	6587.22	146.40	4208.90
AP4-9	8438.79	22801.93	123.90	9895.48	12878.37	397.64	6022.47
T2-1	17.90	59.56	35.22	45.14	308.26	503.40	24.56
T2-2	8.22	18.32	11.34	7.90	43.26	443.08	14.72
T2-3	5.50	26.40	27.94	12.46	43.82	470.68	13.56
T2-4	5.90	34.96	68.14	17.06	66.06	743.48	13.60
T2-5	2.06	11.20	5.30	2.38	12.10	948.09	21.60
T2-6	4.02	15.44	5.42	3.14	3.94	988.93	18.96
T2-7	15.82	39.88	41.62	30.90	156.02	732.04	27.24
T2-8	2.14	9.68	43.78	3.22	79.34	750.44	12.24
T2-9	7.50	17.64	12.18	6.26	31.74	659.40	14.44
T2-10	5.66	19.80	78.78	26.22	163.02	823.44	20.36
T2-11	5.30	11.40	58.74	6.74	133.98	689.44	2.16
T2-12	3.26	6.56	13.26	2.78	31.66	698.68	10.96
T2-13	22.10	77.40	109.30	72.62	223.62	717.52	43.52
T2-14	3.50	6.96	75.78	8.10	143.18	659.24	12.80
T2-15	3.98	8.80	57.38	18.78	121.54	633.88	0.00
T2-16	27.94	73.08	76.74	69.66	259.86	702.64	65.40
T2-17	6.34	15.84	30.26	9.26	89.98	636.60	24.36
T2-18	8.54	27.64	47.22	22.30	102.18	547.16	12.52
SRM614-10	267.70	1142.89	416.54	1075.43	456.02	271.68	554.20
SRM612-10	17227.16	69459.79	23167.55	64817.30	28402.30	250.92	33734.51
SRM610-10	120811.62	611504.97	168228.08	539106.30	191768.15	341.00	57674.96
AP1-10	6.70	10.04	7.10	270.62	129.02	121.80	8.00
AP2-10	879.14	2554.05	18.34	1657.55	2440.07	59.60	865.40
AP3-10	3661.68	10337.66	48.94	5403.33	4838.57	154.40	2826.58
AP4-10	5650.05	16148.37	56.50	7057.54	9503.95	294.20	4446.34

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-9	0.000141	0.000504	0.000175	0.000457	0.000241	0.000076	0.000269
SRM612-9	0.007709	0.028546	0.008771	0.024647	0.010878	0.000085	0.014183
SRM610-9	0.122118	0.557298	0.141101	0.450023	0.150172	0.000341	0.049653
AP1-9	0.000004	0.000016	0.000006	0.000056	0.000020	0.000006	0.000007
AP2-9	0.000071	0.000198	0.000005	0.000092	0.000186	0.000006	0.000089
AP3-9	0.000284	0.000754	0.000005	0.000384	0.000357	0.000008	0.000228
AP4-9	0.000455	0.001229	0.000007	0.000533	0.000694	0.000021	0.000325
T2-1	0.000001	0.000003	0.000002	0.000002	0.000014	0.000023	0.000001
T2-2	0.000000	0.000001	0.000001	0.000000	0.000002	0.000023	0.000001
T2-3	0.000000	0.000002	0.000002	0.000001	0.000003	0.000029	0.000001
T2-4	0.000000	0.000002	0.000004	0.000001	0.000004	0.000042	0.000001
T2-5	0.000000	0.000001	0.000000	0.000000	0.000001	0.000060	0.000001
T2-6	0.000000	0.000001	0.000000	0.000000	0.000000	0.000070	0.000001
T2-7	0.000001	0.000002	0.000003	0.000002	0.000010	0.000045	0.000002

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000000	0.000001	0.000003	0.000000	0.000005	0.000045	0.000001
T2-9	0.000000	0.000001	0.000001	0.000000	0.000002	0.000041	0.000001
T2-10	0.000001	0.000003	0.000010	0.000003	0.000022	0.000109	0.000003
T2-11	0.000001	0.000001	0.000007	0.000001	0.000016	0.000080	0.000000
T2-12	0.000000	0.000001	0.000001	0.000000	0.000003	0.000076	0.000001
T2-13	0.000002	0.000008	0.000011	0.000007	0.000023	0.000072	0.000004
T2-14	0.000000	0.000001	0.000007	0.000001	0.000013	0.000061	0.000001
T2-15	0.000000	0.000001	0.000005	0.000002	0.000011	0.000055	0.000000
T2-16	0.000002	0.000005	0.000005	0.000005	0.000018	0.000049	0.000005
T2-17	0.000000	0.000001	0.000002	0.000001	0.000006	0.000040	0.000002
T2-18	0.000001	0.000002	0.000003	0.000001	0.000006	0.000032	0.000001
SRM614-10	0.000143	0.000612	0.000223	0.000576	0.000244	0.000146	0.000297
SRM612-10	0.008103	0.032672	0.010897	0.030488	0.013360	0.000118	0.015868
SRM610-10	0.117067	0.592551	0.163014	0.522396	0.185824	0.000330	0.055887
AP1-10	0.000000	0.000001	0.000001	0.000020	0.000009	0.000009	0.000001
AP2-10	0.000062	0.000179	0.000001	0.000116	0.000171	0.000004	0.000061
AP3-10	0.000262	0.000740	0.000004	0.000387	0.000346	0.000011	0.000202
AP4-10	0.000401	0.001147	0.000004	0.000501	0.000675	0.000021	0.000316
standardize signal averages AP							
AP1	0.000002	0.000009	0.000003	0.000038	0.000015	0.000008	0.000004
AP2	0.000066	0.000189	0.000003	0.000104	0.000179	0.000005	0.000075
AP3	0.000273	0.000747	0.000004	0.000386	0.000352	0.000009	0.000215
AP4	0.000428	0.001188	0.000005	0.000517	0.000685	0.000021	0.000320
linest from std sig ave							
	0.033551	0.008441	2.190548	0.004749	0.027478	0.053387	0.009556
standardize signal averages SRM							
srm614-2	0.000142	0.000558	0.000199	0.000517	0.000243	0.000111	0.000283
srm612-2	0.007906	0.030609	0.009834	0.027567	0.012119	0.000101	0.015025
srm610-2	0.119592	0.574924	0.152057	0.486209	0.167998	0.000336	0.052770
linest from std sig ave							
	0.045056	0.008832	0.032068	0.009056	0.030943	0.000000	0.013385
concentration data							
SRM614-9	0.41	0.36	32.95	0.19	0.57	0.35	0.22
SRM612-9	22.18	20.67	1647.86	10.04	25.64	0.39	11.62
SRM610-9	351.38	403.45	26508.31	183.30	353.90	1.56	40.69
AP1-9	0.05	0.05	4.82	0.11	0.22	0.14	0.03
AP2-9	0.95	0.67	4.10	0.17	2.04	0.12	0.34
AP3-9	3.80	2.54	3.94	0.73	3.91	0.17	0.87
AP4-9	6.09	4.14	5.84	1.01	7.61	0.46	1.24
T2-1	0.01	0.01	1.39	0.00	0.15	0.49	0.00
T2-2	0.01	0.00	0.51	0.00	0.02	0.49	0.00
T2-3	0.00	0.01	1.50	0.00	0.03	0.62	0.00
T2-4	0.00	0.01	3.36	0.00	0.04	0.89	0.00
T2-5	0.00	0.00	0.29	0.00	0.01	1.27	0.01
T2-6	0.00	0.00	0.34	0.00	0.00	1.50	0.01
T2-7	0.01	0.01	2.22	0.00	0.10	0.95	0.01
T2-8	0.00	0.00	2.27	0.00	0.05	0.95	0.00
T2-9	0.01	0.00	0.66	0.00	0.02	0.86	0.00
T2-10	0.01	0.01	9.15	0.01	0.24	2.33	0.01
T2-11	0.01	0.00	5.98	0.00	0.17	1.71	0.00
T2-12	0.00	0.00	1.26	0.00	0.04	1.61	0.00
T2-13	0.03	0.03	9.62	0.01	0.25	1.54	0.02
T2-14	0.00	0.00	6.17	0.00	0.15	1.31	0.00
T2-15	0.00	0.00	4.37	0.00	0.12	1.18	0.00
T2-16	0.03	0.02	4.70	0.01	0.20	1.05	0.02
T2-17	0.01	0.00	1.68	0.00	0.06	0.86	0.01
T2-18	0.01	0.01	2.42	0.00	0.07	0.68	0.00
SRM614-10	0.41	0.44	41.93	0.23	0.58	0.67	0.24
SRM612-10	23.32	23.65	2047.27	12.42	31.48	0.54	13.00
SRM610-10	336.85	428.97	30625.04	212.78	437.92	1.51	45.80
AP1-10	0.01	0.00	0.45	0.04	0.10	0.19	0.00
AP2-10	0.83	0.60	1.12	0.22	1.88	0.09	0.23
AP3-10	3.51	2.49	3.06	0.73	3.80	0.24	0.77
AP4-10	5.37	3.86	3.51	0.95	7.40	0.45	1.20
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-1		1.44	3.04	3.16	4.12	2.40	1504.29
SRM614-1		306.16	868.56	227.84	671.48	387.28	1538.01
SRM612-1		14496.36	42912.20	10728.30	30274.45	24118.78	1785.65
SRM610-1		104463.07	357111.44	75641.43	231196.27	89708.82	2217.65
AP1-1		26.16	68.20	23.88	230.16	118.56	1391.57
AP2-1		874.24	1992.77	59.68	758.64	1957.69	1385.69
AP3-1		6323.28	14051.56	89.76	6200.67	6354.00	1655.13
AP4-1		5024.55	11117.66	70.68	3882.62	5525.63	1631.33
41LU1-REDO-1		62.88	45.56	10.80	22.76	271.56	2773.26
41LU1-REDO-2		26.00	18.84	3.40	4.48	279.52	2421.45
41LU1-REDO-3		15.04	15.64	7.60	6.48	349.84	2391.09
41LU1-REDO-4		17.80	38.52	11.88	14.64	385.44	3391.30
41LU1-REDO-5		9.76	13.48	6.16	4.20	415.76	4459.19
41LU1-REDO-6		7.64	14.76	6.80	5.84	363.00	3614.98
41LU1-REDO-7		15.32	29.76	12.68	22.64	372.60	12271.75
41LU1REDO-8		10.68	8.88	6.56	1.52	362.88	8683.17
41LU1-REDO-9		3.80	9.08	3.00	5.96	404.44	7249.32
41LU1REDO-10		34.40	38.52	9.40	12.04	350.72	4722.95
41LU1-REDO-11		36.64	31.88	8.72	3.84	351.92	4298.66
41LU1REDO-12		18.60	19.52	7.88	2.60	328.76	4098.66
41LU1-REDO-13		28.84	24.48	6.88	3.12	346.68	3777.22
41LU1-REDO-14		22.76	22.08	6.20	6.40	336.00	3753.94
41LU1-REDO-15		22.72	25.64	9.16	12.40	483.52	3427.82
SRM614-2		274.56	995.25	292.92	832.84	514.08	2154.73
SRM612-2		15929.29	53141.50	15398.89	43025.48	22033.52	2114.45
SRM610-2		117385.62	466421.47	109240.66	346277.28	130709.66	2315.93
AP1-2		4.60	13.28	12.64	414.76	88.20	1629.85
AP2-2		736.68	1732.13	28.96	611.64	1957.29	1397.89
AP3-2		4588.07	10795.34	48.40	4980.15	5042.35	1800.61
AP4-2		4811.79	11177.06	43.16	4707.83	5933.91	1654.45
blank-2		3.96	3.16	2.16	6.00	5.32	2184.01
blank average		2.70	3.10	2.66	5.06	3.86	1844.15
blank subtraction							
SRM614-1		303.46	865.46	225.18	666.42	383.42	-306.14
SRM612-1		14493.66	42909.10	10725.64	30269.39	24114.91	-58.50
SRM610-1		104460.37	357108.34	75638.77	231191.21	89704.96	373.50
AP1-1		23.46	65.10	21.22	225.10	114.70	-452.58
AP2-1		871.54	1989.67	57.02	753.58	1953.83	-458.46
AP3-1		6320.58	14048.46	87.10	6195.61	6350.14	-189.02
AP4-1		5021.85	11114.56	68.02	3877.56	5521.77	-212.82
41LU1-REDO-1		60.18	42.46	8.14	17.70	267.70	929.11
41LU1-REDO-2		23.30	15.74	0.74	-0.58	275.66	577.30
41LU1-REDO-3		12.34	12.54	4.94	1.42	345.98	546.94
41LU1-REDO-4		15.10	35.42	9.22	9.58	381.58	1547.15
41LU1-REDO-5		7.06	10.38	3.50	-0.86	411.90	2615.03
41LU1-REDO-6		4.94	11.66	4.14	0.78	359.14	1770.83
41LU1-REDO-7		12.62	26.66	10.02	17.58	368.74	10427.60
41LU1REDO-8		7.98	5.78	3.90	-3.54	359.02	6839.02
41LU1-REDO-9		1.10	5.98	0.34	0.90	400.58	5405.17
41LU1REDO-10		31.70	35.42	6.74	6.98	346.86	2878.80
41LU1-REDO-11		33.94	28.78	6.06	-1.22	348.06	2454.51
41LU1REDO-12		15.90	16.42	5.22	-2.46	324.90	2254.51
41LU1-REDO-13		26.14	21.38	4.22	-1.94	342.82	1933.07
41LU1-REDO-14		20.06	18.98	3.54	1.34	332.14	1909.79
41LU1-REDO-15		20.02	22.54	6.50	7.34	479.66	1583.67
SRM614-2		271.86	992.15	290.26	827.78	510.22	310.58
SRM612-2		15926.59	53138.40	15396.23	43020.42	22029.66	270.30
SRM610-2		117382.92	466418.37	109238.00	346272.22	130705.80	471.78
AP1-2		1.90	10.18	9.98	409.70	84.34	-214.30
AP2-2		733.98	1729.03	26.30	606.58	1953.43	-446.26
AP3-2		4585.37	10792.24	45.74	4975.09	5038.49	-43.54
AP4-2		4809.09	11173.96	40.50	4702.77	5930.05	-189.70
zero correction							
SRM614-1		303.46	865.46	225.18	666.42	383.42	0.00
SRM612-1		14493.66	42909.10	10725.64	30269.39	24114.91	0.00
SRM610-1		104460.37	357108.34	75638.77	231191.21	89704.96	373.50
AP1-1		23.46	65.10	21.22	225.10	114.70	0.00
AP2-1		871.54	1989.67	57.02	753.58	1953.83	0.00
AP3-1		6320.58	14048.46	87.10	6195.61	6350.14	0.00
AP4-1		5021.85	11114.56	68.02	3877.56	5521.77	0.00
41LU1-REDO-1		60.18	42.46	8.14	17.70	267.70	929.11
41LU1-REDO-2		23.30	15.74	0.74	0.00	275.66	577.30
41LU1-REDO-3		12.34	12.54	4.94	1.42	345.98	546.94

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	15.10	35.42	9.22	9.58	381.58	1547.15	10.70
41LU1-REDO-5	7.06	10.38	3.50	0.00	411.90	2615.03	20.62
41LU1-REDO-6	4.94	11.66	4.14	0.78	359.14	1770.83	18.74
41LU1-REDO-7	12.62	26.66	10.02	17.58	368.74	10427.60	33.22
41LU1REDO-8	7.98	5.78	3.90	0.00	359.02	6839.02	10.90
41LU1-REDO-9	1.10	5.98	0.34	0.90	400.58	5405.17	14.42
41LU1REDO-10	31.70	35.42	6.74	6.98	346.86	2878.80	17.22
41LU1-REDO-11	33.94	28.78	6.06	0.00	348.06	2454.51	4.86
41LU1REDO-12	15.90	16.42	5.22	0.00	324.90	2254.51	7.90
41LU1-REDO-13	26.14	21.38	4.22	0.00	342.82	1933.07	12.94
41LU1-REDO-14	20.06	18.98	3.54	1.34	332.14	1909.79	5.90
41LU1-REDO-15	20.02	22.54	6.50	7.34	479.66	1583.67	7.70
SRM614-2	271.86	992.15	290.26	827.78	510.22	310.58	614.90
SRM612-2	15926.59	53138.40	15396.23	43020.42	22029.66	270.30	31139.59
SRM610-2	117382.92	466418.37	109238.00	346272.22	130705.80	471.78	61245.16
AP1-2	1.90	10.18	9.98	409.70	84.34	0.00	9.50
AP2-2	733.98	1729.03	26.30	606.58	1953.43	0.00	826.02
AP3-2	4585.37	10792.24	45.74	4975.09	5038.49	0.00	3957.56
AP4-2	4809.09	11173.96	40.50	4702.77	5930.05	0.00	2640.71

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-1	0.000094	0.000269	0.000070	0.000208	0.000119	0.000000	0.000218
SRM612-1	0.004886	0.014465	0.003616	0.010204	0.008129	0.000000	0.011707
SRM610-1	0.072659	0.248392	0.052612	0.160808	0.062396	0.000260	0.040638
AP1-1	0.000003	0.000007	0.000002	0.000025	0.000013	0.000000	0.000006
AP2-1	0.000057	0.000131	0.000004	0.000050	0.000128	0.000000	0.000076
AP3-1	0.000288	0.000641	0.000004	0.000283	0.000290	0.000000	0.000300
AP4-1	0.000336	0.000743	0.000005	0.000259	0.000369	0.000000	0.000227
41LU1-REDO-1	0.000011	0.000008	0.000001	0.000003	0.000048	0.000166	0.000004
41LU1-REDO-2	0.000003	0.000002	0.000000	0.000000	0.000041	0.000085	0.000002
41LU1-REDO-3	0.000002	0.000002	0.000001	0.000000	0.000043	0.000069	0.000001
41LU1-REDO-4	0.000003	0.000007	0.000002	0.000002	0.000077	0.000313	0.000002
41LU1-REDO-5	0.000001	0.000002	0.000001	0.000000	0.000070	0.000444	0.000003
41LU1-REDO-6	0.000001	0.000002	0.000001	0.000000	0.000067	0.000330	0.000003
41LU1-REDO-7	0.000003	0.000007	0.000002	0.000004	0.000090	0.002554	0.000008
41LU1REDO-8	0.000002	0.000001	0.000001	0.000000	0.000082	0.001561	0.000002
41LU1-REDO-9	0.000000	0.000001	0.000000	0.000000	0.000095	0.001276	0.000003
41LU1REDO-10	0.000007	0.000007	0.000001	0.000001	0.000073	0.000608	0.000004
41LU1-REDO-11	0.000007	0.000006	0.000001	0.000000	0.000076	0.000533	0.000001
41LU1REDO-12	0.000004	0.000004	0.000001	0.000000	0.000077	0.000535	0.000002
41LU1-REDO-13	0.000006	0.000005	0.000001	0.000000	0.000080	0.000449	0.000003
41LU1-REDO-14	0.000004	0.000004	0.000001	0.000000	0.000069	0.000398	0.000001
41LU1-REDO-15	0.000003	0.000004	0.000001	0.000001	0.000080	0.000264	0.000001
SRM614-2	0.000094	0.000342	0.000100	0.000285	0.000176	0.000107	0.000212
SRM612-2	0.005634	0.018797	0.005446	0.015218	0.007793	0.000096	0.011015
SRM610-2	0.086899	0.345292	0.080869	0.256347	0.096762	0.000349	0.045340
AP1-2	0.000000	0.000001	0.000001	0.000041	0.000008	0.000000	0.000001
AP2-2	0.000046	0.000109	0.000002	0.000038	0.000123	0.000000	0.000052
AP3-2	0.000211	0.000498	0.000002	0.000229	0.000232	0.000000	0.000183
AP4-2	0.000294	0.000682	0.000002	0.000287	0.000362	0.000000	0.000161

standardize signal averages AP							
AP1	0.000001	0.000004	0.000002	0.000033	0.000011	0.000000	0.000003
AP2	0.000052	0.000120	0.000003	0.000044	0.000126	0.000000	0.000064
AP3	0.000250	0.000569	0.000003	0.000256	0.000261	0.000000	0.000241
AP4	0.000315	0.000713	0.000004	0.000273	0.000366	0.000000	0.000194

lineat from std sig ave							
	0.042012	0.012869	3.051503	0.008027	0.046321	0.000000	0.011609

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srms614-2	0.000094	0.000306	0.000085	0.000246	0.000148	0.000053	0.000215
srms612-2	0.005260	0.016631	0.004531	0.012711	0.007961	0.000048	0.011361
srms610-2	0.079779	0.296842	0.066741	0.208578	0.079579	0.000305	0.042989

linest from std sig ave							
	0.067542	0.017104	0.073051	0.021110	0.065173	0.000000	0.016525

concentration data							
SRM614-1	0.34	0.30	18.35	0.14	0.47	0.00	0.22
SRM612-1	17.60	15.97	946.24	7.02	32.29	0.00	11.66
SRM610-1	261.79	274.16	13768.79	110.71	247.87	0.00	40.46
AP1-1	0.04	0.04	2.84	0.08	0.23	0.00	0.03
AP2-1	0.96	0.67	4.56	0.16	2.37	0.00	0.35
AP3-1	4.83	3.29	4.84	0.90	5.35	0.00	1.39
AP4-1	5.63	3.82	5.54	0.83	6.82	0.00	1.05
41LU1-REDO-1	0.18	0.04	1.77	0.01	0.88	0.00	0.02
41LU1-REDO-2	0.06	0.01	0.13	0.00	0.75	0.00	0.01
41LU1-REDO-3	0.03	0.01	0.76	0.00	0.80	0.00	0.01
41LU1-REDO-4	0.05	0.04	2.27	0.01	1.43	0.00	0.01
41LU1-REDO-5	0.02	0.01	0.72	0.00	1.29	0.00	0.02
41LU1-REDO-6	0.02	0.01	0.94	0.00	1.24	0.00	0.02
41LU1-REDO-7	0.05	0.03	2.99	0.01	1.67	0.00	0.04
41LU1REDO-8	0.03	0.01	1.08	0.00	1.51	0.00	0.01
41LU1-REDO-9	0.00	0.01	0.10	0.00	1.75	0.00	0.02
41LU1REDO-10	0.11	0.04	1.73	0.00	1.35	0.00	0.02
41LU1-REDO-11	0.12	0.03	1.60	0.00	1.40	0.00	0.00
41LU1REDO-12	0.06	0.02	1.51	0.00	1.42	0.00	0.01
41LU1-REDO-13	0.10	0.03	1.19	0.00	1.47	0.00	0.01
41LU1-REDO-14	0.07	0.02	0.90	0.00	1.28	0.00	0.01
41LU1-REDO-15	0.06	0.02	1.32	0.00	1.48	0.00	0.01
SRM614-2	0.34	0.38	26.16	0.20	0.70	0.00	0.21
SRM612-2	20.30	20.75	1425.31	10.48	30.96	0.00	10.97
SRM610-2	313.10	381.11	21164.00	176.48	384.40	0.00	45.14
AP1-2	0.00	0.01	1.22	0.13	0.16	0.00	0.01
AP2-2	0.77	0.56	2.01	0.12	2.27	0.00	0.24
AP3-2	3.54	2.56	2.57	0.73	4.29	0.00	0.85
AP4-2	4.92	3.50	3.01	0.92	6.69	0.00	0.75

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
blank-17		7.76	3.80	0.56	0.56	3.20	1608.37	8.76
SRM614-17		204.00	537.04	159.60	421.04	232.04	1689.49	431.64
SRM612-17		12426.75	37351.29	10204.74	28652.76	16950.49	1775.57	34997.68
SRM610-17		103806.10	371292.41	82577.66	254395.67	98723.59	2163.77	61384.34
AP1-17		38.00	66.08	20.16	221.80	128.68	1313.29	74.12
AP2-17		595.04	1315.77	26.20	611.76	1922.37	1289.73	719.76
AP3-17		2321.45	5149.99	57.96	2104.13	2265.09	1740.81	1930.29
AP4-17		3277.02	7375.48	34.60	2640.21	3536.94	1606.45	2197.29
41LU1-1		764.80	340.28	11.84	9.44	314.16	2590.61	28.72
41LU1-2		1378.13	599.04	22.40	23.48	356.00	3697.54	37.72
41LU1-3		458.44	210.68	6.00	4.80	289.20	2238.25	24.36
41LU1-4		3031.46	1335.69	30.44	14.36	373.00	4548.15	31.76
41LU1-5		1362.33	635.12	14.20	6.84	346.64	3516.86	22.20
41LU1-6		1703.85	803.28	10.84	12.12	307.08	3970.94	23.68
41LU1-7		42306.56	19769.27	210.12	112.48	459.28	22369.57	222.24
41LU1-8		15416.93	7673.08	49.16	30.12	662.88	11909.87	64.44
41LU1-9		17210.94	8630.73	61.16	44.00	592.28	13225.68	100.64
41LU1-10		29546.37	15135.81	99.28	66.76	475.04	15508.73	137.12
41LU1-11		56527.96	28061.16	240.36	105.68	368.36	22366.97	268.00
41LU1-12		49112.80	24106.22	180.40	87.00	430.52	23620.13	227.76
SRM614-18		198.32	673.92	238.36	661.44	385.16	7057.72	489.80
SRM612-18		13232.48	45563.41	13880.04	40228.67	24767.86	6009.63	37145.21
SRM610-18		137778.94	597001.63	146592.63	473444.06	172047.53	6122.87	76269.67
AP1-18		3.96	21.52	8.44	336.64	102.72	3497.38	23.68
AP2-18		608.56	1538.33	14.28	668.36	2058.37	3326.02	653.16
AP3-18		2634.01	6499.92	25.04	3025.22	2856.06	3982.30	1913.01
AP4-18		3676.82	9063.01	33.40	3246.98	4315.50	3719.70	1695.57
blank-18		3.08	7.40	0.92	2.12	2.40	8826.77	19.12

Appendix A. Raw trace element datasheets from laser ablation.

blank average	5.42	5.60	0.74	1.34	2.80	5217.57	13.94
blank subtraction							
SRM614-17	198.58	531.44	158.86	419.70	229.24	-3528.08	417.70
SRM612-17	12421.33	37345.69	10204.00	28651.42	16947.69	-3442.00	34983.74
SRM610-17	103800.68	371286.81	82576.92	254394.33	98720.79	-3053.80	61370.40
AP1-17	32.58	60.48	19.42	220.46	125.88	-3904.28	60.18
AP2-17	589.62	1310.17	25.46	610.42	1919.57	-3927.84	705.82
AP3-17	2316.03	5144.39	57.22	2102.79	2262.29	-3476.76	1916.35
AP4-17	3271.60	7369.88	33.86	2638.87	3534.14	-3611.12	2183.35
41LU1-1	759.38	334.68	11.10	8.10	311.36	-2626.95	14.78
41LU1-2	1372.71	593.44	21.66	22.14	353.20	-1520.03	23.78
41LU1-3	453.02	205.08	5.26	3.46	286.40	-2979.32	10.42
41LU1-4	3026.04	1330.09	29.70	13.02	370.20	-669.42	17.82
41LU1-5	1356.91	629.52	13.46	5.50	343.84	-1700.71	8.26
41LU1-6	1698.43	797.68	10.10	10.78	304.28	-1246.63	9.74
41LU1-7	42301.14	19763.67	209.38	111.14	456.48	17152.00	208.30
41LU1-8	15411.51	7667.48	48.42	28.78	660.08	6692.30	50.50
41LU1-9	17205.52	8625.13	60.42	42.66	589.48	8008.11	86.70
41LU1-10	29540.94	15130.20	98.54	65.42	472.24	10291.16	123.18
41LU1-11	56522.54	28055.56	239.62	104.34	365.56	17149.40	254.06
41LU1-12	49107.38	24100.61	179.66	85.66	427.72	18402.56	213.82
SRM614-18	192.90	668.32	237.62	660.10	382.36	1840.15	475.86
SRM612-18	13227.05	45557.81	13879.30	40227.33	24765.06	792.06	37131.27
SRM610-18	137773.52	596996.03	146591.89	473442.72	172044.73	905.31	76255.73
AP1-18	-1.46	15.92	7.70	335.30	99.92	-1720.19	9.74
AP2-18	603.14	1532.73	13.54	667.02	2055.57	-1891.55	639.22
AP3-18	2628.59	6494.32	24.30	3023.88	2853.26	-1235.27	1899.07
AP4-18	3671.40	9057.41	32.66	3245.64	4312.70	-1497.87	1681.63
zero correction							
SRM614-17	198.58	531.44	158.86	419.70	229.24	0.00	417.70
SRM612-17	12421.33	37345.69	10204.00	28651.42	16947.69	0.00	34983.74
SRM610-17	103800.68	371286.81	82576.92	254394.33	98720.79	0.00	61370.40
AP1-17	32.58	60.48	19.42	220.46	125.88	0.00	60.18
AP2-17	589.62	1310.17	25.46	610.42	1919.57	0.00	705.82
AP3-17	2316.03	5144.39	57.22	2102.79	2262.29	0.00	1916.35
AP4-17	3271.60	7369.88	33.86	2638.87	3534.14	0.00	2183.35
41LU1-1	759.38	334.68	11.10	8.10	311.36	0.00	14.78
41LU1-2	1372.71	593.44	21.66	22.14	353.20	0.00	23.78
41LU1-3	453.02	205.08	5.26	3.46	286.40	0.00	10.42
41LU1-4	3026.04	1330.09	29.70	13.02	370.20	0.00	17.82
41LU1-5	1356.91	629.52	13.46	5.50	343.84	0.00	8.26
41LU1-6	1698.43	797.68	10.10	10.78	304.28	0.00	9.74
41LU1-7	42301.14	19763.67	209.38	111.14	456.48	17152.00	208.30
41LU1-8	15411.51	7667.48	48.42	28.78	660.08	6692.30	50.50
41LU1-9	17205.52	8625.13	60.42	42.66	589.48	8008.11	86.70
41LU1-10	29540.94	15130.20	98.54	65.42	472.24	10291.16	123.18
41LU1-11	56522.54	28055.56	239.62	104.34	365.56	17149.40	254.06
41LU1-12	49107.38	24100.61	179.66	85.66	427.72	18402.56	213.82
SRM614-18	192.90	668.32	237.62	660.10	382.36	1840.15	475.86
SRM612-18	13227.05	45557.81	13879.30	40227.33	24765.06	792.06	37131.27
SRM610-18	137773.52	596996.03	146591.89	473442.72	172044.73	905.31	76255.73
AP1-18	0.00	15.92	7.70	335.30	99.92	0.00	9.74
AP2-18	603.14	1532.73	13.54	667.02	2055.57	0.00	639.22
AP3-18	2628.59	6494.32	24.30	3023.88	2853.26	0.00	1899.07
AP4-18	3671.40	9057.41	32.66	3245.64	4312.70	0.00	1681.63
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-17	0.000105	0.000281	0.000084	0.000222	0.000121	0.000000	0.000221

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.005129	0.015419	0.004213	0.011830	0.006997	0.000000	0.014444
SRM610-17	0.087887	0.314365	0.069917	0.215393	0.083586	0.000000	0.051962
AP1-17	0.000002	0.000005	0.000001	0.000017	0.000009	0.000000	0.000005
AP2-17	0.000047	0.000104	0.000002	0.000049	0.000153	0.000000	0.000056
AP3-17	0.000200	0.000445	0.000005	0.000182	0.000196	0.000000	0.000166
AP4-17	0.000301	0.000678	0.000003	0.000243	0.000325	0.000000	0.000201
41LU1-1	0.000114	0.000050	0.000002	0.000001	0.000047	0.000000	0.000002
41LU1-2	0.000215	0.000093	0.000003	0.000003	0.000055	0.000000	0.000004
41LU1-3	0.000084	0.000038	0.000001	0.000001	0.000053	0.000000	0.000002
41LU1-4	0.000548	0.000241	0.000005	0.000002	0.000067	0.000000	0.000003
41LU1-5	0.000315	0.000146	0.000003	0.000001	0.000080	0.000000	0.000002
41LU1-6	0.000431	0.000203	0.000003	0.000003	0.000077	0.000000	0.000002
41LU1-7	0.002888	0.001349	0.000014	0.000008	0.000031	0.001171	0.000014
41LU1-8	0.001480	0.000736	0.000005	0.000003	0.000063	0.000643	0.000005
41LU1-9	0.001646	0.000825	0.000006	0.000004	0.000056	0.000766	0.000008
41LU1-10	0.002013	0.001031	0.000007	0.000004	0.000032	0.000701	0.000008
41LU1-11	0.002809	0.001394	0.000012	0.000005	0.000018	0.000852	0.000013
41LU1-12	0.002591	0.001272	0.000009	0.000005	0.000023	0.000971	0.000011
SRM614-18	0.000113	0.000393	0.000140	0.000388	0.000225	0.001082	0.000280
SRM612-18	0.005990	0.020633	0.006286	0.018219	0.011216	0.000359	0.016817
SRM610-18	0.104538	0.452981	0.111229	0.359233	0.130542	0.000687	0.057860
AP1-18	0.000000	0.000001	0.000001	0.000022	0.000007	0.000000	0.000001
AP2-18	0.000044	0.000112	0.000001	0.000049	0.000151	0.000000	0.000047
AP3-18	0.000197	0.000486	0.000002	0.000226	0.000214	0.000000	0.000142
AP4-18	0.000297	0.000732	0.000003	0.000262	0.000349	0.000000	0.000136
standardize signal averages AP							
AP1	0.000001	0.000003	0.000001	0.000020	0.000008	0.000000	0.000003
AP2	0.000046	0.000108	0.000002	0.000049	0.000152	0.000000	0.000051
AP3	0.000199	0.000466	0.000003	0.000204	0.000205	0.000000	0.000154
AP4	0.000299	0.000705	0.000003	0.000253	0.000337	0.000000	0.000168
linest from std sig ave							
	0.047462	0.014015	3.649304	0.009388	0.051406	0.000000	0.016177
standardize signal averages SRM							
srm614-2	0.000109	0.000337	0.000112	0.000305	0.000173	0.000541	0.000250
srm612-2	0.005560	0.018026	0.005249	0.015024	0.009107	0.000179	0.015630
srm610-2	0.096213	0.383673	0.090573	0.287313	0.107064	0.000343	0.054911
linest from std sig ave							
	0.056022	0.013235	0.053852	0.015326	0.048512	0.000000	0.012864
concentration data							
SRM614-17	0.43	0.34	26.29	0.18	0.53	0.00	0.31
SRM612-17	20.88	18.53	1318.58	9.52	30.85	0.00	20.04
SRM610-17	357.74	377.86	21882.34	173.42	368.51	0.00	72.09
AP1-17	0.05	0.03	2.12	0.06	0.19	0.00	0.03
AP2-17	0.89	0.58	2.95	0.18	3.13	0.00	0.36
AP3-17	3.79	2.49	7.21	0.68	4.01	0.00	1.07
AP4-17	5.70	3.79	4.53	0.91	6.66	0.00	1.30
41LU1-1	2.16	0.28	2.42	0.00	0.96	0.00	0.01
41LU1-2	4.08	0.52	4.95	0.01	1.14	0.00	0.02
41LU1-3	1.60	0.21	1.43	0.00	1.09	0.00	0.01
41LU1-4	10.38	1.35	7.84	0.01	1.38	0.00	0.02
41LU1-5	5.96	0.82	4.55	0.00	1.64	0.00	0.01
41LU1-6	8.17	1.13	3.74	0.01	1.59	0.00	0.02
41LU1-7	54.68	7.54	20.81	0.03	0.64	0.00	0.09
41LU1-8	28.02	4.12	6.77	0.01	1.30	0.00	0.03
41LU1-9	31.16	4.61	8.41	0.02	1.16	0.00	0.05
41LU1-10	38.12	5.77	9.78	0.02	0.66	0.00	0.05
41LU1-11	53.18	7.79	17.34	0.02	0.37	0.00	0.08
41LU1-12	49.06	7.11	13.80	0.02	0.46	0.00	0.07
SRM614-18	0.46	0.47	43.74	0.31	0.99	0.00	0.39
SRM612-18	24.38	24.80	1967.32	14.67	49.45	0.00	23.33
SRM610-18	425.52	544.48	34811.96	289.23	575.53	0.00	80.28
AP1-18	0.00	0.01	0.01	0.75	0.08	0.14	0.00
AP2-18	0.84	0.63	1.44	0.18	3.09	0.00	0.30
AP3-18	3.72	2.72	2.65	0.85	4.38	0.00	0.92
AP4-18	5.62	4.09	3.84	0.98	7.15	0.00	0.88
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-19	0.76	2.64	2.08	2.28	24.32	617.80	18.68
SRM614-19	242.32	960.17	339.64	922.33	487.56	732.12	581.72
SRM612-19	13524.48	52127.25	17439.46	47456.51	24229.70	871.84	33542.67
SRM610-19	102649.86	484225.44	130167.45	410627.38	160687.50	1028.53	60782.90
AP1-19	11.36	40.16	25.60	537.24	135.64	651.72	48.88
AP2-19	747.84	2230.37	35.84	1001.49	2140.61	733.48	759.64
AP3-19	2732.90	7350.28	33.64	3356.22	3025.86	783.92	1445.61
AP4-19	3901.06	11069.10	38.20	4259.06	5198.67	760.64	1958.61
THEO-1	74.88	57.44	47.84	40.56	249.64	2012.69	65.12
THEO-2	85.00	55.96	75.16	39.08	271.08	1703.17	90.72
THEO-2	37.88	45.56	52.80	26.64	339.40	1721.17	64.20
THEO-3	204.20	177.24	89.32	101.56	200.36	4255.22	110.36
THEO-4	424.28	267.20	176.84	141.20	198.36	3147.78	182.56
THEO-5	312.96	215.72	36.60	24.88	225.44	2720.02	57.12
THEO-6	644.12	334.72	151.44	118.84	109.48	3440.18	135.64
THEO-7	740.88	437.84	136.56	63.76	83.24	2784.54	114.68
THEO-8	248.00	142.28	11.56	12.68	30.52	2594.33	20.60
THEO-9	745.00	421.16	52.88	27.24	40.48	2487.65	54.84
THEO-10	610.44	328.60	11.84	7.52	31.16	3591.26	35.80
THEO-11	617.92	354.60	53.16	47.24	64.92	5329.95	82.40
THEO-12	542.36	338.76	154.36	122.16	106.56	5615.39	146.48
THEO-13	353.52	225.60	41.52	7.60	53.72	3473.38	35.36
THEO-14	382.36	226.08	47.52	25.48	45.28	3227.66	70.52
THEO-15	406.44	290.92	79.56	44.36	74.76	3459.50	87.92
THEO-16	886.52	554.60	124.68	72.92	78.28	3689.90	137.80
THEO-17	1251.89	656.68	119.88	66.68	75.76	3809.06	106.00
THEO-18	1239.01	739.28	68.08	38.60	50.72	3519.34	69.88
SRM614-20	230.52	854.84	312.12	809.12	433.60	1438.45	493.60
SRM612-20	10393.26	42421.28	14563.84	39725.66	18578.23	1394.61	22735.89
SRM610-20	87741.93	431311.69	121401.56	378368.16	140644.72	1338.57	47872.71
AP1-20	4.48	18.44	5.60	644.44	88.96	913.53	27.84
AP2-20	438.24	1258.81	20.32	606.64	1387.13	933.05	449.44
AP3-20	2677.66	7390.12	34.76	3656.30	3389.50	961.41	1627.41
AP4-20	3185.22	9034.73	36.56	3612.74	4534.23	881.36	1444.97
blank-20	3.52	4.16	4.40	4.16	3.00	1660.97	10.28
blank average	2.14	3.40	3.24	3.22	13.66	1139.39	14.48
blank subtraction							
SRM614-19	240.18	956.77	336.40	919.11	473.90	-407.26	567.24
SRM612-19	13522.34	52123.85	17436.22	47453.29	24216.04	-267.54	33528.19
SRM610-19	102647.72	484222.04	130164.21	410624.16	160673.84	-110.86	60768.42
AP1-19	9.22	36.76	22.36	534.02	121.98	-487.66	34.40
AP2-19	745.70	2226.97	32.60	998.27	2126.95	-405.90	745.16
AP3-19	2730.76	7346.88	30.40	3353.00	3012.20	-355.46	1431.13
AP4-19	3898.92	11065.70	34.96	4255.84	5185.01	-378.74	1944.13
THEO-1	72.74	54.04	44.60	37.34	235.98	873.30	50.64
THEO-2	82.86	52.56	71.92	35.86	257.42	563.78	76.24
THEO-2	35.74	42.16	49.56	23.42	325.74	581.78	49.72
THEO-3	202.06	173.84	86.08	98.34	186.70	3115.84	95.88
THEO-4	422.14	263.80	173.60	137.98	184.70	2008.39	168.08
THEO-5	310.82	212.32	33.36	21.66	211.78	1580.63	42.64
THEO-6	641.98	331.32	148.20	115.62	95.82	2300.79	121.16
THEO-7	738.74	434.44	133.32	60.54	69.58	1645.15	100.20
THEO-8	245.86	138.88	8.32	9.46	16.86	1454.95	6.12
THEO-9	742.86	417.76	49.64	24.02	26.82	1348.27	40.36
THEO-10	608.30	325.20	8.60	4.30	17.50	2451.87	21.32
THEO-11	615.78	351.20	49.92	44.02	51.26	4190.56	67.92
THEO-12	540.22	335.36	151.12	118.94	92.90	4476.01	132.00
THEO-13	351.38	222.20	38.28	4.38	40.06	2333.99	20.88
THEO-14	380.22	222.68	44.28	22.26	31.62	2088.27	56.04
THEO-15	404.30	287.52	76.32	41.14	61.10	2320.11	73.44
THEO-16	884.38	551.20	121.44	69.70	64.62	2550.51	123.32
THEO-17	1249.75	653.28	116.64	63.46	62.10	2669.68	91.52
THEO-18	1236.87	735.88	64.84	35.38	37.06	2379.95	55.40
SRM614-20	228.38	851.44	308.88	805.90	419.94	299.06	479.12
SRM612-20	10391.12	42417.88	14560.60	39722.44	18564.56	255.22	22721.41
SRM610-20	87739.79	431308.29	121398.32	378364.94	140631.06	199.18	47858.23
AP1-20	2.34	15.04	2.36	641.22	75.30	-225.86	13.36
AP2-20	436.10	1255.41	17.08	603.42	1373.47	-206.34	434.96
AP3-20	2675.51	7386.72	31.52	3653.08	3375.84	-177.98	1612.93
AP4-20	3183.08	9031.33	33.32	3609.52	4520.57	-258.02	1430.49
zero correction							
SRM614-19	240.18	956.77	336.40	919.11	473.90	0.00	567.24

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	13522.34	52123.85	17436.22	47453.29	24216.04	0.00	33528.19
SRM610-19	102647.72	484222.04	130164.21	410624.16	160673.84	0.00	60768.42
AP1-19	9.22	36.76	22.36	534.02	121.98	0.00	34.40
AP2-19	745.70	2226.97	32.60	998.27	2126.95	0.00	745.16
AP3-19	2730.76	7346.88	30.40	3353.00	3012.20	0.00	1431.13
AP4-19	3898.92	11065.70	34.96	4255.84	5185.01	0.00	1944.13
THEO-1	72.74	54.04	44.60	37.34	235.98	873.30	50.64
THEO-2	82.86	52.56	71.92	35.86	257.42	563.78	76.24
THEO-2	35.74	42.16	49.56	23.42	325.74	581.78	49.72
THEO-3	202.06	173.84	86.08	98.34	186.70	3115.84	95.88
THEO-4	422.14	263.80	173.60	137.98	184.70	2008.39	168.08
THEO-5	310.82	212.32	33.36	21.66	211.78	1580.63	42.64
THEO-6	641.98	331.32	148.20	115.62	95.82	2300.79	121.16
THEO-7	738.74	434.44	133.32	60.54	69.58	1645.15	100.20
THEO-8	245.86	138.88	8.32	9.46	16.86	1454.95	6.12
THEO-9	742.86	417.76	49.64	24.02	26.82	1348.27	40.36
THEO-10	608.30	325.20	8.60	4.30	17.50	2451.87	21.32
THEO-11	615.78	351.20	49.92	44.02	51.26	4190.56	67.92
THEO-12	540.22	335.36	151.12	118.94	92.90	4476.01	132.00
THEO-13	351.38	222.20	38.28	4.38	40.06	2333.99	20.88
THEO-14	380.22	222.68	44.28	22.26	31.62	2088.27	56.04
THEO-15	404.30	287.52	76.32	41.14	61.10	2320.11	73.44
THEO-16	884.38	551.20	121.44	69.70	64.62	2550.51	123.32
THEO-17	1249.75	653.28	116.64	63.46	62.10	2669.68	91.52
THEO-18	1236.87	735.88	64.84	35.38	37.06	2379.95	55.40
SRM614-20	228.38	851.44	308.88	805.90	419.94	299.06	479.12
SRM612-20	10391.12	42417.88	14560.60	39722.44	18564.56	255.22	22721.41
SRM610-20	87739.79	431308.29	121398.32	378364.94	140631.06	199.18	47858.23
AP1-20	2.34	15.04	2.36	641.22	75.30	0.00	13.36
AP2-20	436.10	1255.41	17.08	603.42	1373.47	0.00	434.96
AP3-20	2675.51	7386.72	31.52	3653.08	3375.84	0.00	1612.93
AP4-20	3183.08	9031.33	33.32	3609.52	4520.57	0.00	1430.49

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-19	0.000134	0.000532	0.000187	0.000512	0.000264	0.000000	0.000316
SRM612-19	0.007537	0.029053	0.009719	0.026450	0.013498	0.000000	0.018688
SRM610-19	0.111080	0.523998	0.140856	0.444355	0.173872	0.000000	0.065760
AP1-19	0.000001	0.000003	0.000002	0.000042	0.000010	0.000000	0.000003
AP2-19	0.000078	0.000232	0.000003	0.000104	0.000222	0.000000	0.000078
AP3-19	0.000204	0.000549	0.000002	0.000251	0.000225	0.000000	0.000107
AP4-19	0.000302	0.000858	0.000003	0.000330	0.000402	0.000000	0.000151
THEO-1	0.000016	0.000012	0.000010	0.000008	0.000052	0.000191	0.000011
THEO-2	0.000013	0.000008	0.000011	0.000006	0.000041	0.000089	0.000012
THEO-2	0.000005	0.000006	0.000007	0.000003	0.000043	0.000077	0.000007
THEO-3	0.000036	0.000031	0.000015	0.000017	0.000033	0.000550	0.000017
THEO-4	0.000068	0.000043	0.000028	0.000022	0.000030	0.000325	0.000027
THEO-5	0.000040	0.000027	0.000004	0.000003	0.000027	0.000203	0.000005
THEO-6	0.000124	0.000064	0.000029	0.000022	0.000019	0.000445	0.000023
THEO-7	0.000113	0.000066	0.000020	0.000009	0.000011	0.000252	0.000015
THEO-8	0.000045	0.000025	0.000002	0.000002	0.000003	0.000266	0.000001
THEO-9	0.000115	0.000065	0.000008	0.000004	0.000004	0.000209	0.000006
THEO-10	0.000086	0.000046	0.000001	0.000001	0.000002	0.000348	0.000003
THEO-11	0.000093	0.000053	0.000008	0.000007	0.000008	0.000631	0.000010
THEO-12	0.000102	0.000063	0.000028	0.000022	0.000017	0.000842	0.000025
THEO-13	0.000059	0.000037	0.000006	0.000001	0.000007	0.000389	0.000003
THEO-14	0.000068	0.000040	0.000008	0.000004	0.000006	0.000375	0.000010
THEO-15	0.000070	0.000050	0.000013	0.000007	0.000011	0.000403	0.000013
THEO-16	0.000165	0.000103	0.000023	0.000013	0.000012	0.000476	0.000023
THEO-17	0.000179	0.000094	0.000017	0.000009	0.000009	0.000382	0.000013
THEO-18	0.000182	0.000108	0.000010	0.000005	0.000005	0.000350	0.000008

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000152	0.000567	0.000206	0.000537	0.000280	0.000199	0.000319
SRM612-20	0.007558	0.030852	0.010590	0.028891	0.013503	0.000186	0.016526
SRM610-20	0.113737	0.559105	0.157369	0.490475	0.182300	0.000258	0.062039
AP1-20	0.000000	0.000001	0.000000	0.000060	0.000007	0.000000	0.000001
AP2-20	0.000056	0.000162	0.000002	0.000078	0.000177	0.000000	0.000056
AP3-20	0.000214	0.000591	0.000003	0.000292	0.000270	0.000000	0.000129
AP4-20	0.000295	0.000837	0.000003	0.000334	0.000419	0.000000	0.000133

standardize signal averages AP

AP1	0.000000	0.000002	0.000001	0.000051	0.000008	0.000000	0.000002
AP2	0.000067	0.000197	0.000003	0.000091	0.000199	0.000000	0.000067
AP3	0.000209	0.000570	0.000002	0.000271	0.000248	0.000000	0.000118
AP4	0.000298	0.000847	0.000003	0.000332	0.000410	0.000000	0.000142

linest from std sig ave

	0.046297	0.011500	3.497212	0.007150	0.041736	0.000000	0.019966
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standardize signal averages SRM

srm614-2	0.000143	0.000550	0.000196	0.000524	0.000272	0.000100	0.000317
srm612-2	0.007547	0.029952	0.010155	0.027671	0.013500	0.000093	0.017607
srm610-2	0.112408	0.541552	0.149113	0.467415	0.178086	0.000129	0.063899

linest from std sig ave

	0.047933	0.009376	0.032696	0.009420	0.029184	0.000000	0.011083
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concentration data

SRM614-19	0.53	0.53	56.16	0.31	0.94	0.00	0.54
SRM612-19	29.93	28.65	2914.94	16.22	48.31	0.00	32.00
SRM610-19	441.05	516.80	42247.28	272.49	622.37	0.00	112.61
AP1-19	0.01	0.01	2.46	0.12	0.16	0.00	0.02
AP2-19	1.44	1.06	4.74	0.30	3.69	0.00	0.62
AP3-19	3.77	2.52	3.17	0.72	3.75	0.00	0.85
AP4-19	5.58	3.93	3.78	0.94	6.69	0.00	1.20
THEO-1	0.29	0.05	13.59	0.02	0.86	0.00	0.09
THEO-2	0.24	0.04	15.83	0.02	0.68	0.00	0.10
THEO-2	0.09	0.03	9.14	0.01	0.72	0.00	0.05
THEO-3	0.66	0.14	21.19	0.05	0.55	0.00	0.13
THEO-4	1.26	0.20	39.15	0.06	0.50	0.00	0.22
THEO-5	0.74	0.13	5.98	0.01	0.45	0.00	0.04
THEO-6	2.29	0.29	39.99	0.06	0.31	0.00	0.19
THEO-7	2.09	0.30	28.44	0.03	0.18	0.00	0.12
THEO-8	0.83	0.12	2.12	0.00	0.05	0.00	0.01
THEO-9	2.13	0.30	10.76	0.01	0.07	0.00	0.05
THEO-10	1.60	0.21	1.70	0.00	0.04	0.00	0.02
THEO-11	1.71	0.24	10.49	0.02	0.13	0.00	0.08
THEO-12	1.88	0.29	39.67	0.06	0.29	0.00	0.20
THEO-13	1.08	0.17	8.90	0.00	0.11	0.00	0.03
THEO-14	1.26	0.18	11.09	0.01	0.09	0.00	0.08
THEO-15	1.30	0.23	18.48	0.02	0.18	0.00	0.10
THEO-16	3.05	0.47	31.60	0.04	0.20	0.00	0.18
THEO-17	3.31	0.43	23.30	0.03	0.15	0.00	0.10
THEO-18	3.36	0.50	13.30	0.01	0.09	0.00	0.06
SRM614-20	0.60	0.56	61.71	0.33	1.00	0.00	0.55
SRM612-20	30.01	30.43	3176.38	17.72	48.33	0.00	28.30
SRM610-20	451.60	551.43	47199.82	300.77	652.53	0.00	106.23
AP1-20	0.00	0.01	0.31	0.17	0.12	0.00	0.01
AP2-20	1.04	0.74	3.07	0.22	2.94	0.00	0.45
AP3-20	3.95	2.71	3.52	0.83	4.49	0.00	1.03
AP4-20	5.45	3.84	4.31	0.95	6.97	0.00	1.06

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
blank-15		0.56	4.52	0.28	1.84	0.84	1510.05	9.64
SRM614-15		183.08	677.24	191.60	631.76	290.68	1745.57	410.68
SRM612-15		10299.78	35735.56	11084.06	30511.45	20076.19	1927.85	27861.08
SRM610-15		90027.02	382658.84	100318.00	305944.03	126468.55	2195.53	52055.57
AP1-15		28.52	73.68	17.04	367.00	165.64	1518.01	55.72
AP2-15		775.12	1931.17	43.32	884.76	2157.73	1578.81	918.69
AP3-15		4041.38	10406.14	44.00	4631.31	4719.51	1848.25	2793.14

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	5127.71	13105.23	53.68	5397.23	6680.08	2061.65	2596.97
LA3324-2-1	56.36	31.28	4.44	1.08	9.56	7688.44	43.48
LA3324-2-2	106.48	48.08	4.00	1.84	23.60	6644.40	33.80
LA3324-2-3	313.68	185.96	8.28	0.72	27.44	7391.40	31.40
LA3324-2-4	62.32	32.60	4.60	9.68	113.36	6742.40	26.84
LA3324-2-5	58.08	42.32	2.28	2.52	108.24	6613.32	22.80
LA3324-2-6	134.24	71.00	2.72	0.68	99.28	6933.52	23.68
LA3324-2-7	658.08	344.44	16.00	9.08	87.32	17159.10	67.52
LA3324-2-8	516.96	285.12	5.36	5.44	85.88	16476.13	49.72
LA3324-2-9	518.40	295.20	7.04	3.00	91.24	17558.22	55.76
LA3324-2-10	238.00	148.00	14.24	5.92	76.84	111464.23	212.64
LA3324-2-11	291.64	193.00	3.32	1.44	87.76	52409.61	105.96
LA3324-2-12	2375.01	1397.33	13.16	7.12	165.00	57577.89	133.56
SRM614-16	215.92	769.84	284.80	772.44	373.96	2694.18	454.80
SRM612-16	10900.66	43198.96	14608.20	39152.50	18562.55	2402.41	22767.17
SRM610-16	93432.48	452211.97	123600.58	385956.53	145431.86	2376.53	52922.46
AP1-16	3.20	13.56	8.24	264.28	95.12	1495.69	23.32
AP2-16	624.36	1664.49	19.80	749.84	1979.53	1538.13	645.08
AP3-16	3736.74	10205.54	40.32	5037.95	4637.35	2072.37	2617.93
AP4-16	4537.71	12526.87	39.52	4926.15	6590.16	1968.69	2266.21
blank-16	4.52	4.84	10.40	2.04	3.36	2610.25	15.56
blank average	2.54	4.68	5.34	1.94	2.10	2060.15	12.60

blank subtraction							
SRM614-15	180.54	672.56	186.26	629.82	288.58	-314.58	398.08
SRM612-15	10297.24	35730.88	11078.72	30509.51	20074.09	-132.30	27848.48
SRM610-15	90024.48	382654.16	100312.66	305942.09	126466.45	135.38	52042.97
AP1-15	25.98	69.00	11.70	365.06	163.54	-542.14	43.12
AP2-15	772.58	1926.49	37.98	882.82	2155.63	-481.34	906.09
AP3-15	4038.84	10401.46	38.66	4629.37	4717.41	-211.90	2780.54
AP4-15	5125.17	13100.55	48.34	5395.29	6677.98	1.50	2584.37
LA3324-2-1	53.82	26.60	-0.90	-0.86	7.46	5628.29	30.88
LA3324-2-2	103.94	43.40	-1.34	-0.10	21.50	4584.25	21.20
LA3324-2-3	311.14	181.28	2.94	-1.22	25.34	5331.25	18.80
LA3324-2-4	59.78	27.92	-0.74	7.74	111.26	4682.25	14.24
LA3324-2-5	55.54	37.64	-3.06	0.58	106.14	4553.17	10.20
LA3324-2-6	131.70	66.32	-2.62	-1.26	97.18	4873.37	11.08
LA3324-2-7	655.54	339.76	10.66	7.14	85.22	15098.94	54.92
LA3324-2-8	514.42	280.44	0.02	3.50	83.78	14415.98	37.12
LA3324-2-9	515.86	290.52	1.70	1.06	89.14	15498.07	43.16
LA3324-2-10	235.46	143.32	8.90	3.98	74.74	109404.08	200.04
LA3324-2-11	289.10	188.32	-2.02	-0.50	85.66	50349.46	93.36
LA3324-2-12	2372.47	1392.65	7.82	5.18	162.90	55517.74	120.96
SRM614-16	213.38	765.16	279.46	770.50	371.86	634.02	442.20
SRM612-16	10898.12	43194.28	14602.86	39150.56	18560.44	342.26	22754.57
SRM610-16	93429.94	452207.29	123595.24	385954.59	145429.76	316.38	52909.86
AP1-16	0.66	8.88	2.90	262.34	93.02	-564.46	10.72
AP2-16	621.82	1659.81	14.46	747.90	1977.43	-522.02	632.48
AP3-16	3734.20	10200.86	34.98	5036.01	4635.25	12.22	2605.33
AP4-16	4535.17	12522.19	34.18	4924.21	6588.06	-91.46	2253.61

zero correction							
SRM614-15	180.54	672.56	186.26	629.82	288.58	0.00	398.08
SRM612-15	10297.24	35730.88	11078.72	30509.51	20074.09	0.00	27848.48
SRM610-15	90024.48	382654.16	100312.66	305942.09	126466.45	135.38	52042.97
AP1-15	25.98	69.00	11.70	365.06	163.54	0.00	43.12
AP2-15	772.58	1926.49	37.98	882.82	2155.63	0.00	906.09
AP3-15	4038.84	10401.46	38.66	4629.37	4717.41	0.00	2780.54
AP4-15	5125.17	13100.55	48.34	5395.29	6677.98	1.50	2584.37
LA3324-2-1	53.82	26.60	0.00	0.00	7.46	5628.29	30.88
LA3324-2-2	103.94	43.40	0.00	0.00	21.50	4584.25	21.20
LA3324-2-3	311.14	181.28	2.94	0.00	25.34	5331.25	18.80
LA3324-2-4	59.78	27.92	0.00	7.74	111.26	4682.25	14.24
LA3324-2-5	55.54	37.64	0.00	0.58	106.14	4553.17	10.20
LA3324-2-6	131.70	66.32	0.00	0.00	97.18	4873.37	11.08
LA3324-2-7	655.54	339.76	10.66	7.14	85.22	15098.94	54.92
LA3324-2-8	514.42	280.44	0.02	3.50	83.78	14415.98	37.12
LA3324-2-9	515.86	290.52	1.70	1.06	89.14	15498.07	43.16
LA3324-2-10	235.46	143.32	8.90	3.98	74.74	109404.08	200.04
LA3324-2-11	289.10	188.32	0.00	0.00	85.66	50349.46	93.36
LA3324-2-12	2372.47	1392.65	7.82	5.18	162.90	55517.74	120.96
SRM614-16	213.38	765.16	279.46	770.50	371.86	634.02	442.20
SRM612-16	10898.12	43194.28	14602.86	39150.56	18560.44	342.26	22754.57
SRM610-16	93429.94	452207.29	123595.24	385954.59	145429.76	316.38	52909.86
AP1-16	0.66	8.88	2.90	262.34	93.02	0.00	10.72
AP2-16	621.82	1659.81	14.46	747.90	1977.43	0.00	632.48
AP3-16	3734.20	10200.86	34.98	5036.01	4635.25	12.22	2605.33
AP4-16	4535.17	12522.19	34.18	4924.21	6588.06	0.00	2253.61

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-15	0.000133	0.000494	0.000137	0.000463	0.000212	0.000000	0.000293
SRM612-15	0.007182	0.024920	0.007727	0.021278	0.014000	0.000000	0.019422
SRM610-15	0.115982	0.492986	0.129236	0.394155	0.162931	0.000174	0.067049
AP1-15	0.000002	0.000006	0.000001	0.000032	0.000014	0.000000	0.000004
AP2-15	0.000063	0.000156	0.000003	0.000072	0.000175	0.000000	0.000074
AP3-15	0.000242	0.000623	0.000002	0.000277	0.000283	0.000000	0.000167
AP4-15	0.000340	0.000869	0.000003	0.000358	0.000443	0.000000	0.000171
LA3324-2-1	0.000014	0.000007	0.000000	0.000000	0.000002	0.001467	0.000008
LA3324-2-2	0.000022	0.000009	0.000000	0.000000	0.000005	0.000983	0.000005
LA3324-2-3	0.000059	0.000034	0.000001	0.000000	0.000005	0.001011	0.000004
LA3324-2-4	0.000008	0.000004	0.000000	0.000001	0.000016	0.000661	0.000002
LA3324-2-5	0.000008	0.000005	0.000000	0.000000	0.000015	0.000628	0.000001
LA3324-2-6	0.000018	0.000009	0.000000	0.000000	0.000013	0.000675	0.000002
LA3324-2-7	0.000137	0.000071	0.000002	0.000001	0.000018	0.003153	0.000011
LA3324-2-8	0.000096	0.000052	0.000000	0.000001	0.000016	0.002690	0.000007
LA3324-2-9	0.000094	0.000053	0.000000	0.000000	0.000016	0.002828	0.000008
LA3324-2-10	0.000043	0.000026	0.000002	0.000001	0.000014	0.019911	0.000036
LA3324-2-11	0.000043	0.000028	0.000000	0.000000	0.000013	0.007425	0.000014
LA3324-2-12	0.000244	0.000144	0.000001	0.000001	0.000017	0.005721	0.000012
SRM614-16	0.000158	0.000566	0.000207	0.000570	0.000275	0.000469	0.000327
SRM612-16	0.007706	0.030544	0.010326	0.027684	0.013125	0.000242	0.016090
SRM610-16	0.112792	0.545922	0.149209	0.465939	0.175568	0.000382	0.063875
AP1-16	0.000000	0.000001	0.000000	0.000024	0.000009	0.000000	0.000001
AP2-16	0.000054	0.000144	0.000001	0.000065	0.000171	0.000000	0.000055
AP3-16	0.000235	0.000643	0.000002	0.000317	0.000292	0.000001	0.000164
AP4-16	0.000312	0.000862	0.000002	0.000339	0.000454	0.000000	0.000155
standardize signal averages AP							
AP1	0.000001	0.000003	0.000001	0.000028	0.000011	0.000000	0.000002
AP2	0.000058	0.000150	0.000002	0.000068	0.000173	0.000000	0.000064
AP3	0.000239	0.000633	0.000002	0.000297	0.000287	0.000000	0.000165
AP4	0.000326	0.000865	0.000003	0.000348	0.000448	0.000000	0.000163
linest from std sig ave							
	0.041920	0.010995	4.113144	0.006630	0.038791	0.000000	0.015817
standardize signal averages SRM							
srm614-2	0.000145	0.000530	0.000172	0.000517	0.000244	0.000235	0.000310
srm612-2	0.007444	0.027732	0.009026	0.024481	0.013562	0.000121	0.017756
srm610-2	0.114387	0.519454	0.139223	0.430047	0.169250	0.000278	0.065462
linest from std sig ave							
	0.047109	0.009775	0.035024	0.010239	0.030699	0.000000	0.010832
concentration data							
SRM614-15	0.48	0.47	48.30	0.26	0.71	0.00	0.40
SRM612-15	25.82	23.50	2725.62	12.10	46.58	0.00	26.35
SRM610-15	416.98	464.87	45588.77	224.11	542.04	0.00	90.95
AP1-15	0.04	0.03	1.67	0.08	0.22	0.00	0.02
AP2-15	1.05	0.69	5.06	0.19	2.71	0.00	0.46
AP3-15	4.05	2.73	3.80	0.73	4.37	0.00	1.05
AP4-15	5.68	3.81	5.26	0.95	6.85	0.00	1.08
LA3324-2-1	0.23	0.03	0.00	0.00	0.03	0.00	0.05
LA3324-2-2	0.37	0.04	0.00	0.00	0.07	0.00	0.03
LA3324-2-3	0.99	0.15	0.92	0.00	0.07	0.00	0.02
LA3324-2-4	0.14	0.02	0.00	0.00	0.24	0.00	0.01
LA3324-2-5	0.13	0.02	0.00	0.00	0.23	0.00	0.01
LA3324-2-6	0.31	0.04	0.00	0.00	0.21	0.00	0.01

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	2.29	0.31	3.65	0.00	0.28	0.00	0.07
LA3324-2-8	1.61	0.23	0.01	0.00	0.24	0.00	0.04
LA3324-2-9	1.57	0.23	0.51	0.00	0.25	0.00	0.05
LA3324-2-10	0.72	0.11	2.66	0.00	0.21	0.00	0.23
LA3324-2-11	0.71	0.12	0.00	0.00	0.20	0.00	0.09
LA3324-2-12	4.09	0.63	1.32	0.00	0.26	0.00	0.08
SRM614-16	0.57	0.53	72.96	0.32	0.92	0.00	0.44
SRM612-16	27.71	28.80	3642.58	15.74	43.66	0.00	21.83
SRM610-16	405.51	514.79	52634.30	264.92	584.08	0.00	86.65
AP1-16	0.00	0.00	0.44	0.06	0.13	0.00	0.01
AP2-16	0.90	0.63	2.06	0.17	2.65	0.00	0.35
AP3-16	3.94	2.82	3.62	0.84	4.52	0.00	1.04
AP4-16	5.22	3.78	3.86	0.90	7.02	0.00	0.98

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
blank-13		2.12	1.08	1.72	1.20	3.84	892.93	6.44
SRM614-13		274.60	923.85	294.80	841.92	401.72	1079.77	544.84
SRM612-13		13702.12	51932.33	16336.01	44353.05	19889.15	1418.09	28705.64
SRM610-13		112860.27	513064.28	133978.00	416361.66	153497.03	1672.93	62684.23
AP1-13		42.44	94.28	34.88	180.92	200.04	1027.77	72.72
AP2-13		693.08	1950.85	45.44	927.53	1865.49	1085.09	816.16
AP3-13		3693.62	10071.94	40.68	4063.18	4020.78	1259.09	2097.05
AP4-13		6073.31	16127.81	81.44	7629.48	9428.21	1494.89	3677.30
LA3324-1-1		198.92	117.08	28.52	22.44	242.20	12546.03	71.04
LA3324-1-2		100.20	75.20	10.08	3.52	144.32	12235.15	58.68
LA3324-1-3		71.16	62.20	9.44	10.00	122.92	13210.23	63.68
LA3324-1-4		489.56	329.80	26.96	25.08	199.92	15041.44	130.48
LA3324-1-5		257.24	176.72	11.60	4.88	132.80	17235.62	70.56
LA3324-1-6		362.92	223.20	13.60	10.32	174.76	16103.61	88.84
LA3324-1-7		296.32	192.56	20.96	4.40	210.48	7936.84	76.52
LA3324-1-8		507.08	334.32	22.04	7.92	209.92	7469.80	104.48
LA3324-1-9		624.36	391.64	49.32	21.56	245.48	7244.20	149.04
LA3324-1-10		292.28	204.76	38.32	9.92	116.40	9391.81	55.68
LA3324-1-11		146.00	94.12	8.76	5.52	89.72	5926.79	34.24
LA3324-1-12		205.76	111.68	10.20	9.40	90.80	6190.07	43.56
LA3324-1-13		194.60	130.00	23.64	27.64	113.52	8210.01	57.20
LA3324-1-14		199.00	138.52	23.40	11.24	98.28	7809.80	42.60
LA3324-1-15		162.40	107.52	17.72	9.96	103.44	7777.64	49.48
LA3324-1-16		108.32	53.64	16.08	6.16	84.44	5260.71	23.52
LA3324-1-17		95.36	69.68	14.44	8.40	113.16	4903.31	27.44
LA3324-1-18		116.56	84.00	10.84	5.64	87.04	4614.35	32.24
SRM614-14		211.32	756.00	294.92	806.08	419.48	1481.97	402.60
SRM612-14		10992.82	44423.85	15385.77	41756.64	18262.02	1485.29	22638.01
SRM610-14		97330.98	498569.94	139377.14	436924.25	153815.23	1547.01	52037.41
AP1-14		2.88	13.92	18.88	180.60	96.92	954.37	20.24
AP2-14		535.28	1469.05	12.36	638.80	1492.89	1035.33	514.24
AP3-14		2964.26	8302.57	36.60	3868.34	3517.78	1207.57	1671.37
AP4-14		4062.62	11705.91	49.32	4985.59	6080.67	1183.73	1981.89
blank-14		0.60	10.28	5.56	0.88	3.16	1259.09	15.00
blank average		1.36	5.68	3.64	1.04	3.50	1076.01	10.72

blank subtraction

SRM614-13	273.24	918.17	291.16	840.88	398.22	3.76	534.12
SRM612-13	13700.76	51926.65	16332.37	44352.01	19885.65	342.08	28694.92
SRM610-13	112858.91	513058.60	133974.36	416360.62	153493.53	596.92	62673.51
AP1-13	41.08	88.60	31.24	179.88	196.54	-48.24	62.00
AP2-13	691.72	1945.17	41.80	926.49	1861.99	9.08	805.44
AP3-13	3692.26	10066.26	37.04	4062.14	4017.28	183.08	2086.33
AP4-13	6071.95	16122.13	77.80	7628.44	9424.71	418.88	3666.58
LA3324-1-1	197.56	111.40	24.88	21.40	238.70	11470.02	60.32
LA3324-1-2	98.84	69.52	6.44	2.48	140.82	11159.14	47.96
LA3324-1-3	69.80	56.52	5.80	8.96	119.42	12134.23	52.96
LA3324-1-4	488.20	324.12	23.32	24.04	196.42	13965.44	119.76
LA3324-1-5	255.88	171.04	7.96	3.84	129.30	16159.61	59.84
LA3324-1-6	361.56	217.52	9.96	9.28	171.26	15027.60	78.12
LA3324-1-7	294.96	186.88	17.32	3.36	206.98	6860.84	65.80
LA3324-1-8	505.72	328.64	18.40	6.88	206.42	6393.80	93.76
LA3324-1-9	623.00	385.96	45.68	20.52	241.98	6168.19	138.32

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	290.92	199.08	34.68	8.88	112.90	8315.81	44.96
LA3324-1-11	144.64	88.44	5.12	4.48	86.22	4850.79	23.52
LA3324-1-12	204.40	106.00	6.56	8.36	87.30	5114.07	32.84
LA3324-1-13	193.24	124.32	20.00	26.60	110.02	7134.00	46.48
LA3324-1-14	197.64	132.84	19.76	10.20	94.78	6733.80	31.88
LA3324-1-15	161.04	101.84	14.08	8.92	99.94	6701.64	38.76
LA3324-1-16	106.96	47.96	12.44	5.12	80.94	4184.70	12.80
LA3324-1-17	94.00	64.00	10.80	7.36	109.66	3827.30	16.72
LA3324-1-18	115.20	78.32	7.20	4.60	83.54	3538.34	21.52
SRM614-14	209.96	750.32	291.28	805.04	415.98	405.96	391.88
SRM612-14	10991.46	44418.17	15382.13	41755.60	18258.52	409.28	22627.29
SRM610-14	97329.62	498564.26	139373.50	436923.21	153811.73	471.00	52026.69
AP1-14	1.52	8.24	15.24	179.56	93.42	-121.64	9.52
AP2-14	533.92	1463.37	8.72	637.76	1489.39	-40.68	503.52
AP3-14	2962.90	8296.89	32.96	3867.30	3514.28	131.56	1660.65
AP4-14	4061.26	11700.23	45.68	4984.55	6077.17	107.72	1971.17

zero correction

SRM614-13	273.24	918.17	291.16	840.88	398.22	3.76	534.12
SRM612-13	13700.76	51926.65	16332.37	44352.01	19885.65	342.08	28694.92
SRM610-13	112858.91	513058.60	133974.36	416360.62	153493.53	596.92	62673.51
AP1-13	41.08	88.60	31.24	179.88	196.54	0.00	62.00
AP2-13	691.72	1945.17	41.80	926.49	1861.99	9.08	805.44
AP3-13	3692.26	10066.26	37.04	4062.14	4017.28	183.08	2086.33
AP4-13	6071.95	16122.13	77.80	7628.44	9424.71	418.88	3666.58
LA3324-1-1	197.56	111.40	24.88	21.40	238.70	11470.02	60.32
LA3324-1-2	98.84	69.52	6.44	2.48	140.82	11159.14	47.96
LA3324-1-3	69.80	56.52	5.80	8.96	119.42	12134.23	52.96
LA3324-1-4	488.20	324.12	23.32	24.04	196.42	13965.44	119.76
LA3324-1-5	255.88	171.04	7.96	3.84	129.30	16159.61	59.84
LA3324-1-6	361.56	217.52	9.96	9.28	171.26	15027.60	78.12
LA3324-1-7	294.96	186.88	17.32	3.36	206.98	6860.84	65.80
LA3324-1-8	505.72	328.64	18.40	6.88	206.42	6393.80	93.76
LA3324-1-9	623.00	385.96	45.68	20.52	241.98	6168.19	138.32
LA3324-1-10	290.92	199.08	34.68	8.88	112.90	8315.81	44.96
LA3324-1-11	144.64	88.44	5.12	4.48	86.22	4850.79	23.52
LA3324-1-12	204.40	106.00	6.56	8.36	87.30	5114.07	32.84
LA3324-1-13	193.24	124.32	20.00	26.60	110.02	7134.00	46.48
LA3324-1-14	197.64	132.84	19.76	10.20	94.78	6733.80	31.88
LA3324-1-15	161.04	101.84	14.08	8.92	99.94	6701.64	38.76
LA3324-1-16	106.96	47.96	12.44	5.12	80.94	4184.70	12.80
LA3324-1-17	94.00	64.00	10.80	7.36	109.66	3827.30	16.72
LA3324-1-18	115.20	78.32	7.20	4.60	83.54	3538.34	21.52
SRM614-14	209.96	750.32	291.28	805.04	415.98	405.96	391.88
SRM612-14	10991.46	44418.17	15382.13	41755.60	18258.52	409.28	22627.29
SRM610-14	97329.62	498564.26	139373.50	436923.21	153811.73	471.00	52026.69
AP1-14	1.52	8.24	15.24	179.56	93.42	0.00	9.52
AP2-14	533.92	1463.37	8.72	637.76	1489.39	0.00	503.52
AP3-14	2962.90	8296.89	32.96	3867.30	3514.28	131.56	1660.65
AP4-14	4061.26	11700.23	45.68	4984.55	6077.17	107.72	1971.17

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-13	0.000141	0.000474	0.000150	0.000434	0.000206	0.000002	0.000276
SRM612-13	0.007926	0.030040	0.009448	0.025658	0.011504	0.000198	0.016600
SRM610-13	0.116981	0.531796	0.138867	0.431567	0.159099	0.000619	0.064962
AP1-13	0.000003	0.000006	0.000002	0.000012	0.000013	0.000000	0.000004
AP2-13	0.000057	0.000160	0.000003	0.000076	0.000153	0.000001	0.000066
AP3-13	0.000206	0.000561	0.000002	0.000226	0.000224	0.000010	0.000116
AP4-13	0.000382	0.001014	0.000005	0.000480	0.000593	0.000026	0.000231
LA3324-1-1	0.000024	0.000014	0.000003	0.000003	0.000029	0.001393	0.000007

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000014	0.000010	0.000001	0.000000	0.000020	0.001590	0.000007
LA3324-1-3	0.000012	0.000010	0.000001	0.000002	0.000021	0.002090	0.000009
LA3324-1-4	0.000042	0.000028	0.000002	0.000002	0.000017	0.001204	0.000010
LA3324-1-5	0.000026	0.000017	0.000001	0.000000	0.000013	0.001653	0.000006
LA3324-1-6	0.000034	0.000020	0.000001	0.000001	0.000016	0.001408	0.000007
LA3324-1-7	0.000026	0.000017	0.000002	0.000000	0.000019	0.000615	0.000006
LA3324-1-8	0.000040	0.000026	0.000001	0.000001	0.000016	0.000503	0.000007
LA3324-1-9	0.000050	0.000031	0.000004	0.000002	0.000020	0.000499	0.000011
LA3324-1-10	0.000051	0.000035	0.000006	0.000002	0.000020	0.001464	0.000008
LA3324-1-11	0.000029	0.000018	0.000001	0.000001	0.000018	0.000987	0.000005
LA3324-1-12	0.000041	0.000021	0.000001	0.000002	0.000017	0.001022	0.000007
LA3324-1-13	0.000027	0.000017	0.000003	0.000004	0.000015	0.000994	0.000006
LA3324-1-14	0.000027	0.000018	0.000003	0.000001	0.000013	0.000932	0.000004
LA3324-1-15	0.000023	0.000014	0.000002	0.000001	0.000014	0.000941	0.000005
LA3324-1-16	0.000017	0.000008	0.000002	0.000001	0.000013	0.000657	0.000002
LA3324-1-17	0.000013	0.000009	0.000002	0.000001	0.000015	0.000535	0.000002
LA3324-1-18	0.000016	0.000011	0.000001	0.000001	0.000011	0.000486	0.000003
SRM614-14	0.000159	0.000568	0.000220	0.000609	0.000315	0.000307	0.000296
SRM612-14	0.008126	0.032837	0.011371	0.030868	0.013498	0.000303	0.016728
SRM610-14	0.118869	0.608900	0.170218	0.533617	0.187851	0.000575	0.063541
AP1-14	0.000000	0.000001	0.000001	0.000014	0.000008	0.000000	0.000001
AP2-14	0.000057	0.000155	0.000001	0.000068	0.000158	0.000000	0.000053
AP3-14	0.000203	0.000569	0.000002	0.000265	0.000241	0.000009	0.000114
AP4-14	0.000325	0.000936	0.000004	0.000399	0.000486	0.000009	0.000158

standardize signal averages AP

AP1	0.000001	0.000003	0.000002	0.000013	0.000010	0.000000	0.000002
AP2	0.000057	0.000158	0.000002	0.000072	0.000156	0.000000	0.000060
AP3	0.000204	0.000565	0.000002	0.000246	0.000232	0.000010	0.000115
AP4	0.000353	0.000975	0.000004	0.000439	0.000539	0.000017	0.000194

linest from std sig ave

	0.041750	0.010516	3.200831	0.006074	0.035696	0.061674	0.016377
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standardize signal averages SRM

srM614-2	0.000150	0.000521	0.000185	0.000522	0.000260	0.000155	0.000286
srM612-2	0.008026	0.031438	0.010410	0.028263	0.012501	0.000250	0.016664
srM610-2	0.117925	0.570348	0.154543	0.482592	0.173475	0.000597	0.064251

linest from std sig ave

	0.045689	0.008902	0.031549	0.009124	0.029966	0.000000	0.011071
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concentration data

SRM614-13	0.51	0.43	41.27	0.23	0.63	0.01	0.39
SRM612-13	28.38	27.09	2593.69	13.37	35.22	1.05	23.31
SRM610-13	418.86	479.60	38120.85	224.82	487.06	3.27	91.24
AP1-13	0.05	0.02	2.66	0.03	0.19	0.00	0.03
AP2-13	0.95	0.67	4.40	0.19	2.19	0.02	0.43
AP3-13	3.42	2.35	2.63	0.55	3.19	0.25	0.76
AP4-13	6.36	4.25	6.25	1.16	8.44	0.65	1.51
LA3324-1-1	0.40	0.06	3.86	0.01	0.41	34.28	0.05
LA3324-1-2	0.23	0.04	1.17	0.00	0.29	39.12	0.04
LA3324-1-3	0.20	0.04	1.28	0.00	0.29	51.42	0.06
LA3324-1-4	0.70	0.12	2.57	0.01	0.24	29.63	0.07
LA3324-1-5	0.44	0.07	1.04	0.00	0.19	40.68	0.04
LA3324-1-6	0.56	0.09	1.19	0.00	0.23	34.64	0.05
LA3324-1-7	0.44	0.07	1.98	0.00	0.26	15.13	0.04
LA3324-1-8	0.66	0.11	1.85	0.00	0.23	12.38	0.05
LA3324-1-9	0.84	0.13	4.72	0.00	0.28	12.27	0.07
LA3324-1-10	0.85	0.15	7.79	0.00	0.28	36.01	0.05
LA3324-1-11	0.49	0.08	1.33	0.00	0.25	24.28	0.03
LA3324-1-12	0.68	0.09	1.67	0.00	0.25	25.14	0.04
LA3324-1-13	0.45	0.07	3.56	0.01	0.22	24.45	0.04
LA3324-1-14	0.46	0.08	3.49	0.00	0.19	22.93	0.03
LA3324-1-15	0.38	0.06	2.52	0.00	0.20	23.16	0.04
LA3324-1-16	0.28	0.03	2.49	0.00	0.18	16.16	0.01
LA3324-1-17	0.22	0.04	1.93	0.00	0.22	13.17	0.02
LA3324-1-18	0.26	0.05	1.26	0.00	0.16	11.96	0.02
SRM614-14	0.57	0.51	60.49	0.32	0.96	1.62	0.42
SRM612-14	29.09	29.61	3121.60	16.08	41.32	1.60	23.49
SRM610-14	425.63	549.13	46726.98	277.98	575.08	3.04	89.24
AP1-14	0.00	0.00	1.56	0.03	0.11	0.00	0.00
AP2-14	0.94	0.65	1.18	0.16	2.25	0.00	0.35
AP3-14	3.38	2.39	2.89	0.64	3.43	0.22	0.74
AP4-14	5.41	3.92	4.66	0.97	6.92	0.21	1.03

certified concentration

SRM614	0.81	0.72	0.67	0.77			
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-11	1.40	4.16	1.48	1.68	3.20	268.88	12.92
SRM614-11	219.80	607.16	171.76	497.04	262.84	367.16	446.48
SRM612-11	11514.75	34881.36	9647.09	25806.43	12443.79	461.20	26423.07
SRM610-11	88802.82	321007.31	72266.13	218422.78	86618.61	638.52	52694.82
AP1-11	14.28	46.24	11.96	254.28	126.20	333.68	66.56
AP2-11	528.12	1261.57	23.52	469.44	1296.09	287.84	740.76
AP3-11	2663.01	5813.07	21.28	2369.01	2444.77	385.40	1912.17
AP4-11	3870.42	8510.73	34.92	3406.46	4148.70	440.56	2095.69
M17-24-141-1	80.24	44.48	2.76	2.88	17.24	475.80	16.00
M17-24-141-2	94.48	37.64	5.96	2.56	9.44	502.96	7.56
M17-24-141-3	81.08	50.56	5.08	0.88	9.76	456.72	11.16
M17-24-141-4	151.36	66.92	5.24	2.72	19.68	515.68	14.72
M17-24-141-5	147.96	74.88	2.52	0.76	16.16	549.16	26.68
M17-24-141-6	120.20	58.12	5.88	2.12	15.96	581.36	16.20
M17-24-141-7	83.40	40.24	4.00	6.56	31.48	740.32	28.36
M17-24-141-8	79.52	51.56	4.72	1.48	19.36	720.96	12.36
M17-24-141-9	103.04	34.36	1.80	0.64	16.20	782.64	13.92
M17-24-141-10	669.36	332.56	23.00	10.12	40.12	961.25	61.56
M17-24-141-11	1646.49	811.72	45.52	5.56	33.12	944.65	40.20
M17-24-141-12	2794.62	1366.49	82.68	9.32	50.08	1007.09	78.92
M17-24-141-13	5021.59	2639.97	325.08	36.56	80.60	963.89	452.56
M17-24-141-14	5485.27	2993.26	337.60	27.84	47.36	891.25	337.04
M17-24-141-15	5920.87	3157.34	374.44	39.88	43.44	955.45	277.28
M17-24-141-16	584.64	308.04	153.60	38.76	58.84	1487.29	611.08
M17-24-141-17	429.12	263.12	144.04	11.64	29.00	1374.69	420.24
M17-24-141-18	303.88	183.68	126.24	6.40	32.28	1521.33	473.96
SRM614-12	204.20	698.76	264.16	620.40	326.36	820.40	386.56
SRM612-12	13675.32	48624.59	14733.40	41785.88	19277.39	807.68	29307.89
SRM610-12	114191.96	492915.16	122805.97	386795.63	147449.83	931.17	63715.96
AP1-12	3.60	9.72	7.32	273.16	86.96	576.48	16.48
AP2-12	618.16	1538.45	12.96	711.04	1620.05	561.76	647.40
AP3-12	3200.50	7876.28	27.44	3168.30	3187.74	617.48	1985.49
AP4-12	5216.51	13383.28	53.08	5688.83	7476.20	707.96	3052.02
blank-12	4.04	3.00	2.00	1.68	0.68	696.48	6.88
blank average	2.72	3.58	1.74	1.68	1.94	482.68	9.90

blank subtraction							
SRM614-11	217.08	603.58	170.02	495.36	260.90	-115.52	436.58
SRM612-11	11512.02	34877.77	9645.35	25804.75	12441.85	-21.48	26413.17
SRM610-11	88800.10	321003.73	72264.38	218421.10	86616.67	155.84	52684.92
AP1-11	11.56	42.66	10.22	252.60	124.26	-149.00	56.66
AP2-11	525.40	1257.99	21.78	467.76	1294.15	-194.84	730.86
AP3-11	2660.29	5809.49	19.54	2367.33	2442.83	-97.28	1902.27
AP4-11	3867.70	8507.15	33.18	3404.78	4146.76	-42.12	2085.79
M17-24-141-1	77.52	40.90	1.02	1.20	15.30	-6.88	6.10
M17-24-141-2	91.76	34.06	4.22	0.88	7.50	20.28	-2.34
M17-24-141-3	78.36	46.98	3.34	-0.80	7.82	-25.96	1.26
M17-24-141-4	148.64	63.34	3.50	1.04	17.74	33.00	4.82
M17-24-141-5	145.24	71.30	0.78	-0.92	14.22	66.48	16.78
M17-24-141-6	117.48	54.54	4.14	0.44	14.02	98.68	6.30
M17-24-141-7	80.68	36.66	2.26	4.88	29.54	257.64	18.46
M17-24-141-8	76.80	47.98	2.98	-0.20	17.42	238.28	2.46
M17-24-141-9	100.32	30.78	0.06	-1.04	14.26	299.96	4.02
M17-24-141-10	666.64	328.98	21.26	8.44	38.18	478.56	51.66
M17-24-141-11	1643.77	808.14	43.78	3.88	31.18	461.96	30.30
M17-24-141-12	2791.90	1362.91	80.94	7.64	48.14	524.40	69.02
M17-24-141-13	5018.87	2636.39	323.34	34.88	78.66	481.20	442.66
M17-24-141-14	5482.55	2989.68	335.86	26.16	45.42	408.56	327.14
M17-24-141-15	5918.15	3153.76	372.70	38.20	41.50	472.76	267.38
M17-24-141-16	581.92	304.46	151.86	37.08	56.90	1004.61	601.18
M17-24-141-17	426.40	259.54	142.30	9.96	27.06	892.00	410.34
M17-24-141-18	301.16	180.10	124.50	4.72	30.34	1038.65	464.06
SRM614-12	201.48	695.18	262.42	618.72	324.42	337.72	376.66
SRM612-12	13672.60	48621.01	14731.66	41784.19	19275.45	325.00	29297.98
SRM610-12	114189.24	492911.58	122804.23	386793.95	147447.89	448.48	63706.06
AP1-12	0.88	6.14	5.58	271.48	85.02	93.80	6.58
AP2-12	615.44	1534.87	11.22	709.36	1618.11	79.08	637.50
AP3-12	3197.78	7872.70	25.70	3166.62	3185.80	134.80	1975.59
AP4-12	5213.79	13379.69	51.34	5687.15	7474.26	225.28	3042.12

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-11	217.08	603.58	170.02	495.36	260.90	0.00	436.58
SRM612-11	11512.02	34877.77	9645.35	25804.75	12441.85	0.00	26413.17
SRM610-11	88800.10	321003.73	72264.38	218421.10	86616.67	155.84	52684.92
AP1-11	11.56	42.66	10.22	252.60	124.26	0.00	56.66
AP2-11	525.40	1257.99	21.78	467.76	1294.15	0.00	730.86
AP3-11	2660.29	5809.49	19.54	2367.33	2442.83	0.00	1902.27
AP4-11	3867.70	8507.15	33.18	3404.78	4146.76	0.00	2085.79
M17-24-141-1	77.52	40.90	1.02	1.20	15.30	0.00	6.10
M17-24-141-2	91.76	34.06	4.22	0.88	7.50	20.28	0.00
M17-24-141-3	78.36	46.98	3.34	0.00	7.82	0.00	1.26
M17-24-141-4	148.64	63.34	3.50	1.04	17.74	33.00	4.82
M17-24-141-5	145.24	71.30	0.78	0.00	14.22	66.48	16.78
M17-24-141-6	117.48	54.54	4.14	0.44	14.02	98.68	6.30
M17-24-141-7	80.68	36.66	2.26	4.88	29.54	257.64	18.46
M17-24-141-8	76.80	47.98	2.98	0.00	17.42	238.28	2.46
M17-24-141-9	100.32	30.78	0.06	0.00	14.26	299.96	4.02
M17-24-141-10	666.64	328.98	21.26	8.44	38.18	478.56	51.66
M17-24-141-11	1643.77	808.14	43.78	3.88	31.18	461.96	30.30
M17-24-141-12	2791.90	1362.91	80.94	7.64	48.14	524.40	69.02
M17-24-141-13	5018.87	2636.39	323.34	34.88	78.66	481.20	442.66
M17-24-141-14	5482.55	2989.68	335.86	26.16	45.42	408.56	327.14
M17-24-141-15	5918.15	3153.76	372.70	38.20	41.50	472.76	267.38
M17-24-141-16	581.92	304.46	151.86	37.08	56.90	1004.61	601.18
M17-24-141-17	426.40	259.54	142.30	9.96	27.06	892.00	410.34
M17-24-141-18	301.16	180.10	124.50	4.72	30.34	1038.65	464.06
SRM614-12	201.48	695.18	262.42	618.72	324.42	337.72	376.66
SRM612-12	13672.60	48621.01	14731.66	41784.19	19275.45	325.00	29297.98
SRM610-12	114189.24	492911.58	122804.23	386793.95	147447.89	448.48	63706.06
AP1-12	0.88	6.14	5.58	271.48	85.02	93.80	6.58
AP2-12	615.44	1534.87	11.22	709.36	1618.11	79.08	637.50
AP3-12	3197.78	7872.70	25.70	3166.62	3185.80	134.80	1975.59
AP4-12	5213.79	13379.69	51.34	5687.15	7474.26	225.28	3042.12
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-11	0.000117	0.000324	0.000091	0.000266	0.000140	0.000000	0.000235
SRM612-11	0.005953	0.018035	0.004987	0.013343	0.006434	0.000000	0.013658
SRM610-11	0.086876	0.314049	0.070699	0.213689	0.084740	0.000152	0.051543
AP1-11	0.000001	0.000004	0.000001	0.000022	0.000011	0.000000	0.000005
AP2-11	0.000049	0.000117	0.000002	0.000044	0.000121	0.000000	0.000068
AP3-11	0.000187	0.000408	0.000001	0.000166	0.000172	0.000000	0.000134
AP4-11	0.000285	0.000626	0.000002	0.000251	0.000305	0.000000	0.000154
M17-24-141-1	0.000035	0.000019	0.000000	0.000001	0.000007	0.000000	0.000003
M17-24-141-2	0.000038	0.000014	0.000002	0.000000	0.000003	0.000008	0.000000
M17-24-141-3	0.000029	0.000017	0.000001	0.000000	0.000003	0.000000	0.000000
M17-24-141-4	0.000044	0.000019	0.000001	0.000000	0.000005	0.000010	0.000001
M17-24-141-5	0.000045	0.000022	0.000000	0.000000	0.000004	0.000021	0.000005
M17-24-141-6	0.000037	0.000017	0.000001	0.000000	0.000004	0.000031	0.000002
M17-24-141-7	0.000027	0.000012	0.000001	0.000002	0.000010	0.000087	0.000006
M17-24-141-8	0.000027	0.000017	0.000001	0.000000	0.000006	0.000084	0.000001
M17-24-141-9	0.000033	0.000010	0.000000	0.000000	0.000005	0.000099	0.000001
M17-24-141-10	0.000143	0.000071	0.000005	0.000002	0.000008	0.000103	0.000011
M17-24-141-11	0.000257	0.000126	0.000007	0.000001	0.000005	0.000072	0.000005
M17-24-141-12	0.000377	0.000184	0.000011	0.000001	0.000007	0.000071	0.000009
M17-24-141-13	0.000300	0.000158	0.000019	0.000002	0.000005	0.000029	0.000026
M17-24-141-14	0.000326	0.000178	0.000020	0.000002	0.000003	0.000024	0.000019
M17-24-141-15	0.000349	0.000186	0.000022	0.000002	0.000002	0.000028	0.000016
M17-24-141-16	0.000033	0.000017	0.000009	0.000002	0.000003	0.000056	0.000034
M17-24-141-17	0.000023	0.000014	0.000008	0.000001	0.000001	0.000049	0.000022

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000016	0.000010	0.000007	0.000000	0.000002	0.000056	0.000025
SRM614-12	0.000137	0.000472	0.000178	0.000420	0.000220	0.000229	0.000256
SRM612-12	0.007235	0.025727	0.007795	0.022110	0.010199	0.000172	0.015503
SRM610-12	0.113276	0.488968	0.121822	0.383700	0.146268	0.000445	0.063196
AP1-12	0.000000	0.000001	0.000000	0.000023	0.000007	0.000008	0.000001
AP2-12	0.000051	0.000126	0.000001	0.000058	0.000133	0.000006	0.000052
AP3-12	0.000193	0.000475	0.000002	0.000191	0.000192	0.000008	0.000119
AP4-12	0.000323	0.000829	0.000003	0.000352	0.000463	0.000014	0.000188

standardize signal averages AP

AP1	0.000001	0.000002	0.000001	0.000022	0.000009	0.000004	0.000003
AP2	0.000050	0.000122	0.000001	0.000051	0.000127	0.000003	0.000060
AP3	0.000190	0.000442	0.000001	0.000179	0.000182	0.000004	0.000126
AP4	0.000304	0.000727	0.000003	0.000301	0.000384	0.000007	0.000171

linest from std sig ave

	0.047535	0.013914	5.035624	0.008777	0.049060	0.139693	0.017469
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standardize signal averages SRM

srm614-2	0.000127	0.000398	0.000135	0.000343	0.000180	0.000115	0.000245
srm612-2	0.006594	0.021881	0.006391	0.017727	0.008316	0.000086	0.014580
srm610-2	0.100076	0.401508	0.096260	0.298694	0.115504	0.000299	0.057370

linest from std sig ave

	0.053843	0.012646	0.050653	0.014741	0.045007	0.000000	0.012415
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concentration data

SRM614-11	0.48	0.39	39.47	0.20	0.59	0.00	0.35
SRM612-11	24.27	21.52	2153.94	10.04	27.07	0.00	20.46
SRM610-11	354.17	374.77	30532.65	160.86	356.54	1.83	77.22
AP1-11	0.02	0.02	1.79	0.08	0.21	0.00	0.03
AP2-11	0.93	0.65	4.08	0.15	2.36	0.00	0.47
AP3-11	3.54	2.27	2.76	0.58	3.36	0.00	0.93
AP4-11	5.40	3.48	4.91	0.88	5.98	0.00	1.07
M17-24-141-1	0.67	0.10	0.93	0.00	0.14	0.00	0.02
M17-24-141-2	0.71	0.08	3.47	0.00	0.06	0.46	0.00
M17-24-141-3	0.55	0.10	2.50	0.00	0.06	0.00	0.00
M17-24-141-4	0.84	0.10	2.09	0.00	0.10	0.55	0.01
M17-24-141-5	0.86	0.12	0.49	0.00	0.09	1.16	0.04
M17-24-141-6	0.71	0.10	2.64	0.00	0.09	1.74	0.01
M17-24-141-7	0.52	0.07	1.54	0.01	0.20	4.86	0.04
M17-24-141-8	0.51	0.09	2.11	0.00	0.12	4.68	0.01
M17-24-141-9	0.63	0.06	0.04	0.00	0.09	5.51	0.01
M17-24-141-10	2.72	0.39	9.19	0.01	0.16	5.74	0.08
M17-24-141-11	4.88	0.70	13.76	0.00	0.10	4.03	0.03
M17-24-141-12	7.15	1.02	21.96	0.00	0.13	3.95	0.06
M17-24-141-13	5.69	0.87	38.83	0.01	0.09	1.60	0.18
M17-24-141-14	6.18	0.99	40.13	0.01	0.05	1.35	0.14
M17-24-141-15	6.61	1.03	44.12	0.01	0.05	1.55	0.11
M17-24-141-16	0.62	0.09	17.08	0.01	0.06	3.14	0.23
M17-24-141-17	0.44	0.08	15.55	0.00	0.03	2.70	0.16
M17-24-141-18	0.31	0.05	13.48	0.00	0.03	3.12	0.17
SRM614-12	0.56	0.56	76.98	0.32	0.93	2.75	0.38
SRM612-12	29.49	30.70	3366.49	16.64	42.91	2.06	23.23
SRM610-12	461.79	583.51	52611.20	288.84	615.42	5.33	94.68
AP1-12	0.00	0.00	0.93	0.08	0.14	0.43	0.00
AP2-12	0.96	0.70	1.85	0.20	2.60	0.36	0.36
AP3-12	3.66	2.64	3.11	0.67	3.76	0.45	0.83
AP4-12	6.12	4.60	6.39	1.23	9.06	0.78	1.31

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
blank-9		3.56	2.72	1.92	2.64	0.28	298.96	11.68
SRM614-9		355.20	1088.85	366.32	993.17	510.32	472.72	606.64
SRM612-9		14211.88	51514.89	16049.85	44316.01	19389.87	537.68	25640.39
SRM610-9		119836.55	556747.94	143498.53	454706.03	171825.73	678.12	70515.91
AP1-9		23.88	89.16	38.12	385.64	152.88	461.40	83.20
AP2-9		768.64	2205.05	35.16	958.65	2321.21	486.00	896.09
AP3-9		3744.78	9846.94	43.48	4521.15	3899.10	563.84	2109.01

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	6186.75	16418.65	65.64	7380.88	9351.89	718.64	3591.78
M17-24-97-1	4678.75	2461.77	55.76	41.68	98.60	1299.09	198.84
M17-24-97-2	4013.14	2092.57	43.72	13.24	70.32	1007.73	87.52
M17-24-97-3	3971.66	2208.37	27.68	18.84	81.48	967.41	88.60
M17-24-97-4	39.64	20.12	22.72	37.96	83.80	1304.41	242.84
M17-24-97-5	14.36	9.00	16.00	10.88	36.16	1182.37	85.72
M17-24-97-6	16.68	14.00	19.80	20.28	36.28	1148.53	107.08
M17-24-97-7	17.76	10.44	22.96	28.80	42.44	1291.41	155.04
M17-24-97-8	12.76	7.04	20.92	10.88	31.72	1249.49	125.32
M17-24-97-9	13.00	6.96	7.72	6.52	28.12	1201.73	83.24
M17-24-97-10	13.40	23.28	27.92	32.68	52.32	1466.65	131.08
M17-24-97-11	9.96	9.24	16.12	11.96	25.68	1314.69	90.28
M17-24-97-12	12.68	11.44	17.00	8.08	30.32	1316.29	122.76
M17-24-97-13	62.52	38.96	106.88	99.48	123.64	1628.53	523.48
M17-24-97-14	17.60	13.48	27.92	30.88	58.28	1486.65	198.36
M17-24-97-15	16.88	17.92	18.76	20.44	33.04	1414.77	127.08
M17-24-97-16	37.04	52.72	73.72	63.40	118.52	1771.13	383.48
M17-24-97-17	20.40	13.48	25.24	19.08	66.44	1442.97	173.40
M17-24-97-18	36.44	41.88	72.00	67.04	92.24	1388.69	312.88
SRM614-10	303.84	1126.37	410.16	1145.17	560.96	628.04	600.76
SRM612-10	11227.94	45974.46	15814.05	43331.93	18758.59	624.72	24369.86
SRM610-10	97916.71	511093.03	142292.08	450316.66	156574.59	681.48	51889.49
AP1-10	3.76	4.88	8.16	123.08	87.56	456.68	23.20
AP2-10	557.80	1669.33	21.08	666.28	1714.61	459.32	583.16
AP3-10	2938.30	8572.89	26.64	4338.74	3705.74	503.60	2015.89
AP4-10	4924.11	14059.32	46.04	6128.63	8223.29	653.12	2796.82
blank-10	3.88	5.60	2.08	1.04	3.56	468.84	10.32
blank average	3.72	4.16	2.00	1.84	1.92	383.90	11.00
blank subtraction							
SRM614-9	351.48	1084.69	364.32	991.33	508.40	88.82	595.64
SRM612-9	14208.16	51510.73	16047.85	44314.17	19387.95	153.78	25629.38
SRM610-9	119832.83	556743.78	143496.53	454704.19	171823.81	294.22	70504.91
AP1-9	20.16	85.00	36.12	383.80	150.96	77.50	72.20
AP2-9	764.92	2200.89	33.16	956.81	2319.29	102.10	885.08
AP3-9	3741.06	9842.78	41.48	4519.31	3897.18	179.94	2098.01
AP4-9	6183.03	16414.49	63.64	7379.04	9349.97	334.74	3580.78
M17-24-97-1	4675.03	2457.61	53.76	39.84	96.68	915.19	187.84
M17-24-97-2	4009.42	2088.41	41.72	11.40	68.40	623.82	76.52
M17-24-97-3	3967.94	2204.21	25.68	17.00	79.56	583.50	77.60
M17-24-97-4	35.92	15.96	20.72	36.12	81.88	920.51	231.84
M17-24-97-5	10.64	4.84	14.00	9.04	34.24	798.46	74.72
M17-24-97-6	12.96	9.84	17.80	18.44	34.36	764.62	96.08
M17-24-97-7	14.04	6.28	20.96	26.96	40.52	907.51	144.04
M17-24-97-8	9.04	2.88	18.92	9.04	29.80	865.58	114.32
M17-24-97-9	9.28	2.80	5.72	4.68	26.20	817.82	72.24
M17-24-97-10	9.68	19.12	25.92	30.84	50.40	1082.75	120.08
M17-24-97-11	6.24	5.08	14.12	10.12	23.76	930.79	79.28
M17-24-97-12	8.96	7.28	15.00	6.24	28.40	932.39	111.76
M17-24-97-13	58.80	34.80	104.88	97.64	121.72	1244.63	512.48
M17-24-97-14	13.88	9.32	25.92	29.04	56.36	1102.75	187.36
M17-24-97-15	13.16	13.76	16.76	18.60	31.12	1030.87	116.08
M17-24-97-16	33.32	48.56	71.72	61.56	116.60	1387.23	372.48
M17-24-97-17	16.68	9.32	23.24	17.24	64.52	1059.07	162.40
M17-24-97-18	32.72	37.72	70.00	65.20	90.32	1004.79	301.88
SRM614-10	300.12	1122.21	408.16	1143.33	559.04	244.14	589.76
SRM612-10	11224.22	45970.30	15812.05	43330.09	18756.67	240.82	24358.86
SRM610-10	97912.99	511088.87	142290.08	450314.82	156572.67	297.58	51878.49
AP1-10	0.04	0.72	6.16	121.24	85.64	72.78	12.20
AP2-10	554.08	1665.17	19.08	664.44	1712.69	75.42	572.16
AP3-10	2934.58	8568.73	24.64	4336.90	3703.82	119.70	2004.89
AP4-10	4920.39	14055.16	44.04	6126.79	8221.37	269.22	2785.82
zero correction							
SRM614-9	351.48	1084.69	364.32	991.33	508.40	88.82	595.64
SRM612-9	14208.16	51510.73	16047.85	44314.17	19387.95	153.78	25629.38
SRM610-9	119832.83	556743.78	143496.53	454704.19	171823.81	294.22	70504.91
AP1-9	20.16	85.00	36.12	383.80	150.96	77.50	72.20
AP2-9	764.92	2200.89	33.16	956.81	2319.29	102.10	885.08
AP3-9	3741.06	9842.78	41.48	4519.31	3897.18	179.94	2098.01
AP4-9	6183.03	16414.49	63.64	7379.04	9349.97	334.74	3580.78
M17-24-97-1	4675.03	2457.61	53.76	39.84	96.68	915.19	187.84
M17-24-97-2	4009.42	2088.41	41.72	11.40	68.40	623.82	76.52
M17-24-97-3	3967.94	2204.21	25.68	17.00	79.56	583.50	77.60
M17-24-97-4	35.92	15.96	20.72	36.12	81.88	920.51	231.84
M17-24-97-5	10.64	4.84	14.00	9.04	34.24	798.46	74.72
M17-24-97-6	12.96	9.84	17.80	18.44	34.36	764.62	96.08
M17-24-97-7	14.04	6.28	20.96	26.96	40.52	907.51	144.04

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	9.04	2.88	18.92	9.04	29.80	865.58	114.32
M17-24-97-9	9.28	2.80	5.72	4.68	26.20	817.82	72.24
M17-24-97-10	9.68	19.12	25.92	30.84	50.40	1082.75	120.08
M17-24-97-11	6.24	5.08	14.12	10.12	23.76	930.79	79.28
M17-24-97-12	8.96	7.28	15.00	6.24	28.40	932.39	111.76
M17-24-97-13	58.80	34.80	104.88	97.64	121.72	1244.63	512.48
M17-24-97-14	13.88	9.32	25.92	29.04	56.36	1102.75	187.36
M17-24-97-15	13.16	13.76	16.76	18.60	31.12	1030.87	116.08
M17-24-97-16	33.32	48.56	71.72	61.56	116.60	1387.23	372.48
M17-24-97-17	16.68	9.32	23.24	17.24	64.52	1059.07	162.40
M17-24-97-18	32.72	37.72	70.00	65.20	90.32	1004.79	301.88
SRM614-10	300.12	1122.21	408.16	1143.33	559.04	244.14	589.76
SRM612-10	11224.22	45970.30	15812.05	43330.09	18756.67	240.82	24358.86
SRM610-10	97912.99	511088.87	142290.08	450314.82	156572.67	297.58	51878.49
AP1-10	0.04	0.72	6.16	121.24	85.64	72.78	12.20
AP2-10	554.08	1665.17	19.08	664.44	1712.69	75.42	572.16
AP3-10	2934.58	8568.73	24.64	4336.90	3703.82	119.70	2004.89
AP4-10	4920.39	14055.16	44.04	6126.79	8221.37	269.22	2785.82

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-9	0.000150	0.000461	0.000155	0.000422	0.000216	0.000038	0.000253
SRM612-9	0.007854	0.028475	0.008871	0.024497	0.010718	0.000085	0.014168
SRM610-9	0.119398	0.554722	0.142975	0.453053	0.171200	0.000293	0.070249
AP1-9	0.000002	0.000007	0.000003	0.000030	0.000012	0.000006	0.000006
AP2-9	0.000057	0.000164	0.000002	0.000071	0.000173	0.000008	0.000066
AP3-9	0.000209	0.000551	0.000002	0.000253	0.000218	0.000010	0.000117
AP4-9	0.000381	0.001011	0.000004	0.000455	0.000576	0.000021	0.000221
M17-24-97-1	0.000623	0.000327	0.000007	0.000005	0.000013	0.000122	0.000025
M17-24-97-2	0.000579	0.000301	0.000006	0.000002	0.000010	0.000090	0.000011
M17-24-97-3	0.000516	0.000286	0.000003	0.000002	0.000010	0.000076	0.000010
M17-24-97-4	0.000007	0.000003	0.000004	0.000007	0.000015	0.000171	0.000043
M17-24-97-5	0.000002	0.000001	0.000003	0.000002	0.000006	0.000147	0.000014
M17-24-97-6	0.000002	0.000002	0.000003	0.000003	0.000006	0.000133	0.000017
M17-24-97-7	0.000003	0.000001	0.000004	0.000005	0.000008	0.000183	0.000029
M17-24-97-8	0.000002	0.000001	0.000004	0.000002	0.000007	0.000190	0.000025
M17-24-97-9	0.000002	0.000001	0.000001	0.000001	0.000005	0.000158	0.000014
M17-24-97-10	0.000002	0.000005	0.000006	0.000008	0.000013	0.000269	0.000030
M17-24-97-11	0.000001	0.000001	0.000003	0.000002	0.000005	0.000201	0.000017
M17-24-97-12	0.000002	0.000001	0.000003	0.000001	0.000006	0.000188	0.000023
M17-24-97-13	0.000013	0.000008	0.000024	0.000022	0.000028	0.000286	0.000118
M17-24-97-14	0.000003	0.000002	0.000005	0.000006	0.000012	0.000233	0.000040
M17-24-97-15	0.000003	0.000003	0.000004	0.000004	0.000007	0.000221	0.000025
M17-24-97-16	0.000006	0.000009	0.000013	0.000011	0.000022	0.000258	0.000069
M17-24-97-17	0.000003	0.000002	0.000004	0.000003	0.000011	0.000179	0.000027
M17-24-97-18	0.000005	0.000006	0.000012	0.000011	0.000015	0.000167	0.000050
SRM614-10	0.000152	0.000568	0.000206	0.000578	0.000283	0.000124	0.000298
SRM612-10	0.008219	0.033661	0.011578	0.031728	0.013734	0.000176	0.017836
SRM610-10	0.122053	0.637096	0.177371	0.561339	0.195175	0.000371	0.064669
AP1-10	0.000000	0.000000	0.000001	0.000012	0.000008	0.000007	0.000001
AP2-10	0.000051	0.000154	0.000002	0.000061	0.000158	0.000007	0.000053
AP3-10	0.000201	0.000586	0.000002	0.000297	0.000253	0.000008	0.000137
AP4-10	0.000358	0.001023	0.000003	0.000446	0.000598	0.000020	0.000203

standardize signal averages AP

AP1	0.000001	0.000003	0.000002	0.000021	0.000010	0.000007	0.000003
AP2	0.000054	0.000159	0.000002	0.000066	0.000166	0.000007	0.000059
AP3	0.000205	0.000569	0.000002	0.000275	0.000236	0.000009	0.000127
AP4	0.000370	0.001017	0.000004	0.000450	0.000587	0.000020	0.000212

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

0.040347 0.010164 3.524072 0.005796 0.033061 0.055698 0.014967

standardize signal averages SRM

srm614-2	0.000151	0.000515	0.000181	0.000500	0.000250	0.000081	0.000276
srm612-2	0.008036	0.031068	0.010225	0.028112	0.012226	0.000131	0.016002
srm610-2	0.120725	0.595909	0.160173	0.507196	0.183187	0.000332	0.067459

linest from std sig ave

0.044632 0.008521 0.030445 0.008682 0.028385 0.000000 0.010599

concentration data

SRM614-9	0.52	0.40	46.84	0.21	0.61	0.18	0.33
SRM612-9	27.18	24.82	2681.17	12.18	30.39	0.41	18.19
SRM610-9	413.14	483.56	43212.16	225.19	485.42	1.40	90.18
AP1-9	0.03	0.03	3.99	0.07	0.16	0.14	0.03
AP2-9	0.92	0.67	3.48	0.16	2.28	0.17	0.39
AP3-9	3.37	2.23	3.26	0.58	2.88	0.22	0.70
AP4-9	6.13	4.10	5.51	1.05	7.60	0.46	1.32
M17-24-97-1	10.02	1.33	10.07	0.01	0.17	2.71	0.15
M17-24-97-2	9.32	1.22	8.47	0.00	0.13	2.00	0.07
M17-24-97-3	8.30	1.16	4.69	0.01	0.14	1.68	0.06
M17-24-97-4	0.11	0.01	5.41	0.02	0.20	3.80	0.26
M17-24-97-5	0.03	0.00	3.63	0.00	0.08	3.28	0.08
M17-24-97-6	0.04	0.01	4.36	0.01	0.08	2.96	0.10
M17-24-97-7	0.05	0.01	5.95	0.01	0.11	4.07	0.17
M17-24-97-8	0.03	0.00	5.83	0.00	0.09	4.21	0.15
M17-24-97-9	0.03	0.00	1.55	0.00	0.07	3.51	0.08
M17-24-97-10	0.04	0.02	9.05	0.02	0.17	5.97	0.18
M17-24-97-11	0.02	0.00	4.28	0.01	0.07	4.46	0.10
M17-24-97-12	0.03	0.01	4.25	0.00	0.08	4.18	0.13
M17-24-97-13	0.22	0.03	33.84	0.05	0.37	6.35	0.70
M17-24-97-14	0.05	0.01	7.71	0.01	0.16	5.18	0.24
M17-24-97-15	0.05	0.01	5.05	0.01	0.09	4.91	0.15
M17-24-97-16	0.10	0.04	18.75	0.03	0.29	5.73	0.41
M17-24-97-17	0.05	0.01	5.52	0.01	0.14	3.97	0.16
M17-24-97-18	0.09	0.03	16.40	0.03	0.20	3.72	0.30
SRM614-10	0.53	0.49	62.40	0.29	0.80	0.59	0.38
SRM612-10	28.44	29.34	3499.30	15.77	38.94	0.84	22.90
SRM610-10	422.33	555.37	53607.81	279.01	553.40	1.77	83.01
AP1-10	0.00	0.00	0.83	0.03	0.11	0.16	0.01
AP2-10	0.83	0.62	2.48	0.14	2.09	0.16	0.32
AP3-10	3.23	2.38	2.37	0.69	3.34	0.18	0.82
AP4-10	5.77	4.15	4.51	1.03	7.89	0.44	1.21

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Yb Lu Hf Ta W Hg Tl

raw data

blank-7		1.20	0.28	0.76	0.64	0.60	189.92	7.04
SRM614-7		210.96	656.76	188.64	467.68	257.56	251.80	472.24
SRM612-7		10719.94	32281.10	8683.17	23552.61	11012.22	331.44	21429.60
SRM610-7		80652.53	286315.44	65888.06	196935.14	75626.23	485.12	39153.54
AP1-7		25.20	58.96	22.96	222.72	107.20	306.44	42.16
AP2-7		638.64	1478.33	18.92	507.20	1549.93	270.32	744.16
AP3-7		3447.22	7627.32	48.60	4397.06	3480.98	359.92	2951.62
AP4-7		4249.50	10089.22	43.12	3898.86	5589.87	436.76	2593.41
34HP45-837-1		427.48	193.20	16.60	8.28	21.68	708.68	27.96
34HP45-837-2		513.64	242.60	14.84	10.12	27.44	612.84	22.52
34HP45-837-3		489.48	216.16	19.08	5.24	24.24	622.20	29.04
34HP45-837-4		885.13	464.44	72.08	14.52	47.04	567.92	52.64
34HP45-837-5		512.88	284.52	63.44	7.24	44.92	536.36	43.36
34HP45-837-6		531.00	295.68	59.96	16.28	40.20	540.40	42.32
34HP45-837-7		914.37	477.84	89.04	30.28	97.56	627.68	60.52
34HP45-837-8		1556.61	770.20	70.92	11.08	57.88	628.68	31.88
34HP45-837-9		2248.81	1075.61	72.16	11.00	76.40	654.76	31.64
34HP45-837-10		51.92	42.24	32.60	22.16	141.84	692.00	33.04
34HP45-837-11		35.64	18.52	30.60	10.00	102.12	700.96	25.72
34HP45-837-12		45.88	35.24	36.12	7.28	87.60	679.24	17.12
34HP45-837-13		42.20	34.32	22.20	34.20	131.16	898.73	82.32
34HP45-837-14		9.32	11.20	7.92	5.44	68.60	819.48	43.36
34HP45-837-15		8.24	14.84	16.16	11.96	93.56	842.20	55.40

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	299.12	1025.05	343.92	959.49	467.28	665.16	531.80
SRM612-8	14279.72	53886.10	16870.41	46129.34	19913.51	700.32	25429.34
SRM610-8	136768.30	652754.25	162557.52	524906.06	185205.72	796.12	64570.29
AP1-8	9.04	11.52	12.80	337.68	117.84	549.76	22.32
AP2-8	931.73	2332.09	29.00	1017.57	2769.98	518.76	942.25
AP3-8	4796.59	12221.39	41.16	5580.91	5650.51	680.72	3627.34
AP4-8	6149.27	16007.69	63.60	6764.36	9306.25	762.68	3154.98
blank-8	2.96	2.08	1.16	0.56	5.80	462.96	12.44
blank average	2.08	1.18	0.96	0.60	3.20	326.44	9.74
blank subtraction							
SRM614-7	208.88	655.58	187.68	467.08	254.36	-74.64	462.50
SRM612-7	10717.86	32279.92	8682.21	23552.01	11009.02	5.00	21419.86
SRM610-7	80650.45	286314.26	65887.09	196934.54	75623.03	158.68	39143.80
AP1-7	23.12	57.78	22.00	222.12	104.00	-20.00	32.42
AP2-7	636.56	1477.15	17.96	506.60	1546.73	-56.12	734.42
AP3-7	3445.14	7626.14	47.64	4396.46	3477.78	33.48	2941.88
AP4-7	4247.42	10088.04	42.16	3898.26	5586.67	110.32	2583.67
34HP45-837-1	425.40	192.02	15.64	7.68	18.48	382.24	18.22
34HP45-837-2	511.56	241.42	13.88	9.52	24.24	286.40	12.78
34HP45-837-3	487.40	214.98	18.12	4.64	21.04	295.76	19.30
34HP45-837-4	883.04	463.26	71.12	13.92	43.84	241.48	42.90
34HP45-837-5	510.80	283.34	62.48	6.64	41.72	209.92	33.62
34HP45-837-6	528.92	294.50	59.00	15.68	37.00	213.96	32.58
34HP45-837-7	912.29	476.66	88.08	29.68	94.36	301.24	50.78
34HP45-837-8	1554.53	769.02	69.96	10.48	54.68	302.24	22.14
34HP45-837-9	2246.73	1074.43	71.20	10.40	73.20	328.32	21.90
34HP45-837-10	49.84	41.06	31.64	21.56	138.64	365.56	23.30
34HP45-837-11	33.56	17.34	29.64	9.40	98.92	374.52	15.98
34HP45-837-12	43.80	34.06	35.16	6.68	84.40	352.80	7.38
34HP45-837-13	40.12	33.14	21.24	33.60	127.96	572.28	72.58
34HP45-837-14	7.24	10.02	6.96	4.84	65.40	493.04	33.62
34HP45-837-15	6.16	13.66	15.20	11.36	90.36	515.76	45.66
SRM614-8	297.04	1023.87	342.96	958.89	464.08	338.72	522.06
SRM612-8	14277.64	53884.92	16869.45	46128.74	19910.31	373.88	25419.60
SRM610-8	136766.22	652753.07	162556.56	524905.46	185202.52	469.68	64560.54
AP1-8	6.96	10.34	11.84	337.08	114.64	223.32	12.58
AP2-8	929.65	2330.91	28.04	1016.97	2766.78	192.32	932.51
AP3-8	4794.51	12220.21	40.20	5580.31	5647.31	354.28	3617.60
AP4-8	6147.19	16006.51	62.64	6763.76	9303.05	436.24	3145.24
zero correction							
SRM614-7	208.88	655.58	187.68	467.08	254.36	0.00	462.50
SRM612-7	10717.86	32279.92	8682.21	23552.01	11009.02	5.00	21419.86
SRM610-7	80650.45	286314.26	65887.09	196934.54	75623.03	158.68	39143.80
AP1-7	23.12	57.78	22.00	222.12	104.00	0.00	32.42
AP2-7	636.56	1477.15	17.96	506.60	1546.73	0.00	734.42
AP3-7	3445.14	7626.14	47.64	4396.46	3477.78	33.48	2941.88
AP4-7	4247.42	10088.04	42.16	3898.26	5586.67	110.32	2583.67
34HP45-837-1	425.40	192.02	15.64	7.68	18.48	382.24	18.22
34HP45-837-2	511.56	241.42	13.88	9.52	24.24	286.40	12.78
34HP45-837-3	487.40	214.98	18.12	4.64	21.04	295.76	19.30
34HP45-837-4	883.04	463.26	71.12	13.92	43.84	241.48	42.90
34HP45-837-5	510.80	283.34	62.48	6.64	41.72	209.92	33.62
34HP45-837-6	528.92	294.50	59.00	15.68	37.00	213.96	32.58
34HP45-837-7	912.29	476.66	88.08	29.68	94.36	301.24	50.78
34HP45-837-8	1554.53	769.02	69.96	10.48	54.68	302.24	22.14
34HP45-837-9	2246.73	1074.43	71.20	10.40	73.20	328.32	21.90
34HP45-837-10	49.84	41.06	31.64	21.56	138.64	365.56	23.30
34HP45-837-11	33.56	17.34	29.64	9.40	98.92	374.52	15.98
34HP45-837-12	43.80	34.06	35.16	6.68	84.40	352.80	7.38
34HP45-837-13	40.12	33.14	21.24	33.60	127.96	572.28	72.58
34HP45-837-14	7.24	10.02	6.96	4.84	65.40	493.04	33.62
34HP45-837-15	6.16	13.66	15.20	11.36	90.36	515.76	45.66
SRM614-8	297.04	1023.87	342.96	958.89	464.08	338.72	522.06
SRM612-8	14277.64	53884.92	16869.45	46128.74	19910.31	373.88	25419.60
SRM610-8	136766.22	652753.07	162556.56	524905.46	185202.52	469.68	64560.54
AP1-8	6.96	10.34	11.84	337.08	114.64	223.32	12.58
AP2-8	929.65	2330.91	28.04	1016.97	2766.78	192.32	932.51
AP3-8	4794.51	12220.21	40.20	5580.31	5647.31	354.28	3617.60
AP4-8	6147.19	16006.51	62.64	6763.76	9303.05	436.24	3145.24
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-7	0.000094	0.000295	0.000085	0.000210	0.000115	0.000000	0.000208
SRM612-7	0.005765	0.017363	0.004670	0.012669	0.005922	0.000003	0.011522
SRM610-7	0.083295	0.295703	0.068048	0.203393	0.078103	0.000164	0.040427
AP1-7	0.000002	0.000006	0.000002	0.000021	0.000010	0.000000	0.000003
AP2-7	0.000053	0.000122	0.000001	0.000042	0.000128	0.000000	0.000061
AP3-7	0.000209	0.000463	0.000003	0.000267	0.000211	0.000002	0.000179
AP4-7	0.000294	0.000697	0.000003	0.000269	0.000386	0.000008	0.000179
34HP45-837-1	0.000104	0.000047	0.000004	0.000002	0.000005	0.000094	0.000004
34HP45-837-2	0.000129	0.000061	0.000003	0.000002	0.000006	0.000072	0.000003
34HP45-837-3	0.000147	0.000065	0.000005	0.000001	0.000006	0.000089	0.000006
34HP45-837-4	0.000096	0.000050	0.000008	0.000002	0.000005	0.000026	0.000005
34HP45-837-5	0.000060	0.000033	0.000007	0.000001	0.000005	0.000025	0.000004
34HP45-837-6	0.000067	0.000037	0.000007	0.000002	0.000005	0.000027	0.000004
34HP45-837-7	0.000115	0.000060	0.000011	0.000004	0.000012	0.000038	0.000006
34HP45-837-8	0.000194	0.000096	0.000009	0.000001	0.000007	0.000038	0.000003
34HP45-837-9	0.000348	0.000167	0.000011	0.000002	0.000011	0.000051	0.000003
34HP45-837-10	0.000010	0.000008	0.000007	0.000004	0.000029	0.000075	0.000005
34HP45-837-11	0.000006	0.000003	0.000006	0.000002	0.000019	0.000071	0.000003
34HP45-837-12	0.000008	0.000006	0.000006	0.000001	0.000015	0.000062	0.000001
34HP45-837-13	0.000011	0.000009	0.000006	0.000009	0.000035	0.000158	0.000020
34HP45-837-14	0.000002	0.000003	0.000002	0.000001	0.000018	0.000134	0.000009
34HP45-837-15	0.000002	0.000003	0.000004	0.000003	0.000023	0.000129	0.000011
SRM614-8	0.000166	0.000572	0.000191	0.000535	0.000259	0.000189	0.000291
SRM612-8	0.008748	0.033016	0.010336	0.028264	0.012199	0.000229	0.015575
SRM610-8	0.138115	0.659191	0.164160	0.530082	0.187029	0.000474	0.065197
AP1-8	0.000001	0.000001	0.000001	0.000025	0.000009	0.000017	0.000001
AP2-8	0.000060	0.000150	0.000002	0.000065	0.000177	0.000012	0.000060
AP3-8	0.000246	0.000627	0.000002	0.000287	0.000290	0.000018	0.000186
AP4-8	0.000364	0.000949	0.000004	0.000401	0.000551	0.000026	0.000186

standardize signal averages AP							
AP1	0.000001	0.000003	0.000002	0.000023	0.000009	0.000008	0.000002
AP2	0.000056	0.000136	0.000002	0.000054	0.000153	0.000006	0.000060
AP3	0.000228	0.000545	0.000002	0.000277	0.000251	0.000010	0.000182
AP4	0.000329	0.000823	0.000003	0.000335	0.000469	0.000017	0.000182

linest from std sig ave							
	0.042459	0.011986	3.777357	0.006972	0.039362	0.060250	0.014237

standardize signal averages SRM							
srm614-2	0.000130	0.000433	0.000138	0.000373	0.000187	0.000095	0.000250
srm612-2	0.007257	0.025190	0.007503	0.020466	0.009061	0.000116	0.013548
srm610-2	0.110705	0.477447	0.116104	0.366737	0.132566	0.000319	0.052812

linest from std sig ave							
	0.048674	0.010635	0.041999	0.012007	0.039221	0.000000	0.013478

concentration data							
SRM614-7	0.34	0.30	27.40	0.13	0.39	0.00	0.25
SRM612-7	20.99	17.85	1512.94	7.58	19.99	0.01	14.07
SRM610-7	303.31	303.96	22044.57	121.62	263.66	0.85	49.36
AP1-7	0.04	0.03	3.18	0.06	0.16	0.00	0.02
AP2-7	0.89	0.59	2.24	0.12	2.01	0.00	0.35
AP3-7	3.55	2.22	4.36	0.74	3.32	0.05	1.02
AP4-7	4.97	3.33	4.39	0.75	6.06	0.18	1.01
34HP45-837-1	1.77	0.23	5.78	0.01	0.07	2.25	0.03
34HP45-837-2	2.18	0.29	5.26	0.01	0.10	1.73	0.02
34HP45-837-3	2.49	0.31	8.25	0.00	0.10	2.15	0.03
34HP45-837-4	1.62	0.24	11.64	0.00	0.07	0.63	0.03
34HP45-837-5	1.01	0.16	11.04	0.00	0.08	0.59	0.02
34HP45-837-6	1.13	0.18	11.22	0.01	0.07	0.65	0.02
34HP45-837-7	1.95	0.29	16.76	0.01	0.19	0.91	0.04
34HP45-837-8	3.28	0.46	13.15	0.00	0.11	0.91	0.02
34HP45-837-9	5.90	0.80	16.64	0.00	0.18	1.22	0.02
34HP45-837-10	0.17	0.04	9.81	0.01	0.45	1.81	0.03

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	0.11	0.02	8.41	0.00	0.29	1.69	0.02
34HP45-837-12	0.13	0.03	9.27	0.00	0.23	1.48	0.01
34HP45-837-13	0.19	0.04	8.86	0.03	0.56	3.81	0.11
34HP45-837-14	0.03	0.01	2.85	0.00	0.28	3.21	0.05
34HP45-837-15	0.03	0.02	5.73	0.01	0.35	3.10	0.06
SRM614-8	0.60	0.59	62.02	0.32	0.87	0.98	0.36
SRM612-8	31.86	33.94	3348.52	16.90	41.18	1.18	19.02
SRM610-8	502.93	677.60	53180.75	316.97	631.37	2.45	79.61
AP1-8	0.01	0.00	1.34	0.07	0.14	0.40	0.01
AP2-8	1.01	0.71	2.71	0.18	2.79	0.30	0.34
AP3-8	4.17	3.00	3.11	0.80	4.55	0.44	1.06
AP4-8	6.17	4.54	5.59	1.11	8.66	0.62	1.06

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-5	1.20	0.00	0.60	2.08	10.52	427.24	27.40
SRM614-5	165.40	528.24	139.76	414.08	213.12	655.24	339.56
SRM612-5	10226.58	31794.82	8752.61	23866.33	11886.63	833.96	21845.80
SRM610-5	87765.06	317649.91	73601.06	222987.38	89462.63	1066.77	47250.39
AP1-5	16.20	55.44	23.88	264.04	132.52	597.28	53.16
AP2-5	693.52	1682.41	24.52	607.56	2012.81	668.88	892.25
AP3-5	3836.26	8791.53	43.80	4073.62	4033.82	1019.05	3131.18
AP4-5	4562.35	10878.06	56.40	3964.30	5179.63	1120.89	2218.73
34HP45-718-1	398.44	233.12	46.64	31.96	62.00	3915.22	238.76
34HP45-718-2	1048.05	554.64	61.92	17.24	58.88	3877.98	104.64
34HP45-718-3	805.44	455.36	128.16	59.64	108.88	3664.50	231.32
34HP45-718-4	3452.02	1877.69	300.92	42.52	129.48	5169.75	268.64
34HP45-718-5	2024.81	1177.29	221.64	33.48	94.56	4810.23	186.52
34HP45-718-6	1993.73	1121.89	217.40	50.44	144.12	5000.55	222.76
34HP45-718-7	2155.01	1128.45	230.84	53.32	131.24	4660.35	140.16
34HP45-718-8	2426.41	1304.45	243.00	34.16	102.52	4005.06	103.52
34HP45-718-9	3377.10	1921.09	248.40	47.76	129.16	4005.90	108.52
34HP45-718-10	1229.53	655.80	353.24	72.68	165.76	6594.04	443.88
34HP45-718-11	997.89	587.72	384.52	51.52	110.36	5816.59	238.36
34HP45-718-12	986.85	562.52	384.68	33.24	133.76	6913.20	190.36
34HP45-718-13	533.52	418.92	418.20	372.04	395.16	6258.64	1363.37
34HP45-718-14	418.28	307.08	530.92	434.60	324.48	4497.19	1202.29
34HP45-718-15	357.04	203.96	351.60	225.68	165.24	3772.74	780.24
34HP45-718-16	209.68	130.20	257.08	34.12	88.16	5247.59	558.12
34HP45-718-17	127.00	83.08	209.96	16.56	73.68	5038.27	182.08
34HP45-718-18	129.60	108.76	210.20	16.12	66.84	4634.59	163.24
SRM614-6	204.16	721.92	247.32	646.40	314.52	1315.49	382.68
SRM612-6	12085.47	45568.54	14578.88	39709.38	18829.71	1330.17	23449.33
SRM610-6	120726.88	580593.69	145226.06	474086.19	178996.25	1539.41	64131.96
AP1-6	2.44	17.44	26.56	605.64	121.48	908.93	24.92
AP2-6	797.52	2174.65	24.80	840.08	2694.94	1042.69	894.81
AP3-6	4756.87	12755.59	26.32	5887.83	5842.15	1670.65	3734.82
AP4-6	5570.35	14635.92	50.40	5579.63	7029.56	1625.17	2188.21
blank-6	2.64	3.88	5.04	2.76	3.16	925.37	7.92
blank average	1.92	1.94	2.82	2.42	6.84	676.30	17.66

blank subtraction							
SRM614-5	163.48	526.30	136.94	411.66	206.28	-21.06	321.90
SRM612-5	10224.66	31792.88	8749.79	23863.91	11879.79	157.66	21828.14
SRM610-5	87763.13	317647.97	73598.23	222984.96	89455.78	390.46	47232.73
AP1-5	14.28	53.50	21.06	261.62	125.68	-79.02	35.50
AP2-5	691.60	1680.47	21.70	605.14	2005.97	-7.42	874.58
AP3-5	3834.34	8789.59	40.98	4071.20	4026.98	342.74	3113.52
AP4-5	4560.43	10876.12	53.58	3961.88	5172.79	444.58	2201.07
34HP45-718-1	396.52	231.18	43.82	29.54	55.16	3238.92	221.10
34HP45-718-2	1046.13	552.70	59.10	14.82	52.04	3201.68	86.98
34HP45-718-3	803.52	453.42	125.34	57.22	102.04	2988.20	213.66
34HP45-718-4	3450.10	1875.75	298.10	40.10	122.64	4493.45	250.98
34HP45-718-5	2022.89	1175.35	218.82	31.06	87.72	4133.92	168.86
34HP45-718-6	1991.81	1119.95	214.58	48.02	137.28	4324.24	205.10
34HP45-718-7	2153.09	1126.51	228.02	50.90	124.40	3984.04	122.50
34HP45-718-8	2424.49	1302.51	240.18	31.74	95.68	3328.76	85.86
34HP45-718-9	3375.18	1919.15	245.58	45.34	122.32	3329.60	90.86
34HP45-718-10	1227.61	653.86	350.42	70.26	158.92	5917.73	426.22

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	995.97	585.78	381.70	49.10	103.52	5140.29	220.70
34HP45-718-12	984.93	560.58	381.86	30.82	126.92	6236.89	172.70
34HP45-718-13	531.60	416.98	415.38	369.62	388.32	5582.33	1345.71
34HP45-718-14	416.36	305.14	528.10	432.18	317.64	3820.88	1184.63
34HP45-718-15	355.12	202.02	348.78	223.26	158.40	3096.44	762.58
34HP45-718-16	207.76	128.26	254.26	31.70	81.32	4571.29	540.46
34HP45-718-17	125.08	81.14	207.14	14.14	66.84	4361.96	164.42
34HP45-718-18	127.68	106.82	207.38	13.70	60.00	3958.28	145.58
SRM614-6	202.24	719.98	244.50	643.98	307.68	639.18	365.02
SRM612-6	12083.55	45566.59	14576.06	39706.96	18822.86	653.86	23431.67
SRM610-6	120724.96	580591.75	145223.24	474083.77	178989.41	863.10	64114.30
AP1-6	0.52	15.50	23.74	603.22	114.64	232.62	7.26
AP2-6	795.60	2172.71	21.98	837.66	2688.10	366.38	877.14
AP3-6	4754.95	12753.65	23.50	5885.41	5835.31	994.35	3717.16
AP4-6	5568.43	14633.98	47.58	5577.21	7022.72	948.87	2170.55

zero correction

SRM614-5	163.48	526.30	136.94	411.66	206.28	0.00	321.90
SRM612-5	10224.66	31792.88	8749.79	23863.91	11879.79	157.66	21828.14
SRM610-5	87763.13	317647.97	73598.23	222984.96	89455.78	390.46	47232.73
AP1-5	14.28	53.50	21.06	261.62	125.68	0.00	35.50
AP2-5	691.60	1680.47	21.70	605.14	2005.97	0.00	874.58
AP3-5	3834.34	8789.59	40.98	4071.20	4026.98	342.74	3113.52
AP4-5	4560.43	10876.12	53.58	3961.88	5172.79	444.58	2201.07
34HP45-718-1	396.52	231.18	43.82	29.54	55.16	3238.92	221.10
34HP45-718-2	1046.13	552.70	59.10	14.82	52.04	3201.68	86.98
34HP45-718-3	803.52	453.42	125.34	57.22	102.04	2988.20	213.66
34HP45-718-4	3450.10	1875.75	298.10	40.10	122.64	4493.45	250.98
34HP45-718-5	2022.89	1175.35	218.82	31.06	87.72	4133.92	168.86
34HP45-718-6	1991.81	1119.95	214.58	48.02	137.28	4324.24	205.10
34HP45-718-7	2153.09	1126.51	228.02	50.90	124.40	3984.04	122.50
34HP45-718-8	2424.49	1302.51	240.18	31.74	95.68	3328.76	85.86
34HP45-718-9	3375.18	1919.15	245.58	45.34	122.32	3329.60	90.86
34HP45-718-10	1227.61	653.86	350.42	70.26	158.92	5917.73	426.22
34HP45-718-11	995.97	585.78	381.70	49.10	103.52	5140.29	220.70
34HP45-718-12	984.93	560.58	381.86	30.82	126.92	6236.89	172.70
34HP45-718-13	531.60	416.98	415.38	369.62	388.32	5582.33	1345.71
34HP45-718-14	416.36	305.14	528.10	432.18	317.64	3820.88	1184.63
34HP45-718-15	355.12	202.02	348.78	223.26	158.40	3096.44	762.58
34HP45-718-16	207.76	128.26	254.26	31.70	81.32	4571.29	540.46
34HP45-718-17	125.08	81.14	207.14	14.14	66.84	4361.96	164.42
34HP45-718-18	127.68	106.82	207.38	13.70	60.00	3958.28	145.58
SRM614-6	202.24	719.98	244.50	643.98	307.68	639.18	365.02
SRM612-6	12083.55	45566.59	14576.06	39706.96	18822.86	653.86	23431.67
SRM610-6	120724.96	580591.75	145223.24	474083.77	178989.41	863.10	64114.30
AP1-6	0.52	15.50	23.74	603.22	114.64	232.62	7.26
AP2-6	795.60	2172.71	21.98	837.66	2688.10	366.38	877.14
AP3-6	4754.95	12753.65	23.50	5885.41	5835.31	994.35	3717.16
AP4-6	5568.43	14633.98	47.58	5577.21	7022.72	948.87	2170.55

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-5	0.000109	0.000350	0.000091	0.000274	0.000137	0.000000	0.000214
SRM612-5	0.005891	0.018316	0.005041	0.013748	0.006844	0.000091	0.012576
SRM610-5	0.082387	0.298191	0.069090	0.209327	0.083976	0.000367	0.044340
AP1-5	0.000001	0.000004	0.000002	0.000020	0.000010	0.000000	0.000003
AP2-5	0.000049	0.000119	0.000002	0.000043	0.000142	0.000000	0.000062
AP3-5	0.000223	0.000511	0.000002	0.000237	0.000234	0.000020	0.000181
AP4-5	0.000274	0.000654	0.000003	0.000238	0.000311	0.000027	0.000132
34HP45-718-1	0.000047	0.000027	0.000005	0.000003	0.000007	0.000383	0.000026
34HP45-718-2	0.000082	0.000044	0.000005	0.000001	0.000004	0.000252	0.000007

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000054	0.000030	0.000008	0.000004	0.000007	0.000199	0.000014
34HP45-718-4	0.000163	0.000089	0.000014	0.000002	0.000006	0.000212	0.000012
34HP45-718-5	0.000123	0.000071	0.000013	0.000002	0.000005	0.000251	0.000010
34HP45-718-6	0.000127	0.000071	0.000014	0.000003	0.000009	0.000275	0.000013
34HP45-718-7	0.000125	0.000065	0.000013	0.000003	0.000007	0.000231	0.000007
34HP45-718-8	0.000133	0.000072	0.000013	0.000002	0.000005	0.000183	0.000005
34HP45-718-9	0.000177	0.000101	0.000013	0.000002	0.000006	0.000174	0.000005
34HP45-718-10	0.000077	0.000041	0.000022	0.000004	0.000010	0.000373	0.000027
34HP45-718-11	0.000059	0.000035	0.000022	0.000003	0.000006	0.000303	0.000013
34HP45-718-12	0.000054	0.000031	0.000021	0.000002	0.000007	0.000343	0.000009
34HP45-718-13	0.000033	0.000026	0.000026	0.000023	0.000024	0.000351	0.000085
34HP45-718-14	0.000026	0.000019	0.000033	0.000027	0.000020	0.000236	0.000073
34HP45-718-15	0.000020	0.000011	0.000020	0.000013	0.000009	0.000173	0.000043
34HP45-718-16	0.000013	0.000008	0.000016	0.000002	0.000005	0.000287	0.000034
34HP45-718-17	0.000007	0.000004	0.000011	0.000001	0.000004	0.000234	0.000009
34HP45-718-18	0.000008	0.000006	0.000012	0.000001	0.000004	0.000235	0.000009
SRM614-6	0.000167	0.000593	0.000201	0.000530	0.000253	0.000526	0.000301
SRM612-6	0.008011	0.030210	0.009664	0.026325	0.012479	0.000434	0.015535
SRM610-6	0.120494	0.579482	0.144946	0.473178	0.178647	0.000861	0.063992
AP1-6	0.000000	0.000001	0.000002	0.000043	0.000008	0.000017	0.000001
AP2-6	0.000052	0.000143	0.000001	0.000055	0.000177	0.000024	0.000058
AP3-6	0.000255	0.000684	0.000001	0.000316	0.000313	0.000053	0.000199
AP4-6	0.000328	0.000861	0.000003	0.000328	0.000413	0.000056	0.000128
standardize signal averages AP							
AP1	0.000001	0.000003	0.000002	0.000032	0.000009	0.000008	0.000002
AP2	0.000051	0.000131	0.000001	0.000049	0.000159	0.000012	0.000060
AP3	0.000239	0.000597	0.000002	0.000276	0.000273	0.000037	0.000190
AP4	0.000301	0.000757	0.000003	0.000283	0.000362	0.000041	0.000130
linest from std sig ave							
	0.043937	0.012177	4.167480	0.007573	0.044766	0.022764	0.015351
standardize signal averages SRM							
srm614-2	0.000138	0.000472	0.000146	0.000402	0.000195	0.000263	0.000257
srm612-2	0.006951	0.024263	0.007352	0.020037	0.009662	0.000262	0.014055
srm610-2	0.101441	0.438837	0.107018	0.341252	0.131312	0.000614	0.054166
linest from std sig ave							
	0.053112	0.011570	0.045555	0.012903	0.039585	0.000000	0.013132
concentration data							
SRM614-5	0.41	0.37	32.56	0.18	0.53	0.00	0.28
SRM612-5	22.20	19.13	1801.69	8.93	26.28	0.18	16.56
SRM610-5	310.45	311.41	24693.90	135.96	322.41	0.72	58.38
AP1-5	0.02	0.02	2.67	0.06	0.17	0.00	0.02
AP2-5	0.86	0.58	2.55	0.13	2.53	0.00	0.38
AP3-5	3.90	2.48	3.96	0.71	4.18	0.18	1.11
AP4-5	4.81	3.18	5.35	0.72	5.55	0.24	0.81
34HP45-718-1	0.82	0.13	8.61	0.01	0.12	3.48	0.16
34HP45-718-2	1.44	0.21	7.73	0.00	0.07	2.29	0.04
34HP45-718-3	0.94	0.15	13.90	0.01	0.12	1.81	0.09
34HP45-718-4	2.86	0.43	23.40	0.01	0.10	1.93	0.07
34HP45-718-5	2.15	0.35	22.06	0.01	0.09	2.28	0.06
34HP45-718-6	2.22	0.35	22.66	0.01	0.16	2.49	0.08
34HP45-718-7	2.19	0.32	21.99	0.01	0.13	2.10	0.04
34HP45-718-8	2.33	0.35	21.93	0.01	0.09	1.66	0.03
34HP45-718-9	3.10	0.49	21.39	0.01	0.11	1.58	0.03
34HP45-718-10	1.36	0.20	36.70	0.01	0.18	3.39	0.16
34HP45-718-11	1.03	0.17	37.39	0.01	0.11	2.75	0.08
34HP45-718-12	0.95	0.15	34.90	0.01	0.12	3.11	0.06
34HP45-718-13	0.59	0.13	43.45	0.07	0.44	3.19	0.52
34HP45-718-14	0.45	0.09	54.33	0.08	0.35	2.15	0.45
34HP45-718-15	0.35	0.05	32.48	0.04	0.16	1.58	0.26
34HP45-718-16	0.23	0.04	26.52	0.01	0.09	2.60	0.21
34HP45-718-17	0.12	0.02	18.49	0.00	0.06	2.13	0.05
34HP45-718-18	0.13	0.03	20.49	0.00	0.06	2.14	0.05
SRM614-6	0.63	0.62	71.96	0.34	0.97	1.03	0.40
SRM612-6	30.19	31.55	3453.96	17.10	47.91	0.85	20.45
SRM610-6	454.05	605.17	51805.88	307.33	685.88	1.68	84.25
AP1-6	0.00	0.01	2.82	0.13	0.15	0.15	0.00
AP2-6	0.92	0.69	2.40	0.17	3.16	0.22	0.35
AP3-6	4.47	3.32	2.09	0.95	5.59	0.48	1.22
AP4-6	5.74	4.18	4.66	0.99	7.38	0.51	0.78
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	461.50	434.70	417.70	376.60	445.30	61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-3		3.76	3.36	2.80	1.72	7.00	529.12
SRM614-3		300.52	785.96	208.40	669.00	309.64	752.48
SRM612-3		13025.71	40575.03	11115.66	30855.77	25715.86	931.81
SRM610-3		94923.13	348017.03	80580.02	242689.53	90270.75	1097.45
AP1-3		64.04	159.92	38.20	427.44	257.68	619.80
AP2-3		814.80	2107.85	71.36	898.61	2528.57	590.88
AP3-3		6780.80	15817.09	86.28	8212.17	7923.04	778.68
AP4-3		5601.79	13341.48	67.04	5135.23	6933.04	817.56
34HP45-856-1		297.60	158.20	95.12	21.80	125.36	2724.62
34HP45-856-2		235.16	129.76	95.80	13.24	85.32	2092.93
34HP45-856-3		151.56	85.56	92.00	19.24	116.20	2382.53
34HP45-856-4		172.52	114.68	228.60	130.20	296.28	2675.78
34HP45-856-5		251.84	108.08	231.16	184.32	192.56	2809.70
34HP45-856-6		214.12	114.56	215.44	152.76	458.72	2904.10
34HP45-856-7		263.48	170.52	354.00	252.84	188.16	3309.50
34HP45-856-8		357.12	206.32	495.96	225.20	281.20	3535.82
34HP45-856-9		261.64	149.76	328.68	302.72	488.24	3527.58
34HP45-856-10		99.56	77.20	110.32	41.52	125.60	3969.30
34HP45-856-11		111.28	63.76	134.52	33.32	118.12	3866.34
34HP45-856-12		187.28	105.48	192.20	78.52	181.56	3846.66
34HP45-856-13		107.64	80.68	131.96	39.92	182.72	4369.02
34HP45-856-14		103.96	54.44	113.76	37.36	167.20	4475.63
34HP45-856-15		80.20	65.32	84.76	23.32	142.96	4276.26
34HP45-856-16		200.92	104.04	65.00	51.04	245.64	4401.46
34HP45-856-17		92.32	61.64	26.40	15.96	217.20	4199.46
34HP45-856-18		123.44	69.56	42.88	22.40	183.48	3858.74
SRM614-4		280.24	951.57	285.80	792.48	395.48	1667.25
SRM612-4		15609.17	59254.90	18664.98	52281.41	23593.17	1610.25
SRM610-4		155695.39	753478.31	189834.67	625396.38	237147.50	1711.69
AP1-4		6.80	25.00	15.76	476.28	155.24	1072.13
AP2-4		970.17	2580.85	29.32	1003.37	3275.98	1024.01
AP3-4		7235.92	19312.27	66.00	9697.38	9667.41	1232.53
AP4-4		7761.32	21022.24	58.60	9170.73	11999.83	1228.25
blank-4		4.48	2.40	3.36	1.16	4.88	1417.05
blank average		4.12	2.88	3.08	1.44	5.94	973.09

blank subtraction							
SRM614-3	296.40	783.08	205.32	667.56	303.70	-220.60	500.84
SRM612-3	13021.59	40572.15	11112.58	30854.33	25709.92	-41.28	30510.33
SRM610-3	94919.01	348014.15	80576.94	242688.09	90264.81	124.36	39651.22
AP1-3	59.92	157.04	35.12	426.00	251.74	-353.28	102.88
AP2-3	810.68	2104.97	68.28	897.17	2522.63	-382.20	1183.33
AP3-3	6776.68	15814.21	83.20	8210.73	7917.10	-194.40	6369.76
AP4-3	5597.67	13338.60	63.96	5133.79	6927.10	-155.52	2919.06
34HP45-856-1	293.48	155.32	92.04	20.36	119.42	1751.53	1642.49
34HP45-856-2	231.04	126.88	92.72	11.80	79.38	1119.85	1440.41
34HP45-856-3	147.44	82.68	88.92	17.80	110.26	1409.45	821.00
34HP45-856-4	168.40	111.80	225.52	128.76	290.34	1702.69	262.64
34HP45-856-5	247.72	105.20	228.08	182.88	186.62	1836.61	280.44
34HP45-856-6	210.00	111.68	212.36	151.32	452.78	1931.01	394.56
34HP45-856-7	259.36	167.64	350.92	251.40	182.22	2336.41	297.52
34HP45-856-8	353.00	203.44	492.88	223.76	275.26	2562.73	444.16
34HP45-856-9	257.52	146.88	325.60	301.28	482.30	2554.49	523.72
34HP45-856-10	95.44	74.32	107.24	40.08	119.66	2996.22	106.08
34HP45-856-11	107.16	60.88	131.44	31.88	112.18	2893.26	121.12
34HP45-856-12	183.16	102.60	189.12	77.08	175.62	2873.58	151.04
34HP45-856-13	103.52	77.80	128.88	38.48	176.78	3395.94	165.24
34HP45-856-14	99.84	51.56	110.68	35.92	161.26	3502.54	225.04
34HP45-856-15	76.08	62.44	81.68	21.88	137.02	3303.18	172.88
34HP45-856-16	196.80	101.16	61.92	49.60	239.70	3428.38	56.80
34HP45-856-17	88.20	58.76	23.32	14.52	211.26	3226.38	23.28
34HP45-856-18	119.32	66.68	39.80	20.96	177.54	2885.66	23.56
SRM614-4	276.12	948.69	282.72	791.04	389.54	694.16	418.12
SRM612-4	15605.05	59252.01	18661.90	52279.97	23587.23	637.16	27699.24
SRM610-4	155691.27	753475.43	189831.59	625394.94	237141.56	738.60	71780.64
AP1-4	2.68	22.12	12.68	474.84	149.30	99.04	14.28
AP2-4	966.05	2577.97	26.24	1001.93	3270.04	50.92	1103.25
AP3-4	7231.80	19309.39	62.92	9695.93	9661.47	259.44	6589.08
AP4-4	7757.20	21019.36	55.52	9169.29	11993.89	255.16	4545.31

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-3	296.40	783.08	205.32	667.56	303.70	0.00	500.84
SRM612-3	13021.59	40572.15	11112.58	30854.33	25709.92	0.00	30510.33
SRM610-3	94919.01	348014.15	80576.94	242688.09	90264.81	124.36	39651.22
AP1-3	59.92	157.04	35.12	426.00	251.74	0.00	102.88
AP2-3	810.68	2104.97	68.28	897.17	2522.63	0.00	1183.33
AP3-3	6776.68	15814.21	83.20	8210.73	7917.10	0.00	6369.76
AP4-3	5597.67	13338.60	63.96	5133.79	6927.10	0.00	2919.06
34HP45-856-1	293.48	155.32	92.04	20.36	119.42	1751.53	1642.49
34HP45-856-2	231.04	126.88	92.72	11.80	79.38	1119.85	1440.41
34HP45-856-3	147.44	82.68	88.92	17.80	110.26	1409.45	821.00
34HP45-856-4	168.40	111.80	225.52	128.76	290.34	1702.69	262.64
34HP45-856-5	247.72	105.20	228.08	182.88	186.62	1836.61	280.44
34HP45-856-6	210.00	111.68	212.36	151.32	452.78	1931.01	394.56
34HP45-856-7	259.36	167.64	350.92	251.40	182.22	2336.41	297.52
34HP45-856-8	353.00	203.44	492.88	223.76	275.26	2562.73	444.16
34HP45-856-9	257.52	146.88	325.60	301.28	482.30	2554.49	523.72
34HP45-856-10	95.44	74.32	107.24	40.08	119.66	2996.22	106.08
34HP45-856-11	107.16	60.88	131.44	31.88	112.18	2893.26	121.12
34HP45-856-12	183.16	102.60	189.12	77.08	175.62	2873.58	151.04
34HP45-856-13	103.52	77.80	128.88	38.48	176.78	3395.94	165.24
34HP45-856-14	99.84	51.56	110.68	35.92	161.26	3502.54	225.04
34HP45-856-15	76.08	62.44	81.68	21.88	137.02	3303.18	172.88
34HP45-856-16	196.80	101.16	61.92	49.60	239.70	3428.38	56.80
34HP45-856-17	88.20	58.76	23.32	14.52	211.26	3226.38	23.28
34HP45-856-18	119.32	66.68	39.80	20.96	177.54	2885.66	23.56
SRM614-4	276.12	948.69	282.72	791.04	389.54	694.16	418.12
SRM612-4	15605.05	59252.01	18661.90	52279.97	23587.23	637.16	27699.24
SRM610-4	155691.27	753475.43	189831.59	625394.94	237141.56	738.60	71780.64
AP1-4	2.68	22.12	12.68	474.84	149.30	99.04	14.28
AP2-4	966.05	2577.97	26.24	1001.93	3270.04	50.92	1103.25
AP3-4	7231.80	19309.39	62.92	9695.93	9661.47	259.44	6589.08
AP4-4	7757.20	21019.36	55.52	9169.29	11993.89	255.16	4545.31
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-3	0.000125	0.000331	0.000087	0.000282	0.000128	0.000000	0.000211
SRM612-3	0.005269	0.016417	0.004497	0.012485	0.010403	0.000000	0.012346
SRM610-3	0.068632	0.251635	0.058262	0.175478	0.065267	0.000090	0.028670
AP1-3	0.000004	0.000010	0.000002	0.000028	0.000017	0.000000	0.000007
AP2-3	0.000050	0.000129	0.000004	0.000055	0.000155	0.000000	0.000073
AP3-3	0.000304	0.000709	0.000004	0.000368	0.000355	0.000000	0.000285
AP4-3	0.000297	0.000708	0.000003	0.000273	0.000368	0.000000	0.000155
34HP45-856-1	0.000017	0.000009	0.000005	0.000001	0.000007	0.000103	0.000097
34HP45-856-2	0.000014	0.000008	0.000006	0.000001	0.000005	0.000068	0.000088
34HP45-856-3	0.000010	0.000005	0.000006	0.000001	0.000007	0.000093	0.000054
34HP45-856-4	0.000013	0.000009	0.000018	0.000010	0.000023	0.000134	0.000021
34HP45-856-5	0.000017	0.000007	0.000016	0.000013	0.000013	0.000127	0.000019
34HP45-856-6	0.000013	0.000007	0.000014	0.000010	0.000029	0.000123	0.000025
34HP45-856-7	0.000019	0.000012	0.000026	0.000019	0.000013	0.000173	0.000022
34HP45-856-8	0.000025	0.000015	0.000035	0.000016	0.000020	0.000185	0.000032
34HP45-856-9	0.000019	0.000011	0.000024	0.000022	0.000036	0.000190	0.000039
34HP45-856-10	0.000006	0.000005	0.000007	0.000003	0.000008	0.000202	0.000007
34HP45-856-11	0.000007	0.000004	0.000009	0.000002	0.000007	0.000191	0.000008
34HP45-856-12	0.000012	0.000007	0.000012	0.000005	0.000012	0.000188	0.000010
34HP45-856-13	0.000007	0.000005	0.000008	0.000002	0.000011	0.000216	0.000011
34HP45-856-14	0.000007	0.000004	0.000008	0.000002	0.000011	0.000243	0.000016
34HP45-856-15	0.000006	0.000005	0.000007	0.000002	0.000011	0.000264	0.000014
34HP45-856-16	0.000021	0.000011	0.000007	0.000005	0.000025	0.000363	0.000006
34HP45-856-17	0.000009	0.000006	0.000002	0.000002	0.000022	0.000335	0.000002
34HP45-856-18	0.000015	0.000008	0.000005	0.000003	0.000023	0.000367	0.000003

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000186	0.000638	0.000190	0.000532	0.000262	0.000467	0.000281
SRM612-4	0.008277	0.031428	0.009899	0.027730	0.012511	0.000338	0.014692
SRM610-4	0.125735	0.608500	0.153306	0.505063	0.191513	0.000596	0.057969
AP1-4	0.000000	0.000001	0.000001	0.000031	0.000010	0.000006	0.000001
AP2-4	0.000057	0.000153	0.000002	0.000060	0.000195	0.000003	0.000066
AP3-4	0.000313	0.000835	0.000003	0.000419	0.000418	0.000011	0.000285
AP4-4	0.000377	0.001020	0.000003	0.000445	0.000582	0.000012	0.000221

standardize signal averages AP

AP1	0.000002	0.000006	0.000002	0.000029	0.000013	0.000003	0.000004
AP2	0.000054	0.000141	0.000003	0.000057	0.000175	0.000002	0.000069
AP3	0.000308	0.000772	0.000003	0.000394	0.000386	0.000006	0.000285
AP4	0.000337	0.000864	0.000003	0.000359	0.000475	0.000006	0.000188

linest from std sig ave

0.036546	0.010043	3.020483	0.005507	0.033618	0.142268	0.010253
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standardize signal averages SRM

srm614-2	0.000155	0.000484	0.000138	0.000407	0.000195	0.000234	0.000246
srm612-2	0.006773	0.023923	0.007198	0.020108	0.011457	0.000169	0.013519
srm610-2	0.097184	0.430068	0.105784	0.340271	0.128390	0.000343	0.043320

linest from std sig ave

0.055435	0.011806	0.046088	0.012940	0.040439	0.000000	0.016164
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concentration data

SRM614-3	0.39	0.28	22.45	0.13	0.37	0.00	0.19
SRM612-3	16.51	14.14	1164.82	5.90	29.99	0.00	10.86
SRM610-3	215.11	216.75	15092.52	82.87	188.18	1.10	25.21
AP1-3	0.06	0.04	2.79	0.06	0.22	0.00	0.03
AP2-3	0.73	0.52	5.05	0.12	2.08	0.00	0.30
AP3-3	4.43	2.84	4.49	0.81	4.76	0.00	1.17
AP4-3	4.33	2.84	4.09	0.60	4.93	0.00	0.63
34HP45-856-1	0.25	0.04	6.52	0.00	0.09	5.85	0.40
34HP45-856-2	0.21	0.03	6.80	0.00	0.06	3.87	0.36
34HP45-856-3	0.14	0.02	7.09	0.00	0.10	5.29	0.22
34HP45-856-4	0.19	0.04	21.38	0.02	0.31	7.60	0.08
34HP45-856-5	0.25	0.03	19.08	0.03	0.17	7.24	0.08
34HP45-856-6	0.20	0.03	16.35	0.02	0.39	7.00	0.10
34HP45-856-7	0.28	0.05	31.32	0.04	0.18	9.82	0.09
34HP45-856-8	0.37	0.06	42.76	0.04	0.27	10.47	0.13
34HP45-856-9	0.28	0.04	29.19	0.05	0.48	10.79	0.16
34HP45-856-10	0.09	0.02	8.69	0.01	0.11	11.44	0.03
34HP45-856-11	0.10	0.02	10.44	0.00	0.10	10.82	0.03
34HP45-856-12	0.17	0.03	14.93	0.01	0.15	10.69	0.04
34HP45-856-13	0.10	0.02	9.88	0.01	0.15	12.27	0.04
34HP45-856-14	0.10	0.01	9.26	0.01	0.15	13.81	0.06
34HP45-856-15	0.09	0.02	7.85	0.00	0.15	14.96	0.06
34HP45-856-16	0.30	0.04	7.91	0.01	0.34	20.63	0.02
34HP45-856-17	0.13	0.02	2.92	0.00	0.29	19.03	0.01
34HP45-856-18	0.22	0.03	6.09	0.01	0.30	20.81	0.01
SRM614-4	0.58	0.55	49.28	0.25	0.76	5.70	0.25
SRM612-4	25.94	27.07	2564.19	13.10	36.07	4.12	12.92
SRM610-4	394.09	524.13	39713.33	238.53	552.17	7.28	50.98
AP1-4	0.00	0.00	0.21	0.01	0.03	0.08	0.00
AP2-4	0.18	0.13	0.40	0.03	0.56	0.04	0.06
AP3-4	0.98	0.72	0.71	0.20	1.21	0.14	0.25
AP4-4	5.49	4.09	3.25	0.98	7.81	0.70	0.90

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

raw data

	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-1	4.32	2.12	3.48	0.84	2.92	339.52	14.32
SRM614-1	267.96	781.24	224.48	626.96	332.52	585.12	525.52
SRM612-1	13651.64	44424.89	12492.19	35548.24	16622.25	752.08	28422.56
SRM610-1	125823.51	504842.00	116637.18	376047.81	157279.28	1061.85	90444.43
AP1-1	19.64	50.64	26.80	173.76	177.40	506.16	53.16
AP2-1	912.73	2199.01	38.44	841.20	2493.77	534.80	873.80
AP3-1	4408.15	10728.98	62.16	4934.27	4791.79	661.40	3229.14
AP4-1	7085.44	17404.02	89.84	7101.92	10252.82	808.80	3877.58

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	100.76	65.76	49.08	18.48	219.76	1479.69	60.84
34HP45-695-2	74.24	58.96	29.52	5.56	281.28	1297.69	40.12
34HP45-695-3	91.88	54.44	31.84	5.52	272.48	1343.09	31.08
34HP45-695-4	124.84	66.64	157.60	116.88	99.04	1119.53	149.60
34HP45-695-5	149.64	94.00	120.52	93.96	80.36	1089.61	141.28
34HP45-695-6	150.80	76.44	209.48	174.32	111.88	1166.17	217.88
34HP45-695-7	115.60	63.12	110.00	67.68	287.24	1581.25	123.76
34HP45-695-8	125.20	92.60	154.88	63.60	233.24	1454.29	180.88
34HP45-695-9	212.04	123.28	152.92	60.24	184.40	1342.89	114.92
34HP45-695-10	97.80	84.24	85.32	71.04	299.80	1911.09	98.32
34HP45-695-11	119.00	67.72	99.52	63.96	280.52	1801.17	69.92
34HP45-695-12	129.52	94.60	115.20	101.08	288.20	1698.49	135.80
34HP45-695-13	138.72	88.96	183.56	86.28	331.64	2190.09	168.00
34HP45-695-14	76.04	45.32	71.04	26.68	204.76	2084.41	74.36
34HP45-695-15	87.44	56.44	93.76	88.80	242.52	1773.65	150.88
34HP45-695-16	82.00	67.76	56.76	38.48	222.16	1855.85	99.20
34HP45-695-17	55.48	53.88	40.00	21.40	163.12	1762.45	69.80
34HP45-695-18	58.68	39.32	49.84	13.08	187.92	1674.89	49.40
SRM614-2	257.04	1029.85	352.60	1008.65	509.60	1032.97	502.76
SRM612-2	15426.01	61500.39	20418.31	55896.36	23748.73	1114.09	31723.58
SRM610-2	151941.81	772868.38	201698.89	660602.88	238640.06	1219.17	92893.09
AP1-2	8.12	18.24	12.08	175.92	147.68	777.76	27.96
AP2-2	850.88	2492.33	32.08	959.97	3065.94	735.64	917.89
AP3-2	4920.95	13313.84	41.40	6779.20	5992.55	866.92	3149.74
AP4-2	8576.61	24011.70	90.52	11158.14	14469.36	1047.89	4604.99
blank-2	3.20	5.04	4.04	5.48	5.00	662.24	15.28
blank average	3.76	3.58	3.76	3.16	3.96	500.88	14.80

blank subtraction							
SRM614-1	264.20	777.66	220.72	623.80	328.56	84.24	510.72
SRM612-1	13647.88	44421.31	12488.43	35545.08	16618.29	251.20	28407.76
SRM610-1	125819.75	504838.42	116633.42	376044.65	157275.32	560.96	90429.63
AP1-1	15.88	47.06	23.04	170.60	173.44	5.28	38.36
AP2-1	908.97	2195.43	34.68	838.04	2489.81	33.92	859.00
AP3-1	4404.38	10725.40	58.40	4931.11	4787.83	160.52	3214.34
AP4-1	7081.68	17400.44	86.08	7098.76	10248.86	307.92	3862.78
34HP45-695-1	97.00	62.18	45.32	15.32	215.80	978.81	46.04
34HP45-695-2	70.48	55.38	25.76	2.40	277.32	796.80	25.32
34HP45-695-3	88.12	50.86	28.08	2.36	268.52	842.20	16.28
34HP45-695-4	121.08	63.06	153.84	113.72	95.08	618.64	134.80
34HP45-695-5	145.88	90.42	116.76	90.80	76.40	588.72	126.48
34HP45-695-6	147.04	72.86	205.72	171.16	107.92	665.28	203.08
34HP45-695-7	111.84	59.54	106.24	64.52	283.28	1080.37	108.96
34HP45-695-8	121.44	89.02	151.12	60.44	229.28	953.41	166.08
34HP45-695-9	208.28	119.70	149.16	57.08	180.44	842.00	100.12
34HP45-695-10	94.04	80.66	81.56	67.88	295.84	1410.21	83.52
34HP45-695-11	115.24	64.14	95.76	60.80	276.56	1300.29	55.12
34HP45-695-12	125.76	91.02	111.44	97.92	284.24	1197.61	121.00
34HP45-695-13	134.96	85.38	179.80	83.12	327.68	1689.21	153.20
34HP45-695-14	72.28	41.74	67.28	23.52	200.80	1583.53	59.56
34HP45-695-15	83.68	52.86	90.00	85.64	238.56	1272.77	136.08
34HP45-695-16	78.24	64.18	53.00	35.32	218.20	1354.97	84.40
34HP45-695-17	51.72	50.30	36.24	18.24	159.16	1261.57	55.00
34HP45-695-18	54.92	35.74	46.08	9.92	183.96	1174.01	34.60
SRM614-2	253.28	1026.27	348.84	1005.49	505.64	532.08	487.96
SRM612-2	15422.25	61496.81	20414.55	55893.19	23744.77	613.20	31708.78
SRM610-2	151938.05	772864.80	201695.13	660599.72	238636.10	718.28	92878.29
AP1-2	4.36	14.66	8.32	172.76	143.72	276.88	13.16
AP2-2	847.12	2488.75	28.32	956.81	3061.98	234.76	903.09
AP3-2	4917.19	13310.25	37.64	6776.04	5988.59	366.04	3134.94
AP4-2	8572.85	24008.11	86.76	11154.98	14465.40	547.00	4590.19

zero correction							
SRM614-1	264.20	777.66	220.72	623.80	328.56	84.24	510.72
SRM612-1	13647.88	44421.31	12488.43	35545.08	16618.29	251.20	28407.76
SRM610-1	125819.75	504838.42	116633.42	376044.65	157275.32	560.96	90429.63
AP1-1	15.88	47.06	23.04	170.60	173.44	5.28	38.36
AP2-1	908.97	2195.43	34.68	838.04	2489.81	33.92	859.00
AP3-1	4404.38	10725.40	58.40	4931.11	4787.83	160.52	3214.34
AP4-1	7081.68	17400.44	86.08	7098.76	10248.86	307.92	3862.78
34HP45-695-1	97.00	62.18	45.32	15.32	215.80	978.81	46.04
34HP45-695-2	70.48	55.38	25.76	2.40	277.32	796.80	25.32
34HP45-695-3	88.12	50.86	28.08	2.36	268.52	842.20	16.28
34HP45-695-4	121.08	63.06	153.84	113.72	95.08	618.64	134.80
34HP45-695-5	145.88	90.42	116.76	90.80	76.40	588.72	126.48
34HP45-695-6	147.04	72.86	205.72	171.16	107.92	665.28	203.08
34HP45-695-7	111.84	59.54	106.24	64.52	283.28	1080.37	108.96
34HP45-695-8	121.44	89.02	151.12	60.44	229.28	953.41	166.08

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	208.28	119.70	149.16	57.08	180.44	842.00	100.12
34HP45-695-10	94.04	80.66	81.56	67.88	295.84	1410.21	83.52
34HP45-695-11	115.24	64.14	95.76	60.80	276.56	1300.29	55.12
34HP45-695-12	125.76	91.02	111.44	97.92	284.24	1197.61	121.00
34HP45-695-13	134.96	85.38	179.80	83.12	327.68	1689.21	153.20
34HP45-695-14	72.28	41.74	67.28	23.52	200.80	1583.53	59.56
34HP45-695-15	83.68	52.86	90.00	85.64	238.56	1272.77	136.08
34HP45-695-16	78.24	64.18	53.00	35.32	218.20	1354.97	84.40
34HP45-695-17	51.72	50.30	36.24	18.24	159.16	1261.57	55.00
34HP45-695-18	54.92	35.74	46.08	9.92	183.96	1174.01	34.60
SRM614-2	253.28	1026.27	348.84	1005.49	505.64	532.08	487.96
SRM612-2	15422.25	61496.81	20414.55	55893.19	23744.77	613.20	31708.78
SRM610-2	151938.05	772864.80	201695.13	660599.72	238636.10	718.28	92878.29
AP1-2	4.36	14.66	8.32	172.76	143.72	276.88	13.16
AP2-2	847.12	2488.75	28.32	956.81	3061.98	234.76	903.09
AP3-2	4917.19	13310.25	37.64	6776.04	5988.59	366.04	3134.94
AP4-2	8572.85	24008.11	86.76	11154.98	14465.40	547.00	4590.19

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-1	0.000130	0.000381	0.000108	0.000306	0.000161	0.000041	0.000250
SRM612-1	0.005913	0.019247	0.005411	0.015401	0.007200	0.000109	0.012308
SRM610-1	0.081949	0.328813	0.075966	0.244927	0.102437	0.000365	0.058899
AP1-1	0.000001	0.000003	0.000001	0.000011	0.000011	0.000000	0.000002
AP2-1	0.000051	0.000124	0.000002	0.000047	0.000140	0.000002	0.000048
AP3-1	0.000197	0.000479	0.000003	0.000220	0.000214	0.000007	0.000144
AP4-1	0.000313	0.000770	0.000004	0.000314	0.000453	0.000014	0.000171
34HP45-695-1	0.000009	0.000006	0.000004	0.000001	0.000020	0.000089	0.000004
34HP45-695-2	0.000008	0.000007	0.000003	0.000000	0.000033	0.000096	0.000003
34HP45-695-3	0.000010	0.000006	0.000003	0.000000	0.000031	0.000097	0.000002
34HP45-695-4	0.000007	0.000004	0.000009	0.000007	0.000006	0.000037	0.000008
34HP45-695-5	0.000010	0.000006	0.000008	0.000006	0.000005	0.000040	0.000009
34HP45-695-6	0.000012	0.000006	0.000017	0.000014	0.000009	0.000055	0.000017
34HP45-695-7	0.000007	0.000004	0.000007	0.000004	0.000018	0.000070	0.000007
34HP45-695-8	0.000008	0.000006	0.000010	0.000004	0.000015	0.000063	0.000011
34HP45-695-9	0.000013	0.000007	0.000009	0.000004	0.000011	0.000053	0.000006
34HP45-695-10	0.000007	0.000006	0.000006	0.000005	0.000023	0.000108	0.000006
34HP45-695-11	0.000009	0.000005	0.000008	0.000005	0.000022	0.000102	0.000004
34HP45-695-12	0.000011	0.000008	0.000010	0.000009	0.000026	0.000108	0.000011
34HP45-695-13	0.000010	0.000006	0.000013	0.000006	0.000024	0.000125	0.000011
34HP45-695-14	0.000006	0.000003	0.000005	0.000002	0.000016	0.000124	0.000005
34HP45-695-15	0.000006	0.000004	0.000007	0.000007	0.000019	0.000099	0.000011
34HP45-695-16	0.000006	0.000005	0.000004	0.000003	0.000018	0.000110	0.000007
34HP45-695-17	0.000004	0.000004	0.000003	0.000002	0.000014	0.000107	0.000005
34HP45-695-18	0.000004	0.000003	0.000004	0.000001	0.000015	0.000094	0.000003
SRM614-2	0.000161	0.000652	0.000222	0.000639	0.000321	0.000338	0.000310
SRM612-2	0.008790	0.035051	0.011635	0.031857	0.013534	0.000350	0.018073
SRM610-2	0.131141	0.667074	0.174087	0.570176	0.205971	0.000620	0.080165
AP1-2	0.000000	0.000001	0.000001	0.000012	0.000010	0.000020	0.000001
AP2-2	0.000057	0.000167	0.000002	0.000064	0.000205	0.000016	0.000061
AP3-2	0.000260	0.000704	0.000002	0.000358	0.000317	0.000019	0.000166
AP4-2	0.000425	0.001189	0.000004	0.000553	0.000716	0.000027	0.000227

standardize signal averages AP							
AP1	0.000001	0.000002	0.000001	0.000011	0.000011	0.000010	0.000002
AP2	0.000054	0.000145	0.000002	0.000056	0.000173	0.000009	0.000054
AP3	0.000228	0.000592	0.000002	0.000289	0.000265	0.000013	0.000155
AP4	0.000369	0.000979	0.000004	0.000433	0.000585	0.000020	0.000199

linest from std sig ave							
	0.039301	0.010360	3.516647	0.005823	0.032642	0.048318	0.014659

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.000145	0.000517	0.000165	0.000473	0.000241	0.000190	0.000280
srM612-2	0.007352	0.027149	0.008523	0.023629	0.010367	0.000229	0.015191
srM610-2	0.106545	0.497944	0.125026	0.407551	0.154204	0.000493	0.069532
linest from std sig ave							
	0.050566	0.010197	0.038995	0.010804	0.033720	0.000000	0.010322
concentration data							
SRM614-1	0.44	0.34	32.64	0.15	0.45	0.17	0.31
SRM612-1	19.93	17.10	1631.93	7.69	20.16	0.45	15.47
SRM610-1	276.22	292.16	22911.26	122.32	286.77	1.51	74.05
AP1-1	0.02	0.01	2.04	0.02	0.14	0.01	0.01
AP2-1	0.80	0.51	2.74	0.11	1.83	0.04	0.28
AP3-1	3.09	1.98	3.66	0.51	2.79	0.14	0.84
AP4-1	4.91	3.18	5.34	0.73	5.90	0.26	1.00
34HP45-695-1	0.14	0.02	5.76	0.00	0.25	1.71	0.02
34HP45-695-2	0.13	0.03	4.35	0.00	0.44	1.85	0.02
34HP45-695-3	0.16	0.02	4.55	0.00	0.40	1.87	0.01
34HP45-695-4	0.11	0.02	12.91	0.02	0.07	0.71	0.05
34HP45-695-5	0.16	0.03	11.11	0.01	0.07	0.77	0.05
34HP45-695-6	0.19	0.03	23.99	0.03	0.12	1.07	0.10
34HP45-695-7	0.11	0.02	9.70	0.01	0.24	1.36	0.04
34HP45-695-8	0.13	0.02	13.95	0.01	0.20	1.21	0.06
34HP45-695-9	0.20	0.03	13.08	0.01	0.15	1.01	0.04
34HP45-695-10	0.11	0.03	8.77	0.01	0.30	2.08	0.04
34HP45-695-11	0.14	0.02	10.55	0.01	0.28	1.97	0.03
34HP45-695-12	0.18	0.03	14.04	0.02	0.33	2.07	0.06
34HP45-695-13	0.16	0.03	18.62	0.01	0.32	2.40	0.07
34HP45-695-14	0.09	0.01	7.41	0.00	0.21	2.40	0.03
34HP45-695-15	0.10	0.02	9.80	0.02	0.24	1.91	0.06
34HP45-695-16	0.10	0.02	6.05	0.01	0.23	2.13	0.04
34HP45-695-17	0.07	0.02	4.33	0.00	0.18	2.07	0.03
34HP45-695-18	0.07	0.01	5.18	0.00	0.19	1.81	0.02
SRM614-2	0.54	0.58	66.88	0.32	0.90	1.40	0.39
SRM612-2	29.63	31.14	3509.24	15.91	37.89	1.45	22.72
SRM610-2	442.02	592.71	52504.26	284.76	576.62	2.57	100.79
AP1-2	0.00	0.00	0.83	0.03	0.13	0.38	0.01
AP2-2	0.89	0.69	2.66	0.15	2.67	0.30	0.35
AP3-2	4.08	2.91	2.79	0.83	4.13	0.37	0.97
AP4-2	6.66	4.91	6.03	1.28	9.33	0.52	1.33
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-1	3.20	2.56	7.04	4.52	19.44	635.52	123.64
SRM614-1	653.88	2313.73	776.44	2122.33	3074.74	1480.89	1088.69
SRM612-1	11387.74	41506.84	13239.07	37591.93	18529.10	1898.45	9109.33
SRM610-1	88721.62	378857.66	112338.55	341693.00	137737.94	1988.93	25767.31
AP1-1	170.20	574.52	216.96	1201.97	5065.91	1666.73	352.76
AP2-1	1297.17	3401.14	109.44	1748.37	6154.95	1765.33	1439.81
AP3-1	5069.71	14185.32	121.32	6976.68	8774.25	1767.69	5197.07
AP4-1	9777.21	27572.20	164.80	11284.58	19951.35	2003.65	7657.16
MZ1-1	26.16	42.40	23.96	272.84	303.24	1466.97	237.60
MZ1-2	20.76	24.60	9.80	7.40	150.56	1501.89	101.68
MZ1-3	18.64	18.80	15.44	5.84	98.96	1380.37	73.44
MZ1-4	29.48	41.76	19.44	22.04	242.16	1772.93	121.88
MZ1-5	23.40	22.76	29.80	14.28	93.52	1525.65	91.92
MZ1-6	17.40	13.92	20.00	12.80	74.96	1446.81	118.52
MZ1-7	17.12	19.80	18.92	14.00	121.68	1565.85	99.76
MZ1-8	13.48	22.72	16.60	9.92	123.28	1381.57	127.44
MZ1-9	9.88	15.68	25.92	4.00	104.80	1384.81	128.92
MZ1-10	14.64	13.56	17.44	19.52	174.04	1696.77	85.20
MZ1-11	10.84	6.16	15.40	6.56	139.44	1503.89	75.56
MZ1-12	12.20	11.56	10.60	6.32	159.16	1376.53	66.24
MZ1-13	45.40	52.72	55.88	18.32	296.64	1462.65	108.40
MZ1-14	55.28	47.24	67.60	20.08	355.12	1260.45	125.12
MZ1-15	34.36	43.68	59.32	24.28	303.64	1234.93	103.28
MZ1-16	22.00	23.32	24.76	18.72	257.72	1339.33	106.16

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	16.96	12.56	22.64	5.08	231.72	1291.73	46.52
MZ1-18	32.08	30.00	32.40	10.04	267.56	1539.77	110.40
MZ1-19	15.80	21.00	21.00	11.32	267.76	1740.01	77.72
MZ1-20	13.92	22.24	12.56	5.08	251.56	1653.33	63.44
MZ1-21	10.92	17.60	25.80	7.12	277.40	1486.85	50.68
srn614-2	481.64	1850.81	611.92	1813.13	1322.77	1417.01	923.25
srn612-2	6564.68	26137.15	9325.77	26113.91	14772.24	1483.13	8169.77
srn610-2	65289.21	302871.59	94586.81	288049.44	122797.53	1585.69	21089.28
AP1-2	9.88	24.00	14.60	538.64	270.80	1213.97	49.80
AP2-2	651.68	1920.69	23.64	822.36	2177.81	1188.29	587.24
AP3-2	3309.70	9720.65	31.40	4394.46	4599.63	1298.81	2580.25
AP4-2	6223.23	17951.34	71.92	8532.53	12946.39	1406.57	4195.02
blank-2	1.68	2.84	4.16	1.28	6.00	733.16	35.72
blank ave	2.44	2.70	5.60	2.90	12.72	684.34	79.68

blank subtraction							
SRM614-1	651.44	2311.03	770.84	2119.43	3062.02	796.54	1009.01
SRM612-1	11385.30	41504.14	13233.47	37589.03	18516.38	1214.11	9029.65
SRM610-1	88719.18	378854.96	112332.95	341690.10	137725.22	1304.59	25687.62
AP1-1	167.76	571.82	211.36	1199.07	5053.19	982.39	273.08
AP2-1	1294.73	3398.44	103.84	1745.47	6142.23	1080.99	1360.13
AP3-1	5067.27	14182.62	115.72	6973.78	8761.53	1083.35	5117.39
AP4-1	9774.77	27569.49	159.20	11281.68	19938.63	1319.31	7577.48
MZ1-1	23.72	39.70	18.36	269.94	290.52	782.62	157.92
MZ1-2	18.32	21.90	4.20	4.50	137.84	817.54	22.00
MZ1-3	16.20	16.10	9.84	2.94	86.24	696.02	-6.24
MZ1-4	27.04	39.06	13.84	19.14	229.44	1088.59	42.20
MZ1-5	20.96	20.06	24.20	11.38	80.80	841.30	12.24
MZ1-6	14.96	11.22	14.40	9.90	62.24	762.46	38.84
MZ1-7	14.68	17.10	13.32	11.10	108.96	881.50	20.08
MZ1-8	11.04	20.02	11.00	7.02	110.56	697.22	47.76
MZ1-9	7.44	12.98	20.32	1.10	92.08	700.46	49.24
MZ1-10	12.20	10.86	11.84	16.62	161.32	1012.43	5.52
MZ1-11	8.40	3.46	9.80	3.66	126.72	819.54	-4.12
MZ1-12	9.76	8.86	5.00	3.42	146.44	692.18	-13.44
MZ1-13	42.96	50.02	50.28	15.42	283.92	778.30	28.72
MZ1-14	52.84	44.54	62.00	17.18	342.40	576.10	45.44
MZ1-15	31.92	40.98	53.72	21.38	290.92	550.58	23.60
MZ1-16	19.56	20.62	19.16	15.82	245.00	654.98	26.48
MZ1-17	14.52	9.86	17.04	2.18	219.00	607.38	-33.16
MZ1-18	29.64	27.30	26.80	7.14	254.84	855.42	30.72
MZ1-19	13.36	18.30	15.40	8.42	255.04	1055.67	-1.96
MZ1-20	11.48	19.54	6.96	2.18	238.84	968.99	-16.24
MZ1-21	8.48	14.90	20.20	4.22	264.68	802.50	-29.00
srn614-2	479.20	1848.11	606.32	1810.23	1310.05	732.66	843.56
srn612-2	6562.24	26134.45	9320.17	26111.01	14759.52	798.78	8090.09
srn610-2	65286.77	302868.89	94581.21	288046.54	122784.81	901.34	21009.60
AP1-2	7.44	21.30	9.00	535.74	258.08	529.62	-29.88
AP2-2	649.24	1917.99	18.04	819.46	2165.09	503.94	507.56
AP3-2	3307.26	9717.95	25.80	4391.56	4586.91	614.46	2500.57
AP4-2	6220.79	17948.64	66.32	8529.63	12933.67	722.22	4115.34

zero correction							
SRM614-1	651.44	2311.03	770.84	2119.43	3062.02	796.54	1009.01
SRM612-1	11385.30	41504.14	13233.47	37589.03	18516.38	1214.11	9029.65
SRM610-1	88719.18	378854.96	112332.95	341690.10	137725.22	1304.59	25687.62
AP1-1	167.76	571.82	211.36	1199.07	5053.19	982.39	273.08
AP2-1	1294.73	3398.44	103.84	1745.47	6142.23	1080.99	1360.13
AP3-1	5067.27	14182.62	115.72	6973.78	8761.53	1083.35	5117.39
AP4-1	9774.77	27569.49	159.20	11281.68	19938.63	1319.31	7577.48
MZ1-1	23.72	39.70	18.36	269.94	290.52	782.62	157.92
MZ1-2	18.32	21.90	4.20	4.50	137.84	817.54	22.00
MZ1-3	16.20	16.10	9.84	2.94	86.24	696.02	0.00
MZ1-4	27.04	39.06	13.84	19.14	229.44	1088.59	42.20
MZ1-5	20.96	20.06	24.20	11.38	80.80	841.30	12.24
MZ1-6	14.96	11.22	14.40	9.90	62.24	762.46	38.84
MZ1-7	14.68	17.10	13.32	11.10	108.96	881.50	20.08
MZ1-8	11.04	20.02	11.00	7.02	110.56	697.22	47.76
MZ1-9	7.44	12.98	20.32	1.10	92.08	700.46	49.24
MZ1-10	12.20	10.86	11.84	16.62	161.32	1012.43	5.52
MZ1-11	8.40	3.46	9.80	3.66	126.72	819.54	0.00
MZ1-12	9.76	8.86	5.00	3.42	146.44	692.18	0.00
MZ1-13	42.96	50.02	50.28	15.42	283.92	778.30	28.72
MZ1-14	52.84	44.54	62.00	17.18	342.40	576.10	45.44
MZ1-15	31.92	40.98	53.72	21.38	290.92	550.58	23.60
MZ1-16	19.56	20.62	19.16	15.82	245.00	654.98	26.48
MZ1-17	14.52	9.86	17.04	2.18	219.00	607.38	0.00
MZ1-18	29.64	27.30	26.80	7.14	254.84	855.42	30.72

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	13.36	18.30	15.40	8.42	255.04	1055.67	0.00
MZ1-20	11.48	19.54	6.96	2.18	238.84	968.99	0.00
MZ1-21	8.48	14.90	20.20	4.22	264.68	802.50	0.00
srm614-2	479.20	1848.11	606.32	1810.23	1310.05	732.66	843.56
srm612-2	6562.24	26134.45	9320.17	26111.01	14759.52	798.78	8090.09
srm610-2	65286.77	302868.89	94581.21	288046.54	122784.81	901.34	21009.69
AP1-2	7.44	21.30	9.00	535.74	258.08	529.62	0.00
AP2-2	649.24	1917.99	18.04	819.46	2165.09	503.94	507.56
AP3-2	3307.26	9717.95	25.80	4391.56	4586.91	614.46	2500.57
AP4-2	6220.79	17948.64	66.32	8529.63	12933.67	722.22	4115.34

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-1	0.000145	0.000516	0.000172	0.000473	0.000683	0.000178	0.000225
SRM612-1	0.008913	0.032491	0.010360	0.029426	0.014495	0.000950	0.007069
SRM610-1	0.129178	0.551626	0.163561	0.497513	0.200533	0.001900	0.037402
AP1-1	0.000010	0.000033	0.000012	0.000070	0.000294	0.000057	0.000016
AP2-1	0.000089	0.000235	0.000007	0.000121	0.000424	0.000075	0.000094
AP3-1	0.000269	0.000753	0.000006	0.000370	0.000465	0.000058	0.000272
AP4-1	0.000569	0.001605	0.000009	0.000657	0.001161	0.000077	0.000441
MZ1-1	0.000002	0.000003	0.000002	0.000023	0.000025	0.000067	0.000014
MZ1-2	0.000002	0.000002	0.000000	0.000000	0.000013	0.000080	0.000002
MZ1-3	0.000002	0.000002	0.000001	0.000000	0.000010	0.000078	0.000000
MZ1-4	0.000003	0.000004	0.000001	0.000002	0.000022	0.000104	0.000004
MZ1-5	0.000002	0.000002	0.000002	0.000001	0.000008	0.000084	0.000001
MZ1-6	0.000002	0.000001	0.000002	0.000001	0.000007	0.000088	0.000004
MZ1-7	0.000001	0.000001	0.000001	0.000001	0.000009	0.000074	0.000002
MZ1-8	0.000001	0.000002	0.000001	0.000001	0.000009	0.000055	0.000004
MZ1-9	0.000001	0.000001	0.000002	0.000000	0.000008	0.000063	0.000004
MZ1-10	0.000002	0.000001	0.000001	0.000002	0.000020	0.000127	0.000001
MZ1-11	0.000001	0.000000	0.000001	0.000000	0.000015	0.000099	0.000000
MZ1-12	0.000001	0.000001	0.000001	0.000000	0.000017	0.000082	0.000000
MZ1-13	0.000004	0.000005	0.000005	0.000002	0.000029	0.000080	0.000003
MZ1-14	0.000004	0.000004	0.000005	0.000001	0.000029	0.000048	0.000004
MZ1-15	0.000003	0.000003	0.000004	0.000002	0.000024	0.000046	0.000002
MZ1-16	0.000002	0.000003	0.000002	0.000002	0.000031	0.000083	0.000003
MZ1-17	0.000002	0.000001	0.000002	0.000000	0.000024	0.000066	0.000000
MZ1-18	0.000002	0.000002	0.000002	0.000001	0.000019	0.000064	0.000002
MZ1-19	0.000001	0.000001	0.000001	0.000000	0.000014	0.000058	0.000000
MZ1-20	0.000001	0.000001	0.000000	0.000000	0.000013	0.000054	0.000000
MZ1-21	0.000000	0.000001	0.000001	0.000000	0.000014	0.000042	0.000000
srm614-2	0.000170	0.000656	0.000215	0.000642	0.000465	0.000260	0.000299
srm612-2	0.008565	0.034109	0.012164	0.034079	0.019263	0.001043	0.010559
srm610-2	0.118496	0.549708	0.171665	0.522806	0.222855	0.001636	0.038133
AP1-2	0.000001	0.000002	0.000001	0.000056	0.000027	0.000056	0.000000
AP2-2	0.000080	0.000236	0.000002	0.000101	0.000267	0.000062	0.000062
AP3-2	0.000266	0.000781	0.000002	0.000353	0.000368	0.000049	0.000201
AP4-2	0.000500	0.001442	0.000005	0.000685	0.001039	0.000058	0.000331

standardize signal averages AP							
AP1	0.000005	0.000018	0.000007	0.000063	0.000160	0.000056	0.000008
AP2	0.000085	0.000235	0.000005	0.000111	0.000345	0.000068	0.000078
AP3	0.000267	0.000767	0.000004	0.000362	0.000417	0.000053	0.000236
AP4	0.000534	0.001524	0.000007	0.000671	0.001100	0.000067	0.000386

linest from std sig ave							
	0.028448	0.006931	1.337716	0.004038	0.017610	0.010137	0.008119

standardize signal averages SRM							
srm614-2	0.000158	0.000586	0.000194	0.000558	0.000574	0.000219	0.000262
srm612-2	0.008739	0.033300	0.011262	0.031752	0.016879	0.000996	0.008814

Appendix A. Raw trace element datasheets from laser ablation.

srm610-2	0.123837	0.550667	0.167613	0.510159	0.211694	0.001768	0.037767
linest from std sig ave							
	0.043502	0.009219	0.029089	0.008631	0.024544	0.000000	0.018947
concentration data							
SRM614-1	0.35	0.31	19.73	0.16	1.03	0.15	0.16
SRM612-1	21.74	19.31	1188.52	10.19	21.89	0.83	4.92
SRM610-1	315.16	327.90	18764.76	172.31	302.86	1.65	26.04
AP1-1	0.11	0.09	6.56	0.11	2.06	0.23	0.05
AP2-1	1.01	0.65	3.83	0.19	2.98	0.30	0.30
AP3-1	3.05	2.08	3.28	0.60	3.27	0.23	0.88
AP4-1	6.46	4.44	4.95	1.06	8.15	0.31	1.43
MZ1-1	0.02	0.01	0.84	0.04	0.18	0.27	0.04
MZ1-2	0.02	0.01	0.22	0.00	0.09	0.32	0.01
MZ1-3	0.02	0.00	0.59	0.00	0.07	0.32	0.00
MZ1-4	0.03	0.01	0.70	0.00	0.15	0.42	0.01
MZ1-5	0.02	0.01	1.29	0.00	0.06	0.34	0.00
MZ1-6	0.02	0.00	0.89	0.00	0.05	0.36	0.01
MZ1-7	0.01	0.00	0.60	0.00	0.06	0.30	0.01
MZ1-8	0.01	0.00	0.47	0.00	0.06	0.22	0.01
MZ1-9	0.01	0.00	0.97	0.00	0.06	0.25	0.01
MZ1-10	0.02	0.00	0.79	0.00	0.14	0.51	0.00
MZ1-11	0.01	0.00	0.63	0.00	0.11	0.40	0.00
MZ1-12	0.01	0.00	0.32	0.00	0.12	0.33	0.00
MZ1-13	0.05	0.01	2.74	0.00	0.20	0.32	0.01
MZ1-14	0.05	0.01	2.76	0.00	0.20	0.19	0.01
MZ1-15	0.03	0.01	2.38	0.00	0.17	0.19	0.01
MZ1-16	0.03	0.01	1.30	0.00	0.22	0.34	0.01
MZ1-17	0.02	0.00	0.99	0.00	0.17	0.27	0.00
MZ1-18	0.03	0.01	1.07	0.00	0.13	0.26	0.01
MZ1-19	0.01	0.00	0.45	0.00	0.10	0.24	0.00
MZ1-20	0.01	0.00	0.21	0.00	0.09	0.22	0.00
MZ1-21	0.01	0.00	0.57	0.00	0.10	0.17	0.00
srm614-2	0.41	0.39	24.68	0.22	0.70	0.23	0.21
srm612-2	20.90	20.28	1395.56	11.80	29.09	0.91	7.35
srm610-2	289.10	326.76	19694.56	181.07	336.58	1.42	26.55
AP1-2	0.01	0.01	0.50	0.09	0.19	0.23	0.01
AP2-2	0.91	0.65	1.19	0.16	1.87	0.25	0.20
AP3-2	3.01	2.16	1.11	0.57	2.59	0.20	0.65
AP4-2	5.67	3.99	2.84	1.10	7.30	0.23	1.07
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-5	3.64	3.72	2.32	6.72	8.12	106.52	20.56
SRM614-5	206.32	802.40	306.40	780.68	681.84	1430.77	494.00
SRM612-5	12968.91	50628.97	17197.06	49866.52	30415.21	1313.81	31603.82
SRM610-5	95188.09	434476.88	129689.41	394210.91	146948.83	1372.73	46842.86
AP1-5	8.60	25.16	16.84	174.12	213.72	975.25	51.72
AP2-5	516.20	1444.69	23.96	761.40	2261.61	1006.57	573.28
AP3-5	1949.33	5361.15	23.20	2990.66	2574.53	996.77	1359.01
AP4-5	4003.66	11197.94	46.08	4266.10	6996.44	975.17	1859.77
MZ2-1b	8.20	7.60	4.60	2.00	22.92	944.13	37.56
MZ2-2b	9.96	6.88	8.04	5.08	28.40	836.16	37.16
MZ2-3b	7.60	4.76	5.20	5.12	30.88	860.48	41.96
MZ2-4b	5.24	10.12	6.08	9.96	48.24	875.80	44.92
MZ2-5b	8.12	8.68	4.64	7.00	42.28	931.73	30.16
MZ2-6b	9.16	4.60	8.88	8.84	34.92	823.04	32.32
MZ2-7b	22.36	13.36	23.52	10.40	95.36	944.65	35.72
MZ2-8b	14.48	17.56	13.80	14.16	92.08	890.85	50.80
MZ2-9b	7.12	5.96	5.84	6.56	71.92	836.24	46.12
MZ2-10b	8.04	6.24	12.64	4.96	77.12	892.93	32.52
MZ2-11b	13.16	5.24	12.16	4.60	78.68	805.80	46.08
MZ2-12b	8.84	9.92	4.68	4.12	70.28	806.12	34.88
MZ2-13b	10.44	11.92	9.76	2.68	104.80	783.76	41.36
MZ2-14b	8.28	6.96	8.40	4.64	115.20	800.64	39.12
MZ2-15b	19.96	20.16	24.84	16.32	144.96	818.76	31.84
srm614-6	145.32	570.08	219.84	616.88	428.84	750.56	326.68
srm612-6	9134.25	35644.36	12810.83	36423.61	22659.49	825.80	23867.49

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	75194.14	347714.16	107446.52	322969.94	116181.09	811.64	38068.70
AP1-6	8.12	12.28	9.80	124.84	97.76	648.76	33.68
AP2-6	392.40	1102.93	20.76	589.24	1577.61	646.88	440.72
AP3-6	1589.73	4719.95	29.36	2418.97	2171.69	731.40	1061.17
AP4-6	3636.50	10310.94	36.64	4113.02	6710.24	753.76	1563.49
blank-6	2.76	4.72	3.44	3.04	7.32	636.52	28.96
blank ave	3.20	4.22	2.88	4.88	7.72	371.52	24.76
blank subtraction							
SRM614-5	203.12	798.18	303.52	775.80	674.12	1059.25	469.24
SRM612-5	12965.71	50624.74	17194.18	49861.64	30407.49	942.29	31579.06
SRM610-5	95184.89	434472.66	129686.53	394206.03	146941.11	1001.21	46818.10
AP1-5	5.40	20.94	13.96	169.24	206.00	603.72	26.96
AP2-5	513.00	1440.47	21.08	756.52	2253.89	635.04	548.52
AP3-5	1946.13	5356.93	20.32	2985.78	2566.81	625.24	1334.25
AP4-5	4000.46	11193.72	43.20	4261.22	6988.72	603.64	1835.01
MZ2-1b	5.00	3.38	1.72	-2.88	15.20	572.60	12.80
MZ2-2b	6.76	2.66	5.16	0.20	20.68	464.64	12.40
MZ2-3b	4.40	0.54	2.32	0.24	23.16	488.96	17.20
MZ2-4b	2.04	5.90	3.20	5.08	40.52	504.28	20.16
MZ2-5b	4.92	4.46	1.76	2.12	34.56	560.20	5.40
MZ2-6b	5.96	0.38	6.00	3.96	27.20	451.52	7.56
MZ2-7b	19.16	9.14	20.64	5.52	87.64	573.12	10.96
MZ2-8b	11.28	13.34	10.92	9.28	84.36	519.32	26.04
MZ2-9b	3.92	1.74	2.96	1.68	64.20	464.72	21.36
MZ2-10b	4.84	2.02	9.76	0.08	69.40	521.40	7.76
MZ2-11b	9.96	1.02	9.28	-0.28	70.96	434.28	21.32
MZ2-12b	5.64	5.70	1.80	-0.76	62.56	434.60	10.12
MZ2-13b	7.24	7.70	6.88	-2.20	97.08	412.24	16.60
MZ2-14b	5.08	2.74	5.52	-0.24	107.48	429.12	14.36
MZ2-15b	16.76	15.94	21.96	11.44	137.24	447.24	7.08
srm614-6	142.12	565.86	216.96	612.00	421.12	379.04	301.92
srm612-6	9131.05	35640.14	12807.95	36418.72	22651.77	454.28	23842.73
srm610-6	75190.94	347709.94	107443.64	322965.06	116173.37	440.12	38043.93
AP1-6	4.92	8.06	6.92	119.96	90.04	277.24	8.92
AP2-6	389.20	1098.71	17.88	584.36	1569.89	275.36	415.96
AP3-6	1586.53	4715.73	26.48	2414.09	2163.97	359.88	1036.41
AP4-6	3633.30	10306.72	33.76	4108.14	6702.52	382.24	1538.73
zero correction							
SRM614-5	203.12	798.18	303.52	775.80	674.12	1059.25	469.24
SRM612-5	12965.71	50624.74	17194.18	49861.64	30407.49	942.29	31579.06
SRM610-5	95184.89	434472.66	129686.53	394206.03	146941.11	1001.21	46818.10
AP1-5	5.40	20.94	13.96	169.24	206.00	603.72	26.96
AP2-5	513.00	1440.47	21.08	756.52	2253.89	635.04	548.52
AP3-5	1946.13	5356.93	20.32	2985.78	2566.81	625.24	1334.25
AP4-5	4000.46	11193.72	43.20	4261.22	6988.72	603.64	1835.01
MZ2-1b	5.00	3.38	1.72	0.00	15.20	572.60	12.80
MZ2-2b	6.76	2.66	5.16	0.20	20.68	464.64	12.40
MZ2-3b	4.40	0.54	2.32	0.24	23.16	488.96	17.20
MZ2-4b	2.04	5.90	3.20	5.08	40.52	504.28	20.16
MZ2-5b	4.92	4.46	1.76	2.12	34.56	560.20	5.40
MZ2-6b	5.96	0.38	6.00	3.96	27.20	451.52	7.56
MZ2-7b	19.16	9.14	20.64	5.52	87.64	573.12	10.96
MZ2-8b	11.28	13.34	10.92	9.28	84.36	519.32	26.04
MZ2-9b	3.92	1.74	2.96	1.68	64.20	464.72	21.36
MZ2-10b	4.84	2.02	9.76	0.08	69.40	521.40	7.76
MZ2-11b	9.96	1.02	9.28	0.00	70.96	434.28	21.32
MZ2-12b	5.64	5.70	1.80	0.00	62.56	434.60	10.12
MZ2-13b	7.24	7.70	6.88	0.00	97.08	412.24	16.60
MZ2-14b	5.08	2.74	5.52	0.00	107.48	429.12	14.36
MZ2-15b	16.76	15.94	21.96	11.44	137.24	447.24	7.08
srm614-6	142.12	565.86	216.96	612.00	421.12	379.04	301.92
srm612-6	9131.05	35640.14	12807.95	36418.72	22651.77	454.28	23842.73
srm610-6	75190.94	347709.94	107443.64	322965.06	116173.37	440.12	38043.93
AP1-6	4.92	8.06	6.92	119.96	90.04	277.24	8.92
AP2-6	389.20	1098.71	17.88	584.36	1569.89	275.36	415.96
AP3-6	1586.53	4715.73	26.48	2414.09	2163.97	359.88	1036.41
AP4-6	3633.30	10306.72	33.76	4108.14	6702.52	382.24	1538.73
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-5	0.000170	0.000668	0.000254	0.000649	0.000564	0.000886	0.000392
SRM612-5	0.008722	0.034057	0.011567	0.033543	0.020456	0.000634	0.021244
SRM610-5	0.141878	0.647602	0.193304	0.587582	0.219023	0.001492	0.069785
AP1-5	0.000001	0.000003	0.000002	0.000023	0.000028	0.000083	0.000004
AP2-5	0.000066	0.000184	0.000003	0.000097	0.000288	0.000081	0.000070
AP3-5	0.000287	0.000789	0.000003	0.000440	0.000378	0.000092	0.000197
AP4-5	0.000395	0.001104	0.000004	0.000420	0.000689	0.000060	0.000181
MZ2-1b	0.000001	0.000001	0.000001	0.000000	0.000005	0.000170	0.000004
MZ2-2b	0.000002	0.000001	0.000001	0.000000	0.000006	0.000125	0.000003
MZ2-3b	0.000001	0.000000	0.000001	0.000000	0.000007	0.000147	0.000005
MZ2-4b	0.000000	0.000001	0.000001	0.000001	0.000009	0.000110	0.000004
MZ2-5b	0.000001	0.000001	0.000000	0.000000	0.000007	0.000119	0.000001
MZ2-6b	0.000001	0.000000	0.000001	0.000001	0.000007	0.000111	0.000002
MZ2-7b	0.000004	0.000002	0.000004	0.000001	0.000017	0.000111	0.000002
MZ2-8b	0.000002	0.000003	0.000002	0.000002	0.000016	0.000099	0.000005
MZ2-9b	0.000001	0.000000	0.000001	0.000000	0.000014	0.000101	0.000005
MZ2-10b	0.000001	0.000000	0.000002	0.000000	0.000017	0.000128	0.000002
MZ2-11b	0.000003	0.000000	0.000002	0.000000	0.000019	0.000116	0.000006
MZ2-12b	0.000002	0.000002	0.000001	0.000000	0.000019	0.000135	0.000003
MZ2-13b	0.000002	0.000002	0.000001	0.000000	0.000021	0.000088	0.000004
MZ2-14b	0.000001	0.000000	0.000001	0.000000	0.000019	0.000078	0.000003
MZ2-15b	0.000003	0.000003	0.000004	0.000002	0.000023	0.000075	0.000001
srm614-6	0.000157	0.000624	0.000239	0.000675	0.000465	0.000418	0.000333
srm612-6	0.008458	0.033014	0.011864	0.033735	0.020982	0.000421	0.022086
srm610-6	0.135964	0.628749	0.194286	0.584004	0.210071	0.000796	0.068793
AP1-6	0.000001	0.000001	0.000001	0.000021	0.000016	0.000049	0.000002
AP2-6	0.000063	0.000177	0.000003	0.000094	0.000254	0.000044	0.000067
AP3-6	0.000264	0.000786	0.000004	0.000402	0.000361	0.000060	0.000173
AP4-6	0.000402	0.001142	0.000004	0.000455	0.000742	0.000042	0.000170

standardize signal averages AP							
AP1	0.000001	0.000002	0.000002	0.000022	0.000022	0.000066	0.000003
AP2	0.000064	0.000181	0.000003	0.000096	0.000271	0.000063	0.000069
AP3	0.000276	0.000788	0.000004	0.000421	0.000369	0.000076	0.000185
AP4	0.000399	0.001123	0.000004	0.000438	0.000716	0.000051	0.000176

linest from std sig ave							
	0.035087	0.008616	2.762197	0.004932	0.025637	0.009052	0.014387

standardize signal averages SRM							
srm614-2	0.000163	0.000646	0.000247	0.000662	0.000514	0.000652	0.000363
srm612-2	0.008590	0.033535	0.011716	0.033639	0.020719	0.000527	0.021665
srm610-2	0.138921	0.638175	0.193795	0.585793	0.214547	0.001144	0.069289

linest from std sig ave							
	1.021260	1.014773	0.997430	1.003035	1.020551	1.301680	1.004789

concentration data							
SRM614-5	0.51	0.49	60.13	0.27	1.24	0.69	0.48
SRM612-5	26.25	25.17	2740.17	14.19	44.98	0.49	26.21
SRM610-5	426.93	478.53	45792.58	248.55	481.57	1.16	86.11
AP1-5	0.01	0.01	2.11	0.05	0.29	0.30	0.02
AP2-5	0.92	0.63	2.97	0.19	2.94	0.29	0.40
AP3-5	4.01	2.71	3.30	0.87	3.87	0.33	1.13
AP4-5	5.52	3.80	4.70	0.83	7.05	0.22	1.04
MZ2-1b	0.02	0.00	0.56	0.00	0.05	0.61	0.02
MZ2-2b	0.03	0.00	1.52	0.00	0.06	0.45	0.02
MZ2-3b	0.02	0.00	0.77	0.00	0.07	0.53	0.03
MZ2-4b	0.01	0.00	0.77	0.00	0.09	0.40	0.03
MZ2-5b	0.01	0.00	0.41	0.00	0.08	0.43	0.01
MZ2-6b	0.02	0.00	1.63	0.00	0.07	0.40	0.01
MZ2-7b	0.05	0.01	4.39	0.00	0.17	0.40	0.01
MZ2-8b	0.03	0.01	2.30	0.00	0.17	0.36	0.03
MZ2-9b	0.01	0.00	0.71	0.00	0.14	0.37	0.03
MZ2-10b	0.02	0.00	2.64	0.00	0.17	0.46	0.01
MZ2-11b	0.04	0.00	2.74	0.00	0.19	0.42	0.03
MZ2-12b	0.02	0.01	0.62	0.00	0.20	0.49	0.02

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	0.02	0.01	1.61	0.00	0.21	0.32	0.02
MZ2-14b	0.01	0.00	1.10	0.00	0.20	0.28	0.01
MZ2-15b	0.04	0.01	4.06	0.00	0.24	0.27	0.01
srm614-6	0.47	0.46	56.72	0.29	1.02	0.32	0.41
srm612-6	25.45	24.39	2810.53	14.27	46.13	0.33	27.25
srm610-6	409.14	464.60	46025.16	247.04	461.89	0.62	84.88
AP1-6	0.01	0.00	1.36	0.04	0.16	0.18	0.01
AP2-6	0.88	0.61	3.18	0.19	2.59	0.16	0.39
AP3-6	3.70	2.70	4.86	0.79	3.69	0.22	0.99
AP4-6	5.63	3.92	4.12	0.90	7.59	0.15	0.98

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
raw data								
blank-7		0.28	3.16	1.68	4.92	3.52	460.32	36.16
SRM614-7		363.80	1190.21	377.60	1116.93	579.24	1115.77	712.44
SRM612-7		18963.23	69236.39	20956.64	60520.42	27724.80	1256.81	39058.94
SRM610-7		191588.95	886838.31	224346.06	748715.75	276605.41	1830.29	129157.33
AP1-7		65.52	207.88	75.60	346.52	280.80	891.29	114.84
AP2-7		1096.69	2876.30	82.52	1257.05	2443.33	838.96	897.97
AP3-7		4417.46	11971.27	51.36	5864.91	5031.27	895.37	2719.86
AP4-7		7025.00	18774.51	71.04	7665.40	10208.14	1025.73	3397.26
T1-1		10.20	35.92	19.56	23.04	50.56	3654.06	41.16
T1-2		3.20	12.80	6.72	2.84	16.24	2978.02	31.84
T1-3		5.64	8.00	7.68	5.60	17.96	3164.58	34.68
T1-4		19.12	37.44	69.68	36.20	47.68	4626.35	75.80
T1-5		4.16	27.44	54.96	15.36	15.72	3547.86	41.48
T1-6		21.84	117.96	70.08	101.12	34.52	3578.02	50.08
T1-7		13.96	39.64	42.20	42.68	70.76	5041.39	80.72
T1-8		1.68	14.32	13.12	7.44	27.40	4196.78	51.92
T1-9		4.24	20.76	34.40	15.76	12.56	3676.18	40.80
T1-10		14.28	36.56	26.00	31.76	61.32	4697.59	83.96
T1-11		8.32	12.04	18.08	10.24	17.16	3981.30	43.08
T1-12		7.40	14.04	18.36	10.36	13.04	3691.22	38.96
T1-13		8.68	33.04	48.76	22.72	47.20	3771.34	62.40
T1-14		6.20	10.20	18.84	5.52	14.12	3479.70	41.28
T1-15		4.92	12.68	29.64	2.60	15.96	3207.18	32.32
T1-16		4.40	17.00	41.20	10.12	23.20	3685.70	42.12
T1-17		5.24	9.04	50.80	7.04	18.16	3350.18	43.36
T1-18		7.44	5.16	19.52	4.44	31.20	3119.50	50.92
SRM614-8		277.08	1031.53	374.48	1030.73	547.84	1241.45	564.08
SRM612-8		15856.93	64908.41	21886.28	61676.31	26689.67	1124.37	34326.40
SRM610-8		147453.59	773199.44	214448.77	708315.13	237637.02	1461.73	93852.97
AP1-8		25.84	82.12	38.24	202.12	144.96	805.68	39.40
AP2-8		771.32	2395.77	24.80	1018.81	2010.25	683.28	652.04
AP3-8		3789.78	10908.34	35.16	4883.31	4839.35	802.56	2709.38
AP4-8		5091.23	14644.60	53.16	6537.08	8055.69	825.36	2912.50
blank-8		3.12	2.36	3.00	1.60	5.28	653.24	23.40
blank average		1.70	2.76	2.34	3.26	4.40	556.78	29.78

blank subtraction								
SRM614-7		362.10	1187.45	375.26	1113.67	574.84	558.98	682.66
SRM612-7		18961.53	69233.63	20954.30	60517.16	27720.39	700.02	39029.16
SRM610-7		191587.25	886835.55	224343.72	748712.49	276601.01	1273.51	129127.55
AP1-7		63.82	205.12	73.26	343.26	276.40	334.50	85.06
AP2-7		1094.99	2873.54	80.18	1253.79	2438.93	282.18	868.18
AP3-7		4415.76	11968.51	49.02	5861.65	5026.87	338.58	2690.08
AP4-7		7023.30	18771.75	68.70	7662.14	10203.74	468.94	3367.48
T1-1		8.50	33.16	17.22	19.78	46.16	3097.28	11.38
T1-2		1.50	10.04	4.38	-0.42	11.84	2421.23	2.06
T1-3		3.94	5.24	5.34	2.34	13.56	2607.79	4.90
T1-4		17.42	34.68	67.34	32.94	43.28	4069.56	46.02
T1-5		2.46	24.68	52.62	12.10	11.32	2991.08	11.70
T1-6		20.14	115.20	67.74	97.86	30.12	3021.24	20.30
T1-7		12.26	36.88	39.86	39.42	66.36	4484.61	50.94
T1-8		-0.02	11.56	10.78	4.18	23.00	3640.00	22.14
T1-9		2.54	18.00	32.06	12.50	8.16	3119.40	11.02
T1-10		12.58	33.80	23.66	28.50	56.92	4140.80	54.18
T1-11		6.62	9.28	15.74	6.98	12.76	3424.52	13.30
T1-12		5.70	11.28	16.02	7.10	8.64	3134.44	9.18

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	6.98	30.28	46.42	19.46	42.80	3214.56	32.62
T1-14	4.50	7.44	16.50	2.26	9.72	2922.92	11.50
T1-15	3.22	9.92	27.30	-0.66	11.56	2650.39	2.54
T1-16	2.70	14.24	38.86	6.86	18.80	3128.92	12.34
T1-17	3.54	6.28	48.46	3.78	13.76	2793.40	13.58
T1-18	5.74	2.40	17.18	1.18	26.80	2562.71	21.14
SRM614-8	275.38	1028.77	372.14	1027.47	543.44	684.66	534.30
SRM612-8	15855.23	64905.65	21883.94	61673.05	26685.27	567.58	34296.61
SRM610-8	147451.89	773196.68	214446.43	708311.87	237632.62	904.95	93823.19
AP1-8	24.14	79.36	35.90	198.86	140.56	248.90	9.62
AP2-8	769.62	2393.01	22.46	1015.55	2005.85	126.50	622.26
AP3-8	3788.08	10905.58	32.82	4880.05	4834.95	245.78	2679.60
AP4-8	5089.53	14641.84	50.82	6533.82	8051.29	268.58	2882.72
zero correction							
SRM614-7	362.10	1187.45	375.26	1113.67	574.84	558.98	682.66
SRM612-7	18961.53	69233.63	20954.30	60517.16	27720.39	700.02	39029.16
SRM610-7	191587.25	886835.55	224343.72	748712.49	276601.01	1273.51	129127.55
AP1-7	63.82	205.12	73.26	343.26	276.40	334.50	85.06
AP2-7	1094.99	2873.54	80.18	1253.79	2438.93	282.18	868.18
AP3-7	4415.76	11968.51	49.02	5861.65	5026.87	338.58	2690.08
AP4-7	7023.30	18771.75	68.70	7662.14	10203.74	468.94	3367.48
T1-1	8.50	33.16	17.22	19.78	46.16	3097.28	11.38
T1-2	1.50	10.04	4.38	0.00	11.84	2421.23	2.06
T1-3	3.94	5.24	5.34	2.34	13.56	2607.79	4.90
T1-4	17.42	34.68	67.34	32.94	43.28	4069.56	46.02
T1-5	2.46	24.68	52.62	12.10	11.32	2991.08	11.70
T1-6	20.14	115.20	67.74	97.86	30.12	3021.24	20.30
T1-7	12.26	36.88	39.86	39.42	66.36	4484.61	50.94
T1-8	0.00	11.56	10.78	4.18	23.00	3640.00	22.14
T1-9	2.54	18.00	32.06	12.50	8.16	3119.40	11.02
T1-10	12.58	33.80	23.66	28.50	56.92	4140.80	54.18
T1-11	6.62	9.28	15.74	6.98	12.76	3424.52	13.30
T1-12	5.70	11.28	16.02	7.10	8.64	3134.44	9.18
T1-13	6.98	30.28	46.42	19.46	42.80	3214.56	32.62
T1-14	4.50	7.44	16.50	2.26	9.72	2922.92	11.50
T1-15	3.22	9.92	27.30	0.00	11.56	2650.39	2.54
T1-16	2.70	14.24	38.86	6.86	18.80	3128.92	12.34
T1-17	3.54	6.28	48.46	3.78	13.76	2793.40	13.58
T1-18	5.74	2.40	17.18	1.18	26.80	2562.71	21.14
SRM614-8	275.38	1028.77	372.14	1027.47	543.44	684.66	534.30
SRM612-8	15855.23	64905.65	21883.94	61673.05	26685.27	567.58	34296.61
SRM610-8	147451.89	773196.68	214446.43	708311.87	237632.62	904.95	93823.19
AP1-8	24.14	79.36	35.90	198.86	140.56	248.90	9.62
AP2-8	769.62	2393.01	22.46	1015.55	2005.85	126.50	622.26
AP3-8	3788.08	10905.58	32.82	4880.05	4834.95	245.78	2679.60
AP4-8	5089.53	14641.84	50.82	6533.82	8051.29	268.58	2882.72
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003
standardized signal							
SRM614-7	0.000128	0.000418	0.000132	0.000392	0.000203	0.000197	0.000241
SRM612-7	0.006895	0.025176	0.007620	0.022007	0.010080	0.000255	0.014193
SRM610-7	0.115940	0.536673	0.135763	0.453087	0.167386	0.000771	0.078142
AP1-7	0.000004	0.000013	0.000005	0.000021	0.000017	0.000021	0.000005
AP2-7	0.000065	0.000170	0.000005	0.000074	0.000144	0.000017	0.000051
AP3-7	0.000216	0.000584	0.000002	0.000286	0.000245	0.000017	0.000131
AP4-7	0.000404	0.001080	0.000004	0.000441	0.000587	0.000027	0.000194
T1-1	0.000001	0.000002	0.000001	0.000001	0.000003	0.000206	0.000001
T1-2	0.000000	0.000001	0.000000	0.000000	0.000001	0.000215	0.000000
T1-3	0.000000	0.000001	0.000001	0.000000	0.000002	0.000305	0.000001
T1-4	0.000001	0.000002	0.000005	0.000002	0.000003	0.000288	0.000003

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000000	0.000002	0.000004	0.000001	0.000001	0.000204	0.000001
T1-6	0.000001	0.000008	0.000004	0.000006	0.000002	0.000198	0.000001
T1-7	0.000001	0.000003	0.000004	0.000004	0.000006	0.000403	0.000005
T1-8	0.000000	0.000001	0.000001	0.000000	0.000002	0.000345	0.000002
T1-9	0.000000	0.000001	0.000003	0.000001	0.000001	0.000258	0.000001
T1-10	0.000001	0.000003	0.000002	0.000002	0.000005	0.000356	0.000005
T1-11	0.000001	0.000001	0.000001	0.000001	0.000001	0.000277	0.000001
T1-12	0.000000	0.000001	0.000001	0.000001	0.000001	0.000253	0.000001
T1-13	0.000001	0.000002	0.000003	0.000001	0.000003	0.000240	0.000002
T1-14	0.000000	0.000001	0.000001	0.000000	0.000001	0.000205	0.000001
T1-15	0.000000	0.000001	0.000002	0.000000	0.000001	0.000198	0.000000
T1-16	0.000000	0.000001	0.000003	0.000001	0.000002	0.000268	0.000001
T1-17	0.000000	0.000000	0.000004	0.000000	0.000001	0.000203	0.000001
T1-18	0.000000	0.000000	0.000001	0.000000	0.000002	0.000190	0.000002
SRM614-8	0.000156	0.000582	0.000210	0.000581	0.000307	0.000387	0.000302
SRM612-8	0.008238	0.033721	0.011370	0.032042	0.013864	0.000295	0.017819
SRM610-8	0.125586	0.658540	0.182646	0.603277	0.202394	0.000771	0.079910
AP1-8	0.000002	0.000007	0.000003	0.000017	0.000012	0.000021	0.000001
AP2-8	0.000058	0.000180	0.000002	0.000076	0.000151	0.000009	0.000047
AP3-8	0.000234	0.000674	0.000002	0.000302	0.000299	0.000015	0.000166
AP4-8	0.000381	0.001096	0.000004	0.000489	0.000603	0.000020	0.000216
standardize signal averages AP							
AP1	0.000003	0.000010	0.000004	0.000019	0.000015	0.000021	0.000003
AP2	0.000061	0.000175	0.000003	0.000075	0.000147	0.000013	0.000049
AP3	0.000225	0.000629	0.000002	0.000294	0.000272	0.000016	0.000148
AP4	0.000393	0.001088	0.000004	0.000465	0.000595	0.000024	0.000205
linest from std sig ave							
	0.037682	0.009426	2.252034	0.005561	0.032323	0.033711	0.014605
standardize signal averages SRM							
srm614-2	0.000142	0.000500	0.000171	0.000487	0.000255	0.000292	0.000271
srm612-2	0.007566	0.029449	0.009495	0.027024	0.011972	0.000275	0.016006
srm610-2	0.120763	0.597606	0.159204	0.528182	0.184890	0.000771	0.079026
linest from std sig ave							
	0.044626	0.008497	0.030635	0.008337	0.028126	0.000000	0.009107
concentration data							
SRM614-7	0.41	0.34	25.54	0.19	0.56	0.57	0.30
SRM612-7	22.28	20.35	1471.71	10.50	27.94	0.74	17.78
SRM610-7	374.68	433.87	26221.36	216.11	464.02	2.23	97.88
AP1-7	0.06	0.05	4.06	0.05	0.22	0.28	0.03
AP2-7	0.97	0.64	4.25	0.16	1.86	0.22	0.30
AP3-7	3.24	2.20	2.15	0.63	3.16	0.22	0.77
AP4-7	6.07	4.06	3.55	0.98	7.57	0.36	1.13
T1-1	0.01	0.01	1.03	0.00	0.04	2.78	0.00
T1-2	0.00	0.00	0.35	0.00	0.01	2.89	0.00
T1-3	0.01	0.00	0.56	0.00	0.02	4.11	0.00
T1-4	0.02	0.01	4.27	0.01	0.04	3.87	0.02
T1-5	0.00	0.01	3.23	0.00	0.01	2.74	0.00
T1-6	0.02	0.03	4.00	0.01	0.03	2.67	0.01
T1-7	0.02	0.01	3.22	0.01	0.08	5.43	0.03
T1-8	0.00	0.00	0.92	0.00	0.03	4.64	0.01
T1-9	0.00	0.01	2.39	0.00	0.01	3.47	0.01
T1-10	0.02	0.01	1.83	0.01	0.06	4.79	0.03
T1-11	0.01	0.00	1.14	0.00	0.01	3.73	0.01
T1-12	0.01	0.00	1.16	0.00	0.01	3.40	0.00
T1-13	0.01	0.01	3.11	0.00	0.04	3.23	0.01
T1-14	0.00	0.00	1.04	0.00	0.01	2.76	0.00
T1-15	0.00	0.00	1.83	0.00	0.01	2.66	0.00
T1-16	0.00	0.00	2.99	0.00	0.02	3.61	0.01
T1-17	0.00	0.00	3.17	0.00	0.01	2.73	0.01
T1-18	0.01	0.00	1.15	0.00	0.03	2.56	0.01
SRM614-8	0.50	0.47	40.64	0.28	0.85	1.12	0.38
SRM612-8	26.62	27.26	2195.95	15.28	38.43	0.85	22.32
SRM610-8	405.86	532.39	35276.53	287.75	561.06	2.23	100.09
AP1-8	0.03	0.03	2.76	0.04	0.15	0.29	0.00
AP2-8	0.87	0.68	1.51	0.17	1.94	0.13	0.27
AP3-8	3.52	2.53	1.82	0.67	3.85	0.20	0.96
AP4-8	5.73	4.12	3.42	1.09	7.77	0.27	1.26
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-5		1.76	2.00	3.72	4.36	15.36	18.40
SRM614-5		455.60	1660.65	497.80	1451.89	857.08	503.20
SRM612-5		22978.49	84430.27	25654.94	72569.57	35120.04	663.20
SRM610-5		148122.03	634397.38	164382.84	527621.75	226182.36	857.60
AP1-5		57.84	180.84	77.68	254.28	300.48	546.56
AP2-5		1299.77	3367.02	122.44	1516.13	3261.82	531.92
AP3-5		7707.44	20116.75	113.08	10560.82	10929.14	666.64
AP4-5		6751.64	18215.90	112.44	7843.04	10431.70	746.40
TGP12-1		8.80	12.44	5.56	18.72	40.92	713.48
TGP12-2		8.08	7.44	2.72	4.48	10.48	691.00
TGP12-3		1.96	11.52	2.28	8.84	18.12	748.52
TGP12-4		23.80	58.28	14.76	30.00	98.72	768.56
TGP12-5		7.20	8.88	3.64	3.16	17.44	762.72
TGP12-6		15.56	33.04	13.24	29.52	58.08	731.28
TGP12-7		28.04	51.36	42.48	31.84	63.80	854.56
TGP12-8		9.60	12.92	25.28	5.92	16.96	821.68
TGP12-9		13.28	25.32	13.72	9.48	29.68	780.20
TGP12-10		14.80	41.28	55.28	21.80	90.28	861.24
TGP12-11		5.52	18.64	10.28	3.56	43.44	862.92
TGP12-12		6.80	17.04	10.84	4.24	23.68	859.00
TGP12-13		6.40	8.08	10.56	9.20	35.56	883.68
TGP12-14		4.04	11.60	9.08	3.68	20.08	842.64
TGP12-15		1.80	5.16	9.32	2.44	32.92	806.44
TGP12-16		4.56	21.16	73.80	29.92	253.04	788.80
TGP12-17		16.72	18.84	90.12	15.12	326.44	814.36
TGP12-18		5.72	21.48	20.52	20.24	125.92	794.00
SRM614-6		329.40	1306.05	466.60	1272.37	709.24	602.16
SRM612-6		15972.21	64848.93	21525.52	59951.54	27155.67	618.88
SRM610-6		104495.83	506194.31	141613.16	446769.91	172154.48	697.28
AP1-6		4.80	21.16	15.36	87.88	112.76	503.12
AP2-6		831.92	2616.37	24.48	923.97	2550.37	522.20
AP3-6		5721.83	15957.21	47.60	8552.01	8045.85	617.12
AP4-6		5054.03	14121.60	56.28	6220.16	8267.73	639.88
blank-6		1.84	5.96	6.68	2.60	5.00	447.60
blank average		1.80	3.98	5.20	3.48	10.18	428.50

blank subtraction							
SRM614-5		453.80	1656.67	492.60	1448.41	846.90	74.70
SRM612-5		22976.69	84426.29	25649.74	72566.09	35109.86	234.70
SRM610-5		148120.23	634393.40	164377.64	527618.27	226172.18	429.10
AP1-5		56.04	176.86	72.48	250.80	290.30	118.06
AP2-5		1297.97	3363.04	117.24	1512.65	3251.64	103.42
AP3-5		7705.64	20112.77	107.88	10557.34	10918.96	238.14
AP4-5		6749.84	18211.92	107.24	7839.56	10421.52	317.90
TGP12-1		7.00	8.46	0.36	15.24	30.74	284.98
TGP12-2		6.28	3.46	-2.48	1.00	0.30	262.50
TGP12-3		0.16	7.54	-2.92	5.36	7.94	320.02
TGP12-4		22.00	54.30	9.56	26.52	88.54	340.06
TGP12-5		5.40	4.90	-1.56	-0.32	7.26	334.22
TGP12-6		13.76	29.06	8.04	26.04	47.90	302.78
TGP12-7		26.24	47.38	37.28	28.36	53.62	426.06
TGP12-8		7.80	8.94	20.08	2.44	6.78	393.18
TGP12-9		11.48	21.34	8.52	6.00	19.50	351.70
TGP12-10		13.00	37.30	50.08	18.32	80.10	432.74
TGP12-11		3.72	14.66	5.08	0.08	33.26	434.42
TGP12-12		5.00	13.06	5.64	0.76	13.50	430.50
TGP12-13		4.60	4.10	5.36	5.72	25.38	455.18
TGP12-14		2.24	7.62	3.88	0.20	9.90	414.14
TGP12-15		0.00	1.18	4.12	-1.04	22.74	377.94
TGP12-16		2.76	17.18	68.60	26.44	242.86	360.30
TGP12-17		14.92	14.86	84.92	11.64	316.26	385.86
TGP12-18		3.92	17.50	15.32	16.76	115.74	365.50
SRM614-6		327.60	1302.07	461.40	1268.89	699.06	173.66
SRM612-6		15970.41	64844.95	21520.32	59948.06	27145.49	190.38
SRM610-6		104494.03	506190.33	141607.96	446766.43	172144.30	268.78
AP1-6		3.00	17.18	10.16	84.40	102.58	74.62
AP2-6		830.12	2612.39	19.28	920.49	2540.19	93.70
AP3-6		5720.03	15953.23	42.40	8548.53	8035.67	188.62
AP4-6		5052.23	14117.62	51.08	6216.68	8257.55	211.38

zero correction							
SRM614-5		453.80	1656.67	492.60	1448.41	846.90	74.70

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	22976.69	84426.29	25649.74	72566.09	35109.86	234.70	48895.04
SRM610-5	148120.23	634393.40	164377.64	527618.27	226172.18	429.10	87363.77
AP1-5	56.04	176.86	72.48	250.80	290.30	118.06	147.28
AP2-5	1297.97	3363.04	117.24	1512.65	3251.64	103.42	1493.17
AP3-5	7705.64	20112.77	107.88	10557.34	10918.96	238.14	7186.00
AP4-5	6749.84	18211.92	107.24	7839.56	10421.52	317.90	3845.54
TGP12-1	7.00	8.46	0.36	15.24	30.74	284.98	17.64
TGP12-2	6.28	3.46	0.00	1.00	0.30	262.50	2.08
TGP12-3	0.16	7.54	0.00	5.36	7.94	320.02	10.96
TGP12-4	22.00	54.30	9.56	26.52	88.54	340.06	51.64
TGP12-5	5.40	4.90	0.00	0.00	7.26	334.22	12.92
TGP12-6	13.76	29.06	8.04	26.04	47.90	302.78	24.32
TGP12-7	26.24	47.38	37.28	28.36	53.62	426.06	64.32
TGP12-8	7.80	8.94	20.08	2.44	6.78	393.18	17.36
TGP12-9	11.48	21.34	8.52	6.00	19.50	351.70	23.36
TGP12-10	13.00	37.30	50.08	18.32	80.10	432.74	43.12
TGP12-11	3.72	14.66	5.08	0.08	33.26	434.42	21.04
TGP12-12	5.00	13.06	5.64	0.76	13.50	430.50	12.04
TGP12-13	4.60	4.10	5.36	5.72	25.38	455.18	11.60
TGP12-14	2.24	7.62	3.88	0.20	9.90	414.14	1.48
TGP12-15	0.00	1.18	4.12	0.00	22.74	377.94	17.36
TGP12-16	2.76	17.18	68.60	26.44	242.86	360.30	48.24
TGP12-17	14.92	14.86	84.92	11.64	316.26	385.86	42.28
TGP12-18	3.92	17.50	15.32	16.76	115.74	365.50	54.68
SRM614-6	327.60	1302.07	461.40	1268.89	699.06	173.66	703.12
SRM612-6	15970.41	64844.95	21520.32	59948.06	27145.49	190.38	31776.22
SRM610-6	104494.03	506190.33	141607.96	446766.43	172144.30	268.78	50831.61
AP1-6	3.00	17.18	10.16	84.40	102.58	74.62	13.32
AP2-6	830.12	2612.39	19.28	920.49	2540.19	93.70	901.49
AP3-6	5720.03	15953.23	42.40	8548.53	8035.67	188.62	5039.15
AP4-6	5052.23	14117.62	51.08	6216.68	8257.55	211.38	2752.98

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-5	0.000121	0.000440	0.000131	0.000385	0.000225	0.000020	0.000279
SRM612-5	0.007152	0.026278	0.007984	0.022587	0.010928	0.000073	0.015219
SRM610-5	0.104073	0.445739	0.115495	0.370717	0.158914	0.000301	0.061384
AP1-5	0.000003	0.000011	0.000004	0.000015	0.000017	0.000007	0.000009
AP2-5	0.000070	0.000180	0.000006	0.000081	0.000174	0.000006	0.000080
AP3-5	0.000297	0.000776	0.000004	0.000407	0.000421	0.000009	0.000277
AP4-5	0.000418	0.001129	0.000007	0.000486	0.000646	0.000020	0.000238
TGP12-1	0.000002	0.000002	0.000000	0.000004	0.000007	0.000067	0.000004
TGP12-2	0.000002	0.000001	0.000000	0.000000	0.000000	0.000065	0.000001
TGP12-3	0.000000	0.000002	0.000000	0.000001	0.000002	0.000089	0.000003
TGP12-4	0.000004	0.000009	0.000002	0.000004	0.000014	0.000055	0.000008
TGP12-5	0.000001	0.000001	0.000000	0.000000	0.000001	0.000041	0.000002
TGP12-6	0.000001	0.000002	0.000001	0.000002	0.000003	0.000019	0.000002
TGP12-7	0.000001	0.000002	0.000002	0.000001	0.000003	0.000022	0.000003
TGP12-8	0.000000	0.000000	0.000001	0.000000	0.000000	0.000021	0.000001
TGP12-9	0.000001	0.000001	0.000000	0.000000	0.000001	0.000019	0.000001
TGP12-10	0.000001	0.000003	0.000004	0.000001	0.000006	0.000031	0.000003
TGP12-11	0.000000	0.000001	0.000000	0.000000	0.000002	0.000031	0.000001
TGP12-12	0.000000	0.000001	0.000000	0.000000	0.000001	0.000031	0.000001
TGP12-13	0.000001	0.000001	0.000001	0.000001	0.000004	0.000068	0.000002
TGP12-14	0.000000	0.000001	0.000001	0.000000	0.000001	0.000060	0.000000
TGP12-15	0.000000	0.000000	0.000001	0.000000	0.000003	0.000053	0.000002
TGP12-16	0.000000	0.000001	0.000005	0.000002	0.000019	0.000029	0.000004
TGP12-17	0.000001	0.000001	0.000007	0.000001	0.000026	0.000032	0.000003
TGP12-18	0.000000	0.000002	0.000001	0.000002	0.000011	0.000034	0.000005
SRM614-6	0.000138	0.000548	0.000194	0.000534	0.000294	0.000073	0.000296
SRM612-6	0.007666	0.031126	0.010330	0.028775	0.013030	0.000091	0.015253

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.112648	0.545690	0.152658	0.481629	0.185577	0.000290	0.054798	
AP1-6	0.000000	0.000001	0.000001	0.000006	0.000008	0.000006	0.000001	
AP2-6	0.000056	0.000177	0.000001	0.000062	0.000172	0.000006	0.000061	
AP3-6	0.000269	0.000751	0.000002	0.000403	0.000378	0.000009	0.000237	
AP4-6	0.000373	0.001043	0.000004	0.000459	0.000610	0.000016	0.000203	
standardize signal averages AP								
AP1	0.000002	0.000006	0.000003	0.000011	0.000013	0.000006	0.000005	
AP2	0.000063	0.000179	0.000004	0.000072	0.000173	0.000006	0.000071	
AP3	0.000283	0.000764	0.000003	0.000405	0.000400	0.000009	0.000257	
AP4	0.000396	0.001086	0.000005	0.000473	0.000628	0.000018	0.000221	
linest from std sig ave								
	0.034887	0.008900	2.237866	0.004818	0.028327	0.062091	0.010693	
standardize signal averages SRM								
srm614-2	0.000129	0.000494	0.000162	0.000459	0.000260	0.000046	0.000288	
srm612-2	0.007409	0.028702	0.009157	0.025681	0.011979	0.000082	0.015236	
srm610-2	0.108360	0.495714	0.134077	0.426173	0.172245	0.000296	0.058091	
linest from std sig ave								
	0.049721	0.010242	0.036362	0.010332	0.030184	0.000000	0.012235	
concentration data								
SRM614-5	0.36	0.34	25.12	0.16	0.55	0.11	0.26	
SRM612-5	21.40	20.06	1532.28	9.33	26.55	0.39	13.96	
SRM610-5	311.39	340.22	22166.60	153.20	386.07	1.61	56.29	
AP1-5	0.05	0.04	3.88	0.03	0.20	0.18	0.04	
AP2-5	0.97	0.64	5.61	0.16	1.97	0.14	0.34	
AP3-5	4.14	2.76	3.72	0.78	4.76	0.23	1.18	
AP4-5	5.82	4.01	5.93	0.93	7.30	0.49	1.02	
TGP12-1	0.02	0.01	0.08	0.01	0.08	1.65	0.02	
TGP12-2	0.02	0.00	0.00	0.00	0.00	1.61	0.00	
TGP12-3	0.00	0.01	0.00	0.00	0.02	2.21	0.01	
TGP12-4	0.05	0.03	1.37	0.01	0.16	1.35	0.04	
TGP12-5	0.01	0.00	0.00	0.00	0.01	1.02	0.01	
TGP12-6	0.01	0.01	0.46	0.00	0.03	0.48	0.01	
TGP12-7	0.02	0.01	1.73	0.00	0.03	0.55	0.01	
TGP12-8	0.01	0.00	0.95	0.00	0.00	0.51	0.00	
TGP12-9	0.01	0.00	0.41	0.00	0.01	0.47	0.01	
TGP12-10	0.01	0.01	3.20	0.00	0.06	0.77	0.01	
TGP12-11	0.00	0.00	0.32	0.00	0.03	0.76	0.01	
TGP12-12	0.01	0.00	0.36	0.00	0.01	0.77	0.00	
TGP12-13	0.01	0.00	0.71	0.00	0.04	1.68	0.01	
TGP12-14	0.00	0.00	0.50	0.00	0.02	1.49	0.00	
TGP12-15	0.00	0.00	0.52	0.00	0.04	1.32	0.01	
TGP12-16	0.00	0.00	4.87	0.00	0.22	0.71	0.02	
TGP12-17	0.02	0.00	6.23	0.00	0.29	0.79	0.01	
TGP12-18	0.01	0.01	1.26	0.00	0.12	0.84	0.02	
SRM614-6	0.41	0.42	37.25	0.22	0.71	0.39	0.27	
SRM612-6	22.94	23.76	1982.56	11.89	31.65	0.49	13.99	
SRM610-6	337.04	416.51	29299.05	199.03	450.84	1.54	50.25	
AP1-6	0.00	0.00	0.69	0.01	0.09	0.14	0.00	
AP2-6	0.78	0.63	1.17	0.12	1.95	0.16	0.26	
AP3-6	3.75	2.67	1.78	0.77	4.28	0.22	1.01	
AP4-6	5.19	3.70	3.37	0.88	6.89	0.39	0.87	
certified concentration								
SRM614	0.81	0.72	0.67	0.77				
SRM612	39.95	37.71	34.77	39.77	39.55		15.07	
SRM610	461.50	434.70	417.70	376.60	445.30		61.20	
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57	
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80	
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82	
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10	
raw data								
blank-1		3.00	2.80	1.20	2.28	59.64	1437.93	62.72
SRM614-1		561.56	1897.37	631.68	1779.77	1001.37	1731.61	909.85
SRM612-1		28602.12	112754.67	35293.80	101260.57	42329.60	1829.61	48658.59
SRM610-1		172006.05	824123.19	214844.36	707140.75	254956.47	2038.25	76640.99
AP1-1		92.64	346.12	108.84	637.92	549.92	1241.13	183.84
AP2-1		1794.85	5078.75	171.48	2327.01	5299.63	1141.25	2192.37
AP3-1		8123.53	22213.40	119.76	11706.79	11087.26	1163.09	6471.76
AP4-1		11933.23	32476.94	181.52	15286.41	21103.20	1413.93	8449.97
TGP18-1		8.96	42.76	15.76	26.56	50.48	1144.93	38.56
TGP18-2		8.12	15.40	5.84	11.04	14.28	1170.21	38.16

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	4.84	13.12	7.04	10.16	11.00	1199.49	31.76
TGP18-4	26.32	34.32	15.48	26.00	66.04	1373.13	91.68
TGP18-5	18.60	17.24	17.92	9.84	35.72	1354.53	85.64
TGP18-6	4.88	7.32	12.40	5.48	7.12	1284.37	32.52
TGP18-7	15.60	20.16	15.48	7.48	84.40	1222.93	58.88
TGP18-8	9.32	12.08	14.44	6.12	12.96	1313.81	34.68
TGP18-9	8.72	17.24	15.84	14.08	20.32	1253.49	34.60
TGP18-10	14.64	31.20	14.00	21.24	30.52	1280.41	50.96
TGP18-11	14.88	34.08	12.40	11.52	25.96	1299.05	37.60
TGP18-12	23.68	30.80	14.96	13.72	37.08	1252.85	44.88
SRM614-2	322.52	1169.97	409.96	1173.21	608.84	1359.25	625.12
SRM612-2	21272.04	88367.73	29936.33	83735.39	35283.52	1376.09	40991.39
SRM610-2	129351.73	659424.19	184638.48	596691.63	224716.34	1491.89	66836.09
AP1-2	12.24	44.20	21.60	494.12	199.40	981.73	64.28
AP2-2	1279.65	3658.26	40.16	1636.85	3571.10	973.61	1443.53
AP3-2	6625.64	18674.06	69.00	10515.62	10010.10	1024.81	5561.99
AP4-2	10502.62	29323.00	113.84	14645.56	20388.91	1250.09	8417.49
blank-2	0.60	6.56	3.04	3.08	10.80	1073.49	27.68
blank ave	1.80	4.68	2.12	2.68	35.22	1255.71	45.20

blank subtraction

SRM614-1	559.76	1892.69	629.56	1777.09	966.15	475.90	864.64
SRM612-1	28600.32	112749.99	35291.68	101257.89	42294.38	573.90	48613.39
SRM610-1	172004.25	824118.51	214842.24	707138.07	254921.25	782.54	76595.79
AP1-1	90.84	341.44	106.72	635.24	514.70	-14.58	138.64
AP2-1	1793.05	5074.07	169.36	2324.33	5264.41	-114.46	2147.17
AP3-1	8121.73	22208.72	117.64	11704.11	11052.04	-92.62	6426.56
AP4-1	11931.43	32472.26	179.40	15283.73	21067.98	158.22	8404.77
TGP18-1	7.16	38.08	13.64	23.88	15.26	-110.78	-6.64
TGP18-2	6.32	10.72	3.72	8.36	-20.94	-85.50	-7.04
TGP18-3	3.04	8.44	4.92	7.48	-24.22	-56.22	-13.44
TGP18-4	24.52	29.64	13.36	23.32	30.82	117.42	46.48
TGP18-5	16.80	12.56	15.80	7.16	0.50	98.82	40.44
TGP18-6	3.08	2.64	10.28	2.80	-28.10	28.66	-12.68
TGP18-7	13.80	15.48	13.36	4.80	49.18	-32.78	13.68
TGP18-8	7.52	7.40	12.32	3.44	-22.26	58.10	-10.52
TGP18-9	6.92	12.56	13.72	11.40	-14.90	-2.22	-10.60
TGP18-10	12.84	26.52	11.88	18.56	-4.70	24.70	5.76
TGP18-11	13.08	29.40	10.28	8.84	-9.26	43.34	-7.60
TGP18-12	21.88	26.12	12.84	11.04	1.86	-2.86	-0.32
SRM614-2	320.72	1165.29	407.84	1170.53	573.62	103.54	579.92
SRM612-2	21270.24	88363.05	29934.21	83732.71	35248.30	120.38	40946.19
SRM610-2	129349.93	659419.51	184636.36	596688.95	224681.12	236.18	66790.89
AP1-2	10.44	39.52	19.48	491.44	164.18	-273.98	19.08
AP2-2	1277.85	3653.58	38.04	1634.17	3535.88	-282.10	1398.33
AP3-2	6623.84	18669.38	66.88	10512.94	9974.88	-230.90	5516.79
AP4-2	10500.82	29318.32	111.72	14642.88	20353.69	-5.62	8372.29

zero correction

SRM614-1	559.76	1892.69	629.56	1777.09	966.15	475.90	864.64
SRM612-1	28600.32	112749.99	35291.68	101257.89	42294.38	573.90	48613.39
SRM610-1	172004.25	824118.51	214842.24	707138.07	254921.25	782.54	76595.79
AP1-1	90.84	341.44	106.72	635.24	514.70	0.00	138.64
AP2-1	1793.05	5074.07	169.36	2324.33	5264.41	0.00	2147.17
AP3-1	8121.73	22208.72	117.64	11704.11	11052.04	0.00	6426.56
AP4-1	11931.43	32472.26	179.40	15283.73	21067.98	158.22	8404.77
TGP18-1	7.16	38.08	13.64	23.88	15.26	0.00	0.00
TGP18-2	6.32	10.72	3.72	8.36	0.00	0.00	0.00
TGP18-3	3.04	8.44	4.92	7.48	0.00	0.00	0.00
TGP18-4	24.52	29.64	13.36	23.32	30.82	117.42	46.48
TGP18-5	16.80	12.56	15.80	7.16	0.50	98.82	40.44
TGP18-6	3.08	2.64	10.28	2.80	0.00	28.66	0.00
TGP18-7	13.80	15.48	13.36	4.80	49.18	0.00	13.68
TGP18-8	7.52	7.40	12.32	3.44	0.00	58.10	0.00
TGP18-9	6.92	12.56	13.72	11.40	0.00	0.00	0.00
TGP18-10	12.84	26.52	11.88	18.56	0.00	24.70	5.76
TGP18-11	13.08	29.40	10.28	8.84	0.00	43.34	0.00
TGP18-12	21.88	26.12	12.84	11.04	1.86	0.00	0.00
SRM614-2	320.72	1165.29	407.84	1170.53	573.62	103.54	579.92
SRM612-2	21270.24	88363.05	29934.21	83732.71	35248.30	120.38	40946.19
SRM610-2	129349.93	659419.51	184636.36	596688.95	224681.12	236.18	66790.89
AP1-2	10.44	39.52	19.48	491.44	164.18	0.00	19.08
AP2-2	1277.85	3653.58	38.04	1634.17	3535.88	0.00	1398.33
AP3-2	6623.84	18669.38	66.88	10512.94	9974.88	0.00	5516.79
AP4-2	10500.82	29318.32	111.72	14642.88	20353.69	0.00	8372.29

certified concentration

SRM614	0.81	0.72	0.67	0.77			
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-1	0.000141	0.000478	0.000159	0.000449	0.000244	0.000120	0.000218
SRM612-1	0.007812	0.030797	0.009640	0.027658	0.011553	0.000157	0.013279
SRM610-1	0.119674	0.573392	0.149480	0.492001	0.177365	0.000544	0.053293
AP1-1	0.000004	0.000016	0.000005	0.000029	0.000023	0.000000	0.000006
AP2-1	0.000075	0.000213	0.000007	0.000098	0.000221	0.000000	0.000090
AP3-1	0.000340	0.000929	0.000005	0.000489	0.000462	0.000000	0.000269
AP4-1	0.000535	0.001457	0.000008	0.000686	0.000945	0.000007	0.000377
TGP18-1	0.000000	0.000002	0.000001	0.000001	0.000001	0.000000	0.000000
TGP18-2	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000
TGP18-3	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TGP18-4	0.000001	0.000001	0.000000	0.000001	0.000001	0.000004	0.000001
TGP18-5	0.000001	0.000000	0.000001	0.000000	0.000000	0.000003	0.000001
TGP18-6	0.000000	0.000000	0.000000	0.000000	0.000000	0.000001	0.000000
TGP18-7	0.000000	0.000001	0.000000	0.000000	0.000002	0.000000	0.000000
TGP18-8	0.000000	0.000000	0.000000	0.000000	0.000000	0.000002	0.000000
TGP18-9	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TGP18-10	0.000000	0.000001	0.000000	0.000001	0.000000	0.000001	0.000000
TGP18-11	0.000000	0.000001	0.000000	0.000000	0.000000	0.000001	0.000000
TGP18-12	0.000001	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000
SRM614-2	0.000172	0.000626	0.000219	0.000629	0.000308	0.000056	0.000312
SRM612-2	0.008483	0.035242	0.011939	0.033395	0.014058	0.000048	0.016331
SRM610-2	0.120895	0.616317	0.172568	0.557687	0.209995	0.000221	0.062425
AP1-2	0.000001	0.000003	0.000001	0.000031	0.000010	0.000000	0.000001
AP2-2	0.000071	0.000203	0.000002	0.000091	0.000196	0.000000	0.000078
AP3-2	0.000352	0.000993	0.000004	0.000559	0.000531	0.000000	0.000293
AP4-2	0.000578	0.001613	0.000006	0.000806	0.001120	0.000000	0.000461

standardize signal averages AP							
AP1	0.000002	0.000009	0.000003	0.000030	0.000017	0.000000	0.000004
AP2	0.000073	0.000208	0.000005	0.000094	0.000209	0.000000	0.000084
AP3	0.000346	0.000961	0.000004	0.000524	0.000496	0.000000	0.000281
AP4	0.000557	0.001535	0.000007	0.000746	0.001033	0.000004	0.000419

linest from std sig ave							
	0.026047	0.006549	1.746009	0.003329	0.018535	0.301413	0.007268

standardize signal averages SRM							
srm614-2	0.000157	0.000552	0.000189	0.000539	0.000276	0.000088	0.000265
srm612-2	0.008148	0.033020	0.010789	0.030527	0.012805	0.000102	0.014805
srm610-2	0.120285	0.594855	0.161024	0.524844	0.193680	0.000383	0.057859

linest from std sig ave							
	0.994761	0.963824	0.928152	0.937318	0.915704	1.427304	0.919593

concentration data							
SRM614-1	0.32	0.27	23.82	0.13	0.39	3.11	0.14
SRM612-1	17.45	17.30	1443.49	7.90	18.36	4.05	8.28
SRM610-1	267.33	322.07	22383.52	140.46	281.94	14.07	33.22
AP1-1	0.04	0.04	3.38	0.04	0.17	0.00	0.02
AP2-1	0.78	0.56	4.96	0.13	1.64	0.00	0.26
AP3-1	3.53	2.43	3.43	0.65	3.42	0.00	0.78
AP4-1	5.56	3.81	5.61	0.91	6.99	0.85	1.09
TGP18-1	0.00	0.00	0.41	0.00	0.00	0.00	0.00
TGP18-2	0.00	0.00	0.13	0.00	0.00	0.00	0.00
TGP18-3	0.00	0.00	0.19	0.00	0.00	0.00	0.00
TGP18-4	0.01	0.00	0.30	0.00	0.01	0.45	0.00
TGP18-5	0.01	0.00	0.36	0.00	0.00	0.39	0.00
TGP18-6	0.00	0.00	0.31	0.00	0.00	0.15	0.00
TGP18-7	0.01	0.00	0.33	0.00	0.01	0.00	0.00
TGP18-8	0.00	0.00	0.31	0.00	0.00	0.25	0.00
TGP18-9	0.00	0.00	0.33	0.00	0.00	0.00	0.00

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.00	0.00	0.28	0.00	0.00	0.10	0.00
TGP18-11	0.00	0.00	0.22	0.00	0.00	0.16	0.00
TGP18-12	0.01	0.00	0.27	0.00	0.00	0.00	0.00
SRM614-2	1.79	1.64	152.72	0.84	2.28	6.69	0.90
SRM612-2	18.95	19.79	1787.74	9.53	22.35	1.24	10.18
SRM610-2	270.06	346.18	25840.81	159.21	333.81	5.71	38.91
AP1-2	0.00	0.00	0.18	0.01	0.02	0.00	0.00
AP2-2	0.74	0.53	1.47	0.12	1.45	0.00	0.23
AP3-2	3.66	2.59	2.48	0.74	3.92	0.00	0.85
AP4-2	6.00	4.21	4.28	1.07	8.28	0.00	1.34

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl
raw data							
blank-7b	3	5	4	7	5	95	19
SRM614-7b	225	855	331	891	880	2181	531
SRM612-7	13099	50998	17561	49732	30129	1888	32492
SRM610-7	96628	440928	131696	401680	145900	1891	49598
AP1-7	15	50	25	526	284	1386	76
AP2-7	519	1503	39	663	2924	1297	634
AP3-7	1565	4634	32	1866	1942	1347	808
AP4-7	2523	7111	53	3532	5288	1399	1645
MZ3-1	20	27	11	12	50	1183	36
MZ3-2	11	19	7	5	33	1201	36
MZ3-3	7	18	5	5	31	1141	51
MZ3-4	30	36	34	13	79	1444	73
MZ3-5	22	19	21	10	38	1461	57
MZ3-6	24	24	26	10	50	1485	67
MZ3-7	23	23	25	18	49	1763	85
MZ3-8	27	17	23	9	38	1774	89
MZ3-9	21	19	11	14	46	1755	100
srm614-8	164	607	240	631	788	1146	395
srm612-8	9040	35548	12529	36132	21726	1197	23283
srm610-8	80897	374710	115235	348671	122337	1137	42298
AP1-8	8	12	15	315	99	934	41
AP2-8	447	1157	19	468	2039	884	411
AP3-8	1566	4360	21	1779	1864	972	726
AP4-8	2517	7225	33	3063	4463	975	1260
blank-8	9	9	6	4	5	772	24
blank ave	6	7	5	5	5	433	21

blank subtraction							
SRM614-7b	219.42	847.92	326.48	885.16	875.48	1747.97	509.66
SRM612-7	13093.41	50990.85	17556.46	49726.16	30124.21	1454.61	32470.96
SRM610-7	96622.36	440921.04	131690.98	401674.34	145895.15	1457.37	49576.74
AP1-7	8.50	43.60	19.68	520.48	278.92	952.65	54.86
AP2-7	513.38	1496.33	33.84	657.84	2919.38	864.20	612.34
AP3-7	1558.87	4627.67	26.56	1860.77	1936.77	913.33	786.58
AP4-7	2517.39	7103.76	48.12	3526.34	5282.55	966.01	1623.63
MZ3-1	13.86	19.76	6.40	6.76	45.24	749.44	14.94
MZ3-2	4.98	11.88	2.32	-0.12	28.48	767.36	14.18
MZ3-3	0.94	11.08	0.44	0.04	25.96	708.00	29.82
MZ3-4	24.34	29.36	29.44	8.00	74.24	1010.37	51.26
MZ3-5	16.02	12.68	15.60	4.12	32.68	1027.89	35.34
MZ3-6	17.70	16.72	20.72	4.32	45.04	1051.65	45.14
MZ3-7	17.22	16.40	20.36	12.20	43.72	1329.73	63.26
MZ3-8	20.94	10.64	18.24	3.88	33.40	1340.77	67.50
MZ3-9	14.90	12.44	5.72	8.76	41.52	1321.73	78.58
srm614-8	157.86	600.44	234.56	625.64	783.20	713.00	373.10
srm612-8	9033.59	35541.40	12524.27	36126.64	21721.12	764.00	23261.51
srm610-8	80891.31	374703.39	115230.53	348665.81	122332.21	703.92	42276.14
AP1-8	1.78	5.48	10.28	309.24	94.44	500.80	19.82
AP2-8	441.14	1149.77	14.44	462.60	2033.85	450.48	390.06
AP3-8	1559.67	4353.62	15.88	1773.93	1859.53	538.80	705.02
AP4-8	2511.35	7218.28	28.04	3057.26	4458.43	541.36	1238.31

zero correction							
SRM614-7b	219.42	847.92	326.48	885.16	875.48	1747.97	509.66
SRM612-7	13093.41	50990.85	17556.46	49726.16	30124.21	1454.61	32470.96
SRM610-7	96622.36	440921.04	131690.98	401674.34	145895.15	1457.37	49576.74

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	8.50	43.60	19.68	520.48	278.92	952.65	54.86
AP2-7	513.38	1496.33	33.84	657.84	2919.38	864.20	612.34
AP3-7	1558.87	4627.67	26.56	1860.77	1936.77	913.33	786.58
AP4-7	2517.39	7103.76	48.12	3526.34	5282.55	966.01	1623.63
MZ3-1	13.86	19.76	6.40	6.76	45.24	749.44	14.94
MZ3-2	4.98	11.88	2.32	0.00	28.48	767.36	14.18
MZ3-3	0.94	11.08	0.44	0.04	25.96	708.00	29.82
MZ3-4	24.34	29.36	29.44	8.00	74.24	1010.37	51.26
MZ3-5	16.02	12.68	15.60	4.12	32.68	1027.89	35.34
MZ3-6	17.70	16.72	20.72	4.32	45.04	1051.65	45.14
MZ3-7	17.22	16.40	20.36	12.20	43.72	1329.73	63.26
MZ3-8	20.94	10.64	18.24	3.88	33.40	1340.77	67.50
MZ3-9	14.90	12.44	5.72	8.76	41.52	1321.73	78.58
srm614-8	157.86	600.44	234.56	625.64	783.20	713.00	373.10
srm612-8	9033.59	35541.40	12524.27	36126.64	21721.12	764.00	23261.51
srm610-8	80891.31	374703.39	115230.53	348665.81	122332.21	703.92	42276.14
AP1-8	1.78	5.48	10.28	309.24	94.44	500.80	19.82
AP2-8	441.14	1149.77	14.44	462.60	2033.85	450.48	390.06
AP3-8	1559.67	4353.62	15.88	1773.93	1859.53	538.80	705.02
AP4-8	2511.35	7218.28	28.04	3057.26	4458.43	541.36	1238.31

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-7b	0.000155	0.000599	0.000230	0.000625	0.000618	0.001234	0.000360
SRM612-7	0.008484	0.033042	0.011376	0.032222	0.019520	0.000943	0.021041
SRM610-7	0.136191	0.621486	0.185621	0.566167	0.205642	0.002054	0.069879
AP1-7	0.000001	0.000005	0.000002	0.000057	0.000031	0.000105	0.000006
AP2-7	0.000061	0.000178	0.000004	0.000078	0.000348	0.000103	0.000073
AP3-7	0.000186	0.000554	0.000003	0.000223	0.000232	0.000109	0.000094
AP4-7	0.000322	0.000909	0.000006	0.000451	0.000676	0.000124	0.000208
MZ3-1	0.000003	0.000004	0.000001	0.000001	0.000010	0.000166	0.000003
MZ3-2	0.000001	0.000003	0.000001	0.000000	0.000006	0.000168	0.000003
MZ3-3	0.000000	0.000003	0.000000	0.000000	0.000006	0.000172	0.000007
MZ3-4	0.000002	0.000002	0.000002	0.000001	0.000006	0.000076	0.000004
MZ3-5	0.000002	0.000001	0.000002	0.000000	0.000003	0.000099	0.000003
MZ3-6	0.000001	0.000001	0.000002	0.000000	0.000004	0.000082	0.000004
MZ3-7	0.000001	0.000001	0.000002	0.000001	0.000003	0.000105	0.000005
MZ3-8	0.000002	0.000001	0.000001	0.000000	0.000003	0.000108	0.000005
MZ3-9	0.000001	0.000001	0.000000	0.000001	0.000003	0.000106	0.000006
srm614-8	0.000155	0.000591	0.000231	0.000616	0.000771	0.000702	0.000368
srm612-8	0.008256	0.032480	0.011446	0.033015	0.019850	0.000698	0.021258
srm610-8	0.129781	0.601170	0.184875	0.559396	0.196268	0.001129	0.067827
AP1-8	0.000000	0.000001	0.000001	0.000044	0.000013	0.000071	0.000003
AP2-8	0.000063	0.000163	0.000002	0.000066	0.000288	0.000064	0.000055
AP3-8	0.000202	0.000563	0.000002	0.000230	0.000241	0.000070	0.000091
AP4-8	0.000356	0.001024	0.000004	0.000434	0.000633	0.000077	0.000176

standardize signal averages AP							
AP1	0.000001	0.000003	0.000002	0.000051	0.000022	0.000088	0.000004
AP2	0.000062	0.000171	0.000003	0.000072	0.000318	0.000083	0.000064
AP3	0.000194	0.000559	0.000003	0.000226	0.000236	0.000089	0.000093
AP4	0.000339	0.000967	0.000005	0.000443	0.000654	0.000100	0.000192

linest from std sig ave							
	0.043486	0.010596	2.610222	0.006194	0.028021	0.006977	0.017202

standardize signal averages SRM							
srm614-2	0.000155	0.000595	0.000231	0.000621	0.000695	0.000968	0.000364
srm612-2	0.008370	0.032761	0.011411	0.032619	0.019685	0.000820	0.021150
srm610-2	0.132986	0.611328	0.185248	0.562781	0.200955	0.001592	0.068853

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	1.024058	1.016593	1.001995	1.005955	1.023019	1.263914	1.013173
concentration data							
SRM614-7b	0.58	0.54	51.60	0.33	1.49	0.74	0.53
SRM612-7	31.64	30.03	2546.75	17.12	46.91	0.56	31.04
SRM610-7	507.92	564.75	41553.16	300.74	494.19	1.23	103.09
AP1-7	0.02	0.02	2.26	0.14	0.34	0.29	0.04
AP2-7	1.06	0.75	4.20	0.19	3.89	0.29	0.50
AP3-7	3.24	2.34	3.31	0.55	2.59	0.30	0.65
AP4-7	5.59	3.84	6.41	1.12	7.56	0.34	1.43
MZ3-1	0.05	0.02	1.47	0.00	0.11	0.46	0.02
MZ3-2	0.02	0.01	0.53	0.00	0.07	0.47	0.02
MZ3-3	0.00	0.01	0.11	0.00	0.07	0.48	0.05
MZ3-4	0.03	0.01	2.29	0.00	0.06	0.21	0.03
MZ3-5	0.03	0.01	1.57	0.00	0.04	0.28	0.02
MZ3-6	0.02	0.01	1.69	0.00	0.04	0.23	0.02
MZ3-7	0.02	0.01	1.68	0.00	0.04	0.29	0.03
MZ3-8	0.03	0.00	1.53	0.00	0.03	0.30	0.04
MZ3-9	0.02	0.00	0.48	0.00	0.04	0.29	0.04
srm614-8	0.58	0.54	51.72	0.33	1.85	0.42	0.54
srm612-8	30.79	29.52	2562.23	17.54	47.70	0.42	31.36
srm610-8	484.02	546.29	41386.11	297.14	471.67	0.68	100.07
AP1-8	0.00	0.00	1.52	0.11	0.15	0.20	0.02
AP2-8	1.08	0.69	2.13	0.16	3.22	0.18	0.38
AP3-8	3.50	2.38	2.14	0.57	2.69	0.19	0.63
AP4-8	6.18	4.33	4.14	1.07	7.07	0.21	1.21
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10
raw data							
	Yb	Lu	Hf	Ta	W	Hg	Tl
blank-5	3.48	3.96	4.08	6.92	55.60	2844.94	445.80
SRM614-5	619.52	2410.25	833.00	2291.41	1299.85	3122.70	1212.85
SRM612-5	29001.76	112576.55	36662.33	105865.52	50788.84	2582.57	50557.88
SRM610-5	132507.70	605239.06	168891.31	533115.50	225525.91	2533.93	56319.28
AP1-5	43.48	143.24	46.16	524.68	683.28	2061.05	137.88
AP2-5	1682.97	4525.87	147.40	2364.81	6746.56	1759.05	2158.41
AP3-5	6072.15	16619.81	69.32	7700.92	8233.41	1947.05	5135.67
AP4-5	12531.39	34346.47	199.88	17048.86	29203.08	2466.25	11132.58
V1-1	103.12	94.96	325.44	57.52	342.08	2586.05	162.20
V1-2	85.68	42.48	131.72	31.12	1755.93	2132.77	102.84
V1-3	43.00	30.72	46.08	27.16	208.20	2182.81	75.00
V1-4	53.44	38.32	41.56	56.00	118.80	2460.45	145.04
V1-5	37.68	29.56	29.52	49.72	91.08	2126.41	84.96
V1-6	70.40	27.48	53.68	20.16	73.36	1976.77	70.64
V1-7	65.52	70.00	52.24	38.04	165.44	2226.05	148.20
V1-8	42.00	26.64	32.76	19.76	104.08	2275.65	66.20
V1-9	131.80	58.96	73.72	45.40	106.76	1938.01	97.84
V1-10	17.44	17.08	24.92	14.16	81.84	2089.77	102.40
V1-11	24.36	21.00	30.36	15.72	67.40	1972.37	52.04
V1-12	17.48	10.84	28.00	9.20	127.52	1992.17	67.80
V1-13	24.92	22.40	19.28	18.00	100.16	2037.25	105.96
V1-14	21.56	11.28	11.48	12.44	51.44	2205.09	45.12
V1-15	23.68	19.36	15.96	11.00	55.52	1737.41	74.88
SRM614-6	179.56	749.76	259.48	768.44	401.60	1517.93	330.16
SRM612-6	18223.70	73189.38	24879.98	69580.88	34111.27	1309.49	31575.06
SRM610-6	127817.48	620311.75	178237.59	558911.00	242931.72	1407.29	64937.09
AP1-6	11.96	41.44	27.76	197.52	169.44	1064.29	34.88
AP2-6	1031.69	2936.22	28.04	1269.29	3536.26	1006.29	1126.41
AP3-6	4559.79	13169.75	59.80	6327.88	5879.71	1126.61	3198.30
AP4-6	7767.80	21555.76	109.40	10576.42	16896.46	1508.81	6498.72
blank-6	2.00	2.80	3.80	4.08	6.92	1066.81	18.04
blank average	2.74	3.38	3.94	5.50	31.26	1955.87	231.92
blank subtraction							
SRM614-5	616.78	2406.87	829.06	2285.91	1268.59	1166.83	980.93
SRM612-5	28999.02	112573.17	36658.39	105860.02	50757.58	626.70	50325.96
SRM610-5	132504.96	605235.68	168887.37	533110.00	225494.65	578.06	56087.36
AP1-5	40.74	139.86	42.22	519.18	652.02	105.18	-94.04
AP2-5	1680.23	4522.49	143.46	2359.31	6715.30	-196.82	1926.49

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	6069.41	16616.43	65.38	7695.42	8202.15	-8.82	4903.75
AP4-5	12528.65	34343.09	195.94	17043.35	29171.82	510.38	10900.66
V1-1	100.38	91.58	321.50	52.02	310.82	630.18	-69.72
V1-2	82.94	39.10	127.78	25.62	1724.67	176.90	-129.08
V1-3	40.26	27.34	42.14	21.66	176.94	226.94	-156.92
V1-4	50.70	34.94	37.62	50.50	87.54	504.58	-86.88
V1-5	34.94	26.18	25.58	44.22	59.82	170.54	-146.96
V1-6	67.66	24.10	49.74	14.66	42.10	20.90	-161.28
V1-7	62.78	66.62	48.30	32.54	134.18	270.18	-83.72
V1-8	39.26	23.26	28.82	14.26	72.82	319.78	-165.72
V1-9	129.06	55.58	69.78	39.90	75.50	-17.86	-134.08
V1-10	14.70	13.70	20.98	8.66	50.58	133.90	-129.52
V1-11	21.62	17.62	26.42	10.22	36.14	16.50	-179.88
V1-12	14.74	7.46	24.06	3.70	96.26	36.30	-164.12
V1-13	22.18	19.02	15.34	12.50	68.90	81.38	-125.96
V1-14	18.82	7.90	7.54	6.94	20.18	249.22	-186.80
V1-15	20.94	15.98	12.02	5.50	24.26	-218.46	-157.04
SRM614-6	176.82	746.38	255.54	762.94	370.34	-437.94	98.24
SRM612-6	18220.96	73185.99	24876.04	69575.37	34080.01	-646.38	31343.14
SRM610-6	127814.74	620308.37	178233.65	558905.50	242900.46	-548.58	64705.16
AP1-6	9.22	38.06	23.82	192.02	138.18	-891.59	-197.04
AP2-6	1028.95	2932.84	24.10	1263.79	3505.00	-949.59	894.49
AP3-6	4557.05	13166.37	55.86	6322.38	5848.45	-829.26	2966.38
AP4-6	7765.06	21552.38	105.46	10570.92	16865.19	-447.06	6266.80

zero correction

SRM614-5	616.78	2406.87	829.06	2285.91	1268.59	1166.83	980.93
SRM612-5	28999.02	112573.17	36658.39	105860.02	50757.58	626.70	50325.96
SRM610-5	132504.96	605235.68	168887.37	533110.00	225494.65	578.06	56087.36
AP1-5	40.74	139.86	42.22	519.18	652.02	105.18	0.00
AP2-5	1680.23	4522.49	143.46	2359.31	6715.30	0.00	1926.49
AP3-5	6069.41	16616.43	65.38	7695.42	8202.15	0.00	4903.75
AP4-5	12528.65	34343.09	195.94	17043.35	29171.82	510.38	10900.66
V1-1	100.38	91.58	321.50	52.02	310.82	630.18	0.00
V1-2	82.94	39.10	127.78	25.62	1724.67	176.90	0.00
V1-3	40.26	27.34	42.14	21.66	176.94	226.94	0.00
V1-4	50.70	34.94	37.62	50.50	87.54	504.58	0.00
V1-5	34.94	26.18	25.58	44.22	59.82	170.54	0.00
V1-6	67.66	24.10	49.74	14.66	42.10	20.90	0.00
V1-7	62.78	66.62	48.30	32.54	134.18	270.18	0.00
V1-8	39.26	23.26	28.82	14.26	72.82	319.78	0.00
V1-9	129.06	55.58	69.78	39.90	75.50	0.00	0.00
V1-10	14.70	13.70	20.98	8.66	50.58	133.90	0.00
V1-11	21.62	17.62	26.42	10.22	36.14	16.50	0.00
V1-12	14.74	7.46	24.06	3.70	96.26	36.30	0.00
V1-13	22.18	19.02	15.34	12.50	68.90	81.38	0.00
V1-14	18.82	7.90	7.54	6.94	20.18	249.22	0.00
V1-15	20.94	15.98	12.02	5.50	24.26	0.00	0.00
SRM614-6	176.82	746.38	255.54	762.94	370.34	0.00	98.24
SRM612-6	18220.96	73185.99	24876.04	69575.37	34080.01	0.00	31343.14
SRM610-6	127814.74	620308.37	178233.65	558905.50	242900.46	0.00	64705.16
AP1-6	9.22	38.06	23.82	192.02	138.18	0.00	0.00
AP2-6	1028.95	2932.84	24.10	1263.79	3505.00	0.00	894.49
AP3-6	4557.05	13166.37	55.86	6322.38	5848.45	0.00	2966.38
AP4-6	7765.06	21552.38	105.46	10570.92	16865.19	0.00	6266.80

certified concentration

SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration

SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal

SRM614-5	0.000155	0.000606	0.000209	0.000575	0.000319	0.000294	0.000247
SRM612-5	0.008292	0.032189	0.010482	0.030269	0.014513	0.000179	0.014390
SRM610-5	0.121826	0.556458	0.155276	0.490145	0.207321	0.000531	0.051567

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000003	0.000009	0.000003	0.000033	0.000042	0.000007	0.000000
AP2-5	0.000076	0.000206	0.000007	0.000107	0.000305	0.000000	0.000088
AP3-5	0.000313	0.000858	0.000003	0.000397	0.000423	0.000000	0.000253
AP4-5	0.000639	0.001753	0.000010	0.000870	0.001489	0.000026	0.000556
V1-1	0.000011	0.000010	0.000035	0.000006	0.000033	0.000068	0.000000
V1-2	0.000007	0.000003	0.000011	0.000002	0.000153	0.000016	0.000000
V1-3	0.000005	0.000003	0.000005	0.000003	0.000021	0.000027	0.000000
V1-4	0.000006	0.000004	0.000004	0.000006	0.000010	0.000056	0.000000
V1-5	0.000004	0.000003	0.000003	0.000005	0.000006	0.000018	0.000000
V1-6	0.000008	0.000003	0.000006	0.000002	0.000005	0.000002	0.000000
V1-7	0.000007	0.000008	0.000006	0.000004	0.000016	0.000032	0.000000
V1-8	0.000004	0.000003	0.000003	0.000002	0.000008	0.000037	0.000000
V1-9	0.000011	0.000005	0.000006	0.000004	0.000007	0.000000	0.000000
V1-10	0.000002	0.000002	0.000003	0.000001	0.000007	0.000020	0.000000
V1-11	0.000003	0.000002	0.000004	0.000001	0.000005	0.000002	0.000000
V1-12	0.000002	0.000001	0.000004	0.000001	0.000014	0.000005	0.000000
V1-13	0.000004	0.000003	0.000002	0.000002	0.000011	0.000013	0.000000
V1-14	0.000003	0.000001	0.000001	0.000001	0.000003	0.000042	0.000000
V1-15	0.000003	0.000002	0.000002	0.000001	0.000004	0.000000	0.000000
SRM614-6	0.000153	0.000647	0.000221	0.000661	0.000321	0.000000	0.000085
SRM612-6	0.008004	0.032149	0.010927	0.030563	0.014971	0.000000	0.013768
SRM610-6	0.116027	0.563101	0.161796	0.507361	0.220499	0.000000	0.058738
AP1-6	0.000001	0.000004	0.000002	0.000019	0.000013	0.000000	0.000000
AP2-6	0.000061	0.000175	0.000001	0.000075	0.000209	0.000000	0.000053
AP3-6	0.000256	0.000740	0.000003	0.000355	0.000329	0.000000	0.000167
AP4-6	0.000571	0.001583	0.000008	0.000777	0.001239	0.000000	0.000460
standardize signal averages AP							
AP1	0.000002	0.000006	0.000003	0.000026	0.000028	0.000003	0.000000
AP2	0.000069	0.000190	0.000004	0.000091	0.000257	0.000000	0.000070
AP3	0.000285	0.000799	0.000003	0.000376	0.000376	0.000000	0.000210
AP4	0.000605	0.001668	0.000009	0.000823	0.001364	0.000013	0.000508
linest from std sig ave							
	0.025450	0.006392	1.671372	0.003336	0.014681	0.083291	0.006400
standardize signal averages SRM							
srm614-2	0.000154	0.000626	0.000215	0.000618	0.000320	0.000147	0.000166
srm612-2	0.008148	0.032169	0.010705	0.030416	0.014742	0.000090	0.014079
srm610-2	0.118926	0.559779	0.158536	0.498753	0.213910	0.000266	0.055152
linest from std sig ave							
	0.045303	0.009070	0.030754	0.008828	0.024306	0.000000	0.012910
concentration data							
SRM614-5	0.34	0.33	29.92	0.16	0.40	2.10	0.14
SRM612-5	18.10	17.65	1502.50	8.66	18.27	1.28	7.90
SRM610-5	265.91	305.06	22257.58	140.24	261.04	3.80	28.30
AP1-5	0.03	0.02	1.81	0.04	0.25	0.22	0.00
AP2-5	0.78	0.52	4.35	0.14	1.79	0.00	0.22
AP3-5	3.18	2.19	2.25	0.53	2.48	0.00	0.65
AP4-5	6.49	4.47	6.67	1.16	8.72	0.87	1.42
V1-1	0.11	0.03	23.06	0.01	0.20	2.25	0.00
V1-2	0.07	0.01	7.55	0.00	0.90	0.52	0.00
V1-3	0.05	0.01	3.31	0.00	0.12	0.89	0.00
V1-4	0.06	0.01	2.80	0.01	0.06	1.87	0.00
V1-5	0.04	0.01	1.77	0.01	0.04	0.59	0.00
V1-6	0.08	0.01	3.77	0.00	0.03	0.08	0.00
V1-7	0.08	0.02	3.80	0.01	0.09	1.06	0.00
V1-8	0.05	0.01	2.20	0.00	0.05	1.22	0.00
V1-9	0.12	0.01	4.11	0.00	0.04	0.00	0.00
V1-10	0.02	0.01	2.05	0.00	0.04	0.65	0.00
V1-11	0.03	0.01	2.45	0.00	0.03	0.08	0.00
V1-12	0.02	0.00	2.41	0.00	0.08	0.18	0.00
V1-13	0.04	0.01	1.63	0.00	0.06	0.43	0.00
V1-14	0.03	0.00	0.85	0.00	0.02	1.40	0.00
V1-15	0.03	0.01	1.24	0.00	0.02	0.00	0.00
SRM614-6	0.33	0.35	31.73	0.19	0.40	0.00	0.05
SRM612-6	17.47	17.62	1566.37	8.74	18.85	0.00	7.56
SRM610-6	253.25	308.70	23192.15	145.17	277.64	0.00	32.24
AP1-6	0.01	0.01	1.54	0.02	0.08	0.00	0.00
AP2-6	0.62	0.45	0.96	0.10	1.22	0.00	0.14
AP3-6	2.60	1.89	2.09	0.47	1.92	0.00	0.43
AP4-6	5.79	4.04	5.17	1.03	7.26	0.00	1.18
certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

	Yb	Lu	Hf	Ta	W	Hg	Tl	
raw data								
blank-3		3.44	3.32	1.96	4.76	11.40	2936.82	51.52
SRM614-3		455.92	1629.41	566.88	1579.93	1533.13	3390.94	782.60
SRM612-3		24305.38	95794.54	31046.90	88563.94	40117.43	3098.74	44243.81
SRM610-3		129041.73	600657.31	170021.95	543639.44	234029.56	3058.58	52883.10
AP1-3		44.28	129.92	63.96	682.76	481.80	1955.17	112.52
AP2-3		1528.61	4271.22	58.36	1943.77	5061.91	2009.41	1906.73
AP3-3		6397.48	17612.58	73.64	8063.85	8127.85	1783.93	4330.78
AP4-3		10104.38	28284.04	122.60	12473.39	19781.31	2087.77	6369.20
V3-1		20.36	35.64	24.60	57.48	145.16	2423.09	96.08
V3-2		15.36	26.52	11.00	27.48	52.68	2193.17	51.52
V3-3		8.52	18.12	8.28	10.48	53.76	2046.01	48.88
V3-4		33.16	54.16	24.08	56.56	139.72	2137.21	120.76
V3-5		19.04	14.00	8.80	21.28	84.52	2072.29	69.16
V3-6		12.04	14.48	14.32	16.36	69.64	1871.61	52.76
V3-7		122.56	51.60	25.92	51.72	201.44	2028.17	117.68
V3-8		15.68	33.80	19.08	13.20	88.04	1828.69	80.08
V3-9		24.92	42.08	13.72	24.20	49.32	1823.73	94.84
SRM614-4		313.08	1134.53	415.24	1150.53	668.16	1695.37	543.60
SRM612-4		16672.77	68160.14	23463.17	64760.68	29812.17	1656.73	32405.38
SRM610-4		96855.18	462769.53	135362.03	431241.16	199713.59	1582.77	46866.54
AP1-4		8.24	13.60	19.60	334.28	215.72	1126.41	47.92
AP2-4		927.37	2610.93	32.12	1135.37	3100.94	1150.49	1033.01
AP3-4		5240.67	14737.84	58.00	7517.08	6882.56	1145.73	3458.22
AP4-4		7475.88	21311.60	84.28	10155.46	14077.04	1343.69	4366.62
blank-4		2.20	5.48	4.16	5.00	19.96	1289.01	20.08
blank average		2.82	4.40	3.06	4.88	15.68	2112.91	35.80

blank subtraction								
SRM614-3		453.10	1625.01	563.82	1575.05	1517.45	1278.03	746.80
SRM612-3		24302.56	95790.14	31043.83	88559.06	40101.75	985.83	44208.01
SRM610-3		129038.91	600652.91	170018.89	543634.56	234013.88	945.67	52847.30
AP1-3		41.46	125.52	60.90	677.88	466.12	-157.74	76.72
AP2-3		1525.79	4266.82	55.30	1938.89	5046.23	-103.50	1870.93
AP3-3		6394.66	17608.18	70.58	8058.97	8112.17	-328.98	4294.98
AP4-3		10101.56	28279.64	119.54	12468.51	19765.63	-25.14	6333.40
V3-1		17.54	31.24	21.54	52.60	129.48	310.18	60.28
V3-2		12.54	22.12	7.94	22.60	37.00	80.26	15.72
V3-3		5.70	13.72	5.22	5.60	38.08	-66.90	13.08
V3-4		30.34	49.76	21.02	51.68	124.04	24.30	84.96
V3-5		16.22	9.60	5.74	16.40	68.84	-40.62	33.36
V3-6		9.22	10.08	11.26	11.48	53.96	-241.30	16.96
V3-7		119.74	47.20	22.86	46.84	185.76	-84.74	81.88
V3-8		12.86	29.40	16.02	8.32	72.36	-284.22	44.28
V3-9		22.10	37.68	10.66	19.32	33.64	-289.18	59.04
SRM614-4		310.26	1130.13	412.18	1145.65	652.48	-417.54	507.80
SRM612-4		16669.95	68155.74	23460.11	64755.80	29796.49	-456.18	32369.58
SRM610-4		96852.36	462765.13	135358.97	431236.28	199697.91	-530.14	46830.74
AP1-4		5.42	9.20	16.54	329.40	200.04	-986.51	12.12
AP2-4		924.55	2606.53	29.06	1130.49	3085.26	-962.43	997.21
AP3-4		5237.85	14733.44	54.94	7512.20	6866.88	-967.19	3422.42
AP4-4		7473.06	21307.20	81.22	10150.58	14061.36	-769.22	4330.82

zero correction								
SRM614-3		453.10	1625.01	563.82	1575.05	1517.45	1278.03	746.80
SRM612-3		24302.56	95790.14	31043.83	88559.06	40101.75	985.83	44208.01
SRM610-3		129038.91	600652.91	170018.89	543634.56	234013.88	945.67	52847.30
AP1-3		41.46	125.52	60.90	677.88	466.12	0.00	76.72
AP2-3		1525.79	4266.82	55.30	1938.89	5046.23	0.00	1870.93
AP3-3		6394.66	17608.18	70.58	8058.97	8112.17	0.00	4294.98
AP4-3		10101.56	28279.64	119.54	12468.51	19765.63	0.00	6333.40
V3-1		17.54	31.24	21.54	52.60	129.48	310.18	60.28
V3-2		12.54	22.12	7.94	22.60	37.00	80.26	15.72
V3-3		5.70	13.72	5.22	5.60	38.08	0.00	13.08
V3-4		30.34	49.76	21.02	51.68	124.04	24.30	84.96
V3-5		16.22	9.60	5.74	16.40	68.84	0.00	33.36
V3-6		9.22	10.08	11.26	11.48	53.96	0.00	16.96
V3-7		119.74	47.20	22.86	46.84	185.76	0.00	81.88
V3-8		12.86	29.40	16.02	8.32	72.36	0.00	44.28
V3-9		22.10	37.68	10.66	19.32	33.64	0.00	59.04
SRM614-4		310.26	1130.13	412.18	1145.65	652.48	0.00	507.80

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	16669.95	68155.74	23460.11	64755.80	29796.49	0.00	32369.58
SRM610-4	96852.36	462765.13	135358.97	431236.28	199697.91	0.00	46830.74
AP1-4	5.42	9.20	16.54	329.40	200.04	0.00	12.12
AP2-4	924.55	2606.53	29.06	1130.49	3085.26	0.00	997.21
AP3-4	5237.85	14733.44	54.94	7512.20	6866.88	0.00	3422.42
AP4-4	7473.06	21307.20	81.22	10150.58	14061.36	0.00	4330.82

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

standardized concentration							
SRM614	0.000009	0.000008	0.000008	0.000009	0.000000	0.000000	0.000000
SRM612	0.000466	0.000440	0.000405	0.000464	0.000461	0.000000	0.000176
SRM610	0.005381	0.005069	0.004870	0.004391	0.005192	0.000000	0.000714
STD AP1	0.000000	0.000000	0.000002	0.000001	0.000003	0.000000	0.000001
STD AP2	0.000003	0.000002	0.000004	0.000001	0.000007	0.000000	0.000002
STD AP3	0.000009	0.000006	0.000010	0.000002	0.000010	0.000001	0.000002
STD AP4	0.000015	0.000010	0.000015	0.000003	0.000018	0.000001	0.000003

standardized signal							
SRM614-3	0.000165	0.000593	0.000206	0.000575	0.000554	0.000467	0.000273
SRM612-3	0.009234	0.036398	0.011796	0.033650	0.015238	0.000375	0.016798
SRM610-3	0.131430	0.611784	0.173170	0.553709	0.238351	0.000963	0.053827
AP1-3	0.000002	0.000005	0.000003	0.000029	0.000020	0.000000	0.000003
AP2-3	0.000084	0.000234	0.000003	0.000106	0.000276	0.000000	0.000102
AP3-3	0.000295	0.000813	0.000003	0.000372	0.000375	0.000000	0.000198
AP4-3	0.000542	0.001518	0.000006	0.000669	0.001061	0.000000	0.000340
V3-1	0.000003	0.000005	0.000004	0.000009	0.000021	0.000051	0.000010
V3-2	0.000002	0.000003	0.000001	0.000003	0.000005	0.000011	0.000002
V3-3	0.000001	0.000002	0.000001	0.000001	0.000005	0.000000	0.000002
V3-4	0.000003	0.000005	0.000002	0.000005	0.000013	0.000003	0.000009
V3-5	0.000002	0.000001	0.000001	0.000002	0.000008	0.000000	0.000004
V3-6	0.000001	0.000001	0.000001	0.000001	0.000005	0.000000	0.000001
V3-7	0.000005	0.000002	0.000001	0.000002	0.000008	0.000000	0.000004
V3-8	0.000001	0.000001	0.000001	0.000000	0.000003	0.000000	0.000002
V3-9	0.000001	0.000002	0.000000	0.000001	0.000001	0.000000	0.000002
SRM614-4	0.000164	0.000599	0.000219	0.000607	0.000346	0.000000	0.000269
SRM612-4	0.008558	0.034991	0.012044	0.033245	0.015297	0.000000	0.016618
SRM610-4	0.115729	0.552957	0.161740	0.515284	0.238619	0.000000	0.055958
AP1-4	0.000000	0.000001	0.000001	0.000018	0.000011	0.000000	0.000001
AP2-4	0.000069	0.000194	0.000002	0.000084	0.000230	0.000000	0.000074
AP3-4	0.000281	0.000790	0.000003	0.000403	0.000368	0.000000	0.000184
AP4-4	0.000469	0.001339	0.000005	0.000638	0.000883	0.000000	0.000272

standardize signal averages AP							
AP1	0.000001	0.000003	0.000002	0.000023	0.000015	0.000000	0.000002
AP2	0.000076	0.000214	0.000003	0.000095	0.000253	0.000000	0.000088
AP3	0.000288	0.000802	0.000003	0.000388	0.000371	0.000000	0.000191
AP4	0.000506	0.001428	0.000006	0.000654	0.000972	0.000000	0.000306

linest from std sig ave							
	0.029290	0.007235	2.484305	0.004018	0.020132	0.000000	0.010236

standardize signal averages SRM							
srm614-2	0.000165	0.000596	0.000212	0.000591	0.000450	0.000233	0.000271
srm612-2	0.008896	0.035694	0.011920	0.033448	0.015267	0.000187	0.016708
srm610-2	0.123580	0.582371	0.167455	0.534496	0.238485	0.000482	0.054892

linest from std sig ave							
	0.043589	0.008717	0.029110	0.008238	0.021806	0.000000	0.012789

concentration data							
SRM614-3	0.42	0.37	43.85	0.20	0.96	0.00	0.24
SRM612-3	23.20	22.58	2513.23	11.59	26.31	0.00	14.75
SRM610-3	330.15	379.60	36895.80	190.79	411.54	0.00	47.25
AP1-3	0.02	0.02	2.57	0.05	0.16	0.00	0.01
AP2-3	0.98	0.67	3.00	0.17	2.22	0.00	0.42
AP3-3	3.45	2.35	3.23	0.60	3.01	0.00	0.81
AP4-3	6.34	4.38	6.36	1.07	8.52	0.00	1.39
V3-1	0.03	0.01	3.49	0.01	0.17	0.00	0.04
V3-2	0.02	0.01	1.11	0.01	0.04	0.00	0.01
V3-3	0.01	0.00	0.65	0.00	0.04	0.00	0.01

Appendix A. Raw trace element datasheets from laser ablation.

V3-4	0.04	0.02	2.21	0.01	0.11	0.00	0.04
V3-5	0.02	0.00	0.63	0.00	0.06	0.00	0.02
V3-6	0.01	0.00	0.94	0.00	0.04	0.00	0.01
V3-7	0.06	0.01	1.03	0.00	0.07	0.00	0.02
V3-8	0.01	0.00	0.67	0.00	0.02	0.00	0.01
V3-9	0.01	0.00	0.42	0.00	0.01	0.00	0.01
SRM614-4	0.41	0.37	46.55	0.21	0.60	0.00	0.24
SRM612-4	21.50	21.71	2566.19	11.46	26.41	0.00	14.59
SRM610-4	290.71	343.10	34460.61	177.55	412.00	0.00	49.12
AP1-4	0.00	0.00	0.90	0.03	0.09	0.00	0.00
AP2-4	0.80	0.56	2.15	0.13	1.85	0.00	0.30
AP3-4	3.28	2.28	2.92	0.65	2.96	0.00	0.75
AP4-4	5.49	3.86	5.06	1.02	7.09	0.00	1.11

certified concentration							
SRM614	0.81	0.72	0.67	0.77			
SRM612	39.95	37.71	34.77	39.77	39.55		15.07
SRM610	461.50	434.70	417.70	376.60	445.30		61.20
STD AP1	0.05	0.16	0.79	0.30	1.21	0.14	0.57
STD AP2	1.17	0.91	1.70	0.50	2.60	0.19	0.80
STD AP3	3.41	2.39	3.80	0.60	3.90	0.24	0.82
STD AP4	5.85	4.04	6.00	1.00	7.30	0.43	1.10

Appendix A. Raw trace element datasheets from laser ablation.

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-3	118.28	306.36	264.32	624.60	11.64	2.28	6.20
SRM614-3	399.20	3648.98	3219.30	7749.80	3353.42	1526.13	4340.26
SRM612-3	2761.26	44923.45	41291.55	104717.79	178304.84	82045.10	192009.95
SRM610-3	9913.90	195332.94	176352.47	495918.53	849642.13	546183.88	1424580.30
AP1-3	242.64	1923.53	1670.41	4312.62	483.72	147.24	821.00
AP2-3	2933.86	57436.81	47211.43	127190.52	3766.26	3244.58	4222.86
AP3-3	20419.83	540853.38	438851.31	1361173.90	25424.06	16250.29	24707.14
AP4-3	28214.88	787889.56	637179.50	1946671.30	33051.15	23999.10	35928.92
EVA2.5-1	377.56	3196.66	2671.97	6414.04	118.64	45.12	260.84
EVA2.5-2	436.44	2798.38	2563.61	5275.55	156.72	62.44	269.36
EVA2.5-3	367.12	2763.54	2241.93	5720.39	84.36	73.96	173.72
EVA2.5-4	294.80	2793.82	2320.29	5758.83	66.64	71.52	224.32
EVA2.5-5	316.28	2653.69	2187.77	5528.63	51.52	49.84	256.80
EVA2.5-6	310.64	2792.94	2341.45	5948.11	49.40	39.04	274.84
EVA2.5-7	401.20	3689.06	3117.42	7868.84	259.28	41.36	477.68
EVA2.5-8	396.08	3717.62	3113.50	7953.84	46.64	28.80	215.32
EVA2.5-9	400.36	3747.66	3159.50	7863.56	42.64	56.56	220.20
EVA2.5-10	293.68	2740.34	2283.17	6021.03	149.40	21.80	316.72
EVA2.5-11	381.20	3328.14	2753.70	6752.04	50.00	17.84	152.96
EVA2.5-12	375.64	3426.86	2766.66	7191.20	45.68	20.08	208.80
EVA2.5-13	335.40	2928.62	2472.09	6156.75	64.80	20.80	225.68
EVA2.5-14	309.56	3116.06	2524.41	6351.40	56.72	5.92	148.92
EVA2.5-15	343.00	2718.18	2285.93	5776.35	42.56	8.92	145.76
SRM614-4	279.80	2332.17	2075.45	5053.59	2428.73	1474.21	3634.58
SRM612-4	1831.21	29365.56	26788.83	67290.98	112891.91	79739.13	171491.44
SRM610-4	7665.16	152650.70	139369.31	390472.75	672384.25	557932.75	1343318.80
AP1-4	205.20	1107.29	868.12	2187.93	58.44	16.00	79.56
AP2-4	1586.49	28835.04	23851.90	62374.55	1704.49	2641.65	2461.01
AP3-4	13934.28	349812.41	284840.19	875817.25	17333.42	13658.24	19724.07
AP4-4	12250.67	304899.97	249455.17	756321.75	15009.81	15614.73	19059.79
blank-4	126.24	281.56	248.76	689.88	14.72	1.48	16.24
blank average	122.26	293.96	256.54	657.24	13.18	1.88	11.22
blank subtraction							
SRM614-3	276.94	3355.02	2962.76	7092.56	3340.24	1524.25	4329.04
SRM612-3	2638.99	44629.49	41035.01	104060.55	178291.66	82043.22	191998.73
SRM610-3	9791.63	195038.98	176095.93	495261.29	849628.95	546182.00	1424569.08
AP1-3	120.38	1629.57	1413.87	3655.38	470.54	145.36	809.78
AP2-3	2811.60	57142.84	46954.88	126533.28	3753.08	3242.70	4211.64
AP3-3	20297.57	540559.42	438594.77	1360516.66	25410.88	16248.41	24695.92
AP4-3	28092.62	787595.60	636922.96	1946014.06	33037.96	23997.22	35917.70
EVA2.5-1	255.30	2902.70	2415.43	5756.79	105.46	43.24	249.62
EVA2.5-2	314.18	2504.41	2307.07	4618.31	143.54	60.56	258.14
EVA2.5-3	244.86	2469.57	1985.39	5063.15	71.18	72.08	162.50
EVA2.5-4	172.54	2499.85	2063.75	5101.59	53.46	69.64	213.10
EVA2.5-5	194.02	2359.73	1931.23	4871.39	38.34	47.96	245.58
EVA2.5-6	188.38	2498.97	2084.91	5290.87	36.22	37.16	263.62
EVA2.5-7	278.94	3395.10	2860.88	7211.60	246.10	39.48	466.46
EVA2.5-8	273.82	3423.66	2856.96	7296.60	33.46	26.92	204.10
EVA2.5-9	278.10	3453.70	2902.96	7206.32	29.46	54.68	208.98
EVA2.5-10	171.42	2446.37	2026.63	5363.79	136.22	19.92	305.50
EVA2.5-11	258.94	3034.18	2497.15	6094.79	36.82	15.96	141.74
EVA2.5-12	253.38	3132.90	2510.11	6533.96	32.50	18.20	197.58
EVA2.5-13	213.14	2634.65	2215.55	5499.51	51.62	18.92	214.46
EVA2.5-14	187.30	2822.10	2267.87	5694.15	43.54	4.04	137.70
EVA2.5-15	220.74	2424.21	2029.39	5119.11	29.38	7.04	134.54
SRM614-4	157.54	2038.21	1818.91	4396.34	2415.55	1472.33	3623.36
SRM612-4	1708.95	29071.60	26532.29	66633.73	112878.73	79737.25	171480.22
SRM610-4	7542.90	152356.74	139112.77	389815.51	672371.07	557930.87	1343307.58
AP1-4	82.94	813.32	611.58	1530.69	45.26	14.12	68.34
AP2-4	1464.23	28541.08	23595.35	61717.31	1691.31	2639.77	2449.79
AP3-4	13812.02	349518.45	284583.65	875160.01	17320.24	13656.36	19712.85
AP4-4	12128.41	304606.01	249198.63	755664.51	14996.62	15612.85	19048.57
zero correction							
SRM614-3	276.94	3355.02	2962.76	7092.56	3340.24	1524.25	4329.04
SRM612-3	2638.99	44629.49	41035.01	104060.55	178291.66	82043.22	191998.73

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-3	9791.63	195038.98	176095.93	495261.29	849628.95	546182.00	1424569.08
AP1-3	120.38	1629.57	1413.87	3655.38	470.54	145.36	809.78
AP2-3	2811.60	57142.84	46954.88	126533.28	3753.08	3242.70	4211.64
AP3-3	20297.57	540559.42	438594.77	1360516.66	25410.88	16248.41	24695.92
AP4-3	28092.62	787595.60	636922.96	1946014.06	33037.96	23997.22	35917.70
EVA2.5-1	255.30	2902.70	2415.43	5756.79	105.46	43.24	249.62
EVA2.5-2	314.18	2504.41	2307.07	4618.31	143.54	60.56	258.14
EVA2.5-3	244.86	2469.57	1985.39	5063.15	71.18	72.08	162.50
EVA2.5-4	172.54	2499.85	2063.75	5101.59	53.46	69.64	213.10
EVA2.5-5	194.02	2359.73	1931.23	4871.39	38.34	47.96	245.58
EVA2.5-6	188.38	2498.97	2084.91	5290.87	36.22	37.16	263.62
EVA2.5-7	278.94	3395.10	2860.88	7211.60	246.10	39.48	466.46
EVA2.5-8	273.82	3423.66	2856.96	7296.60	33.46	26.92	204.10
EVA2.5-9	278.10	3453.70	2902.96	7206.32	29.46	54.68	208.98
EVA2.5-10	171.42	2446.37	2026.63	5363.79	136.22	19.92	305.50
EVA2.5-11	258.94	3034.18	2497.15	6094.79	36.82	15.96	141.74
EVA2.5-12	253.38	3132.90	2510.11	6533.96	32.50	18.20	197.58
EVA2.5-13	213.14	2634.65	2215.55	5499.51	51.62	18.92	214.46
EVA2.5-14	187.30	2822.10	2267.87	5694.15	43.54	4.04	137.70
EVA2.5-15	220.74	2424.21	2029.39	5119.11	29.38	7.04	134.54
SRM614-4	157.54	2038.21	1818.91	4396.34	2415.55	1472.33	3623.36
SRM612-4	1708.95	29071.60	26532.29	66633.73	112878.73	79737.25	171480.22
SRM610-4	7542.90	152356.74	139112.77	389815.51	672371.07	557930.87	1343307.58
AP1-4	82.94	813.32	611.58	1530.69	45.26	14.12	68.34
AP2-4	1464.23	28541.08	23595.35	61717.31	1691.31	2639.77	2449.79
AP3-4	13812.02	349518.45	284583.65	875160.01	17320.24	13656.36	19712.85
AP4-4	12128.41	304606.01	249198.63	755664.51	14996.62	15612.85	19048.57

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-3	0.000068	0.000824	0.000727	0.001741	0.000820	0.000374	0.001063
SRM612-3	0.000741	0.012524	0.011515	0.029201	0.050032	0.023023	0.053879
SRM610-3	0.007600	0.151374	0.136672	0.384384	0.659417	0.423904	1.105641
AP1-3	0.000006	0.000081	0.000071	0.000182	0.000023	0.000007	0.000040
AP2-3	0.000134	0.002724	0.002239	0.006033	0.000179	0.000155	0.000201
AP3-3	0.000868	0.023106	0.018747	0.058154	0.001086	0.000695	0.001056
AP4-3	0.001393	0.039041	0.031572	0.096465	0.001638	0.001190	0.001780
EVA2.5-1	0.000022	0.000251	0.000209	0.000499	0.000009	0.000004	0.000022
EVA2.5-2	0.000040	0.000316	0.000291	0.000583	0.000018	0.000008	0.000033
EVA2.5-3	0.000028	0.000283	0.000228	0.000580	0.000008	0.000008	0.000019
EVA2.5-4	0.000012	0.000171	0.000142	0.000350	0.000004	0.000005	0.000015
EVA2.5-5	0.000011	0.000133	0.000109	0.000275	0.000002	0.000003	0.000014
EVA2.5-6	0.000010	0.000134	0.000112	0.000283	0.000002	0.000002	0.000014
EVA2.5-7	0.000024	0.000287	0.000242	0.000611	0.000021	0.000003	0.000039
EVA2.5-8	0.000021	0.000267	0.000223	0.000569	0.000003	0.000002	0.000016
EVA2.5-9	0.000021	0.000255	0.000214	0.000531	0.000002	0.000004	0.000015
EVA2.5-10	0.000018	0.000259	0.000214	0.000567	0.000014	0.000002	0.000032
EVA2.5-11	0.000023	0.000273	0.000225	0.000548	0.000003	0.000001	0.000013
EVA2.5-12	0.000021	0.000263	0.000211	0.000549	0.000003	0.000002	0.000017
EVA2.5-13	0.000018	0.000226	0.000190	0.000473	0.000004	0.000002	0.000018
EVA2.5-14	0.000014	0.000218	0.000175	0.000440	0.000003	0.000000	0.000011

Appendix A. Raw trace element datasheets from laser ablation.

EVA2.5-15	0.000017	0.000191	0.000160	0.000403	0.000002	0.000001	0.000011
SRM614-4	0.000065	0.000844	0.000753	0.001820	0.001000	0.000609	0.001500
SRM612-4	0.000755	0.012840	0.011718	0.029429	0.049854	0.035217	0.075735
SRM610-4	0.008005	0.161684	0.147629	0.413680	0.713533	0.592087	1.425544
AP1-4	0.000006	0.000057	0.000043	0.000106	0.000003	0.000001	0.000005
AP2-4	0.000100	0.001947	0.001610	0.004210	0.000115	0.000180	0.000167
AP3-4	0.000831	0.021019	0.017114	0.052629	0.001042	0.000821	0.001185
AP4-4	0.000912	0.022900	0.018735	0.056811	0.001127	0.001174	0.001432

standardize signal averages AP

AP1	0.000006	0.000069	0.000057	0.000144	0.000013	0.000004	0.000023
AP2	0.000117	0.002336	0.001924	0.005121	0.000147	0.000167	0.000184
AP3	0.000849	0.022062	0.017930	0.055391	0.001064	0.000758	0.001121
AP4	0.001152	0.030971	0.025154	0.076638	0.001383	0.001182	0.001606

linest from std sig ave

0.300510	0.011323	0.013939	0.004549	0.003846	0.008541	0.004985
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standardize signal averages SRM

srm614-2	0.000067	0.000834	0.000740	0.001780	0.000910	0.000492	0.001281
srm612-2	0.000748	0.012682	0.011617	0.029315	0.049943	0.029120	0.064807
srm610-2	0.007802	0.156529	0.142151	0.399032	0.686475	0.507996	1.265592

linest from std sig ave

0.617561	0.030820	0.033936	0.012095	0.006080	0.010358	0.004218
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concentration data

SRM614-3	1.75	0.80	0.87	0.68	0.27	0.27	0.45
SRM612-3	19.09	12.16	13.77	11.39	16.50	16.86	23.04
SRM610-3	195.86	147.00	163.38	149.96	217.49	310.52	472.71
AP1-3	0.72	0.37	0.39	0.33	0.04	0.02	0.08
AP2-3	16.07	12.31	12.45	10.95	0.27	0.53	0.40
AP3-3	104.01	104.37	104.25	105.54	1.67	2.37	2.10
AP4-3	166.95	176.36	175.56	175.06	2.51	4.05	3.54
EVA2.5-1	2.65	1.14	1.16	0.91	0.01	0.01	0.04
EVA2.5-2	4.76	1.43	1.62	1.06	0.03	0.03	0.06
EVA2.5-3	3.36	1.28	1.27	1.05	0.01	0.03	0.04
EVA2.5-4	1.42	0.77	0.79	0.64	0.01	0.02	0.03
EVA2.5-5	1.31	0.60	0.61	0.50	0.00	0.01	0.03
EVA2.5-6	1.21	0.60	0.62	0.51	0.00	0.01	0.03
EVA2.5-7	2.83	1.30	1.35	1.11	0.03	0.01	0.08
EVA2.5-8	2.56	1.21	1.24	1.03	0.00	0.01	0.03
EVA2.5-9	2.46	1.15	1.19	0.96	0.00	0.01	0.03
EVA2.5-10	2.17	1.17	1.19	1.03	0.02	0.01	0.06
EVA2.5-11	2.79	1.23	1.25	0.99	0.01	0.00	0.03
EVA2.5-12	2.55	1.19	1.17	1.00	0.00	0.01	0.03
EVA2.5-13	2.20	1.02	1.06	0.86	0.01	0.01	0.04
EVA2.5-14	1.73	0.98	0.97	0.80	0.01	0.00	0.02
EVA2.5-15	2.08	0.86	0.89	0.73	0.00	0.00	0.02
SRM614-4	1.68	0.82	0.90	0.71	0.33	0.45	0.64
SRM612-4	19.45	12.47	14.01	11.48	16.44	25.80	32.38
SRM610-4	206.30	157.01	176.48	161.39	235.34	433.71	609.48
AP1-4	0.69	0.26	0.24	0.19	0.00	0.00	0.01
AP2-4	11.97	8.79	8.95	7.64	0.18	0.61	0.33
AP3-4	99.58	94.95	95.16	95.51	1.60	2.80	2.36
AP4-4	109.31	103.45	104.18	103.10	1.73	4.00	2.85

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

raw data

Appendix A. Raw trace element datasheets from laser ablation.

blank-5	113.24	334.68	334.52	753.88	4.76	32.28	5.96
SRM614-5	300.72	2541.69	2259.93	5651.43	2514.05	1205.85	2990.86
SRM612-5	2486.49	38604.02	35309.44	88204.34	150724.05	74712.82	170464.88
SRM610-5	9811.09	198973.44	180543.38	507846.81	904446.44	525555.25	1351239.00
AP1-5	208.16	1308.49	984.37	2727.62	194.84	54.92	341.80
AP2-5	1901.73	34553.07	29262.08	75929.02	2140.57	2377.81	2739.46
AP3-5	11638.51	277109.88	227327.92	685898.44	13373.88	11936.91	15060.93
AP4-5	15925.65	405168.09	330842.59	1011051.60	17974.46	17257.18	21453.44
EVA3-1	409.72	4838.07	3975.18	10130.74	268.76	86.28	234.64
EVA3-2	301.68	3125.90	2656.86	6539.60	101.68	38.32	121.96
EVA3-3	368.04	3459.58	2904.82	7281.16	99.36	91.20	165.60
SRM614-6	234.56	1569.65	1381.09	3481.74	1599.97	955.77	2084.81
SRM612-6	1778.33	28488.20	26046.03	65495.73	112326.39	69640.88	148479.39
SRM610-6	9291.93	181159.45	165587.81	466427.16	849640.31	553886.38	1332916.60
AP1-6	151.92	661.20	536.72	1294.25	36.56	16.08	80.44
AP2-6	1608.69	29015.88	24628.02	63906.72	1787.17	2353.93	2412.37
AP3-6	13294.44	336202.97	274633.72	840139.50	15874.69	12603.95	18209.46
AP4-6	17925.98	487601.63	396087.41	1207947.80	21703.24	18088.10	26564.83
blank-6	130.12	134.60	112.56	302.44	6.36	6.64	1.84
blank average	121.68	234.64	223.54	528.16	5.56	19.46	3.90

blank subtraction							
SRM614-5	179.04	2307.05	2036.39	5123.27	2508.49	1186.39	2986.96
SRM612-5	2364.81	38369.37	35085.90	87676.17	150718.49	74693.36	170460.98
SRM610-5	9689.41	198738.80	180319.84	507318.65	904440.88	525535.79	1351235.10
AP1-5	86.48	1073.85	760.82	2199.45	189.28	35.46	337.90
AP2-5	1780.05	34318.43	29038.54	75400.86	2135.01	2358.35	2735.56
AP3-5	11516.83	276875.24	227104.38	685370.28	13368.31	11917.45	15057.02
AP4-5	15803.97	404933.45	330619.05	1010523.44	17968.90	17237.72	21449.54
EVA3-1	288.04	4603.43	3751.64	9602.57	263.20	66.82	230.74
EVA3-2	180.00	2891.26	2433.31	6011.43	96.12	18.86	118.06
EVA3-3	246.36	3224.94	2681.28	6753.00	93.80	71.74	161.70
SRM614-6	112.88	1335.01	1157.55	2953.58	1594.41	936.31	2080.91
SRM612-6	1656.65	28253.56	25822.48	64967.56	112320.83	69621.41	148475.49
SRM610-6	9170.25	180924.81	165364.27	465899.00	849634.75	553866.92	1332912.70
AP1-6	30.24	426.56	313.18	766.08	31.00	-3.38	76.54
AP2-6	1487.01	28781.24	24404.48	63378.56	1781.61	2334.47	2408.47
AP3-6	13172.76	335968.33	274410.18	839611.34	15869.13	12584.49	18205.56
AP4-6	17804.30	487366.99	395863.87	1207419.64	21697.68	18068.64	26560.93

zero correction							
SRM614-5	179.04	2307.05	2036.39	5123.27	2508.49	1186.39	2986.96
SRM612-5	2364.81	38369.37	35085.90	87676.17	150718.49	74693.36	170460.98
SRM610-5	9689.41	198738.80	180319.84	507318.65	904440.88	525535.79	1351235.10
AP1-5	86.48	1073.85	760.82	2199.45	189.28	35.46	337.90
AP2-5	1780.05	34318.43	29038.54	75400.86	2135.01	2358.35	2735.56
AP3-5	11516.83	276875.24	227104.38	685370.28	13368.31	11917.45	15057.02
AP4-5	15803.97	404933.45	330619.05	1010523.44	17968.90	17237.72	21449.54
EVA3-1	288.04	4603.43	3751.64	9602.57	263.20	66.82	230.74
EVA3-2	180.00	2891.26	2433.31	6011.43	96.12	18.86	118.06
EVA3-3	246.36	3224.94	2681.28	6753.00	93.80	71.74	161.70
SRM614-6	112.88	1335.01	1157.55	2953.58	1594.41	936.31	2080.91
SRM612-6	1656.65	28253.56	25822.48	64967.56	112320.83	69621.41	148475.49
SRM610-6	9170.25	180924.81	165364.27	465899.00	849634.75	553866.92	1332912.70
AP1-6	30.24	426.56	313.18	766.08	31.00	0.00	76.54
AP2-6	1487.01	28781.24	24404.48	63378.56	1781.61	2334.47	2408.47
AP3-6	13172.76	335968.33	274410.18	839611.34	15869.13	12584.49	18205.56
AP4-6	17804.30	487366.99	395863.87	1207419.64	21697.68	18068.64	26560.93

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
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Appendix A. Raw trace element datasheets from laser ablation.

SRM614-5	0.000065	0.000833	0.000735	0.001850	0.000906	0.000428	0.001078
SRM612-5	0.000807	0.013094	0.011974	0.029921	0.051435	0.025490	0.058172
SRM610-5	0.008076	0.165648	0.150296	0.422848	0.753848	0.438032	1.126249
AP1-5	0.000005	0.000063	0.000045	0.000130	0.000011	0.000002	0.000020
AP2-5	0.000106	0.002050	0.001735	0.004505	0.000128	0.000141	0.000163
AP3-5	0.000565	0.013586	0.011143	0.033629	0.000656	0.000585	0.000739
AP4-5	0.000881	0.022579	0.018435	0.056346	0.001002	0.000961	0.001196
EVA3-1	0.000016	0.000249	0.000203	0.000520	0.000014	0.000004	0.000012
EVA3-2	0.000011	0.000171	0.000144	0.000355	0.000006	0.000001	0.000007
EVA3-3	0.000016	0.000214	0.000178	0.000447	0.000006	0.000005	0.000011
SRM614-6	0.000070	0.000826	0.000716	0.001828	0.000987	0.000579	0.001288
SRM612-6	0.000739	0.012595	0.011512	0.028962	0.050072	0.031037	0.066190
SRM610-6	0.008613	0.169930	0.155315	0.437587	0.798004	0.520210	1.251915
AP1-6	0.000002	0.000030	0.000022	0.000054	0.000002	0.000000	0.000005
AP2-6	0.000100	0.001935	0.001641	0.004262	0.000120	0.000157	0.000162
AP3-6	0.000730	0.018623	0.015211	0.046541	0.000880	0.000698	0.001009
AP4-6	0.001154	0.031592	0.025661	0.078267	0.001406	0.001171	0.001722

standardize signal averages AP

AP1	0.000004	0.000047	0.000033	0.000092	0.000007	0.000001	0.000013
AP2	0.000103	0.001993	0.001688	0.004383	0.000124	0.000149	0.000163
AP3	0.000648	0.016104	0.013177	0.040085	0.000768	0.000641	0.000874
AP4	0.001018	0.027085	0.022048	0.067307	0.001204	0.001066	0.001459

linest from std sig ave

	0.358186	0.013714	0.016826	0.005515	0.004718	0.009635	0.005730
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standardize signal averages SRM

srm614-2	0.000067	0.000830	0.000726	0.001839	0.000946	0.000504	0.001183
srm612-2	0.000773	0.012845	0.011743	0.029442	0.050754	0.028264	0.062181
srm610-2	0.008345	0.167789	0.152806	0.430218	0.775926	0.479121	1.189082

linest from std sig ave

	0.577592	0.028760	0.031580	0.011221	0.005382	0.010981	0.004489
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concentration data

SRM614-5	1.99	0.98	1.06	0.87	0.37	0.35	0.53
SRM612-5	24.79	15.40	17.28	14.15	20.81	21.06	28.59
SRM610-5	248.09	194.83	216.89	199.99	305.01	361.96	553.44
AP1-5	0.73	0.35	0.30	0.29	0.02	0.01	0.05
AP2-5	15.20	11.22	11.65	9.91	0.24	0.54	0.37
AP3-5	80.75	74.33	74.80	73.99	1.23	2.25	1.69
AP4-5	125.92	123.53	123.75	123.96	1.89	3.69	2.73
EVA3-1	2.23	1.36	1.36	1.14	0.03	0.01	0.03
EVA3-2	1.52	0.93	0.97	0.78	0.01	0.00	0.02
EVA3-3	2.33	1.17	1.19	0.98	0.01	0.02	0.02
SRM614-6	2.15	0.97	1.03	0.86	0.40	0.48	0.63
SRM612-6	22.69	14.81	16.61	13.70	20.26	25.65	32.53
SRM610-6	264.58	199.87	224.13	206.96	322.88	429.87	615.19
AP1-6	0.30	0.16	0.15	0.12	0.00	0.00	0.01
AP2-6	14.29	10.59	11.02	9.38	0.23	0.60	0.37
AP3-6	104.34	101.89	102.10	102.39	1.66	2.68	2.31
AP4-6	164.91	172.84	172.25	172.19	2.65	4.50	3.94

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-3	22.28	101.76	85.40	197.48	11.84	3.76	5.48
SRM614-3	2125.93	6051.71	5411.43	12015.31	1038.69	654.56	1824.81
SRM612-3	1449.69	1643.89	1494.77	3304.42	810.80	585.96	1558.93
SRM610-3	3782.66	52454.06	48134.63	120231.72	172827.61	285327.66	680861.00
AP1-3	1833.25	18613.63	16939.38	39124.10	852.84	712.12	996.41
AP2-3	4770.11	84328.56	70246.67	190894.16	5127.99	3461.70	5661.23
AP3-3	27400.55	675596.75	551803.31	1654175.50	37408.29	17266.94	28741.12
AP4-3	46227.94	1277994.60	1046212.30	3084326.30	63332.68	31598.34	52888.30
MZ5-1	1737.89	7468.96	6820.64	14229.72	536.04	261.96	260.80
MZ5-2	1419.53	5279.91	4927.27	9668.53	294.56	2726.90	291.12
MZ5-3	1403.85	3853.46	3440.46	7609.88	339.00	110.40	265.20
MZ5-4	1868.81	7546.44	7024.64	13216.99	416.56	70.52	173.36
MZ5-5	1146.73	1815.65	1610.89	3726.78	62.72	67.20	201.32

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-6	1129.41	2586.29	2258.57	5218.27	68.92	324.12	146.60
MZ5-7	3450.62	23250.45	22422.29	37902.81	1220.69	5094.27	176.96
MZ5-8	1180.17	3612.54	3086.58	7092.44	88.44	81.36	183.44
MZ5-9	1337.81	4212.02	3983.90	7502.76	232.56	1548.65	106.68
MZ5-10	1500.61	5047.39	4728.79	9184.37	274.12	374.32	188.48
MZ5-11	1168.61	2684.22	2431.45	5430.35	100.48	92.36	192.44
MZ5-12	1263.89	4115.50	3943.46	7555.88	181.84	923.09	189.84
MZ5-13	1163.45	2988.50	2576.81	6600.56	195.32	71.48	152.24
MZ5-14	1097.61	3395.26	2905.18	6849.36	210.60	85.00	386.76
MZ5-15	1061.97	3202.58	2787.78	6877.96	149.60	248.60	181.04
MZ5-16	1129.85	3893.62	3325.54	8273.21	179.48	265.16	272.28
MZ5-17	958.97	2330.49	2001.05	5099.27	115.36	58.16	228.04
MZ5-18	918.61	2365.29	1987.61	4720.07	269.04	159.16	186.88
SRM614-4	597.00	1139.01	1005.85	2419.61	629.60	494.40	1202.25
SRM612-4	1305.29	14150.20	12886.11	31488.10	49235.28	24292.62	72089.29
SRM610-4	3952.30	65047.61	59573.61	154026.06	217980.50	225372.31	667419.50
AP1-4	621.24	3492.34	3240.26	6799.12	255.08	35.08	288.16
AP2-4	1554.41	25263.78	21258.04	54870.39	1521.41	1842.37	1918.25
AP3-4	13347.48	307689.00	252554.91	745398.69	17253.18	9999.46	14722.20
AP4-4	21083.04	536079.06	439097.06	1311904.30	26728.51	16941.58	26372.51
blank-4	337.36	127.56	124.40	281.36	9.36	7.92	5.32
blank average	179.82	114.66	104.90	239.42	10.60	5.84	5.40

blank subtraction							
SRM614-3	1946.11	5937.05	5306.53	11775.89	1028.09	648.72	1819.41
SRM612-3	1269.87	1529.23	1389.87	3065.00	800.20	580.12	1553.53
SRM610-3	3602.84	52339.39	48029.73	119992.30	172817.01	285321.82	680855.60
AP1-3	1653.43	18498.96	16834.47	38884.68	842.24	706.28	991.01
AP2-3	4590.29	84213.89	70141.77	190654.74	5117.39	3455.86	5655.83
AP3-3	27220.73	675482.09	551698.41	1653936.08	37397.69	17261.10	28735.72
AP4-3	46048.12	1277879.94	1046107.40	3084086.88	63322.08	31592.50	52882.90
MZ5-1	1558.07	7354.30	6715.74	13990.30	525.44	256.12	255.40
MZ5-2	1239.71	5165.25	4822.37	9429.11	283.96	2721.06	285.72
MZ5-3	1224.03	3738.80	3335.56	7370.46	328.40	104.56	259.80
MZ5-4	1688.99	7431.78	6919.74	12977.57	405.96	64.68	167.96
MZ5-5	966.91	1700.99	1505.99	3487.36	52.12	61.36	195.92
MZ5-6	949.59	2471.63	2153.67	4978.85	58.32	318.28	141.20
MZ5-7	3270.80	23135.79	22317.39	37663.39	1210.09	5088.43	171.56
MZ5-8	1000.35	3497.88	2981.68	6853.02	77.84	75.52	178.04
MZ5-9	1157.99	4097.36	3879.00	7263.34	221.96	1542.81	101.28
MZ5-10	1320.79	4932.73	4623.89	8944.95	263.52	368.48	183.08
MZ5-11	988.79	2569.55	2326.55	5190.93	89.88	86.52	187.04
MZ5-12	1084.07	4000.84	3838.56	7316.46	171.24	917.25	184.44
MZ5-13	983.63	2873.84	2471.91	6361.14	184.72	65.64	146.84
MZ5-14	917.79	3280.60	2800.28	6609.94	200.00	79.16	381.36
MZ5-15	882.14	3087.92	2682.88	6638.54	139.00	242.76	175.64
MZ5-16	950.03	3778.96	3220.64	8033.79	168.88	259.32	266.88
MZ5-17	779.14	2215.83	1896.15	4859.85	104.76	52.32	222.64
MZ5-18	738.78	2250.63	1882.71	4480.65	258.44	153.32	181.48
SRM614-4	417.18	1024.35	900.95	2180.19	619.00	488.56	1196.85
SRM612-4	1125.47	14035.54	12781.21	31248.68	49224.68	24286.78	72083.89
SRM610-4	3772.48	64932.94	59468.71	153786.64	217969.90	225366.47	667414.10
AP1-4	441.42	3377.68	3135.36	6559.70	244.48	29.24	282.76
AP2-4	1374.59	25149.12	21153.14	54630.97	1510.81	1836.53	1912.85
AP3-4	13167.65	307574.34	252450.01	745159.27	17242.58	9993.62	14716.80
AP4-4	20903.22	535964.40	438992.16	1311664.88	26717.91	16935.74	26367.11

zero correction							
SRM614-3	1946.11	5937.05	5306.53	11775.89	1028.09	648.72	1819.41
SRM612-3	1269.87	1529.23	1389.87	3065.00	800.20	580.12	1553.53
SRM610-3	3602.84	52339.39	48029.73	119992.30	172817.01	285321.82	680855.60
AP1-3	1653.43	18498.96	16834.47	38884.68	842.24	706.28	991.01
AP2-3	4590.29	84213.89	70141.77	190654.74	5117.39	3455.86	5655.83
AP3-3	27220.73	675482.09	551698.41	1653936.08	37397.69	17261.10	28735.72
AP4-3	46048.12	1277879.94	1046107.40	3084086.88	63322.08	31592.50	52882.90
MZ5-1	1558.07	7354.30	6715.74	13990.30	525.44	256.12	255.40
MZ5-2	1239.71	5165.25	4822.37	9429.11	283.96	2721.06	285.72
MZ5-3	1224.03	3738.80	3335.56	7370.46	328.40	104.56	259.80
MZ5-4	1688.99	7431.78	6919.74	12977.57	405.96	64.68	167.96
MZ5-5	966.91	1700.99	1505.99	3487.36	52.12	61.36	195.92
MZ5-6	949.59	2471.63	2153.67	4978.85	58.32	318.28	141.20
MZ5-7	3270.80	23135.79	22317.39	37663.39	1210.09	5088.43	171.56
MZ5-8	1000.35	3497.88	2981.68	6853.02	77.84	75.52	178.04
MZ5-9	1157.99	4097.36	3879.00	7263.34	221.96	1542.81	101.28
MZ5-10	1320.79	4932.73	4623.89	8944.95	263.52	368.48	183.08
MZ5-11	988.79	2569.55	2326.55	5190.93	89.88	86.52	187.04
MZ5-12	1084.07	4000.84	3838.56	7316.46	171.24	917.25	184.44
MZ5-13	983.63	2873.84	2471.91	6361.14	184.72	65.64	146.84

Appendix A. Raw trace element datasheets from laser ablation.

MZ5-14	917.79	3280.60	2800.28	6609.94	200.00	79.16	381.36
MZ5-15	882.14	3087.92	2682.88	6638.54	139.00	242.76	175.64
MZ5-16	950.03	3778.96	3220.64	8033.79	168.88	259.32	266.88
MZ5-17	779.14	2215.83	1896.15	4859.85	104.76	52.32	222.64
MZ5-18	738.78	2250.63	1882.71	4480.65	258.44	153.32	181.48
SRM614-4	417.18	1024.35	900.95	2180.19	619.00	488.56	1196.85
SRM612-4	1125.47	14035.54	12781.21	31248.68	49224.68	24286.78	72083.89
SRM610-4	3772.48	64932.94	59468.71	153786.64	217969.90	225366.47	667414.10
AP1-4	441.42	3377.68	3135.36	6559.70	244.48	29.24	282.76
AP2-4	1374.59	25149.12	21153.14	54630.97	1510.81	1836.53	1912.85
AP3-4	13167.65	307574.34	252450.01	745159.27	17242.58	9993.62	14716.80
AP4-4	20903.22	535964.40	438992.16	1311664.88	26717.91	16935.74	26367.11

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-3	0.001657	0.005056	0.004519	0.010029	0.000876	0.000552	0.001549
SRM612-3	0.001478	0.001780	0.001618	0.003567	0.000931	0.000675	0.001808
SRM610-3	0.007230	0.105028	0.096380	0.240785	0.346787	0.572547	1.366252
AP1-3	0.000126	0.001410	0.001283	0.002964	0.000064	0.000054	0.000076
AP2-3	0.000316	0.005799	0.004830	0.013129	0.000352	0.000238	0.000389
AP3-3	0.001833	0.045495	0.037158	0.111397	0.002519	0.001163	0.001935
AP4-3	0.002822	0.078319	0.064114	0.189018	0.003881	0.001936	0.003241
MZ5-1	0.000123	0.000579	0.000529	0.001102	0.000041	0.000020	0.000020
MZ5-2	0.000090	0.000377	0.000352	0.000688	0.000021	0.000199	0.000021
MZ5-3	0.000105	0.000319	0.000285	0.000629	0.000028	0.000009	0.000022
MZ5-4	0.000200	0.000879	0.000819	0.001535	0.000048	0.000008	0.000020
MZ5-5	0.000104	0.000183	0.000162	0.000374	0.000006	0.000007	0.000021
MZ5-6	0.000095	0.000248	0.000216	0.000499	0.000006	0.000032	0.000014
MZ5-7	0.000224	0.001581	0.001525	0.002574	0.000083	0.000348	0.000012
MZ5-8	0.000063	0.000220	0.000188	0.000431	0.000005	0.000005	0.000011
MZ5-9	0.000077	0.000273	0.000258	0.000484	0.000015	0.000103	0.000007
MZ5-10	0.000080	0.000299	0.000280	0.000541	0.000016	0.000022	0.000011
MZ5-11	0.000054	0.000139	0.000126	0.000281	0.000005	0.000005	0.000010
MZ5-12	0.000064	0.000238	0.000228	0.000435	0.000010	0.000055	0.000011
MZ5-13	0.000077	0.000225	0.000194	0.000498	0.000014	0.000005	0.000011
MZ5-14	0.000068	0.000242	0.000207	0.000489	0.000015	0.000006	0.000028
MZ5-15	0.000062	0.000217	0.000188	0.000466	0.000010	0.000017	0.000012
MZ5-16	0.000065	0.000260	0.000221	0.000552	0.000012	0.000018	0.000018
MZ5-17	0.000051	0.000145	0.000124	0.000319	0.000007	0.000003	0.000015
MZ5-18	0.000047	0.000143	0.000120	0.000285	0.000016	0.000010	0.000012
SRM614-4	0.000629	0.001544	0.001358	0.003286	0.000933	0.000736	0.001804
SRM612-4	0.001586	0.019776	0.018009	0.044030	0.069359	0.034221	0.101568
SRM610-4	0.008377	0.144183	0.132049	0.341481	0.483999	0.500423	1.481983
AP1-4	0.000047	0.000360	0.000334	0.000700	0.000026	0.000003	0.000030
AP2-4	0.000136	0.002495	0.002099	0.005420	0.000150	0.000182	0.000190
AP3-4	0.001213	0.028330	0.023252	0.068634	0.001588	0.000920	0.001356
AP4-4	0.001867	0.047869	0.039208	0.117150	0.002386	0.001513	0.002355

standardize signal averages AP							
AP1	0.000087	0.000885	0.000809	0.001832	0.000045	0.000028	0.000053
AP2	0.000226	0.004147	0.003464	0.009275	0.000251	0.000210	0.000290
AP3	0.001523	0.036913	0.030205	0.090016	0.002053	0.001042	0.001645
AP4	0.002345	0.063094	0.051661	0.153084	0.003134	0.001724	0.002798

linest from std sig ave							
	0.154372	0.005910	0.007219	0.002432	0.001796	0.005954	0.003003

standardize signal averages SRM							
srM614-2	0.001143	0.003300	0.002939	0.006657	0.000904	0.000644	0.001677
srM612-2	0.001532	0.010778	0.009813	0.023799	0.035145	0.017448	0.051688
srM610-2	0.007803	0.124605	0.114215	0.291133	0.415393	0.536485	1.424117

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	0.593899	0.038680	0.042202	0.016563	0.010040	0.009809	0.003749
concentration data							
SRM614-3	21.94	2.56	2.80	2.09	0.13	0.28	0.40
SRM612-3	19.57	0.90	1.00	0.74	0.14	0.34	0.47
SRM610-3	95.72	53.23	59.67	50.22	53.40	292.38	351.82
AP1-3	7.76	3.33	3.70	2.88	0.05	0.13	0.09
AP2-3	19.47	13.67	13.91	12.74	0.25	0.57	0.47
AP3-3	112.91	107.26	107.02	108.08	1.80	2.76	2.32
AP4-3	173.80	184.65	184.65	183.40	2.78	4.60	3.88
MZ5-1	7.56	1.37	1.52	1.07	0.03	0.05	0.02
MZ5-2	5.57	0.89	1.01	0.67	0.01	0.47	0.02
MZ5-3	6.44	0.75	0.82	0.61	0.02	0.02	0.03
MZ5-4	12.31	2.07	2.36	1.49	0.03	0.02	0.02
MZ5-5	6.39	0.43	0.47	0.36	0.00	0.02	0.03
MZ5-6	5.87	0.58	0.62	0.48	0.00	0.08	0.02
MZ5-7	13.77	3.73	4.39	2.50	0.06	0.83	0.01
MZ5-8	3.87	0.52	0.54	0.42	0.00	0.01	0.01
MZ5-9	4.75	0.64	0.74	0.47	0.01	0.24	0.01
MZ5-10	4.92	0.70	0.81	0.53	0.01	0.05	0.01
MZ5-11	3.30	0.33	0.36	0.27	0.00	0.01	0.01
MZ5-12	3.97	0.56	0.66	0.42	0.01	0.13	0.01
MZ5-13	4.74	0.53	0.56	0.48	0.01	0.01	0.01
MZ5-14	4.18	0.57	0.60	0.47	0.01	0.01	0.03
MZ5-15	3.81	0.51	0.54	0.45	0.01	0.04	0.01
MZ5-16	4.02	0.61	0.64	0.54	0.01	0.04	0.02
MZ5-17	3.15	0.34	0.36	0.31	0.00	0.01	0.02
MZ5-18	2.89	0.34	0.34	0.28	0.01	0.02	0.01
SRM614-4	8.33	0.78	0.84	0.69	0.14	0.38	0.46
SRM612-4	21.00	10.02	11.15	9.18	10.68	17.48	26.15
SRM610-4	110.90	73.08	81.76	71.23	74.53	255.55	381.63
AP1-4	2.90	0.85	0.96	0.68	0.02	0.01	0.04
AP2-4	8.40	5.88	6.04	5.26	0.11	0.43	0.23
AP3-4	74.69	66.79	66.97	66.59	1.14	2.19	1.62
AP4-4	114.98	112.86	112.92	113.67	1.71	3.59	2.82
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-1	208.48	203.52	180.04	439.36		21.16	3.28
SRM614-1	649.60	3074.94	2632.89	6554.56	1054.57	442.28	1454.37
SRM612-1	2041.85	27687.68	25079.78	62469.79	99722.48	40470.31	129548.65
SRM610-1	4015.78	64780.13	59344.29	151752.98	257720.84	211669.55	566155.88
AP1-1	509.08	4109.10	3447.06	8721.81	850.20	175.04	1571.73
AP2-1	1233.93	18896.95	16006.93	40860.71	2083.77	1280.37	3677.74
AP3-1	3843.74	75811.19	63247.32	171886.20	4769.15	3725.10	5932.95
AP4-1	8679.13	190794.28	157471.77	446975.03	10276.34	8483.53	11866.99
MZ4-1	370.80	1725.21	1415.29	3688.90	91.60	24.64	187.48
MZ4-2	402.04	2169.25	1882.09	4764.79	68.68	56.40	313.68
MZ4-3	422.20	2710.74	2412.05	5866.35	97.92	83.76	359.56
MZ4-4	448.52	3034.66	2628.13	6509.12	149.16	105.92	385.24
MZ4-5	487.44	3227.62	2661.14	6655.72	66.60	74.36	191.80
MZ4-6	482.84	3394.82	2807.38	7241.24	86.32	158.04	300.52
MZ4-7	428.08	3015.70	2498.57	6391.32	98.24	173.60	251.40
MZ4-8	416.96	2647.93	2150.77	5472.75	58.36	63.08	145.92
MZ4-9	813.00	5676.07	5307.07	10018.70	303.52	68.88	198.44
MZ4-10	358.80	1826.33	1457.65	3657.58	63.36	108.96	233.44
MZ4-11	323.48	1542.61	1271.29	3160.02	40.08	75.76	144.16
MZ4-12	393.84	2211.69	1890.45	4207.74	50.76	124.36	198.84
SRM614-2	333.80	1484.49	1358.69	3068.78	1099.05	712.56	2074.89
SRM612-2	1361.61	19131.07	17593.94	43287.20	72075.69	34535.11	107256.05
SRM610-2	3893.66	67272.30	61769.55	159114.89	259321.91	235157.44	625376.75
AP1-2	249.84	904.49	822.12	2011.53	59.00	15.64	59.76
AP2-2	883.28	13865.56	11702.11	29740.85	841.16	1003.01	1019.21
AP3-2	4212.46	84263.48	70882.48	193044.20	4763.83	4130.74	5437.67
AP4-2	7316.68	155917.84	129000.21	361556.47	8318.53	8314.13	9984.58
blank-2	187.76	136.80	125.20	303.36		12.92	3.88
blank average	198.12	170.16	152.62	371.36		17.04	3.58

Appendix A. Raw trace element datasheets from laser ablation.

blank subtraction							
SRM614-1	451.48	2904.78	2480.27	6183.20	1037.53	440.02	1450.79
SRM612-1	1843.73	27517.52	24927.16	62098.43	99705.44	40468.05	129545.07
SRM610-1	3817.66	64609.96	59191.67	151381.62	257703.80	211667.29	566152.30
AP1-1	310.96	3938.94	3294.44	8350.45	833.16	172.78	1568.15
AP2-1	1035.81	18726.78	15854.31	40489.35	2066.73	1278.11	3674.16
AP3-1	3645.62	75641.03	63094.70	171514.84	4752.11	3722.84	5929.37
AP4-1	8481.01	190624.12	157319.15	446603.67	10259.30	8481.27	11863.41
MZ4-1	172.68	1555.05	1262.67	3317.54	74.56	22.38	183.90
MZ4-2	203.92	1999.09	1729.47	4393.42	51.64	54.14	310.10
MZ4-3	224.08	2540.57	2259.43	5494.99	80.88	81.50	355.98
MZ4-4	250.40	2864.50	2475.51	6137.75	132.12	103.66	381.66
MZ4-5	289.32	3057.46	2508.51	6284.36	49.56	72.10	188.22
MZ4-6	284.72	3224.66	2654.75	6869.88	69.28	155.78	296.94
MZ4-7	229.96	2845.54	2345.95	6019.95	81.20	171.34	247.82
MZ4-8	218.84	2477.77	1998.15	5101.39	41.32	60.82	142.34
MZ4-9	614.88	5505.91	5154.45	9647.33	286.48	66.62	194.86
MZ4-10	160.68	1656.17	1305.03	3286.22	46.32	106.70	229.86
MZ4-11	125.36	1372.45	1118.67	2788.66	23.04	73.50	140.58
MZ4-12	195.72	2041.53	1737.83	3836.38	33.72	122.10	195.26
SRM614-2	135.68	1314.33	1206.07	2697.42	1082.01	710.30	2071.31
SRM612-2	1163.49	18960.91	17441.32	42915.84	72058.65	34532.85	107252.47
SRM610-2	3695.54	67102.14	61616.93	158743.53	259304.87	235155.18	625373.17
AP1-2	51.72	734.32	669.50	1640.17	41.96	13.38	56.18
AP2-2	685.16	13695.40	11549.48	29369.49	824.12	1000.75	1015.63
AP3-2	4014.34	84093.32	70729.86	192672.84	4746.79	4128.48	5434.09
AP4-2	7118.56	155747.68	128847.59	361185.11	8301.49	8311.87	9981.00
zero correction							
SRM614-1	451.48	2904.78	2480.27	6183.20	1037.53	440.02	1450.79
SRM612-1	1843.73	27517.52	24927.16	62098.43	99705.44	40468.05	129545.07
SRM610-1	3817.66	64609.96	59191.67	151381.62	257703.80	211667.29	566152.30
AP1-1	310.96	3938.94	3294.44	8350.45	833.16	172.78	1568.15
AP2-1	1035.81	18726.78	15854.31	40489.35	2066.73	1278.11	3674.16
AP3-1	3645.62	75641.03	63094.70	171514.84	4752.11	3722.84	5929.37
AP4-1	8481.01	190624.12	157319.15	446603.67	10259.30	8481.27	11863.41
MZ4-1	172.68	1555.05	1262.67	3317.54	74.56	22.38	183.90
MZ4-2	203.92	1999.09	1729.47	4393.42	51.64	54.14	310.10
MZ4-3	224.08	2540.57	2259.43	5494.99	80.88	81.50	355.98
MZ4-4	250.40	2864.50	2475.51	6137.75	132.12	103.66	381.66
MZ4-5	289.32	3057.46	2508.51	6284.36	49.56	72.10	188.22
MZ4-6	284.72	3224.66	2654.75	6869.88	69.28	155.78	296.94
MZ4-7	229.96	2845.54	2345.95	6019.95	81.20	171.34	247.82
MZ4-8	218.84	2477.77	1998.15	5101.39	41.32	60.82	142.34
MZ4-9	614.88	5505.91	5154.45	9647.33	286.48	66.62	194.86
MZ4-10	160.68	1656.17	1305.03	3286.22	46.32	106.70	229.86
MZ4-11	125.36	1372.45	1118.67	2788.66	23.04	73.50	140.58
MZ4-12	195.72	2041.53	1737.83	3836.38	33.72	122.10	195.26
SRM614-2	135.68	1314.33	1206.07	2697.42	1082.01	710.30	2071.31
SRM612-2	1163.49	18960.91	17441.32	42915.84	72058.65	34532.85	107252.47
SRM610-2	3695.54	67102.14	61616.93	158743.53	259304.87	235155.18	625373.17
AP1-2	51.72	734.32	669.50	1640.17	41.96	13.38	56.18
AP2-2	685.16	13695.40	11549.48	29369.49	824.12	1000.75	1015.63
AP3-2	4014.34	84093.32	70729.86	192672.84	4746.79	4128.48	5434.09
AP4-2	7118.56	155747.68	128847.59	361185.11	8301.49	8311.87	9981.00
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-1	0.000566	0.003641	0.003109	0.007750	0.001300	0.000552	0.001818
SRM612-1	0.001327	0.019803	0.017939	0.044689	0.071753	0.029123	0.093227

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-1	0.008736	0.147852	0.135453	0.346419	0.589725	0.484376	1.295573
AP1-1	0.000038	0.000481	0.000402	0.001019	0.000102	0.000021	0.000191
AP2-1	0.000153	0.002769	0.002344	0.005986	0.000306	0.000189	0.000543
AP3-1	0.000564	0.011705	0.009764	0.026541	0.000735	0.000576	0.000918
AP4-1	0.000999	0.022448	0.018526	0.052592	0.001208	0.000999	0.001397
MZ4-1	0.000027	0.000246	0.000200	0.000525	0.000012	0.000004	0.000029
MZ4-2	0.000031	0.000305	0.000264	0.000669	0.000008	0.000008	0.000047
MZ4-3	0.000034	0.000391	0.000347	0.000845	0.000012	0.000013	0.000055
MZ4-4	0.000040	0.000454	0.000393	0.000974	0.000021	0.000016	0.000061
MZ4-5	0.000047	0.000497	0.000408	0.001021	0.000008	0.000012	0.000031
MZ4-6	0.000046	0.000525	0.000432	0.001118	0.000011	0.000025	0.000048
MZ4-7	0.000046	0.000567	0.000467	0.001199	0.000016	0.000034	0.000049
MZ4-8	0.000045	0.000515	0.000415	0.001060	0.000009	0.000013	0.000030
MZ4-9	0.000124	0.001110	0.001040	0.001946	0.000058	0.000013	0.000039
MZ4-10	0.000033	0.000341	0.000269	0.000677	0.000010	0.000022	0.000047
MZ4-11	0.000021	0.000230	0.000188	0.000468	0.000004	0.000012	0.000024
MZ4-12	0.000029	0.000302	0.000257	0.000567	0.000005	0.000018	0.000029
SRM614-2	0.000130	0.001256	0.001152	0.002578	0.001034	0.000679	0.001979
SRM612-2	0.001118	0.018224	0.016764	0.041248	0.069259	0.033191	0.103085
SRM610-2	0.008280	0.150337	0.138047	0.355651	0.580950	0.526845	1.401095
AP1-2	0.000009	0.000128	0.000117	0.000287	0.000007	0.000002	0.000010
AP2-2	0.000115	0.002297	0.001937	0.004927	0.000138	0.000168	0.000170
AP3-2	0.000625	0.013103	0.011021	0.030021	0.000740	0.000643	0.000847
AP4-2	0.000897	0.019623	0.016234	0.045506	0.001046	0.001047	0.001258
standardize signal averages AP							
AP1	0.000023	0.000305	0.000260	0.000653	0.000055	0.000012	0.000101
AP2	0.000134	0.002533	0.002141	0.005456	0.000222	0.000178	0.000357
AP3	0.000595	0.012404	0.010392	0.028281	0.000737	0.000610	0.000882
AP4	0.000948	0.021035	0.017380	0.049049	0.001127	0.001023	0.001327
linest from std sig ave							
	0.385540	0.017693	0.021335	0.007633	0.005022	0.010046	0.006194
standardize signal averages SRM							
srm614-2	0.000348	0.002448	0.002131	0.005164	0.001167	0.000615	0.001899
srm612-2	0.001223	0.019014	0.017351	0.042969	0.070506	0.031157	0.098156
srm610-2	0.008508	0.149094	0.136750	0.351035	0.585338	0.505610	1.348334
linest from std sig ave							
	0.561696	0.032182	0.035091	0.013680	0.007094	0.010405	0.003955
concentration data							
SRM614-1	18.71	5.52	5.69	5.07	0.56	0.48	0.97
SRM612-1	43.87	30.05	32.82	29.26	30.91	25.09	49.52
SRM610-1	288.87	224.36	247.84	226.78	254.02	417.33	688.24
AP1-1	5.84	3.39	3.42	3.10	0.20	0.08	0.47
AP2-1	23.55	19.54	19.95	18.23	0.61	0.76	1.34
AP3-1	86.77	82.62	83.10	80.82	1.47	2.31	2.27
AP4-1	153.61	158.45	157.68	160.15	2.42	4.00	3.45
MZ4-1	4.21	1.74	1.70	1.60	0.02	0.01	0.07
MZ4-2	4.78	2.15	2.24	2.04	0.02	0.03	0.12
MZ4-3	5.30	2.76	2.96	2.57	0.02	0.05	0.14
MZ4-4	6.11	3.21	3.34	2.97	0.04	0.07	0.15
MZ4-5	7.23	3.51	3.47	3.11	0.02	0.05	0.08
MZ4-6	7.13	3.70	3.68	3.40	0.02	0.10	0.12
MZ4-7	7.05	4.00	3.98	3.65	0.03	0.14	0.12
MZ4-8	7.00	3.64	3.53	3.23	0.02	0.05	0.07
MZ4-9	19.07	7.84	8.85	5.92	0.12	0.05	0.10
MZ4-10	5.09	2.41	2.29	2.06	0.02	0.09	0.12
MZ4-11	3.24	1.63	1.60	1.43	0.01	0.05	0.06
MZ4-12	4.45	2.13	2.19	1.73	0.01	0.07	0.07
SRM614-2	4.29	1.91	2.11	1.69	0.45	0.58	1.05
SRM612-2	36.98	27.65	30.67	27.00	29.83	28.60	54.76
SRM610-2	273.76	228.12	252.59	232.82	250.24	453.92	744.30
AP1-2	1.39	0.91	1.00	0.87	0.01	0.01	0.02
AP2-2	17.68	16.22	16.49	15.00	0.28	0.67	0.42
AP3-2	96.21	92.49	93.80	91.42	1.48	2.58	2.09
AP4-2	137.94	138.51	138.17	138.57	2.10	4.20	3.11
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Appendix A. Raw trace element datasheets from laser ablation.

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-3	83.56	191.68	167.56	396.68	3.88	2.44	1.48
SRM614-3	291.24	2852.02	2411.65	6203.60	2403.05	872.00	2709.70
SRM612-3	2376.49	37436.81	33920.71	84855.52	134619.13	49566.04	124909.38
SRM610-3	10882.62	220174.05	199499.88	556930.63	1023217.30	407575.19	1206610.80
AP1-3	300.12	3020.38	2534.33	6603.24	1619.65	238.32	1968.81
AP2-3	2452.37	45642.86	38199.70	100562.16	3801.30	2467.49	4241.34
AP3-3	19846.31	499974.91	408184.34	1245745.90	27832.36	12467.83	20301.07
AP4-3	32218.46	894413.00	728439.88	2211942.80	40364.27	21512.96	36456.04
TGP3-1	697.16	9827.26	8425.09	21148.76	588.64	127.32	2575.85
TGP3-2	619.72	7451.44	6179.59	15511.01	386.08	81.60	1811.25
TGP3-3	588.64	7798.64	6393.80	16443.97	229.20	55.04	1784.53
TGP3-4	640.96	7522.44	6241.52	15770.29	523.68	156.88	4661.35
TGP3-5	578.24	6403.72	5364.19	13307.80	212.04	97.60	2735.66
TGP3-6	559.68	7461.40	6354.52	15528.45	246.52	165.12	3211.50
TGP3-7	535.20	7174.76	6009.27	15673.61	980.17	1386.69	10003.50
TGP3-8	425.56	4202.70	3498.86	9046.61	242.68	683.12	6564.08
TGP3-9	300.68	2630.45	2211.49	5512.15	117.68	210.40	4369.14
TGP3-10	444.20	4903.83	4053.38	10681.10	504.16	593.00	5029.27
TGP3-11	422.88	4263.50	3557.90	8886.97	475.68	386.80	3873.26
TGP3-12	358.16	3686.34	3017.14	7489.48	177.76	183.88	4183.42
TGP3-13	754.08	11638.95	9847.34	24894.46	784.24	1340.61	3943.70
TGP3-14	582.00	8947.09	7335.20	18840.19	800.84	580.76	3272.70
TGP3-15	1039.13	17118.26	14283.56	36512.41	501.36	2551.77	4016.46
SRM614-4	267.96	2278.53	1996.97	4903.27	1998.89	1045.89	2874.62
SRM612-4	1516.93	24964.14	22864.29	56527.28	94749.38	62030.23	139822.70
SRM610-4	6474.64	126703.67	115556.93	318658.16	543871.88	440588.31	1136952.10
AP1-4	148.00	836.68	634.36	1704.25	77.12	20.80	165.96
AP2-4	1478.57	27535.23	23319.89	60193.86	1647.93	1999.81	2182.33
AP3-4	10921.42	260713.27	212349.84	641696.81	14917.16	9075.41	12936.39
AP4-4	21601.80	583712.56	474295.31	1462511.40	27034.75	20154.31	31664.18
blank-4	144.56	558.48	470.20	1190.61	41.80	1.32	78.56
blank average	114.06	375.08	318.88	793.64	22.84	1.88	40.02
blank subtraction							
SRM614-3	177.18	2476.93	2092.77	5409.95	2380.21	870.12	2669.68
SRM612-3	2262.43	37061.73	33601.83	84061.87	134596.29	49564.16	124869.36
SRM610-3	10768.56	219798.97	199181.00	556136.99	1023194.46	407573.31	1206570.78
AP1-3	186.06	2645.29	2215.45	5809.59	1596.81	236.44	1928.79
AP2-3	2338.31	45267.78	37880.81	99768.52	3778.46	2465.61	4201.32
AP3-3	19732.25	499599.83	407865.46	1244952.26	27809.52	12465.95	20261.05
AP4-3	32104.40	894037.92	728121.00	2211149.16	40341.43	21511.08	36416.02
TGP3-1	583.10	9452.17	8106.21	20355.12	565.80	125.44	2535.83
TGP3-2	505.66	7076.36	5860.71	14717.36	363.24	79.72	1771.23
TGP3-3	474.58	7423.56	6074.91	15650.33	206.36	53.16	1744.51
TGP3-4	526.90	7147.36	5922.63	14976.64	500.84	155.00	4621.33
TGP3-5	464.18	6028.63	5045.31	12514.15	189.20	95.72	2695.64
TGP3-6	445.62	7086.32	6035.63	14734.80	223.68	163.24	3171.48
TGP3-7	421.14	6799.68	5690.39	14879.96	957.33	1384.81	9963.48
TGP3-8	311.50	3827.62	3179.98	8252.97	219.84	681.24	6524.06
TGP3-9	186.62	2255.37	1892.61	4718.51	94.84	208.52	4329.12
TGP3-10	330.14	4528.75	3734.50	9887.46	481.32	591.12	4989.25
TGP3-11	308.82	3888.42	3239.02	8093.33	452.84	384.92	3833.24
TGP3-12	244.10	3311.26	2698.26	6695.84	154.92	182.00	4143.40
TGP3-13	640.02	11263.86	9528.45	24100.81	761.40	1338.73	3903.68
TGP3-14	467.94	8572.01	7016.32	18046.54	778.00	578.88	3232.68
TGP3-15	925.07	16743.17	13964.68	35718.76	478.52	2549.89	3976.44
SRM614-4	153.90	1903.45	1678.09	4109.62	1976.05	1044.01	2834.60
SRM612-4	1402.87	24589.06	22545.41	55733.63	94726.53	62028.35	139782.68
SRM610-4	6360.58	126328.59	115238.05	317864.52	543849.04	440586.43	1136912.08
AP1-4	33.94	461.60	315.48	910.61	54.28	18.92	125.94
AP2-4	1364.51	27160.15	23001.01	59400.21	1625.09	1997.93	2142.31
AP3-4	10807.36	260338.19	212030.96	640903.17	14894.32	9073.53	12896.37
AP4-4	21487.74	583337.48	473976.43	1461717.76	27011.91	20152.43	31624.16
zero correction							
SRM614-3	177.18	2476.93	2092.77	5409.95	2380.21	870.12	2669.68
SRM612-3	2262.43	37061.73	33601.83	84061.87	134596.29	49564.16	124869.36
SRM610-3	10768.56	219798.97	199181.00	556136.99	1023194.46	407573.31	1206570.78
AP1-3	186.06	2645.29	2215.45	5809.59	1596.81	236.44	1928.79
AP2-3	2338.31	45267.78	37880.81	99768.52	3778.46	2465.61	4201.32
AP3-3	19732.25	499599.83	407865.46	1244952.26	27809.52	12465.95	20261.05
AP4-3	32104.40	894037.92	728121.00	2211149.16	40341.43	21511.08	36416.02
TGP3-1	583.10	9452.17	8106.21	20355.12	565.80	125.44	2535.83
TGP3-2	505.66	7076.36	5860.71	14717.36	363.24	79.72	1771.23
TGP3-3	474.58	7423.56	6074.91	15650.33	206.36	53.16	1744.51

Appendix A. Raw trace element datasheets from laser ablation.

TGP3-4	526.90	7147.36	5922.63	14976.64	500.84	155.00	4621.33
TGP3-5	464.18	6028.63	5045.31	12514.15	189.20	95.72	2695.64
TGP3-6	445.62	7086.32	6035.63	14734.80	223.68	163.24	3171.48
TGP3-7	421.14	6799.68	5690.39	14879.96	957.33	1384.81	9963.48
TGP3-8	311.50	3827.62	3179.98	8252.97	219.84	681.24	6524.06
TGP3-9	186.62	2255.37	1892.61	4718.51	94.84	208.52	4329.12
TGP3-10	330.14	4528.75	3734.50	9887.46	481.32	591.12	4989.25
TGP3-11	308.82	3888.42	3239.02	8093.33	452.84	384.92	3833.24
TGP3-12	244.10	3311.26	2698.26	6695.84	154.92	182.00	4143.40
TGP3-13	640.02	11263.86	9528.45	24100.81	761.40	1338.73	3903.68
TGP3-14	467.94	8572.01	7016.32	18046.54	778.00	578.88	3232.68
TGP3-15	925.07	16743.17	13964.68	35718.76	478.52	2549.89	3976.44
SRM614-4	153.90	1903.45	1678.09	4109.62	1976.05	1044.01	2834.60
SRM612-4	1402.87	24589.06	22545.41	55733.63	94726.53	62028.35	139782.68
SRM610-4	6360.58	126328.59	115238.05	317864.52	543849.04	440586.43	1136912.08
AP1-4	33.94	461.60	315.48	910.61	54.28	18.92	125.94
AP2-4	1364.51	27160.15	23001.01	59400.21	1625.09	1997.93	2142.31
AP3-4	10807.36	260338.19	212030.96	640903.17	14894.32	9073.53	12896.37
AP4-4	21487.74	583337.48	473976.43	1461717.76	27011.91	20152.43	31624.16

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-3	0.000055	0.000766	0.000647	0.001673	0.000736	0.000269	0.000826
SRM612-3	0.000738	0.012097	0.010968	0.027439	0.043933	0.016178	0.040758
SRM610-3	0.007914	0.161542	0.146389	0.408736	0.752002	0.299548	0.886775
AP1-3	0.000010	0.000147	0.000123	0.000323	0.000089	0.000013	0.000107
AP2-3	0.000135	0.002618	0.002191	0.005771	0.000219	0.000143	0.000243
AP3-3	0.000887	0.022447	0.018325	0.055935	0.001249	0.000560	0.000910
AP4-3	0.001636	0.045559	0.037104	0.112677	0.002056	0.001096	0.001856
TGP3-1	0.000023	0.000370	0.000317	0.000796	0.000022	0.000005	0.000099
TGP3-2	0.000022	0.000305	0.000252	0.000634	0.000016	0.000003	0.000076
TGP3-3	0.000023	0.000355	0.000291	0.000748	0.000010	0.000003	0.000083
TGP3-4	0.000021	0.000279	0.000231	0.000584	0.000020	0.000006	0.000180
TGP3-5	0.000019	0.000249	0.000208	0.000517	0.000008	0.000004	0.000111
TGP3-6	0.000019	0.000309	0.000264	0.000643	0.000010	0.000007	0.000138
TGP3-7	0.000020	0.000317	0.000266	0.000694	0.000045	0.000065	0.000465
TGP3-8	0.000015	0.000182	0.000151	0.000391	0.000010	0.000032	0.000309
TGP3-9	0.000008	0.000094	0.000079	0.000197	0.000004	0.000009	0.000181
TGP3-10	0.000017	0.000227	0.000187	0.000495	0.000024	0.000030	0.000250
TGP3-11	0.000015	0.000186	0.000155	0.000387	0.000022	0.000018	0.000183
TGP3-12	0.000011	0.000153	0.000125	0.000310	0.000007	0.000008	0.000192
TGP3-13	0.000057	0.001002	0.000847	0.002143	0.000068	0.000119	0.000347
TGP3-14	0.000041	0.000747	0.000612	0.001573	0.000068	0.000050	0.000282
TGP3-15	0.000063	0.001134	0.000946	0.002419	0.000032	0.000173	0.000269
SRM614-4	0.000078	0.000968	0.000853	0.002089	0.001005	0.000531	0.001441
SRM612-4	0.000648	0.011358	0.010414	0.025745	0.043757	0.028653	0.064570
SRM610-4	0.006731	0.133680	0.121944	0.336363	0.575499	0.466227	1.203075
AP1-4	0.000003	0.000036	0.000025	0.000071	0.000004	0.000001	0.000010
AP2-4	0.000103	0.002045	0.001732	0.004473	0.000122	0.000150	0.000161
AP3-4	0.000659	0.015875	0.012929	0.039081	0.000908	0.000553	0.000786
AP4-4	0.001395	0.037872	0.030772	0.094899	0.001754	0.001308	0.002053

standardize signal averages AP							
AP1	0.000007	0.000092	0.000074	0.000197	0.000047	0.000007	0.000059
AP2	0.000119	0.002332	0.001962	0.005122	0.000170	0.000147	0.000202
AP3	0.000773	0.019161	0.015627	0.047508	0.001079	0.000557	0.000848
AP4	0.001516	0.041715	0.033938	0.103788	0.001905	0.001202	0.001954

linest from std sig ave							
	0.253609	0.009359	0.011501	0.003762	0.003077	0.008982	0.004520

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.000067	0.000867	0.000750	0.001881	0.000870	0.000400	0.001133
srM612-2	0.000693	0.011728	0.010691	0.026592	0.043845	0.022415	0.052664
srM610-2	0.007323	0.147611	0.134167	0.372549	0.663750	0.382887	1.044925

linest from std sig ave							
	0.658071	0.032685	0.035960	0.012957	0.006291	0.013741	0.005109

concentration data							
SRM614-3	1.19	0.61	0.64	0.54	0.19	0.21	0.32
SRM612-3	16.06	9.71	10.82	8.85	11.59	12.46	15.80
SRM610-3	172.14	129.66	144.39	131.87	198.46	230.74	343.79
AP1-3	1.05	0.55	0.56	0.48	0.11	0.05	0.19
AP2-3	13.68	9.78	10.05	8.66	0.27	0.51	0.44
AP3-3	89.70	83.81	84.08	83.95	1.53	2.01	1.64
AP4-3	165.52	170.10	170.24	169.10	2.52	3.93	3.35
TGP3-1	2.31	1.38	1.45	1.19	0.03	0.02	0.18
TGP3-2	2.20	1.14	1.16	0.95	0.02	0.01	0.14
TGP3-3	2.30	1.33	1.33	1.12	0.01	0.01	0.15
TGP3-4	2.08	1.04	1.06	0.88	0.02	0.02	0.32
TGP3-5	1.94	0.93	0.96	0.78	0.01	0.01	0.20
TGP3-6	1.97	1.16	1.21	0.97	0.01	0.03	0.25
TGP3-7	1.99	1.18	1.22	1.04	0.05	0.23	0.84
TGP3-8	1.49	0.68	0.69	0.59	0.01	0.12	0.56
TGP3-9	0.79	0.35	0.36	0.30	0.00	0.03	0.33
TGP3-10	1.67	0.85	0.86	0.74	0.03	0.11	0.45
TGP3-11	1.49	0.69	0.71	0.58	0.03	0.07	0.33
TGP3-12	1.14	0.57	0.57	0.47	0.01	0.03	0.35
TGP3-13	5.76	3.74	3.89	3.22	0.08	0.43	0.63
TGP3-14	4.13	2.79	2.81	2.36	0.08	0.18	0.51
TGP3-15	6.34	4.23	4.34	3.63	0.04	0.62	0.49
SRM614-4	1.70	0.78	0.84	0.67	0.27	0.41	0.56
SRM612-4	14.09	9.12	10.27	8.31	11.55	22.07	25.03
SRM610-4	146.40	107.30	120.28	108.52	151.88	359.13	466.42
AP1-4	0.27	0.14	0.11	0.11	0.01	0.01	0.02
AP2-4	10.40	7.64	7.95	6.71	0.15	0.54	0.29
AP3-4	66.68	59.27	59.32	58.65	1.11	1.98	1.42
AP4-4	141.14	141.40	141.19	142.42	2.15	4.69	3.70

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-1	308.68	1437.49	1329.21	2077.01	148.72	1.40	11.84
SRM614-1	287.56	3020.66	2591.17	6585.76	2866.46	1022.13	3087.54
SRM612-1	2424.81	41067.07	37424.33	93007.36	151067.13	54624.71	139858.14
SRM610-1	9154.65	178706.84	162878.44	450890.69	738126.19	354154.78	998114.94
AP1-1	393.28	4175.26	3474.42	8947.77	649.56	113.36	630.32
AP2-1	3160.42	60571.62	50795.69	135609.44	4642.11	2825.46	4162.90
AP3-1	28445.72	779272.00	634828.88	1918701.10	36073.36	15520.73	30789.77
AP4-1	35796.32	1014900.80	823425.19	2505480.00	46733.50	21606.84	36883.93
TGP2-1	1500.89	21592.24	18485.86	42024.40	826.48	413.88	1001.09
TGP2-2	908.29	14213.60	11718.19	29374.08	300.96	192.88	628.92
TGP2-3	4615.51	113321.04	86224.17	256243.44	950.21	583.12	1223.05
TGP2-4	949.93	17231.46	14218.52	36689.49	470.60	115.72	788.52
TGP2-5	771.04	11857.15	10135.62	25658.54	174.60	43.00	168.36
TGP2-6	700.24	10086.74	8470.01	21715.00	368.40	29.76	254.96
TGP2-7	1597.13	19337.19	17314.46	36777.25	960.45	139.56	711.72
TGP2-8	671.04	9022.89	7733.60	19198.71	171.92	42.36	230.80
TGP2-9	637.72	8029.04	6867.00	17281.02	136.92	32.88	296.96
TGP2-10	633.08	7312.24	6315.80	14566.44	163.08	18.48	111.36
TGP2-11	605.52	8445.93	7071.12	18023.90	95.12	32.20	150.52
TGP2-12	650.04	8559.61	7294.72	18387.34	121.00	48.80	214.40
TGP2-13	527.28	6935.32	5733.35	14723.76	256.36	166.84	368.72
TGP2-14	485.56	5855.19	4995.07	12750.99	102.28	88.08	109.40
TGP2-15	533.28	7470.12	6095.55	15575.61	105.92	97.44	224.76
TGP2-16	553.72	6909.76	5835.23	14288.08	202.56	85.12	206.24
TGP2-17	533.08	7204.00	6126.67	14985.97	110.96	63.04	122.28
TGP2-18	586.92	7758.16	6500.60	16571.41	116.20	83.92	154.76
SRM614-2	232.64	2035.85	1730.05	4233.74	2085.57	1222.61	2965.62
SRM612-2	1693.61	26015.31	24115.86	59904.94	100461.37	61884.19	139941.63

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	6502.96	127923.23	116163.02	321835.19	544448.94	402064.00	1032013.30
AP1-2	167.12	1056.13	854.12	1972.85	29.00	10.84	54.00
AP2-2	1907.13	35779.92	29917.37	78717.08	2178.69	2171.13	2272.37
AP3-2	20941.64	559877.00	454942.91	1413252.40	25876.35	16642.37	28056.44
AP4-2	19247.71	500741.53	408419.50	1257822.90	24367.86	16866.06	23994.22
blank-2	107.76	88.88	107.88	190.56	8.56	1.92	2.72
blank average	208.22	763.18	718.54	1133.79	78.64	1.66	7.28
blank subtraction							
SRM614-1	79.34	2257.47	1872.63	5451.97	2787.82	1020.47	3080.26
SRM612-1	2216.59	40303.89	36705.79	91873.57	150988.49	54623.05	139850.86
SRM610-1	8946.43	177943.66	162159.90	449756.90	738047.55	354153.12	998107.66
AP1-1	185.06	3412.08	2755.88	7813.98	570.92	111.70	623.04
AP2-1	2952.20	59808.44	50077.14	134475.65	4563.47	2823.80	4155.62
AP3-1	28237.50	778508.82	634110.34	1917567.31	35994.72	15519.07	30782.49
AP4-1	35588.10	1014137.62	822706.65	2504346.21	46654.86	21605.18	36876.65
TGP2-1	1292.67	20829.06	17767.32	40890.61	747.84	412.22	993.81
TGP2-2	700.06	13450.42	10999.64	28240.30	222.32	191.22	621.64
TGP2-3	4407.28	112557.86	85505.63	255109.65	871.56	581.46	1215.77
TGP2-4	741.70	16468.27	13499.98	35555.70	391.96	114.06	781.24
TGP2-5	562.82	11093.96	9417.07	24524.76	95.96	41.34	161.08
TGP2-6	492.02	9323.55	7751.46	20581.22	289.76	28.10	247.68
TGP2-7	1388.91	18574.00	16595.91	35643.46	881.80	137.90	704.44
TGP2-8	462.82	8259.71	7015.06	18064.92	93.28	40.70	223.52
TGP2-9	429.50	7265.86	6148.45	16147.23	58.28	31.22	289.68
TGP2-10	424.86	6549.06	5597.25	13432.65	84.44	16.82	104.08
TGP2-11	397.30	7682.74	6352.58	16890.12	16.48	30.54	143.24
TGP2-12	441.82	7796.42	6576.18	17253.56	42.36	47.14	207.12
TGP2-13	319.06	6172.13	5014.81	13589.98	177.72	165.18	361.44
TGP2-14	277.34	5092.01	4276.52	11617.20	23.64	86.42	102.12
TGP2-15	325.06	6706.94	5377.01	14441.82	27.28	95.78	217.48
TGP2-16	345.50	6146.57	5116.69	13154.29	123.92	83.46	198.96
TGP2-17	324.86	6440.82	5408.13	13852.18	32.32	61.38	115.00
TGP2-18	378.70	6994.98	5782.05	15437.63	37.56	82.26	147.48
SRM614-2	24.42	1272.67	1011.51	3099.96	2006.93	1220.95	2958.34
SRM612-2	1485.39	25252.12	23397.31	58771.15	100382.73	61882.53	139934.35
SRM610-2	6294.74	127160.05	115444.48	320701.40	544370.30	402062.34	1032006.02
AP1-2	-41.10	292.94	135.58	839.06	-49.64	9.18	46.72
AP2-2	1698.91	35016.74	29198.82	77583.29	2100.05	2169.47	2265.09
AP3-2	20733.42	559113.82	454224.37	1412118.61	25797.71	16640.71	28049.16
AP4-2	19039.49	499978.35	407700.96	1256689.11	24289.22	16864.39	23986.93
zero correction							
SRM614-1	79.34	2257.47	1872.63	5451.97	2787.82	1020.47	3080.26
SRM612-1	2216.59	40303.89	36705.79	91873.57	150988.49	54623.05	139850.86
SRM610-1	8946.43	177943.66	162159.90	449756.90	738047.55	354153.12	998107.66
AP1-1	185.06	3412.08	2755.88	7813.98	570.92	111.70	623.04
AP2-1	2952.20	59808.44	50077.14	134475.65	4563.47	2823.80	4155.62
AP3-1	28237.50	778508.82	634110.34	1917567.31	35994.72	15519.07	30782.49
AP4-1	35588.10	1014137.62	822706.65	2504346.21	46654.86	21605.18	36876.65
TGP2-1	1292.67	20829.06	17767.32	40890.61	747.84	412.22	993.81
TGP2-2	700.06	13450.42	10999.64	28240.30	222.32	191.22	621.64
TGP2-3	4407.28	112557.86	85505.63	255109.65	871.56	581.46	1215.77
TGP2-4	741.70	16468.27	13499.98	35555.70	391.96	114.06	781.24
TGP2-5	562.82	11093.96	9417.07	24524.76	95.96	41.34	161.08
TGP2-6	492.02	9323.55	7751.46	20581.22	289.76	28.10	247.68
TGP2-7	1388.91	18574.00	16595.91	35643.46	881.80	137.90	704.44
TGP2-8	462.82	8259.71	7015.06	18064.92	93.28	40.70	223.52
TGP2-9	429.50	7265.86	6148.45	16147.23	58.28	31.22	289.68
TGP2-10	424.86	6549.06	5597.25	13432.65	84.44	16.82	104.08
TGP2-11	397.30	7682.74	6352.58	16890.12	16.48	30.54	143.24
TGP2-12	441.82	7796.42	6576.18	17253.56	42.36	47.14	207.12
TGP2-13	319.06	6172.13	5014.81	13589.98	177.72	165.18	361.44
TGP2-14	277.34	5092.01	4276.52	11617.20	23.64	86.42	102.12
TGP2-15	325.06	6706.94	5377.01	14441.82	27.28	95.78	217.48
TGP2-16	345.50	6146.57	5116.69	13154.29	123.92	83.46	198.96
TGP2-17	324.86	6440.82	5408.13	13852.18	32.32	61.38	115.00
TGP2-18	378.70	6994.98	5782.05	15437.63	37.56	82.26	147.48
SRM614-2	24.42	1272.67	1011.51	3099.96	2006.93	1220.95	2958.34
SRM612-2	1485.39	25252.12	23397.31	58771.15	100382.73	61882.53	139934.35
SRM610-2	6294.74	127160.05	115444.48	320701.40	544370.30	402062.34	1032006.02
AP1-2	0.00	292.94	135.58	839.06	0.00	9.18	46.72
AP2-2	1698.91	35016.74	29198.82	77583.29	2100.05	2169.47	2265.09
AP3-2	20733.42	559113.82	454224.37	1412118.61	25797.71	16640.71	28049.16
AP4-2	19039.49	499978.35	407700.96	1256689.11	24289.22	16864.39	23986.93
certified concentration							
SRM614	2.40	2.40	2.40	2.40	0.74	0.83	

Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-1	0.000020	0.000578	0.000479	0.001395	0.000713	0.000261	0.000788
SRM612-1	0.000656	0.011920	0.010856	0.027172	0.044656	0.016155	0.041362
SRM610-1	0.008065	0.160420	0.146191	0.405466	0.665367	0.319277	0.899817
AP1-1	0.000009	0.000159	0.000128	0.000364	0.000027	0.000005	0.000029
AP2-1	0.000180	0.003646	0.003053	0.008198	0.000278	0.000172	0.000253
AP3-1	0.001343	0.037026	0.030159	0.091201	0.001712	0.000738	0.001464
AP4-1	0.001799	0.051265	0.041588	0.126595	0.002358	0.001092	0.001864
TGP2-1	0.000050	0.000813	0.000693	0.001596	0.000029	0.000016	0.000039
TGP2-2	0.000029	0.000561	0.000459	0.001178	0.000009	0.000008	0.000026
TGP2-3	0.000184	0.004694	0.003566	0.010640	0.000036	0.000024	0.000051
TGP2-4	0.000067	0.001499	0.001229	0.003236	0.000036	0.000010	0.000071
TGP2-5	0.000048	0.000952	0.000808	0.002105	0.000008	0.000004	0.000014
TGP2-6	0.000050	0.000946	0.000786	0.002087	0.000029	0.000003	0.000025
TGP2-7	0.000152	0.002032	0.001816	0.003900	0.000096	0.000015	0.000077
TGP2-8	0.000047	0.000844	0.000717	0.001845	0.000010	0.000004	0.000023
TGP2-9	0.000043	0.000732	0.000619	0.001626	0.000006	0.000003	0.000029
TGP2-10	0.000033	0.000512	0.000438	0.001050	0.000007	0.000001	0.000008
TGP2-11	0.000028	0.000544	0.000450	0.001197	0.000001	0.000002	0.000010
TGP2-12	0.000035	0.000614	0.000518	0.001360	0.000003	0.000004	0.000016
TGP2-13	0.000027	0.000521	0.000423	0.001147	0.000015	0.000014	0.000031
TGP2-14	0.000021	0.000380	0.000319	0.000866	0.000002	0.000006	0.000008
TGP2-15	0.000021	0.000428	0.000343	0.000922	0.000002	0.000006	0.000014
TGP2-16	0.000016	0.000284	0.000236	0.000607	0.000006	0.000004	0.000009
TGP2-17	0.000015	0.000297	0.000249	0.000639	0.000001	0.000003	0.000005
TGP2-18	0.000017	0.000320	0.000265	0.000707	0.000002	0.000004	0.000007
SRM614-2	0.000011	0.000574	0.000456	0.001397	0.000905	0.000550	0.001333
SRM612-2	0.000700	0.011896	0.011022	0.027685	0.047287	0.029151	0.065919
SRM610-2	0.007361	0.148700	0.135000	0.375026	0.636584	0.470169	1.206822
AP1-2	0.000000	0.000020	0.000009	0.000056	0.000000	0.000001	0.000003
AP2-2	0.000143	0.002943	0.002454	0.006521	0.000177	0.000182	0.000190
AP3-2	0.001136	0.030629	0.024883	0.077357	0.001413	0.000912	0.001537
AP4-2	0.001273	0.033442	0.027270	0.084056	0.001625	0.001128	0.001604

standardize signal averages AP							
AP1	0.000004	0.000089	0.000069	0.000210	0.000013	0.000003	0.000016
AP2	0.000161	0.003295	0.002753	0.007359	0.000227	0.000177	0.000222
AP3	0.001239	0.033827	0.027521	0.084279	0.001563	0.000825	0.001500
AP4	0.001536	0.042353	0.034429	0.105325	0.001992	0.001110	0.001734

linest from std sig ave							
	0.216736	0.007894	0.009708	0.003171	0.002649	0.008641	0.004228

standardize signal averages SRM							
srm614-2	0.000016	0.000576	0.000468	0.001396	0.000809	0.000406	0.001061
srm612-2	0.000678	0.011908	0.010939	0.027429	0.045972	0.022653	0.053641
srm610-2	0.007713	0.154560	0.140596	0.390246	0.650975	0.394723	1.053320

linest from std sig ave							
	0.625138	0.031221	0.034320	0.012370	0.006413	0.013330	0.005068

concentration data							
SRM614-1	0.38	0.39	0.40	0.38	0.16	0.19	0.29
SRM612-1	12.19	8.07	9.04	7.39	10.14	11.97	15.00
SRM610-1	149.92	108.61	121.72	110.26	151.14	236.60	326.25
AP1-1	0.75	0.50	0.50	0.46	0.03	0.02	0.05
AP2-1	15.56	11.48	11.82	10.37	0.29	0.59	0.43
AP3-1	116.12	116.61	116.80	115.36	1.81	2.54	2.47
AP4-1	155.55	161.45	161.07	160.13	2.49	3.76	3.14
TGP2-1	4.36	2.56	2.69	2.02	0.03	0.06	0.07
TGP2-2	2.53	1.77	1.78	1.49	0.01	0.03	0.04
TGP2-3	15.89	14.78	13.81	13.46	0.04	0.08	0.09

Appendix A. Raw trace element datasheets from laser ablation.

TGP2-4	5.84	4.72	4.76	4.09	0.04	0.04	0.12
TGP2-5	4.18	3.00	3.13	2.66	0.01	0.01	0.02
TGP2-6	4.31	2.98	3.04	2.64	0.03	0.01	0.04
TGP2-7	13.14	6.40	7.03	4.93	0.10	0.05	0.13
TGP2-8	4.09	2.66	2.78	2.33	0.01	0.01	0.04
TGP2-9	3.74	2.30	2.40	2.06	0.01	0.01	0.05
TGP2-10	2.87	1.61	1.69	1.33	0.01	0.00	0.01
TGP2-11	2.43	1.71	1.74	1.51	0.00	0.01	0.02
TGP2-12	3.01	1.94	2.01	1.72	0.00	0.01	0.03
TGP2-13	2.33	1.64	1.64	1.45	0.02	0.05	0.05
TGP2-14	1.79	1.20	1.23	1.10	0.00	0.02	0.01
TGP2-15	1.79	1.35	1.33	1.17	0.00	0.02	0.02
TGP2-16	1.38	0.89	0.92	0.77	0.01	0.01	0.02
TGP2-17	1.29	0.94	0.97	0.81	0.00	0.01	0.01
TGP2-18	1.50	1.01	1.03	0.89	0.00	0.01	0.01
SRM614-2	0.20	0.39	0.38	0.38	0.21	0.41	0.48
SRM612-2	13.01	8.05	9.18	7.53	10.74	21.60	23.90
SRM610-2	136.83	100.67	112.40	101.98	144.60	348.42	437.57
AP1-2	0.00	0.06	0.04	0.07	0.00	0.00	0.01
AP2-2	12.35	9.27	9.50	8.25	0.19	0.63	0.32
AP3-2	98.20	96.46	96.37	97.85	1.49	3.14	2.59
AP4-2	110.11	105.32	105.62	106.32	1.72	3.89	2.71

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-11	111.68	279.84	262.12	747.60	12.56	1.44	28.88
SRM614-11	342.24	3877.62	3473.78	8374.97	3267.82	1301.81	3937.62
SRM612-11	2652.77	43240.72	39567.18	99954.60	164120.64	65178.21	170599.41
SRM610-11	14064.68	303193.94	275754.16	773741.88	1546246.30	550782.69	1709889.30
AP1-11	596.76	7971.52	6754.40	15894.73	1713.01	299.32	1889.13
AP2-11	3341.54	64258.88	53616.26	143900.66	5315.15	3069.14	5222.67
AP3-11	27103.63	740139.31	600867.25	1850825.90	38480.98	15970.33	28095.60
AP4-11	70180.27	2242116.50	1828363.00	5307379.50	95588.06	37612.77	74251.86
GCK4-1	377.72	4141.34	3393.10	8856.69	400.32	118.96	506.36
GCK4-2	290.08	2709.82	2294.25	5836.71	235.44	21.00	347.80
GCK4-3	274.48	2864.06	2449.81	5830.99	235.48	46.36	309.60
GCK4-4	329.24	3150.02	2622.97	6722.12	456.04	74.92	703.68
GCK4-5	329.52	2868.62	2485.13	5751.23	117.12	28.80	173.60
GCK4-6	319.36	2969.58	2452.69	6164.03	126.16	27.28	216.52
GCK4-7	302.68	2038.81	1776.37	4431.46	468.76	40.12	562.84
GCK4-8	277.28	1782.37	1584.41	3846.94	120.00	17.36	163.40
GCK4-9	284.84	2660.62	2267.61	5582.19	181.16	25.84	375.56
GCK4-10	297.20	2492.09	2130.33	5384.79	436.12	198.56	605.36
GCK4-11	216.92	1104.49	926.93	2414.25	97.12	36.72	144.04
GCK4-12	241.40	1147.65	974.57	2521.61	204.28	66.88	319.52
GCK4-13	272.76	2619.69	2357.89	5853.11	365.28	50.28	473.84
GCK4-14	256.16	2136.29	1866.17	4356.58	76.48	17.96	159.56
GCK4-15	284.16	2081.41	1753.37	4376.74	122.56	26.88	246.00
GCK4-16	188.24	1214.05	1037.01	2572.17	29.20	9.72	44.80
GCK4-17	215.12	1674.89	1377.01	3449.90	32.60	6.00	62.84
GCK4-18	368.64	2117.45	1963.53	4001.14	156.68	9.92	71.80
SRM614-11	240.60	1313.09	1197.49	2813.82	1149.69	651.16	1585.49
SRM612-11	1167.93	17660.18	16342.85	40262.07	68324.95	43320.48	92134.56
SRM610-11	5840.67	108848.34	99050.48	268280.75	422905.47	319711.09	908755.19
AP1-11	193.16	1611.97	1379.05	3388.10	131.52	60.68	276.52
AP2-11	1694.57	31470.62	27015.83	69503.19	1936.97	2261.89	2452.45
AP3-11	11883.23	290700.25	237641.14	714507.63	15412.09	10167.98	15639.49
AP4-11	27684.80	777764.44	630782.88	1936425.00	36825.61	21312.84	35929.64
blank-11	98.64	263.20	239.24	534.80	9.00	4.56	6.64
blank average	105.16	271.52	250.68	641.20	10.78	3.00	17.76

blank subtraction							
SRM614-11	237.08	3606.10	3223.10	7733.76	3257.04	1298.81	3919.86
SRM612-11	2547.61	42969.20	39316.50	99313.40	164109.86	65175.21	170581.65
SRM610-11	13959.52	302922.42	275503.48	773100.68	1546235.52	550779.69	1709871.54
AP1-11	491.60	7700.00	6503.72	15253.53	1702.23	296.32	1871.37
AP2-11	3236.38	63987.36	53365.58	143259.46	5304.37	3066.14	5204.91
AP3-11	26998.47	739867.79	600616.57	1850184.70	38470.20	15967.33	28077.84
AP4-11	70075.11	2241844.98	1828112.32	5306738.30	95577.27	37609.77	74234.10

Appendix A. Raw trace element datasheets from laser ablation.

GCK4-1	272.56	3869.82	3142.42	8215.49	389.54	115.96	488.60
GCK4-2	184.92	2438.29	2043.57	5195.51	224.66	18.00	330.04
GCK4-3	169.32	2592.53	2199.13	5189.79	224.70	43.36	291.84
GCK4-4	224.08	2878.50	2372.29	6080.91	445.26	71.92	685.92
GCK4-5	224.36	2597.09	2234.45	5110.03	106.34	25.80	155.84
GCK4-6	214.20	2698.06	2202.01	5522.83	115.38	24.28	198.76
GCK4-7	197.52	1767.29	1525.69	3790.26	457.98	37.12	545.08
GCK4-8	172.12	1510.85	1333.73	3205.74	109.22	14.36	145.64
GCK4-9	179.68	2389.09	2016.93	4940.99	170.38	22.84	357.80
GCK4-10	192.04	2220.57	1879.65	4743.59	425.34	195.56	587.60
GCK4-11	111.76	832.96	676.24	1773.05	86.34	33.72	126.28
GCK4-12	136.24	876.12	723.88	1880.41	193.50	63.88	301.76
GCK4-13	167.60	2348.17	2107.21	5211.91	354.50	47.28	456.08
GCK4-14	151.00	1864.77	1615.49	3715.38	65.70	14.96	141.80
GCK4-15	179.00	1809.89	1502.69	3735.54	111.78	23.88	228.24
GCK4-16	83.08	942.53	786.32	1930.97	18.42	6.72	27.04
GCK4-17	109.96	1403.37	1126.33	2808.70	21.82	3.00	45.08
GCK4-18	263.48	1845.93	1712.85	3359.94	145.90	6.92	54.04
SRM614-11	135.44	1041.57	946.81	2172.61	1138.91	648.16	1567.73
SRM612-11	1062.77	17388.66	16092.17	39620.86	68314.16	43317.48	92116.79
SRM610-11	5735.51	108576.82	98799.80	267639.55	422894.69	319708.09	908737.43
AP1-11	88.00	1340.45	1128.37	2746.90	120.74	57.68	258.76
AP2-11	1589.41	31199.10	26765.15	68861.98	1926.19	2258.89	2434.69
AP3-11	11778.07	290428.73	237390.46	713866.43	15401.31	10164.98	15621.73
AP4-11	27579.63	777492.92	630532.20	1935783.80	36814.83	21309.84	35911.88

zero correction

SRM614-11	237.08	3606.10	3223.10	7733.76	3257.04	1298.81	3919.86
SRM612-11	2547.61	42969.20	39316.50	99313.40	164109.86	65175.21	170581.65
SRM610-11	13959.52	302922.42	275503.48	773100.68	1546235.52	550779.69	1709871.54
AP1-11	491.60	7700.00	6503.72	15253.53	1702.23	296.32	1871.37
AP2-11	3236.38	63987.36	53365.58	143259.46	5304.37	3066.14	5204.91
AP3-11	26998.47	739867.79	600616.57	1850184.70	38470.20	15967.33	28077.84
AP4-11	70075.11	2241844.98	1828112.32	5306738.30	95577.27	37609.77	74234.10
GCK4-1	272.56	3869.82	3142.42	8215.49	389.54	115.96	488.60
GCK4-2	184.92	2438.29	2043.57	5195.51	224.66	18.00	330.04
GCK4-3	169.32	2592.53	2199.13	5189.79	224.70	43.36	291.84
GCK4-4	224.08	2878.50	2372.29	6080.91	445.26	71.92	685.92
GCK4-5	224.36	2597.09	2234.45	5110.03	106.34	25.80	155.84
GCK4-6	214.20	2698.06	2202.01	5522.83	115.38	24.28	198.76
GCK4-7	197.52	1767.29	1525.69	3790.26	457.98	37.12	545.08
GCK4-8	172.12	1510.85	1333.73	3205.74	109.22	14.36	145.64
GCK4-9	179.68	2389.09	2016.93	4940.99	170.38	22.84	357.80
GCK4-10	192.04	2220.57	1879.65	4743.59	425.34	195.56	587.60
GCK4-11	111.76	832.96	676.24	1773.05	86.34	33.72	126.28
GCK4-12	136.24	876.12	723.88	1880.41	193.50	63.88	301.76
GCK4-13	167.60	2348.17	2107.21	5211.91	354.50	47.28	456.08
GCK4-14	151.00	1864.77	1615.49	3715.38	65.70	14.96	141.80
GCK4-15	179.00	1809.89	1502.69	3735.54	111.78	23.88	228.24
GCK4-16	83.08	942.53	786.32	1930.97	18.42	6.72	27.04
GCK4-17	109.96	1403.37	1126.33	2808.70	21.82	3.00	45.08
GCK4-18	263.48	1845.93	1712.85	3359.94	145.90	6.92	54.04
SRM614-11	135.44	1041.57	946.81	2172.61	1138.91	648.16	1567.73
SRM612-11	1062.77	17388.66	16092.17	39620.86	68314.16	43317.48	92116.79
SRM610-11	5735.51	108576.82	98799.80	267639.55	422894.69	319708.09	908737.43
AP1-11	88.00	1340.45	1128.37	2746.90	120.74	57.68	258.76
AP2-11	1589.41	31199.10	26765.15	68861.98	1926.19	2258.89	2434.69
AP3-11	11778.07	290428.73	237390.46	713866.43	15401.31	10164.98	15621.73
AP4-11	27579.63	777492.92	630532.20	1935783.80	36814.83	21309.84	35911.88

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000065	0.000995	0.000889	0.002134	0.000899	0.000358	0.001082
SRM612-11	0.000806	0.013596	0.012440	0.031423	0.051925	0.020622	0.053973
SRM610-11	0.008579	0.186160	0.169310	0.475108	0.950236	0.338481	1.050798
AP1-11	0.000024	0.000382	0.000323	0.000757	0.000084	0.000015	0.000093
AP2-11	0.000175	0.003461	0.002886	0.007749	0.000287	0.000166	0.000282
AP3-11	0.001255	0.034399	0.027925	0.086022	0.001789	0.000742	0.001305
AP4-11	0.003150	0.100775	0.082177	0.238549	0.004296	0.001691	0.003337
GCK4-1	0.000015	0.000215	0.000175	0.000457	0.000022	0.000006	0.000027
GCK4-2	0.000010	0.000134	0.000113	0.000286	0.000012	0.000001	0.000018
GCK4-3	0.000009	0.000132	0.000112	0.000263	0.000011	0.000002	0.000015
GCK4-4	0.000008	0.000106	0.000087	0.000224	0.000016	0.000003	0.000025
GCK4-5	0.000008	0.000096	0.000083	0.000189	0.000004	0.000001	0.000006
GCK4-6	0.000008	0.000099	0.000081	0.000203	0.000004	0.000001	0.000007
GCK4-7	0.000021	0.000185	0.000160	0.000397	0.000048	0.000004	0.000057
GCK4-8	0.000022	0.000194	0.000171	0.000412	0.000014	0.000002	0.000019
GCK4-9	0.000016	0.000210	0.000177	0.000434	0.000015	0.000002	0.000031
GCK4-10	0.000018	0.000207	0.000175	0.000442	0.000040	0.000018	0.000055
GCK4-11	0.000021	0.000153	0.000124	0.000325	0.000016	0.000006	0.000023
GCK4-12	0.000023	0.000145	0.000120	0.000312	0.000032	0.000011	0.000050
GCK4-13	0.000013	0.000183	0.000164	0.000406	0.000028	0.000004	0.000036
GCK4-14	0.000012	0.000146	0.000126	0.000290	0.000005	0.000001	0.000011
GCK4-15	0.000014	0.000143	0.000118	0.000294	0.000009	0.000002	0.000018
GCK4-16	0.000005	0.000058	0.000048	0.000118	0.000001	0.000000	0.000002
GCK4-17	0.000007	0.000087	0.000069	0.000173	0.000001	0.000000	0.000003
GCK4-18	0.000017	0.000117	0.000109	0.000214	0.000009	0.000000	0.000003
SRM614-11	0.000141	0.001087	0.000988	0.002267	0.001189	0.000676	0.001636
SRM612-11	0.000846	0.013849	0.012816	0.031555	0.054408	0.034499	0.073365
SRM610-11	0.009258	0.175257	0.159475	0.432004	0.682605	0.516049	1.466816
AP1-11	0.000007	0.000110	0.000093	0.000226	0.000010	0.000005	0.000021
AP2-11	0.000136	0.002665	0.002286	0.005883	0.000165	0.000193	0.000208
AP3-11	0.000886	0.021858	0.017866	0.053727	0.001159	0.000765	0.001176
AP4-11	0.002112	0.059544	0.048289	0.148251	0.002819	0.001632	0.002750
standardize signal averages AP							
AP1	0.000016	0.000246	0.000208	0.000492	0.000047	0.000010	0.000057
AP2	0.000155	0.003063	0.002586	0.006816	0.000226	0.000179	0.000245
AP3	0.001071	0.028129	0.022896	0.069875	0.001474	0.000754	0.001241
AP4	0.002631	0.080160	0.065233	0.193400	0.003558	0.001661	0.003044
linest from std sig ave							
	0.150453	0.004982	0.006122	0.002061	0.001721	0.006517	0.002901
standardize signal averages SRM							
srM614-2	0.000103	0.001041	0.000939	0.002201	0.001044	0.000517	0.001359
srM612-2	0.000826	0.013722	0.012628	0.031489	0.053166	0.027561	0.063669
srM610-2	0.008918	0.180708	0.164393	0.453556	0.816420	0.427265	1.258807
linest from std sig ave							
	0.540404	0.026705	0.029354	0.010643	0.005115	0.012311	0.004241
concentration data							
SRM614-11	0.84	0.43	0.47	0.38	0.13	0.20	0.27
SRM612-11	10.40	5.81	6.53	5.55	7.66	11.53	13.43
SRM610-11	110.69	79.54	88.90	83.98	140.24	189.18	261.47
AP1-11	1.46	0.76	0.79	0.62	0.06	0.04	0.11
AP2-11	10.51	6.88	7.05	6.37	0.20	0.43	0.33
AP3-11	75.34	68.36	68.20	70.73	1.23	1.93	1.51
AP4-11	189.07	200.28	200.71	196.15	2.95	4.40	3.86
GCK4-1	0.91	0.43	0.43	0.38	0.01	0.02	0.03
GCK4-2	0.61	0.27	0.28	0.24	0.01	0.00	0.02
GCK4-3	0.52	0.26	0.27	0.22	0.01	0.01	0.02
GCK4-4	0.49	0.21	0.21	0.18	0.01	0.01	0.03
GCK4-5	0.50	0.19	0.20	0.16	0.00	0.00	0.01
GCK4-6	0.47	0.20	0.20	0.17	0.00	0.00	0.01
GCK4-7	1.24	0.37	0.39	0.33	0.03	0.01	0.07
GCK4-8	1.33	0.39	0.42	0.34	0.01	0.00	0.02
GCK4-9	0.95	0.42	0.43	0.36	0.01	0.01	0.04
GCK4-10	1.07	0.41	0.43	0.36	0.03	0.05	0.06
GCK4-11	1.23	0.30	0.30	0.27	0.01	0.02	0.03
GCK4-12	1.36	0.29	0.29	0.26	0.02	0.03	0.06
GCK4-13	0.78	0.36	0.40	0.33	0.02	0.01	0.04
GCK4-14	0.71	0.29	0.31	0.24	0.00	0.00	0.01
GCK4-15	0.85	0.28	0.29	0.24	0.01	0.00	0.02
GCK4-16	0.30	0.11	0.12	0.10	0.00	0.00	0.00
GCK4-17	0.41	0.17	0.17	0.14	0.00	0.00	0.00
GCK4-18	1.01	0.23	0.27	0.18	0.01	0.00	0.00
SRM614-11	1.82	0.46	0.52	0.40	0.18	0.38	0.41

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-11	10.92	5.92	6.73	5.58	8.03	19.28	18.26
SRM610-11	119.46	74.88	83.74	76.36	100.74	288.43	364.99
AP1-11	0.43	0.22	0.23	0.19	0.01	0.01	0.02
AP2-11	8.15	5.30	5.58	4.84	0.11	0.50	0.24
AP3-11	53.20	43.44	43.64	44.18	0.80	1.99	1.36
AP4-11	126.77	118.34	117.94	121.90	1.94	4.24	3.18

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-9	127.96	467.44	371.48	1008.05	14.52	1.72	3.60
SRM614-9	308.16	2836.94	2317.81	5906.55	2515.73	798.40	2366.77
SRM612-9	2467.93	40212.55	36684.09	91898.12	146581.06	52152.17	131742.30
SRM610-9	13256.87	269652.06	244728.53	684472.31	1119749.30	415353.13	1361958.30
AP1-9	368.20	4697.07	3837.90	9990.78	529.88	127.60	557.24
AP2-9	3068.62	58083.09	48101.27	127493.32	3662.10	2346.09	3140.66
AP3-9	18210.54	454876.41	371906.16	1119403.40	20755.40	13429.64	21003.08
AP4-9	29422.37	788297.56	640759.50	1938707.40	33469.51	20107.23	32940.31
GCK3-1	925.85	18078.42	14858.88	38734.86	173.08	24.84	679.88
GCK3-2	2556.21	51681.37	41900.36	111703.87	484.24	39.88	800.32
GCK3-3	3596.38	74899.98	61956.87	164370.92	666.52	65.72	721.24
GCK3-4	2339.25	45040.77	36664.85	97387.27	742.32	51.72	667.20
GCK3-5	1930.57	35242.80	29067.48	75936.98	319.08	13.88	288.12
GCK3-6	2843.50	50482.32	42238.08	107617.16	611.44	17.44	311.88
GCK3-7	1722.93	30849.73	25387.30	65462.53	694.44	73.48	924.29
GCK3-8	1627.53	27358.07	22665.49	58217.93	283.00	26.44	409.24
GCK3-9	1502.53	25596.22	20975.92	53971.26	297.44	37.96	544.92
GCK3-10	1443.13	22779.53	18943.35	48383.23	695.88	131.12	1283.17
GCK3-11	944.81	14725.04	12177.43	31034.38	209.32	36.96	582.04
GCK3-12	916.69	13753.60	11279.74	29017.36	183.04	33.36	357.52
GCK3-13	1413.81	24071.90	20083.11	50503.72	801.84	108.76	1088.29
GCK3-14	1235.45	20105.59	16611.09	42243.88	214.20	62.56	454.00
GCK3-15	1155.85	19373.91	15912.57	40231.15	443.88	32.60	450.96
GCK3-16	1868.73	25566.34	21538.12	52669.10	581.08	78.16	685.68
GCK3-17	1469.01	24471.62	20139.07	52046.29	256.92	23.72	377.68
GCK3-18	1310.21	22160.24	18037.90	46515.94	239.84	26.68	342.36
SRM614-10	275.00	1885.85	1619.65	3890.54	1824.73	1024.69	2522.05
SRM612-10	1798.81	27796.68	25899.59	63613.92	106693.40	60482.10	139940.70
SRM610-10	8647.93	170354.72	154439.78	429644.94	707703.31	486875.56	1329450.50
AP1-10	221.20	1460.09	1213.93	3176.78	55.76	15.24	80.72
AP2-10	1595.13	27966.60	23669.21	60504.50	1591.93	1899.49	1991.09
AP3-10	14092.52	349256.50	285574.94	864631.50	16069.01	13013.99	19466.19
AP4-10	23151.17	627274.69	511095.97	1562472.50	27562.68	20176.95	31546.62
blank-10	144.16	279.80	257.68	536.56	9.36	1.48	16.96
blank average	136.06	373.62	314.58	772.30	11.94	1.60	10.28

blank subtraction							
SRM614-9	172.10	2463.31	2003.23	5134.25	2503.79	796.80	2356.49
SRM612-9	2331.87	39838.92	36369.50	91125.81	146569.12	52150.57	131732.02
SRM610-9	13120.81	269278.44	244413.95	683700.01	1119737.36	415351.53	1361948.02
AP1-9	232.14	4323.44	3523.32	9218.47	517.94	126.00	546.96
AP2-9	2932.56	57709.46	47786.69	126721.02	3650.16	2344.49	3130.38
AP3-9	18074.48	454502.79	371591.58	1118631.10	20743.46	13428.04	20992.80
AP4-9	29286.30	787923.94	640444.92	1937935.10	33457.57	20105.63	32930.02
GCK3-1	789.78	17704.80	14544.30	37962.55	161.14	23.24	669.60
GCK3-2	2420.15	51307.75	41585.77	110931.57	472.30	38.28	790.04
GCK3-3	3460.32	74526.36	61642.29	163598.62	654.58	64.12	710.96
GCK3-4	2203.19	44667.15	36350.27	96614.96	730.38	50.12	656.92
GCK3-5	1794.51	34869.17	28752.90	75164.68	307.14	12.28	277.84
GCK3-6	2707.44	50108.70	41923.50	106844.86	599.50	15.84	301.60
GCK3-7	1586.87	30476.11	25072.72	64690.22	682.50	71.88	914.01
GCK3-8	1491.47	26984.45	22350.91	57445.62	271.06	24.84	398.96
GCK3-9	1366.47	25222.60	20661.34	53198.96	285.50	36.36	534.64
GCK3-10	1307.07	22405.90	18628.77	47610.93	683.94	129.52	1272.89
GCK3-11	808.74	14351.42	11862.85	30262.07	197.38	35.36	571.76
GCK3-12	780.62	13379.98	10965.16	28245.06	171.10	31.76	347.24
GCK3-13	1277.75	23698.27	19768.53	49731.42	789.90	107.16	1078.01
GCK3-14	1099.39	19731.97	16296.51	41471.57	202.26	60.96	443.72
GCK3-15	1019.79	19000.29	15597.99	39458.84	431.94	31.00	440.68
GCK3-16	1732.67	25192.72	21223.54	51896.79	569.14	76.56	675.40

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-17	1332.95	24098.00	19824.49	51273.99	244.98	22.12	367.40
GCK3-18	1174.15	21786.62	17723.32	45743.64	227.90	25.08	332.08
SRM614-10	138.94	1512.23	1305.07	3118.24	1812.79	1023.09	2511.77
SRM612-10	1662.75	27423.05	25585.00	62841.61	106681.46	60480.50	139930.42
SRM610-10	8511.87	169981.10	154125.20	428872.64	707691.37	486873.96	1329440.22
AP1-10	85.14	1086.47	899.35	2404.47	43.82	13.64	70.44
AP2-10	1459.07	27592.98	23354.63	59732.20	1579.99	1897.89	1980.81
AP3-10	13956.46	348882.88	285260.36	863859.20	16057.07	13012.39	19455.91
AP4-10	23015.11	626901.07	510781.39	1561700.20	27550.74	20175.35	31536.34

zero correction

SRM614-9	172.10	2463.31	2003.23	5134.25	2503.79	796.80	2356.49
SRM612-9	2331.87	39838.92	36369.50	91125.81	146569.12	52150.57	131732.02
SRM610-9	13120.81	269278.44	244413.95	683700.01	1119737.36	415351.53	1361948.02
AP1-9	232.14	4323.44	3523.32	9218.47	517.94	126.00	546.96
AP2-9	2932.56	57709.46	47786.69	126721.02	3650.16	2344.49	3130.38
AP3-9	18074.48	454502.79	371591.58	1118631.10	20743.46	13428.04	20992.80
AP4-9	29286.30	787923.94	640444.92	1937935.10	33457.57	20105.63	32930.02
GCK3-1	789.78	17704.80	14544.30	37962.55	161.14	23.24	669.60
GCK3-2	2420.15	51307.75	41585.77	110931.57	472.30	38.28	790.04
GCK3-3	3460.32	74526.36	61642.29	163598.62	654.58	64.12	710.96
GCK3-4	2203.19	44667.15	36350.27	96614.96	730.38	50.12	656.92
GCK3-5	1794.51	34869.17	28752.90	75164.68	307.14	12.28	277.84
GCK3-6	2707.44	50108.70	41923.50	106844.86	599.50	15.84	301.60
GCK3-7	1586.87	30476.11	25072.72	64690.22	682.50	71.88	914.01
GCK3-8	1491.47	26984.45	22350.91	57445.62	271.06	24.84	398.96
GCK3-9	1366.47	25222.60	20661.34	53198.96	285.50	36.36	534.64
GCK3-10	1307.07	22405.90	18628.77	47610.93	683.94	129.52	1272.89
GCK3-11	808.74	14351.42	11862.85	30262.07	197.38	35.36	571.76
GCK3-12	780.62	13379.98	10965.16	28245.06	171.10	31.76	347.24
GCK3-13	1277.75	23698.27	19768.53	49731.42	789.90	107.16	1078.01
GCK3-14	1099.39	19731.97	16296.51	41471.57	202.26	60.96	443.72
GCK3-15	1019.79	19000.29	15597.99	39458.84	431.94	31.00	440.68
GCK3-16	1732.67	25192.72	21223.54	51896.79	569.14	76.56	675.40
GCK3-17	1332.95	24098.00	19824.49	51273.99	244.98	22.12	367.40
GCK3-18	1174.15	21786.62	17723.32	45743.64	227.90	25.08	332.08
SRM614-10	138.94	1512.23	1305.07	3118.24	1812.79	1023.09	2511.77
SRM612-10	1662.75	27423.05	25585.00	62841.61	106681.46	60480.50	139930.42
SRM610-10	8511.87	169981.10	154125.20	428872.64	707691.37	486873.96	1329440.22
AP1-10	85.14	1086.47	899.35	2404.47	43.82	13.64	70.44
AP2-10	1459.07	27592.98	23354.63	59732.20	1579.99	1897.89	1980.81
AP3-10	13956.46	348882.88	285260.36	863859.20	16057.07	13012.39	19455.91
AP4-10	23015.11	626901.07	510781.39	1561700.20	27550.74	20175.35	31536.34

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-9	0.000050	0.000719	0.000585	0.001500	0.000731	0.000233	0.000688
SRM612-9	0.000627	0.010717	0.009784	0.024514	0.039428	0.014029	0.035437
SRM610-9	0.007290	0.149609	0.135795	0.379859	0.622119	0.230767	0.756689
AP1-9	0.000010	0.000183	0.000149	0.000390	0.000022	0.000005	0.000023
AP2-9	0.000148	0.002922	0.002419	0.006415	0.000185	0.000119	0.000158
AP3-9	0.000677	0.017014	0.013910	0.041874	0.000777	0.000503	0.000786
AP4-9	0.001313	0.035328	0.028716	0.086892	0.001500	0.000901	0.001476
GCK3-1	0.000035	0.000790	0.000649	0.001694	0.000007	0.000001	0.000030
GCK3-2	0.000096	0.002034	0.001648	0.004397	0.000019	0.000002	0.000031
GCK3-3	0.000151	0.003246	0.002685	0.007126	0.000029	0.000003	0.000031
GCK3-4	0.000248	0.005021	0.004086	0.010860	0.000082	0.000006	0.000074
GCK3-5	0.000190	0.003694	0.003046	0.007964	0.000033	0.000001	0.000029
GCK3-6	0.000292	0.005413	0.004529	0.011541	0.000065	0.000002	0.000033
GCK3-7	0.000099	0.001906	0.001568	0.004047	0.000043	0.000004	0.000057
GCK3-8	0.000095	0.001711	0.001417	0.003642	0.000017	0.000002	0.000025

Appendix A. Raw trace element datasheets from laser ablation.

GCK3-9	0.000087	0.001607	0.001316	0.003389	0.000018	0.000002	0.000034
GCK3-10	0.000100	0.001722	0.001431	0.003658	0.000053	0.000010	0.000098
GCK3-11	0.000059	0.001050	0.000868	0.002213	0.000014	0.000003	0.000042
GCK3-12	0.000060	0.001028	0.000843	0.002171	0.000013	0.000002	0.000027
GCK3-13	0.000087	0.001619	0.001350	0.003397	0.000054	0.000007	0.000074
GCK3-14	0.000074	0.001321	0.001091	0.002777	0.000014	0.000004	0.000030
GCK3-15	0.000066	0.001237	0.001015	0.002568	0.000028	0.000002	0.000029
GCK3-16	0.000094	0.001371	0.001155	0.002824	0.000031	0.000004	0.000037
GCK3-17	0.000073	0.001313	0.001080	0.002794	0.000013	0.000001	0.000020
GCK3-18	0.000058	0.001071	0.000871	0.002248	0.000011	0.000001	0.000016
SRM614-10	0.000073	0.000796	0.000687	0.001642	0.000954	0.000539	0.001322
SRM612-10	0.000783	0.012918	0.012052	0.029603	0.050254	0.028490	0.065917
SRM610-10	0.007881	0.157381	0.142700	0.397082	0.655232	0.450784	1.230893
AP1-10	0.000005	0.000064	0.000053	0.000141	0.000003	0.000001	0.000004
AP2-10	0.000119	0.002259	0.001912	0.004890	0.000129	0.000155	0.000162
AP3-10	0.000699	0.017482	0.014294	0.043286	0.000805	0.000652	0.000975
AP4-10	0.001351	0.036794	0.029978	0.091658	0.001617	0.001184	0.001851

standardize signal averages AP

AP1	0.000007	0.000123	0.000101	0.000266	0.000012	0.000003	0.000014
AP2	0.000134	0.002590	0.002166	0.005653	0.000157	0.000137	0.000160
AP3	0.000688	0.017248	0.014102	0.042580	0.000791	0.000577	0.000880
AP4	0.001332	0.036061	0.029347	0.089275	0.001559	0.001043	0.001664

linest from std sig ave

0.287903	0.010771	0.013227	0.004351	0.003842	0.010046	0.005146
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standardize signal averages SRM

srM614-2	0.000062	0.000758	0.000636	0.001571	0.000843	0.000386	0.001005
srM612-2	0.000705	0.011818	0.010918	0.027058	0.044841	0.021260	0.050677
srM610-2	0.007585	0.153495	0.139248	0.388470	0.638676	0.340775	0.993791

linest from std sig ave

0.635377	0.031437	0.034651	0.012427	0.006536	0.015437	0.005371
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concentration data

SRM614-9	1.24	0.66	0.66	0.56	0.24	0.20	0.30
SRM612-9	15.49	9.90	11.10	9.15	12.99	12.09	15.64
SRM610-9	180.00	138.20	154.04	141.75	204.98	198.82	333.93
AP1-9	1.13	0.79	0.79	0.68	0.03	0.02	0.05
AP2-9	17.05	12.55	12.77	11.14	0.28	0.48	0.33
AP3-9	77.71	73.11	73.40	72.69	1.19	2.01	1.61
AP4-9	150.82	151.81	151.52	150.83	2.30	3.61	3.03
GCK3-1	4.05	3.39	3.42	2.94	0.01	0.00	0.06
GCK3-2	11.02	8.74	8.70	7.63	0.03	0.01	0.06
GCK3-3	17.31	13.95	14.17	12.37	0.04	0.01	0.06
GCK3-4	28.44	21.57	21.56	18.85	0.13	0.02	0.15
GCK3-5	21.84	15.88	16.07	13.82	0.05	0.01	0.06
GCK3-6	33.59	23.26	23.90	20.03	0.10	0.01	0.07
GCK3-7	11.40	8.19	8.28	7.02	0.07	0.02	0.12
GCK3-8	10.86	7.35	7.48	6.32	0.03	0.01	0.05
GCK3-9	10.00	6.90	6.94	5.88	0.03	0.01	0.07
GCK3-10	11.53	7.40	7.55	6.35	0.08	0.04	0.20
GCK3-11	6.79	4.51	4.58	3.84	0.02	0.01	0.09
GCK3-12	6.89	4.42	4.45	3.77	0.02	0.01	0.05
GCK3-13	10.02	6.95	7.12	5.90	0.08	0.03	0.15
GCK3-14	8.45	5.68	5.76	4.82	0.02	0.02	0.06
GCK3-15	7.62	5.31	5.36	4.46	0.04	0.01	0.06
GCK3-16	10.83	5.89	6.09	4.90	0.05	0.02	0.08
GCK3-17	8.34	5.64	5.70	4.85	0.02	0.00	0.04
GCK3-18	6.63	4.60	4.60	3.90	0.02	0.00	0.03
SRM614-10	1.81	0.74	0.78	0.61	0.31	0.46	0.58
SRM612-10	19.34	11.93	13.67	11.05	16.56	24.55	29.09
SRM610-10	194.59	145.38	161.87	148.18	215.89	388.38	543.20
AP1-10	0.57	0.27	0.28	0.24	0.00	0.00	0.01
AP2-10	13.72	9.71	10.09	8.49	0.20	0.62	0.33
AP3-10	80.32	75.12	75.42	75.14	1.23	2.61	2.00
AP4-10	155.14	158.10	158.18	159.11	2.48	4.75	3.80

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23
SRM610	413.30	413.30	413.30	413.30	357.70	450.60
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01

Appendix A. Raw trace element datasheets from laser ablation.

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-7	215.92	377.08	326.04	801.80	51.84	2.40	111.48
SRM614-7	420.92	2921.54	2449.25	6092.23	2536.73	1529.53	4251.70
SRM612-7	2174.41	33132.31	29948.49	75149.58	121831.45	80305.73	181888.14
SRM610-7	7905.40	150593.41	136797.53	374596.97	552250.00	516605.97	1462183.50
AP1-7	376.64	4375.78	3802.22	9429.29	640.24	215.64	1352.93
AP2-7	2695.38	51811.29	43590.16	115254.21	3428.62	3414.58	4235.14
AP3-7	17582.22	443410.13	362268.47	1100498.40	20319.20	17702.66	26528.67
AP4-7	27048.19	740160.69	601306.25	1828332.80	33006.23	25024.50	37539.01
GCK2-1	495.64	4299.10	3712.62	9480.57	568.04	41.44	361.88
GCK2-2	341.72	1864.29	1675.77	3768.50	61.48	9.64	87.36
GCK2-3	340.32	1638.77	1472.49	3524.86	79.52	7.56	145.72
GCK2-4	730.32	8503.69	7219.72	17157.78	642.48	53.44	373.32
GCK2-5	456.40	3973.86	3360.02	8282.45	90.32	12.28	51.44
GCK2-6	476.68	4447.83	3711.34	9444.65	75.76	13.84	145.16
GCK2-7	908.21	9428.21	8201.61	19572.43	395.76	78.52	504.80
GCK2-8	689.64	6315.40	5501.79	13289.44	227.88	13.36	171.64
GCK2-9	532.64	5020.67	4346.22	10667.34	103.28	16.80	98.40
GCK2-10	760.36	9010.65	7629.32	19055.71	190.00	41.44	154.40
GCK2-11	631.60	7040.36	5749.59	14748.36	178.16	20.24	122.24
GCK2-12	618.20	6871.80	5922.19	14813.00	116.28	32.00	89.64
GCK2-13	853.96	11628.59	9622.25	24130.50	162.00	30.64	131.24
GCK2-14	563.72	6571.44	5525.95	13863.96	104.60	38.72	50.20
GCK2-15	586.52	6529.76	5474.83	13782.52	83.72	21.52	79.12
GCK2-16	591.76	6656.84	5597.79	14176.44	163.60	37.00	138.72
GCK2-17	537.68	5969.23	5008.19	12687.31	108.40	29.16	49.96
GCK2-18	434.92	3989.94	3445.34	8418.01	50.00	20.60	88.32
SRM614-8	254.80	1604.09	1414.45	3303.82	1361.61	1043.61	2483.09
SRM612-8	1373.41	19971.99	18436.66	44728.57	73255.45	58596.21	123446.62
SRM610-8	6520.80	122871.97	111547.19	305877.28	454172.97	438800.66	1180551.30
AP1-8	189.76	1432.13	1174.73	2931.10	55.52	29.20	94.88
AP2-8	1622.25	30297.37	25545.70	66328.25	1783.25	2307.13	2028.17
AP3-8	13057.79	318981.84	259987.66	789971.94	14915.16	14523.44	21071.08
AP4-8	13952.44	337001.78	275977.34	834588.63	15640.01	16686.85	20864.96
blank-8	130.84	117.56	103.36	264.20	5.28	2.24	8.32
blank average	173.38	247.32	214.70	533.00	28.56	2.32	59.90
blank subtraction							
SRM614-7	247.54	2674.22	2234.55	5559.23	2508.17	1527.21	4191.80
SRM612-7	2001.03	32884.98	29733.79	74616.58	121802.89	80303.41	181828.24
SRM610-7	7732.02	150346.09	136582.83	374063.97	552221.44	516603.65	1462123.60
AP1-7	203.26	4128.46	3587.52	8896.29	611.68	213.32	1293.03
AP2-7	2521.99	51563.97	43375.46	114721.21	3400.06	3412.26	4175.24
AP3-7	17408.84	443162.81	362053.77	1099965.40	20290.63	17700.34	26468.77
AP4-7	26874.81	739913.37	601091.55	1827799.80	32977.67	25022.18	37479.11
GCK2-1	322.26	4051.78	3497.92	8947.57	539.48	39.12	301.98
GCK2-2	168.34	1616.97	1461.07	3235.50	32.92	7.32	27.46
GCK2-3	166.94	1391.45	1257.79	2991.86	50.96	5.24	85.82
GCK2-4	556.94	8256.37	7005.02	16624.77	613.92	51.12	313.42
GCK2-5	283.02	3726.54	3145.32	7749.44	61.76	9.96	-8.46
GCK2-6	303.30	4200.50	3496.64	8911.65	47.20	11.52	85.26
GCK2-7	734.82	9180.89	7986.91	19039.43	367.20	76.20	444.90
GCK2-8	516.26	6068.07	5287.09	12756.43	199.32	11.04	111.74
GCK2-9	359.26	4773.35	4131.52	10134.34	74.72	14.48	38.50
GCK2-10	586.98	8763.33	7414.62	18522.70	161.44	39.12	94.50
GCK2-11	458.22	6793.04	5534.89	14215.36	149.60	17.92	62.34
GCK2-12	444.82	6624.48	5707.49	14280.00	87.72	29.68	29.74
GCK2-13	680.58	11381.26	9407.55	23597.49	133.44	28.32	71.34
GCK2-14	390.34	6324.12	5311.25	13330.96	76.04	36.40	-9.70
GCK2-15	413.14	6282.44	5260.13	13249.52	55.16	19.20	19.22
GCK2-16	418.38	6409.52	5383.09	13643.44	135.04	34.68	78.82
GCK2-17	364.30	5721.91	4793.49	12154.31	79.84	26.84	-9.94
GCK2-18	261.54	3742.62	3230.64	7885.00	21.44	18.28	28.42
SRM614-8	81.42	1356.77	1199.75	2770.82	1333.05	1041.29	2423.19
SRM612-8	1200.03	19724.67	18221.96	44195.57	73226.89	58593.89	123386.72
SRM610-8	6347.42	122624.65	111332.49	305344.28	454144.41	438798.34	1180491.40
AP1-8	16.38	1184.81	960.03	2398.09	26.96	26.88	34.98
AP2-8	1448.87	30050.05	25331.00	65795.25	1754.69	2304.81	1968.27
AP3-8	12884.41	318734.52	259772.96	789438.94	14886.60	14521.12	21011.18
AP4-8	13779.06	336754.46	275762.64	834055.63	15611.45	16684.53	20805.06
zero correction							
SRM614-7	247.54	2674.22	2234.55	5559.23	2508.17	1527.21	4191.80
SRM612-7	2001.03	32884.98	29733.79	74616.58	121802.89	80303.41	181828.24
SRM610-7	7732.02	150346.09	136582.83	374063.97	552221.44	516603.65	1462123.60
AP1-7	203.26	4128.46	3587.52	8896.29	611.68	213.32	1293.03
AP2-7	2521.99	51563.97	43375.46	114721.21	3400.06	3412.26	4175.24

Appendix A. Raw trace element datasheets from laser ablation.

AP3-7	17408.84	443162.81	362053.77	1099965.40	20290.63	17700.34	26468.77
AP4-7	26874.81	739913.37	601091.55	1827799.80	32977.67	25022.18	37479.11
GCK2-1	322.26	4051.78	3497.92	8947.57	539.48	39.12	301.98
GCK2-2	168.34	1616.97	1461.07	3235.50	32.92	7.32	27.46
GCK2-3	166.94	1391.45	1257.79	2991.86	50.96	5.24	85.82
GCK2-4	556.94	8256.37	7005.02	16624.77	613.92	51.12	313.42
GCK2-5	283.02	3726.54	3145.32	7749.44	61.76	9.96	0.00
GCK2-6	303.30	4200.50	3496.64	8911.65	47.20	11.52	85.26
GCK2-7	734.82	9180.89	7986.91	19039.43	367.20	76.20	444.90
GCK2-8	516.26	6068.07	5287.09	12756.43	199.32	11.04	111.74
GCK2-9	359.26	4773.35	4131.52	10134.34	74.72	14.48	38.50
GCK2-10	586.98	8763.33	7414.62	18522.70	161.44	39.12	94.50
GCK2-11	458.22	6793.04	5534.89	14215.36	149.60	17.92	62.34
GCK2-12	444.82	6624.48	5707.49	14280.00	87.72	29.68	29.74
GCK2-13	680.58	11381.26	9407.55	23597.49	133.44	28.32	71.34
GCK2-14	390.34	6324.12	5311.25	13330.96	76.04	36.40	0.00
GCK2-15	413.14	6282.44	5260.13	13249.52	55.16	19.20	19.22
GCK2-16	418.38	6409.52	5383.09	13643.44	135.04	34.68	78.82
GCK2-17	364.30	5721.91	4793.49	12154.31	79.84	26.84	0.00
GCK2-18	261.54	3742.62	3230.64	7885.00	21.44	18.28	28.42
SRM614-8	81.42	1356.77	1199.75	2770.82	1333.05	1041.29	2423.19
SRM612-8	1200.03	19724.67	18221.96	44195.57	73226.89	58593.89	123386.72
SRM610-8	6347.42	122624.65	111332.49	305344.28	454144.41	438798.34	1180491.40
AP1-8	16.38	1184.81	960.03	2398.09	26.96	26.88	34.98
AP2-8	1448.87	30050.05	25331.00	65795.25	1754.69	2304.81	1968.27
AP3-8	12884.41	318734.52	259772.96	789438.94	14886.60	14521.12	21011.18
AP4-8	13779.06	336754.46	275762.64	834055.63	15611.45	16684.53	20805.06

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-7	0.000099	0.001072	0.000896	0.002229	0.001006	0.000612	0.001681
SRM612-7	0.000842	0.013834	0.012509	0.031390	0.051241	0.033783	0.076493
SRM610-7	0.008011	0.155780	0.141519	0.387583	0.572180	0.535274	1.514967
AP1-7	0.000011	0.000224	0.000195	0.000483	0.000033	0.000012	0.000070
AP2-7	0.000168	0.003444	0.002897	0.007662	0.000227	0.000228	0.000279
AP3-7	0.000855	0.021765	0.017781	0.054022	0.000997	0.000869	0.001300
AP4-7	0.001567	0.043134	0.035042	0.106555	0.001922	0.001459	0.002185
GCK2-1	0.000057	0.0000717	0.000619	0.001583	0.000095	0.000007	0.000053
GCK2-2	0.000033	0.000314	0.000284	0.000628	0.000006	0.000001	0.000005
GCK2-3	0.000033	0.000274	0.000248	0.000589	0.000010	0.000001	0.000017
GCK2-4	0.000096	0.001423	0.001207	0.002865	0.000106	0.000009	0.000054
GCK2-5	0.000047	0.000613	0.000517	0.001274	0.000010	0.000002	0.000000
GCK2-6	0.000044	0.000609	0.000507	0.001292	0.000007	0.000002	0.000012
GCK2-7	0.000119	0.001492	0.001298	0.003095	0.000060	0.000012	0.000072
GCK2-8	0.000075	0.000880	0.000767	0.001851	0.000029	0.000002	0.000016
GCK2-9	0.000056	0.000738	0.000639	0.001567	0.000012	0.000002	0.000006
GCK2-10	0.000043	0.000644	0.000545	0.001361	0.000012	0.000003	0.000007
GCK2-11	0.000035	0.000515	0.000420	0.001078	0.000011	0.000001	0.000005
GCK2-12	0.000034	0.000510	0.000439	0.001099	0.000007	0.000002	0.000002
GCK2-13	0.000050	0.000844	0.000697	0.001749	0.000010	0.000002	0.000005
GCK2-14	0.000031	0.000501	0.000421	0.001057	0.000006	0.000003	0.000000
GCK2-15	0.000030	0.000460	0.000385	0.000970	0.000004	0.000001	0.000001
GCK2-16	0.000037	0.000571	0.000479	0.001215	0.000012	0.000003	0.000007
GCK2-17	0.000034	0.000528	0.000442	0.001121	0.000007	0.000002	0.000000
GCK2-18	0.000031	0.000439	0.000379	0.000925	0.000003	0.000002	0.000003
SRM614-8	0.000060	0.001001	0.000885	0.002044	0.000984	0.000768	0.001788
SRM612-8	0.000799	0.013131	0.012131	0.029422	0.048748	0.039007	0.082141
SRM610-8	0.008950	0.172901	0.156979	0.430536	0.640345	0.618707	1.664496
AP1-8	0.000001	0.000090	0.000073	0.000183	0.000002	0.000002	0.000003
AP2-8	0.000131	0.002726	0.002298	0.005969	0.000159	0.000209	0.000179
AP3-8	0.000782	0.019345	0.015766	0.047913	0.000904	0.000881	0.001275

Appendix A. Raw trace element datasheets from laser ablation.

AP4-8	0.001114	0.027221	0.022291	0.067419	0.001262	0.001349	0.001682
standardize signal averages AP							
AP1	0.000006	0.000157	0.000134	0.000333	0.000018	0.000007	0.000036
AP2	0.000150	0.003085	0.002597	0.006815	0.000193	0.000218	0.000229
AP3	0.000818	0.020555	0.016774	0.050967	0.000950	0.000875	0.001288
AP4	0.001340	0.035178	0.028666	0.086987	0.001592	0.001404	0.001933
linest from std sig ave							
	0.275204	0.010610	0.013016	0.004287	0.003640	0.007244	0.004210
standardize signal averages SRM							
srm614-2	0.000080	0.001037	0.000891	0.002137	0.000995	0.000690	0.001734
srm612-2	0.000820	0.013483	0.012320	0.030406	0.049995	0.036395	0.079317
srm610-2	0.008481	0.164340	0.149249	0.409060	0.606262	0.576991	1.589732
linest from std sig ave							
	0.568091	0.029353	0.032320	0.011798	0.006880	0.009117	0.003358
concentration data							
SRM614-7	2.34	0.98	1.00	0.82	0.31	0.38	0.61
SRM612-7	19.87	12.59	13.96	11.54	16.00	20.99	27.62
SRM610-7	189.09	141.76	157.98	142.51	178.62	332.54	546.97
AP1-7	1.21	0.95	1.01	0.83	0.05	0.03	0.12
AP2-7	18.49	14.58	15.04	13.10	0.33	0.66	0.47
AP3-7	93.87	92.13	92.33	92.39	1.45	2.51	2.18
AP4-7	172.01	182.58	181.96	182.24	2.79	4.22	3.67
GCK2-1	6.26	3.03	3.21	2.71	0.14	0.02	0.09
GCK2-2	3.59	1.33	1.47	1.07	0.01	0.00	0.01
GCK2-3	3.61	1.16	1.29	1.01	0.01	0.00	0.03
GCK2-4	10.54	6.02	6.27	4.90	0.15	0.03	0.09
GCK2-5	5.11	2.59	2.69	2.18	0.01	0.00	0.00
GCK2-6	4.83	2.58	2.63	2.21	0.01	0.00	0.02
GCK2-7	13.11	6.32	6.74	5.29	0.09	0.04	0.12
GCK2-8	8.22	3.73	3.98	3.17	0.04	0.00	0.03
GCK2-9	6.10	3.12	3.32	2.68	0.02	0.01	0.01
GCK2-10	4.74	2.73	2.83	2.33	0.02	0.01	0.01
GCK2-11	3.81	2.18	2.18	1.84	0.02	0.00	0.01
GCK2-12	3.76	2.16	2.28	1.88	0.01	0.01	0.00
GCK2-13	5.54	3.57	3.62	2.99	0.01	0.01	0.01
GCK2-14	3.40	2.12	2.19	1.81	0.01	0.01	0.00
GCK2-15	3.32	1.95	2.00	1.66	0.01	0.00	0.00
GCK2-16	4.09	2.42	2.49	2.08	0.02	0.01	0.01
GCK2-17	3.69	2.23	2.29	1.92	0.01	0.01	0.00
GCK2-18	3.37	1.86	1.97	1.58	0.00	0.01	0.01
SRM614-8	1.42	0.91	0.99	0.75	0.31	0.48	0.65
SRM612-8	18.86	11.95	13.54	10.82	15.22	24.23	29.66
SRM610-8	211.24	157.33	175.24	158.30	199.90	384.37	600.96
AP1-8	0.14	0.38	0.38	0.31	0.00	0.01	0.00
AP2-8	14.43	11.54	11.93	10.21	0.23	0.60	0.30
AP3-8	85.85	81.88	81.87	81.95	1.31	2.55	2.14
AP4-8	122.28	115.22	115.75	115.31	1.83	3.90	2.82
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-5	786.60	3256.70	2863.34	7136.00	112.56	4.84	89.28
SRM614-5	1155.49	5847.67	5280.79	11667.99	2650.05	2316.29	4863.23
SRM612-5	2374.41	32297.66	29737.57	72677.33	118247.46	81060.50	184683.48
SRM610-5	9588.53	182300.34	166283.09	457700.63	788619.44	613788.56	1717187.30
AP1-5	562.40	4518.39	3979.70	9913.74	688.68	214.48	1327.13
AP2-5	2833.26	50830.21	42508.44	111565.30	3433.22	3586.82	4070.22
AP3-5	35695.60	1008301.30	815991.31	2482656.80	45192.90	27434.35	46641.02
AP4-5	56799.12	1751518.40	1424752.80	4175551.00	74959.10	42694.32	73556.17
GCK1-1	671.36	6611.04	5534.43	13786.24	294.64	120.32	829.80
GCK1-2	563.32	5692.27	4658.35	11905.51	149.68	32.72	615.32
GCK1-3	595.32	6177.11	5121.39	12978.35	318.84	37.08	789.92
GCK1-4	1168.97	17543.94	14059.00	37210.73	463.24	119.60	1174.69
GCK1-5	747.12	8971.93	7161.88	18794.55	255.68	54.44	764.16
GCK1-6	581.68	4483.39	3710.74	9218.33	161.40	38.16	427.28

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-7	594.32	5308.47	4581.83	11083.66	532.08	104.32	1303.33
GCK1-8	413.36	2018.57	1617.97	4277.90	133.64	19.96	266.32
GCK1-9	585.92	3867.18	3334.14	7158.32	234.56	24.76	357.16
GCK1-10	673.52	7644.36	6506.60	15687.97	304.16	48.44	712.76
GCK1-11	621.16	7236.60	5894.39	14840.20	141.00	30.56	387.40
GCK1-12	4066.70	46611.30	41343.35	85076.23	1907.93	31.52	388.12
GCK1-13	631.24	7637.36	6328.00	15864.97	351.84	110.72	936.49
GCK1-14	727.28	9278.05	7558.24	19085.11	195.16	52.76	510.20
GCK1-15	725.44	9270.89	7713.16	19779.63	163.88	28.04	415.28
GCK1-16	1418.45	25747.55	20906.56	54654.71	529.24	59.56	899.21
GCK1-17	1243.89	20257.23	16777.57	42925.80	238.56	76.04	288.32
GCK1-18	1421.73	24132.94	19796.87	50614.89	356.44	70.88	336.60
SRM614-6	301.84	1498.49	1346.09	3290.54	1196.01	1011.37	2526.09
SRM612-6	1238.89	17828.66	16299.41	40353.63	64265.08	58294.21	116941.86
SRM610-6	6092.83	111090.42	101212.81	272877.69	411528.56	469303.25	1180874.10
AP1-6	262.44	1459.57	1182.89	2974.34	81.36	27.92	136.56
AP2-6	1546.57	27721.52	23136.09	60574.10	1528.65	2292.41	1989.65
AP3-6	17731.30	452013.47	367316.75	1119896.30	21522.16	16392.97	25314.82
AP4-6	19615.11	520038.31	423547.47	1288326.00	23877.25	18763.79	28858.40
blank-6	177.84	297.20	242.36	594.76	17.84	4.04	39.44
blank average	482.22	1776.95	1552.85	3865.38	65.20	4.44	64.36
blank subtraction							
SRM614-5	673.26	4070.72	3727.94	7802.60	2584.85	2311.85	4798.87
SRM612-5	1892.19	30520.71	28184.72	68811.95	118182.26	81056.06	184619.12
SRM610-5	9106.31	180523.39	164730.24	453835.25	788554.24	613784.12	1717122.94
AP1-5	80.18	2741.44	2426.85	6048.35	623.48	210.04	1262.77
AP2-5	2351.03	49053.26	40955.59	107699.92	3368.02	3582.38	4005.86
AP3-5	35213.38	1006524.35	814438.46	2478791.42	45127.69	27429.91	46576.66
AP4-5	56316.90	1749741.45	1423199.95	4171685.62	74893.90	42689.88	73491.81
GCK1-1	189.14	4834.09	3981.58	9920.86	229.44	115.88	765.44
GCK1-2	81.10	3915.32	3105.50	8040.13	84.48	28.28	550.96
GCK1-3	113.10	4400.16	3568.54	9112.97	253.64	32.64	725.56
GCK1-4	686.74	15766.99	12506.15	33345.35	398.04	115.16	1110.33
GCK1-5	264.90	7194.98	5609.03	14929.17	190.48	50.00	699.80
GCK1-6	99.46	2706.44	2157.89	5352.95	96.20	33.72	362.92
GCK1-7	112.10	3531.52	3028.98	7218.28	466.88	99.88	1238.97
GCK1-8	-68.86	241.62	65.12	412.52	68.44	15.52	201.96
GCK1-9	103.70	2090.23	1781.29	3292.94	169.36	20.32	292.80
GCK1-10	191.30	5867.41	4953.75	11822.59	238.96	44.00	648.40
GCK1-11	138.94	5459.65	4341.54	10974.82	75.80	26.12	323.04
GCK1-12	3584.48	44834.35	39790.50	81210.85	1842.73	27.08	323.76
GCK1-13	149.02	5860.41	4775.15	11999.59	286.64	106.28	872.12
GCK1-14	245.06	7501.10	6005.39	15219.73	129.96	48.32	445.84
GCK1-15	243.22	7493.94	6160.31	15914.25	98.68	23.60	350.92
GCK1-16	936.23	23970.60	19353.71	50789.33	464.04	55.12	834.84
GCK1-17	761.66	18480.28	15224.73	39060.42	173.36	71.60	223.96
GCK1-18	939.51	22355.99	18244.02	46749.51	291.24	66.44	272.24
SRM614-6	-180.38	-278.46	-206.76	-574.84	1130.81	1006.93	2461.73
SRM612-6	756.66	16051.71	14746.56	36488.24	64199.88	58289.77	116877.50
SRM610-6	5610.61	109313.47	99659.96	269012.31	411463.36	469298.81	1180809.74
AP1-6	-219.78	-317.38	-369.96	-891.04	16.16	23.48	72.20
AP2-6	1064.35	25944.57	21583.24	56708.72	1463.45	2287.97	1925.29
AP3-6	17249.08	450236.52	365763.90	1116030.92	21456.96	16388.53	25250.46
AP4-6	19132.89	518261.36	421994.62	1284460.62	23812.05	18759.34	28794.04
zero correction							
SRM614-5	673.26	4070.72	3727.94	7802.60	2584.85	2311.85	4798.87
SRM612-5	1892.19	30520.71	28184.72	68811.95	118182.26	81056.06	184619.12
SRM610-5	9106.31	180523.39	164730.24	453835.25	788554.24	613784.12	1717122.94
AP1-5	80.18	2741.44	2426.85	6048.35	623.48	210.04	1262.77
AP2-5	2351.03	49053.26	40955.59	107699.92	3368.02	3582.38	4005.86
AP3-5	35213.38	1006524.35	814438.46	2478791.42	45127.69	27429.91	46576.66
AP4-5	56316.90	1749741.45	1423199.95	4171685.62	74893.90	42689.88	73491.81
GCK1-1	189.14	4834.09	3981.58	9920.86	229.44	115.88	765.44
GCK1-2	81.10	3915.32	3105.50	8040.13	84.48	28.28	550.96
GCK1-3	113.10	4400.16	3568.54	9112.97	253.64	32.64	725.56
GCK1-4	686.74	15766.99	12506.15	33345.35	398.04	115.16	1110.33
GCK1-5	264.90	7194.98	5609.03	14929.17	190.48	50.00	699.80
GCK1-6	99.46	2706.44	2157.89	5352.95	96.20	33.72	362.92
GCK1-7	112.10	3531.52	3028.98	7218.28	466.88	99.88	1238.97
GCK1-8	0.00	241.62	65.12	412.52	68.44	15.52	201.96
GCK1-9	103.70	2090.23	1781.29	3292.94	169.36	20.32	292.80
GCK1-10	191.30	5867.41	4953.75	11822.59	238.96	44.00	648.40
GCK1-11	138.94	5459.65	4341.54	10974.82	75.80	26.12	323.04
GCK1-12	3584.48	44834.35	39790.50	81210.85	1842.73	27.08	323.76
GCK1-13	149.02	5860.41	4775.15	11999.59	286.64	106.28	872.12
GCK1-14	245.06	7501.10	6005.39	15219.73	129.96	48.32	445.84

Appendix A. Raw trace element datasheets from laser ablation.

GCK1-15	243.22	7493.94	6160.31	15914.25	98.68	23.60	350.92
GCK1-16	936.23	23970.60	19353.71	50789.33	464.04	55.12	834.84
GCK1-17	761.66	18480.28	15224.73	39060.42	173.36	71.60	223.96
GCK1-18	939.51	22355.99	18244.02	46749.51	291.24	66.44	272.24
SRM614-6	0.00	0.00	0.00	0.00	1130.81	1006.93	2461.73
SRM612-6	756.66	16051.71	14746.56	36488.24	64199.88	58289.77	116877.50
SRM610-6	5610.61	109313.47	99659.96	269012.31	411463.36	469298.81	1180809.74
AP1-6	0.00	0.00	0.00	0.00	16.16	23.48	72.20
AP2-6	1064.35	25944.57	21583.24	56708.72	1463.45	2287.97	1925.29
AP3-6	17249.08	450236.52	365763.90	1116030.92	21456.96	16388.53	25250.46
AP4-6	19132.89	518261.36	421994.62	1284460.62	23812.05	18759.34	28794.04

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-5	0.000273	0.001651	0.001512	0.003165	0.001049	0.000938	0.001947
SRM612-5	0.000849	0.013686	0.012639	0.030857	0.052997	0.036348	0.082789
SRM610-5	0.008467	0.167854	0.153169	0.421984	0.733212	0.570708	1.596613
AP1-5	0.000005	0.000159	0.000141	0.000350	0.000036	0.000012	0.000073
AP2-5	0.000166	0.003462	0.002890	0.007600	0.000238	0.000253	0.000283
AP3-5	0.001736	0.049607	0.040140	0.122168	0.022224	0.001352	0.002296
AP4-5	0.003072	0.095460	0.077645	0.227593	0.040866	0.002329	0.004009
GCK1-1	0.000011	0.000270	0.000223	0.000554	0.000013	0.000006	0.000043
GCK1-2	0.000004	0.000197	0.000156	0.000405	0.000004	0.000001	0.000028
GCK1-3	0.000008	0.000292	0.000237	0.000605	0.000017	0.000002	0.000048
GCK1-4	0.000037	0.000845	0.000670	0.001787	0.000021	0.000006	0.000059
GCK1-5	0.000014	0.000378	0.000295	0.000785	0.000010	0.000003	0.000037
GCK1-6	0.000006	0.000172	0.000137	0.000341	0.000006	0.000002	0.000023
GCK1-7	0.000013	0.000425	0.000365	0.000869	0.000056	0.000012	0.000149
GCK1-8	0.000000	0.000030	0.000008	0.000051	0.000009	0.000002	0.000025
GCK1-9	0.000012	0.000251	0.000214	0.000396	0.000020	0.000002	0.000035
GCK1-10	0.000010	0.000301	0.000254	0.000607	0.000012	0.000002	0.000033
GCK1-11	0.000009	0.000338	0.000269	0.000679	0.000005	0.000002	0.000020
GCK1-12	0.000214	0.002680	0.002379	0.004855	0.000110	0.000002	0.000019
GCK1-13	0.000013	0.000525	0.000428	0.001075	0.000026	0.000010	0.000078
GCK1-14	0.000022	0.000661	0.000529	0.001340	0.000011	0.000004	0.000039
GCK1-15	0.000023	0.000705	0.000579	0.001497	0.000009	0.000002	0.000033
GCK1-16	0.000115	0.002944	0.002377	0.006239	0.000057	0.000007	0.000103
GCK1-17	0.000081	0.001956	0.001611	0.004134	0.000018	0.000008	0.000024
GCK1-18	0.000119	0.002831	0.002310	0.005920	0.000037	0.000008	0.000034
SRM614-6	0.000000	0.000000	0.000000	0.000000	0.000839	0.000747	0.001825
SRM612-6	0.000533	0.011310	0.010391	0.025710	0.045236	0.041072	0.082354
SRM610-6	0.007645	0.148949	0.135795	0.366551	0.560652	0.639458	1.608949
AP1-6	0.000000	0.000000	0.000000	0.000000	0.000001	0.000002	0.000006
AP2-6	0.000104	0.002534	0.002108	0.005539	0.000143	0.000223	0.000188
AP3-6	0.001130	0.029498	0.023963	0.073118	0.001406	0.001074	0.001654
AP4-6	0.001730	0.046867	0.038161	0.116155	0.002153	0.001696	0.002604

standardize signal averages AP							
AP1	0.000002	0.000079	0.000070	0.000175	0.000019	0.000007	0.000040
AP2	0.000135	0.002998	0.002499	0.006570	0.000190	0.000238	0.000235
AP3	0.001433	0.039552	0.032052	0.097643	0.001815	0.001213	0.001975
AP4	0.002401	0.071163	0.057903	0.171874	0.003120	0.002013	0.003307

linest from std sig ave							
	0.154425	0.005297	0.006517	0.002182	0.001858	0.005104	0.002514

standardize signal averages SRM							
srM614-2	0.000137	0.000826	0.000756	0.001583	0.000944	0.000842	0.001886
srM612-2	0.000691	0.012498	0.011515	0.028284	0.049117	0.038710	0.082571
srM610-2	0.008056	0.158401	0.144482	0.394268	0.646932	0.605083	1.602781

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	0.598516	0.030460	0.033393	0.012243	0.006451	0.008693	0.003330
concentration data							
SRM614-5	3.62	0.75	0.85	0.59	0.17	0.41	0.42
SRM612-5	11.24	6.22	7.06	5.77	8.44	15.91	17.85
SRM610-5	112.14	76.26	85.61	78.95	116.82	249.81	344.31
AP1-5	0.29	0.34	0.37	0.31	0.03	0.02	0.07
AP2-5	10.22	7.32	7.51	6.61	0.18	0.51	0.28
AP3-5	106.92	104.83	104.36	106.32	1.65	2.75	2.30
AP4-5	189.28	201.74	201.86	198.07	3.03	4.74	4.02
GCK1-1	0.65	0.57	0.58	0.48	0.01	0.01	0.04
GCK1-2	0.25	0.42	0.41	0.35	0.00	0.00	0.03
GCK1-3	0.46	0.62	0.62	0.53	0.01	0.00	0.05
GCK1-4	2.27	1.79	1.74	1.55	0.02	0.01	0.06
GCK1-5	0.86	0.80	0.77	0.68	0.01	0.01	0.04
GCK1-6	0.39	0.36	0.36	0.30	0.00	0.00	0.02
GCK1-7	0.83	0.90	0.95	0.76	0.04	0.02	0.15
GCK1-8	0.00	0.06	0.02	0.04	0.01	0.00	0.03
GCK1-9	0.77	0.53	0.56	0.34	0.02	0.00	0.04
GCK1-10	0.60	0.64	0.66	0.53	0.01	0.00	0.03
GCK1-11	0.53	0.71	0.70	0.59	0.00	0.00	0.02
GCK1-12	13.20	5.66	6.18	4.23	0.08	0.00	0.02
GCK1-13	0.82	1.11	1.11	0.94	0.02	0.02	0.08
GCK1-14	1.33	1.40	1.37	1.17	0.01	0.01	0.04
GCK1-15	1.41	1.49	1.51	1.30	0.01	0.00	0.03
GCK1-16	7.08	6.22	6.18	5.43	0.04	0.01	0.10
GCK1-17	4.97	4.13	4.19	3.60	0.01	0.02	0.02
GCK1-18	7.33	5.98	6.01	5.15	0.03	0.02	0.03
SRM614-6	0.00	0.00	0.00	0.00	0.13	0.33	0.39
SRM612-6	7.06	5.14	5.81	4.81	7.21	17.98	17.76
SRM610-6	101.25	67.67	75.90	68.58	89.33	279.90	346.97
AP1-6	0.00	0.00	0.00	0.00	0.00	0.00	0.01
AP2-6	6.40	5.36	5.48	4.82	0.11	0.46	0.19
AP3-6	69.62	62.34	62.30	63.63	1.04	2.19	1.66
AP4-6	106.59	99.04	99.21	101.09	1.60	3.45	2.61
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-1	29.28	66.48	62.52	139.52	8.16	3.84	3.92
SRM614-1	1819.61	7637.88	6968.48	15448.17	2333.01	1774.09	4070.66
SRM612-1	3026.46	31363.34	28495.52	69655.23	108744.57	75707.47	161084.75
SRM610-1	7943.80	123851.78	113256.76	298108.97	513754.06	582033.56	1541382.40
AP1-1	964.77	6205.88	5136.71	13028.59	727.44	226.76	1176.49
AP2-1	3769.78	63571.60	53150.46	140127.78	3682.34	4185.46	4115.54
AP3-1	41474.51	1137296.40	924534.25	2764637.80	55017.31	27884.16	44206.49
AP4-1	46284.62	1305146.50	1059797.10	3154760.80	64034.64	35517.12	50918.21
V2-1	719.60	2363.45	2172.33	4506.55	204.32	404.88	193.76
V2-2	588.92	1338.29	1122.65	2545.37	51.56	44.12	51.44
V2-3	561.44	908.05	723.52	1863.33	49.84	124.08	48.08
V2-4	775.56	5372.51	4416.02	11422.54	616.32	298.56	871.52
V2-5	665.12	4429.75	3748.10	9542.89	145.84	63.24	212.88
V2-6	759.64	5857.83	4916.75	12290.59	224.68	148.40	316.76
V2-7	1310.69	15131.57	12951.75	29748.25	762.84	1333.93	1086.33
V2-8	786.64	5269.15	4515.79	10877.54	176.84	91.40	289.60
V2-9	766.24	5812.91	4837.19	11872.47	238.88	66.72	342.44
V2-10	1354.93	11074.90	9782.94	20363.28	654.68	170.44	542.40
V2-11	628.24	3454.10	2897.82	7281.72	130.32	45.24	179.08
V2-12	643.44	4141.86	3525.02	8454.09	184.56	58.68	366.72
V2-13	1221.61	16986.18	14151.68	36171.36	369.20	671.76	770.92
V2-14	1462.09	20714.88	17182.14	43798.25	239.40	383.80	315.08
V2-15	1451.93	21651.00	18196.42	45442.86	258.84	344.40	440.80
SRM614-2	506.52	2725.78	2348.53	5959.71	1499.73	1096.45	2946.74
SRM612-2	1671.49	23153.77	21362.44	52321.09	83936.91	65943.57	143517.61
SRM610-2	6939.88	123089.57	111602.66	301539.69	466076.91	523764.81	1421515.10
AP1-2	365.32	2263.93	1920.53	4667.63	122.76	70.64	175.16
AP2-2	1973.49	33153.39	27908.56	72147.92	1933.49	2618.09	2391.01
AP3-2	13240.60	311159.31	256424.20	758634.31	16504.45	12181.47	17004.98
AP4-2	26090.99	680708.81	556659.88	1682466.40	35769.60	23386.49	30996.86

Appendix A. Raw trace element datasheets from laser ablation.

blank-2	275.36	175.32	132.92	363.16	9.20	1.12	6.24
blank average	152.32	120.90	97.72	251.34	8.68	2.48	5.08
blank subtraction							
SRM614-1	1667.29	7516.98	6870.76	15196.83	2324.33	1771.61	4065.58
SRM612-1	2874.14	31242.44	28397.80	69403.89	108735.89	75704.99	161079.67
SRM610-1	7791.48	123730.88	113159.04	297857.63	513745.38	582031.08	1541377.32
AP1-1	812.44	6084.97	5038.99	12777.25	718.76	224.28	1171.41
AP2-1	3617.46	63450.70	53052.74	139876.44	3673.66	4182.98	4110.46
AP3-1	41322.19	1137175.50	924436.53	2764386.46	55008.63	27881.68	44201.41
AP4-1	46132.30	1305025.60	1059699.38	3154509.46	64025.96	35514.64	50913.13
V2-1	567.28	2242.55	2074.61	4255.20	195.64	402.40	188.68
V2-2	436.60	1217.39	1024.93	2294.03	42.88	41.64	46.36
V2-3	409.12	787.14	625.80	1611.99	41.16	121.60	43.00
V2-4	623.24	5251.61	4318.30	11171.20	607.64	296.08	866.44
V2-5	512.80	4308.84	3650.38	9291.55	137.16	60.76	207.80
V2-6	607.32	5736.93	4819.03	12039.25	216.00	145.92	311.68
V2-7	1158.37	15010.66	12854.03	29496.91	754.16	1331.45	1081.25
V2-8	634.32	5148.25	4418.07	10626.20	168.16	88.92	284.52
V2-9	613.92	5692.01	4739.47	11621.13	230.20	64.24	337.36
V2-10	1202.61	10954.00	9685.21	20111.93	646.00	167.96	537.32
V2-11	475.92	3333.20	2800.10	7030.38	121.64	42.76	174.00
V2-12	491.12	4020.96	3427.30	8202.75	175.88	56.20	361.64
V2-13	1069.29	16865.28	14053.96	35920.02	360.52	669.28	765.84
V2-14	1309.77	20593.98	17084.42	43546.90	230.72	381.32	310.00
V2-15	1299.61	21530.10	18098.70	45191.51	250.16	341.92	435.72
SRM614-2	354.20	2604.87	2250.81	5708.37	1491.05	1093.97	2941.66
SRM612-2	1519.17	23032.87	21264.72	52069.75	83928.23	65941.09	143512.53
SRM610-2	6787.56	122968.67	111504.94	301288.35	466068.23	523762.33	1421510.02
AP1-2	213.00	2143.03	1822.81	4416.29	114.08	68.16	170.08
AP2-2	1821.17	33032.49	27810.84	71896.58	1924.81	2615.61	2385.93
AP3-2	13088.27	311038.41	256326.48	758382.97	16495.77	12178.99	16999.90
AP4-2	25938.67	680587.91	556562.16	1682215.06	35760.92	23384.01	30991.77
zero correction							
SRM614-1	1667.29	7516.98	6870.76	15196.83	2324.33	1771.61	4065.58
SRM612-1	2874.14	31242.44	28397.80	69403.89	108735.89	75704.99	161079.67
SRM610-1	7791.48	123730.88	113159.04	297857.63	513745.38	582031.08	1541377.32
AP1-1	812.44	6084.97	5038.99	12777.25	718.76	224.28	1171.41
AP2-1	3617.46	63450.70	53052.74	139876.44	3673.66	4182.98	4110.46
AP3-1	41322.19	1137175.50	924436.53	2764386.46	55008.63	27881.68	44201.41
AP4-1	46132.30	1305025.60	1059699.38	3154509.46	64025.96	35514.64	50913.13
V2-1	567.28	2242.55	2074.61	4255.20	195.64	402.40	188.68
V2-2	436.60	1217.39	1024.93	2294.03	42.88	41.64	46.36
V2-3	409.12	787.14	625.80	1611.99	41.16	121.60	43.00
V2-4	623.24	5251.61	4318.30	11171.20	607.64	296.08	866.44
V2-5	512.80	4308.84	3650.38	9291.55	137.16	60.76	207.80
V2-6	607.32	5736.93	4819.03	12039.25	216.00	145.92	311.68
V2-7	1158.37	15010.66	12854.03	29496.91	754.16	1331.45	1081.25
V2-8	634.32	5148.25	4418.07	10626.20	168.16	88.92	284.52
V2-9	613.92	5692.01	4739.47	11621.13	230.20	64.24	337.36
V2-10	1202.61	10954.00	9685.21	20111.93	646.00	167.96	537.32
V2-11	475.92	3333.20	2800.10	7030.38	121.64	42.76	174.00
V2-12	491.12	4020.96	3427.30	8202.75	175.88	56.20	361.64
V2-13	1069.29	16865.28	14053.96	35920.02	360.52	669.28	765.84
V2-14	1309.77	20593.98	17084.42	43546.90	230.72	381.32	310.00
V2-15	1299.61	21530.10	18098.70	45191.51	250.16	341.92	435.72
SRM614-2	354.20	2604.87	2250.81	5708.37	1491.05	1093.97	2941.66
SRM612-2	1519.17	23032.87	21264.72	52069.75	83928.23	65941.09	143512.53
SRM610-2	6787.56	122968.67	111504.94	301288.35	466068.23	523762.33	1421510.02
AP1-2	213.00	2143.03	1822.81	4416.29	114.08	68.16	170.08
AP2-2	1821.17	33032.49	27810.84	71896.58	1924.81	2615.61	2385.93
AP3-2	13088.27	311038.41	256326.48	758382.97	16495.77	12178.99	16999.90
AP4-2	25938.67	680587.91	556562.16	1682215.06	35760.92	23384.01	30991.77
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330

Appendix A. Raw trace element datasheets from laser ablation.

STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-1	0.000665	0.002998	0.002740	0.006060	0.000927	0.000707	0.001621
SRM612-1	0.001286	0.013979	0.012706	0.031054	0.048653	0.033873	0.072073
SRM610-1	0.007458	0.118432	0.108313	0.285102	0.491744	0.557106	1.475369
AP1-1	0.000048	0.000358	0.000296	0.000751	0.000042	0.000013	0.000069
AP2-1	0.000210	0.003677	0.003074	0.008106	0.000213	0.000242	0.000238
AP3-1	0.001967	0.054128	0.044002	0.131581	0.002618	0.001327	0.002104
AP4-1	0.002298	0.065009	0.052788	0.157139	0.003189	0.001769	0.002536
V2-1	0.000063	0.000248	0.000230	0.000471	0.000022	0.000045	0.000021
V2-2	0.000055	0.000153	0.000129	0.000288	0.000005	0.000005	0.000006
V2-3	0.000062	0.000119	0.000095	0.000244	0.000006	0.000018	0.000007
V2-4	0.000074	0.000627	0.000516	0.001335	0.000073	0.000035	0.000104
V2-5	0.000057	0.000478	0.000405	0.001030	0.000015	0.000007	0.000023
V2-6	0.000068	0.000639	0.000537	0.001341	0.000024	0.000016	0.000035
V2-7	0.000188	0.002433	0.002083	0.004781	0.000122	0.000216	0.000175
V2-8	0.000106	0.000861	0.000739	0.001778	0.000028	0.000015	0.000048
V2-9	0.000116	0.001075	0.000895	0.002195	0.000043	0.000012	0.000064
V2-10	0.000235	0.002145	0.001896	0.003938	0.000126	0.000033	0.000105
V2-11	0.000102	0.000717	0.000603	0.001513	0.000026	0.000009	0.000037
V2-12	0.000110	0.000899	0.000767	0.001835	0.000039	0.000013	0.000081
V2-13	0.000060	0.000944	0.000787	0.002010	0.000020	0.000037	0.000043
V2-14	0.000071	0.001121	0.000930	0.002371	0.000013	0.000021	0.000017
V2-15	0.000065	0.001081	0.000908	0.002268	0.000013	0.000017	0.000022
SRM614-2	0.000234	0.001722	0.001488	0.003775	0.000986	0.000723	0.001945
SRM612-2	0.000885	0.013420	0.012390	0.030338	0.048900	0.038420	0.083616
SRM610-2	0.007586	0.137432	0.124620	0.336726	0.520887	0.585368	1.588709
AP1-2	0.000017	0.000175	0.000149	0.000361	0.000009	0.000006	0.000014
AP2-2	0.000146	0.002648	0.002229	0.005764	0.000154	0.000210	0.000191
AP3-2	0.001015	0.024111	0.019870	0.058787	0.001279	0.000944	0.001318
AP4-2	0.001748	0.045874	0.037514	0.113387	0.002410	0.001576	0.002089
standardize signal averages AP							
AP1	0.000033	0.000266	0.000223	0.000556	0.000026	0.000009	0.000041
AP2	0.000178	0.003163	0.002652	0.006935	0.000184	0.000226	0.000215
AP3	0.001491	0.039119	0.031936	0.095184	0.001949	0.001136	0.001711
AP4	0.002023	0.055441	0.045151	0.135263	0.002800	0.001673	0.002313
linest from std sig ave							
	0.171112	0.006343	0.007782	0.002601	0.001965	0.005929	0.003382
standardize signal averages SRM							
srm614-2	0.000450	0.002360	0.002114	0.004918	0.000956	0.000715	0.001783
srm612-2	0.001086	0.013699	0.012548	0.030696	0.048776	0.036147	0.077845
srm610-2	0.007522	0.127932	0.116467	0.310914	0.506316	0.571237	1.532039
linest from std sig ave							
	0.634143	0.037609	0.041309	0.015491	0.008227	0.009209	0.003484
concentration data							
SRM614-1	9.76	1.63	1.83	1.35	0.16	0.36	0.47
SRM612-1	18.87	7.60	8.48	6.93	8.20	17.22	20.90
SRM610-1	109.44	64.42	72.29	63.61	82.89	283.28	427.90
AP1-1	3.26	0.90	0.92	0.78	0.03	0.03	0.09
AP2-1	14.31	9.30	9.54	8.41	0.17	0.57	0.32
AP3-1	134.27	136.96	136.60	136.55	2.05	3.14	2.84
AP4-1	156.87	164.49	163.88	163.08	2.50	4.18	3.42
V2-1	4.29	0.63	0.71	0.49	0.02	0.11	0.03
V2-2	3.74	0.39	0.40	0.30	0.00	0.01	0.01
V2-3	4.23	0.30	0.29	0.25	0.00	0.04	0.01
V2-4	5.08	1.59	1.60	1.39	0.06	0.08	0.14
V2-5	3.88	1.21	1.26	1.07	0.01	0.02	0.03
V2-6	4.62	1.62	1.67	1.39	0.02	0.04	0.05
V2-7	12.82	6.16	6.47	4.96	0.10	0.51	0.24
V2-8	7.24	2.18	2.29	1.84	0.02	0.04	0.06
V2-9	7.91	2.72	2.78	2.28	0.03	0.03	0.09
V2-10	16.07	5.43	5.89	4.09	0.10	0.08	0.14
V2-11	6.99	1.82	1.87	1.57	0.02	0.02	0.05
V2-12	7.50	2.28	2.38	1.90	0.03	0.03	0.11
V2-13	4.08	2.39	2.44	2.09	0.02	0.09	0.06
V2-14	4.87	2.84	2.89	2.46	0.01	0.05	0.02
V2-15	4.45	2.73	2.82	2.35	0.01	0.04	0.03
SRM614-2	3.44	0.94	0.99	0.84	0.17	0.37	0.56
SRM612-2	12.99	7.30	8.27	6.77	8.24	19.54	24.25

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-2	111.32	74.76	83.17	75.12	87.80	297.65	460.77
AP1-2	1.19	0.44	0.46	0.37	0.01	0.01	0.02
AP2-2	9.97	6.70	6.92	5.98	0.12	0.50	0.26
AP3-2	69.26	61.01	61.68	61.01	1.00	2.23	1.78
AP4-2	119.35	116.08	116.46	117.67	1.89	3.73	2.82

certified concentration							
SRM614	2.40	2.40	2.40	2.40	0.74	0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-23	159.04	156.28	156.20	352.96	4.28	3.32	4.52
SRM614-23	272.60	1699.77	1441.05	3637.90	1522.49	575.04	1594.61
SRM612-23	1446.41	21339.52	19480.47	47784.75	78767.28	31970.10	74775.94
SRM610-23	5054.35	90135.83	82701.74	218648.75	369480.88	197477.31	492139.84
AP1-23	205.72	886.65	774.00	1902.93	162.12	82.96	264.92
AP2-23	2574.21	48153.83	40406.07	106403.52	2807.34	1876.01	2122.37
AP3-23	11327.42	263228.72	214943.41	647436.00	14174.28	6992.56	11128.66
AP4-23	14819.36	366195.69	298775.91	914145.25	17378.38	11538.31	15520.69
34HP45-494-1	1829.13	22631.45	18621.34	48239.79	462.24	10108.46	7835.12
34HP45-494-2	1744.97	17971.18	14823.00	38326.14	382.72	6615.56	7210.60
34HP45-494-3	2129.29	24048.82	19602.11	50959.61	856.00	8323.21	9151.69
34HP45-494-4	1594.09	13398.40	11210.10	27868.80	612.60	5648.39	5128.47
34HP45-494-5	1131.25	11625.67	9561.89	24533.22	356.12	8928.77	5375.31
34HP45-494-6	954.09	8945.45	7301.20	18636.58	255.64	6006.79	5264.23
34HP45-494-7	1252.41	14973.12	12317.31	31422.42	1329.45	7707.28	5848.91
34HP45-494-8	1265.45	13473.64	11294.34	28645.00	527.00	4858.27	4237.78
34HP45-494-9	1195.73	12670.03	10313.70	26494.99	375.16	6567.60	4546.35
34HP45-494-10	4492.11	65477.49	52437.45	143289.97	1346.93	23178.01	32215.98
34HP45-494-11	4574.87	59641.61	48677.04	131443.63	1202.57	14413.96	37630.33
34HP45-494-12	4509.27	58967.57	48103.75	130557.53	1192.81	14655.32	51058.05
34HP45-494-13	2116.41	30610.65	24822.26	65186.37	743.60	6904.48	13369.56
34HP45-494-14	2120.25	30360.69	24581.86	64639.41	763.24	6870.00	14006.68
34HP45-494-15	1958.65	27752.76	22947.97	59968.70	623.04	4785.95	13864.96
34HP45-494-16	574.72	4451.71	3759.30	8838.53	237.56	1267.77	63575.04
34HP45-494-17	450.20	3927.46	3317.14	8098.33	160.76	1698.65	58711.49
34HP45-494-18	493.44	3936.06	3224.94	7984.16	174.40	1139.97	59808.82
SRM614-24	292.88	1322.93	1154.69	2898.54	1239.17	782.80	1812.65
SRM612-24	1063.77	15905.69	14367.48	35905.44	60635.06	41785.16	85839.48
SRM610-24	4730.79	85954.73	78003.24	211427.36	360158.91	289411.00	693071.13
AP1-24	191.32	383.56	307.92	795.60	31.56	13.28	46.20
AP2-24	1818.81	33495.39	28192.88	73940.78	1901.85	1933.13	1973.21
AP3-24	9599.97	227949.88	186419.02	567423.88	12439.15	8431.33	12922.11
AP4-24	11984.31	287268.81	234652.28	719323.56	13443.56	12614.27	16704.54
blank-24	192.28	57.80	57.16	129.56	1.04	2.32	4.92
blank average	175.66	107.04	106.68	241.26	2.66	2.82	4.72

blank subtraction							
SRM614-23	96.94	1592.73	1334.37	3396.64	1519.83	572.22	1589.89
SRM612-23	1270.75	21232.48	19373.79	47543.49	78764.62	31967.28	74771.22
SRM610-23	4878.69	90028.79	82595.06	218407.49	369478.22	197474.49	492135.12
AP1-23	30.06	779.60	667.32	1661.67	159.46	80.14	260.20
AP2-23	2398.55	48046.79	40299.39	106162.26	2804.68	1873.19	2117.65
AP3-23	11151.76	263121.68	214836.73	647194.74	14171.62	6989.74	11123.94
AP4-23	14643.70	366088.65	298669.23	913903.99	17375.72	11535.48	15515.97
34HP45-494-1	1653.47	22524.41	18514.66	47998.53	459.58	10105.64	7830.40
34HP45-494-2	1569.31	17864.14	14716.32	38084.88	380.06	6612.74	7205.88
34HP45-494-3	1953.63	23941.78	19495.43	50718.35	853.34	8320.39	9146.97
34HP45-494-4	1418.43	13291.36	11103.42	27627.54	609.94	5645.57	5123.75
34HP45-494-5	955.59	11518.63	9455.21	24291.96	353.46	8925.95	5370.59
34HP45-494-6	778.42	8838.41	7194.52	18395.32	252.98	6003.97	5259.51
34HP45-494-7	1076.75	14866.08	12210.63	31181.15	1326.79	7704.46	5844.19
34HP45-494-8	1089.79	13366.60	11187.66	28403.74	524.34	4855.45	4233.06
34HP45-494-9	1020.07	12562.99	10207.02	26253.73	372.50	6564.78	4541.63
34HP45-494-10	4316.44	65370.45	52330.77	143048.71	1344.27	23175.19	32211.26
34HP45-494-11	4399.20	59534.57	48570.35	131202.37	1199.91	14411.14	37625.61
34HP45-494-12	4333.60	58860.53	47997.07	130316.27	1190.15	14652.50	51053.33
34HP45-494-13	1940.75	30503.61	24715.58	64945.11	740.94	6901.66	13364.84
34HP45-494-14	1944.59	30253.65	24475.18	64398.14	760.58	6867.18	14001.96
34HP45-494-15	1782.99	27645.72	22841.29	59727.43	620.38	4783.13	13860.24
34HP45-494-16	399.06	4344.66	3652.62	8597.27	234.90	1264.95	63570.31
34HP45-494-17	274.54	3820.42	3210.46	7857.06	158.10	1695.83	58706.77

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-18	317.78	3829.02	3118.26	7742.90	171.74	1137.15	59804.10
SRM614-24	117.22	1215.89	1048.01	2657.28	1236.51	779.98	1807.93
SRM612-24	888.11	15798.65	14260.80	35664.18	60632.40	41782.34	85834.76
SRM610-24	4555.13	85847.69	77896.56	211186.10	360156.25	289408.18	693066.41
AP1-24	15.66	276.52	201.24	554.34	28.90	10.46	41.48
AP2-24	1643.15	33388.35	28086.20	73699.52	1899.19	1930.31	1968.49
AP3-24	9424.31	227842.84	186312.34	567182.62	12436.49	8428.51	12917.39
AP4-24	11808.65	287161.77	234545.60	719082.30	13440.90	12611.45	16699.81

zero correction

SRM614-23	96.94	1592.73	1334.37	3396.64	1519.83	572.22	1589.89
SRM612-23	1270.75	21232.48	19373.79	47543.49	78764.62	31967.28	74771.22
SRM610-23	4878.69	90028.79	82595.06	218407.49	369478.22	197474.49	492135.12
AP1-23	30.06	779.60	667.32	1661.67	159.46	80.14	260.20
AP2-23	2398.55	48046.79	40299.39	106162.26	2804.68	1873.19	2117.65
AP3-23	11151.76	263121.68	214836.73	647194.74	14171.62	6989.74	11123.94
AP4-23	14643.70	366088.65	298669.23	913903.99	17375.72	11535.48	15515.97
34HP45-494-1	1653.47	22524.41	18514.66	47998.53	459.58	10105.64	7830.40
34HP45-494-2	1569.31	17864.14	14716.32	38084.88	380.06	6612.74	7205.88
34HP45-494-3	1953.63	23941.78	19495.43	50718.35	853.34	8320.39	9146.97
34HP45-494-4	1418.43	13291.36	11103.42	27627.54	609.94	5645.57	5123.75
34HP45-494-5	955.59	11518.63	9455.21	24291.96	353.46	8925.95	9370.59
34HP45-494-6	778.42	8838.41	7194.52	18395.32	252.98	6003.97	5259.51
34HP45-494-7	1076.75	14866.08	12210.63	31181.15	1326.79	7704.46	5844.19
34HP45-494-8	1089.79	13366.60	11187.66	28403.74	524.34	4855.45	4233.06
34HP45-494-9	1020.07	12562.99	10207.02	26253.73	372.50	6564.78	4541.63
34HP45-494-10	4316.44	65370.45	52330.77	143048.71	1344.27	23175.19	32211.26
34HP45-494-11	4399.20	59534.57	48570.35	131202.37	1199.91	14411.14	37625.61
34HP45-494-12	4333.60	58860.53	47997.07	130316.27	1190.15	14652.50	51053.33
34HP45-494-13	1940.75	30503.61	24715.58	64945.11	740.94	6901.66	13364.84
34HP45-494-14	1944.59	30253.65	24475.18	64398.14	760.58	6867.18	14001.96
34HP45-494-15	1782.99	27645.72	22841.29	59727.43	620.38	4783.13	13860.24
34HP45-494-16	399.06	4344.66	3652.62	8597.27	234.90	1264.95	63570.31
34HP45-494-17	274.54	3820.42	3210.46	7857.06	158.10	1695.83	58706.77
34HP45-494-18	317.78	3829.02	3118.26	7742.90	171.74	1137.15	59804.10
SRM614-24	117.22	1215.89	1048.01	2657.28	1236.51	779.98	1807.93
SRM612-24	888.11	15798.65	14260.80	35664.18	60632.40	41782.34	85834.76
SRM610-24	4555.13	85847.69	77896.56	211186.10	360156.25	289408.18	693066.41
AP1-24	15.66	276.52	201.24	554.34	28.90	10.46	41.48
AP2-24	1643.15	33388.35	28086.20	73699.52	1899.19	1930.31	1968.49
AP3-24	9424.31	227842.84	186312.34	567182.62	12436.49	8428.51	12917.39
AP4-24	11808.65	287161.77	234545.60	719082.30	13440.90	12611.45	16699.81

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-23	0.000047	0.000766	0.000642	0.001634	0.000731	0.000275	0.000765
SRM612-23	0.000653	0.010906	0.009951	0.024421	0.040458	0.016420	0.038406
SRM610-23	0.006732	0.124232	0.113974	0.301383	0.509847	0.272497	0.679103
AP1-23	0.000003	0.000077	0.000066	0.000165	0.000016	0.000008	0.000026
AP2-23	0.000177	0.003542	0.002971	0.007826	0.000207	0.000138	0.000156
AP3-23	0.000740	0.017459	0.014255	0.042943	0.000940	0.000464	0.000738
AP4-23	0.000979	0.024484	0.019975	0.061121	0.001162	0.000771	0.001038
34HP45-494-1	0.000109	0.001483	0.001219	0.003161	0.000030	0.000665	0.000516
34HP45-494-2	0.000118	0.001345	0.001108	0.002868	0.000029	0.000498	0.000543
34HP45-494-3	0.000156	0.001908	0.001554	0.004043	0.000068	0.000663	0.000729
34HP45-494-4	0.000101	0.000946	0.000790	0.001966	0.000043	0.000402	0.000365
34HP45-494-5	0.000068	0.000820	0.000673	0.001729	0.000025	0.000635	0.000382
34HP45-494-6	0.000062	0.000707	0.000576	0.001472	0.000020	0.000480	0.000421
34HP45-494-7	0.000095	0.001314	0.001079	0.002756	0.000117	0.000681	0.000517
34HP45-494-8	0.000107	0.001312	0.001098	0.002788	0.000051	0.000477	0.000415
34HP45-494-9	0.000104	0.001282	0.001041	0.002679	0.000038	0.000670	0.000463

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-494-10	0.000342	0.005173	0.004141	0.011321	0.000106	0.001834	0.002549
34HP45-494-11	0.000322	0.004357	0.003555	0.009602	0.000088	0.001055	0.002754
34HP45-494-12	0.000312	0.004238	0.003456	0.009382	0.000086	0.001055	0.003676
34HP45-494-13	0.000158	0.002481	0.002010	0.005281	0.000060	0.000561	0.001087
34HP45-494-14	0.000150	0.002340	0.001893	0.004982	0.000059	0.000531	0.001083
34HP45-494-15	0.000133	0.002067	0.001708	0.004466	0.000046	0.000358	0.001036
34HP45-494-16	0.000036	0.000392	0.000330	0.000777	0.000021	0.000114	0.005743
34HP45-494-17	0.000023	0.000317	0.000266	0.000652	0.000013	0.000141	0.004872
34HP45-494-18	0.000024	0.000286	0.000233	0.000579	0.000013	0.000085	0.004474
SRM614-24	0.000088	0.000912	0.000786	0.001993	0.000927	0.000585	0.001356
SRM612-24	0.000685	0.012192	0.011005	0.027522	0.046790	0.032243	0.066238
SRM610-24	0.008667	0.163343	0.148215	0.401826	0.685274	0.550660	1.318706
AP1-24	0.000002	0.000032	0.000023	0.000064	0.000003	0.000001	0.000005
AP2-24	0.000142	0.002891	0.002432	0.006382	0.000164	0.000167	0.000170
AP3-24	0.000726	0.017556	0.014356	0.043703	0.000958	0.000649	0.000995
AP4-24	0.000919	0.022338	0.018245	0.055936	0.001046	0.000981	0.001299

standardize signal averages AP

AP1	0.000002	0.000055	0.000045	0.000114	0.000010	0.000005	0.000015
AP2	0.000160	0.003217	0.002701	0.007104	0.000186	0.000153	0.000163
AP3	0.000733	0.017507	0.014305	0.043323	0.000949	0.000557	0.000867
AP4	0.000949	0.023411	0.019110	0.058529	0.001104	0.000876	0.001168

linest from std sig ave

0.356871	0.014691	0.017987	0.005904	0.004589	0.011530	0.006722
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standardize signal averages SRM

srM614-2	0.000067	0.000839	0.000714	0.001814	0.000829	0.000430	0.001060
srM612-2	0.000669	0.011549	0.010478	0.025971	0.043624	0.024332	0.052322
srM610-2	0.007700	0.143788	0.131094	0.351605	0.597560	0.411579	0.998904

linest from std sig ave

0.626269	0.033553	0.036802	0.013727	0.006985	0.012783	0.005344
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concentration data

SRM614-23	1.43	0.97	0.99	0.83	0.29	0.27	0.44
SRM612-23	19.98	13.74	15.35	12.37	15.92	16.24	22.14
SRM610-23	206.05	156.53	175.82	152.60	200.67	269.45	391.51
AP1-23	0.42	0.45	0.47	0.39	0.03	0.04	0.07
AP2-23	25.17	20.76	21.32	18.43	0.38	0.64	0.42
AP3-23	105.34	102.32	102.29	101.14	1.72	2.13	1.98
AP4-23	139.43	143.49	143.33	143.96	2.13	3.55	2.78
34HP45-494-1	15.50	8.69	8.75	7.44	0.06	3.06	1.38
34HP45-494-2	16.82	7.88	7.95	6.75	0.05	2.29	1.46
34HP45-494-3	22.17	11.18	11.15	9.52	0.12	3.05	1.96
34HP45-494-4	14.37	5.54	5.67	4.63	0.08	1.85	0.98
34HP45-494-5	9.68	4.81	4.83	4.07	0.05	2.92	1.03
34HP45-494-6	8.87	4.14	4.13	3.47	0.04	2.21	1.13
34HP45-494-7	13.55	7.70	7.74	6.49	0.21	3.13	1.39
34HP45-494-8	15.23	7.69	7.88	6.57	0.09	2.19	1.11
34HP45-494-9	14.82	7.51	7.47	6.31	0.07	3.08	1.24
34HP45-494-10	48.63	30.32	29.72	26.66	0.19	8.44	6.84
34HP45-494-11	45.84	25.54	25.51	22.62	0.16	4.85	7.38
34HP45-494-12	44.42	24.84	24.80	22.10	0.16	4.85	9.86
34HP45-494-13	22.47	14.54	14.42	12.44	0.11	2.58	2.91
34HP45-494-14	21.42	13.72	13.59	11.73	0.11	2.44	2.90
34HP45-494-15	18.98	12.11	12.25	10.52	0.08	1.64	2.78
34HP45-494-16	5.13	2.30	2.37	1.83	0.04	0.53	15.40
34HP45-494-17	3.24	1.86	1.91	1.54	0.02	0.65	13.06
34HP45-494-18	3.38	1.68	1.67	1.36	0.02	0.39	12.00
SRM614-24	2.69	1.15	1.21	1.01	0.37	0.58	0.78
SRM612-24	20.98	15.36	16.98	13.94	18.42	31.88	38.19
SRM610-24	265.27	205.80	228.64	203.46	269.71	544.50	760.24
AP1-24	0.26	0.19	0.17	0.15	0.01	0.01	0.01
AP2-24	20.26	16.95	17.45	15.03	0.30	0.77	0.46
AP3-24	103.38	102.89	103.01	102.93	1.75	2.99	2.67
AP4-24	130.78	130.92	130.92	131.75	1.91	4.51	3.48

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-21	89.00	310.04	276.00	653.48	23.08	2.00	25.16
SRM614-21	167.00	1489.29	1266.85	3114.10	1100.13	365.00	856.04
SRM612-21	1472.33	23045.73	20776.36	51617.21	77974.28	23334.69	60092.78
SRM610-21	7628.20	144867.66	132023.66	362158.44	702354.38	208795.22	593216.25
AP1-21	220.40	2144.09	1759.37	4550.43	1028.97	284.68	1098.65
AP2-21	1879.17	34164.99	28882.48	74535.62	2270.01	1370.57	1802.93
AP3-21	1485.13	26267.19	21939.24	56814.24	1565.01	1226.45	1288.97
AP4-21	25460.78	696481.94	563442.94	1752620.10	31539.22	14839.96	25398.94
34HP45-671-1	1335.37	22318.41	18465.47	47233.31	482.36	8941.93	10492.50
34HP45-671-2	1314.97	21282.68	17347.58	45632.98	434.92	8262.25	7657.40
34HP45-671-3	887.96	14052.76	11271.18	29236.97	264.84	863.92	9010.65
34HP45-671-4	1534.85	27897.24	22802.77	59629.26	704.12	1688.93	13177.48
34HP45-671-5	1105.45	15509.05	12886.03	32554.58	379.96	800.04	9207.53
34HP45-671-6	975.73	15376.93	13055.87	32926.63	400.04	887.57	7929.88
34HP45-671-7	2280.29	38202.18	31927.30	81216.41	1506.29	1237.65	12114.11
34HP45-671-8	1568.05	25903.55	21280.88	55452.79	770.32	551.44	10116.94
34HP45-671-9	1531.73	25558.90	20730.00	54901.87	491.56	485.20	9450.61
34HP45-671-10	3017.54	53935.06	43416.29	117367.54	1315.09	16563.09	15603.49
34HP45-671-11	1936.53	30731.49	25063.14	66552.22	681.56	8938.53	9168.29
34HP45-671-12	2024.77	32396.94	26451.39	69821.27	620.20	12425.35	9090.45
34HP45-671-13	588.20	5110.95	4181.66	11203.98	555.52	557.80	4932.91
34HP45-671-14	434.00	2480.49	2108.77	5144.87	221.60	188.56	3691.30
34HP45-671-15	417.84	1886.49	1568.25	3912.94	98.40	59.04	2725.50
34HP45-671-16	452.36	2415.89	2109.09	5206.31	208.60	119.88	4492.63
34HP45-671-17	383.08	1890.17	1620.41	4141.46	82.20	85.84	4951.91
34HP45-671-18	416.32	2301.57	1839.33	4689.63	104.48	143.84	5440.35
SRM614-22	225.64	1262.17	1152.49	2923.66	1031.05	568.08	1379.37
SRM612-22	1047.89	15711.57	14237.32	35295.64	57552.32	35205.32	75533.87
SRM610-22	6199.63	119352.43	108855.25	299719.38	540494.44	327864.47	827593.38
AP1-22	176.76	826.08	633.08	1647.89	35.36	23.32	69.32
AP2-22	1241.01	21234.36	17302.34	44949.33	1354.65	1401.05	1467.89
AP3-22	11070.62	262566.13	215223.84	655603.06	14202.36	8438.53	12809.79
AP4-22	14921.04	379845.19	310005.88	958951.19	17922.26	12541.63	18528.26
blank-22	148.24	112.60	104.20	217.20	6.60	0.56	8.20
blank average	118.62	211.32	190.10	435.34	14.84	1.28	16.68
blank subtraction							
SRM614-21	48.38	1277.97	1076.75	2678.75	1085.29	363.72	839.36
SRM612-21	1353.71	22834.41	20586.26	51181.87	77959.44	23333.41	60076.10
SRM610-21	7509.58	144656.34	131833.56	361723.10	702339.54	208793.94	593199.57
AP1-21	101.78	1932.77	1569.27	4115.08	1014.13	283.40	1081.97
AP2-21	1760.55	33953.67	28692.38	74100.27	2255.17	1369.29	1786.25
AP3-21	1366.51	26055.87	21749.14	56378.90	1550.17	1225.17	1272.29
AP4-21	25342.16	696270.62	563252.84	1752184.76	31524.38	14838.68	25382.26
34HP45-671-1	1216.75	22107.08	18275.36	46797.96	467.52	8940.65	10475.82
34HP45-671-2	1196.35	21071.36	17157.48	45197.63	420.08	8260.97	7640.72
34HP45-671-3	769.34	13841.44	11081.08	28801.62	250.00	862.64	8993.97
34HP45-671-4	1416.23	27685.91	22612.67	59193.92	689.28	1687.65	13160.79
34HP45-671-5	986.83	15297.73	12695.93	32119.24	365.12	798.76	9190.85
34HP45-671-6	857.10	15165.61	12865.77	32491.28	385.20	886.29	7913.20
34HP45-671-7	2161.67	37990.85	31737.20	80781.07	1491.45	1236.37	12097.43
34HP45-671-8	1449.43	25692.22	21090.78	55017.45	755.48	550.16	10100.26
34HP45-671-9	1413.11	25347.58	20539.89	54466.52	476.72	483.92	9433.93
34HP45-671-10	2898.92	53723.74	43226.18	116932.20	1300.25	16561.81	15586.81
34HP45-671-11	1817.91	30520.17	24873.04	66116.88	666.72	8937.25	9151.61
34HP45-671-12	1906.15	32185.62	26261.29	69385.93	605.36	12424.07	9073.77
34HP45-671-13	469.58	4899.63	3991.56	10768.64	540.68	556.52	4916.23
34HP45-671-14	315.38	2269.17	1918.67	4709.53	206.76	187.28	3674.62
34HP45-671-15	299.22	1675.17	1378.15	3477.60	83.56	57.76	2708.82
34HP45-671-16	333.74	2204.57	1918.99	4770.97	193.76	118.60	4475.94
34HP45-671-17	264.46	1678.85	1430.31	3706.12	67.36	84.56	4935.23
34HP45-671-18	297.70	2090.25	1649.23	4254.28	89.64	142.56	5423.67
SRM614-22	107.02	1050.85	962.39	2488.31	1016.21	566.80	1362.69
SRM612-22	929.27	15500.25	14047.22	34860.30	57537.48	35204.04	75517.19
SRM610-22	6081.01	119141.11	108665.15	299284.04	540479.60	327863.19	827576.70
AP1-22	58.14	614.76	442.98	1212.55	20.52	22.04	52.64
AP2-22	1122.39	21023.04	17112.24	44513.99	1339.81	1399.77	1451.21
AP3-22	10952.00	262354.81	215033.74	655167.72	14187.52	8437.25	12793.11
AP4-22	14802.42	379633.87	309815.78	958515.85	17907.42	12540.35	18511.58
zero correction							
SRM614-21	48.38	1277.97	1076.75	2678.75	1085.29	363.72	839.36
SRM612-21	1353.71	22834.41	20586.26	51181.87	77959.44	23333.41	60076.10
SRM610-21	7509.58	144656.34	131833.56	361723.10	702339.54	208793.94	593199.57
AP1-21	101.78	1932.77	1569.27	4115.08	1014.13	283.40	1081.97
AP2-21	1760.55	33953.67	28692.38	74100.27	2255.17	1369.29	1786.25
AP3-21	1366.51	26055.87	21749.14	56378.90	1550.17	1225.17	1272.29

Appendix A. Raw trace element datasheets from laser ablation.

AP4-21	25342.16	696270.62	563252.84	1752184.76	31524.38	14838.68	25382.26
34HP45-671-1	1216.75	22107.08	18275.36	46797.96	467.52	8940.65	10475.82
34HP45-671-2	1196.35	21071.36	17157.48	45197.63	420.08	8260.97	7640.72
34HP45-671-3	769.34	13841.44	11081.08	28801.62	250.00	862.64	8993.97
34HP45-671-4	1416.23	27685.91	22612.67	59193.92	689.28	1687.65	13160.79
34HP45-671-5	986.83	15297.73	12695.93	32119.24	365.12	798.76	9190.85
34HP45-671-6	857.10	15165.61	12865.77	32491.28	385.20	886.29	7913.20
34HP45-671-7	2161.67	37990.85	31737.20	80781.07	1491.45	1236.37	12097.43
34HP45-671-8	1449.43	25692.22	21090.78	55017.45	755.48	550.16	10100.26
34HP45-671-9	1413.11	25347.58	20539.89	54466.52	476.72	483.92	9433.93
34HP45-671-10	2898.92	53723.74	43226.18	116932.20	1300.25	16561.81	15586.81
34HP45-671-11	1817.91	30520.17	24873.04	66116.88	666.72	8937.25	9151.61
34HP45-671-12	1906.15	32185.62	26261.29	69385.93	605.36	12424.07	9073.77
34HP45-671-13	469.58	4899.63	3991.56	10768.64	540.68	556.52	4916.23
34HP45-671-14	315.38	2269.17	1918.67	4709.53	206.76	187.28	3674.62
34HP45-671-15	299.22	1675.17	1378.15	3477.60	83.56	57.76	2708.82
34HP45-671-16	333.74	2204.57	1918.99	4770.97	193.76	118.60	4475.94
34HP45-671-17	264.46	1678.85	1430.31	3706.12	67.36	84.56	4935.23
34HP45-671-18	297.70	2090.25	1649.23	4254.28	89.64	142.56	5423.67
SRM614-22	107.02	1050.85	962.39	2488.31	1016.21	566.80	1362.69
SRM612-22	929.27	15500.25	14047.22	34860.30	57537.48	35204.04	75517.19
SRM610-22	6081.01	119141.11	108665.15	299284.04	540479.60	327863.19	827576.70
AP1-22	58.14	614.76	442.98	1212.55	20.52	22.04	52.64
AP2-22	1122.39	21023.04	17112.24	44513.99	1339.81	1399.77	1451.21
AP3-22	10952.00	262354.81	215033.74	655167.72	14187.52	8437.25	12793.11
AP4-22	14802.42	379633.87	309815.78	958515.85	17907.42	12540.35	18511.58

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-21	0.000036	0.000953	0.000803	0.001997	0.000809	0.000271	0.000626
SRM612-21	0.000686	0.011572	0.010433	0.025938	0.039508	0.011825	0.030445
SRM610-21	0.007313	0.140872	0.128385	0.352260	0.683965	0.203331	0.577680
AP1-21	0.000010	0.000186	0.000151	0.000396	0.000098	0.000027	0.000104
AP2-21	0.000133	0.002573	0.002175	0.005616	0.000171	0.000104	0.000135
AP3-21	0.000112	0.002133	0.001780	0.004614	0.000127	0.000100	0.000104
AP4-21	0.001490	0.040940	0.033119	0.103027	0.001854	0.000872	0.001492
34HP45-671-1	0.000063	0.001149	0.000950	0.002433	0.000024	0.000465	0.000545
34HP45-671-2	0.000068	0.001204	0.000981	0.002583	0.000024	0.000472	0.000437
34HP45-671-3	0.000046	0.000832	0.000666	0.001730	0.000015	0.000052	0.000540
34HP45-671-4	0.000077	0.001496	0.001222	0.003198	0.000037	0.000091	0.000711
34HP45-671-5	0.000059	0.000918	0.000762	0.001928	0.000022	0.000048	0.000552
34HP45-671-6	0.000061	0.001075	0.000912	0.002303	0.000027	0.000063	0.000561
34HP45-671-7	0.000118	0.002073	0.001732	0.004408	0.000081	0.000067	0.000660
34HP45-671-8	0.000082	0.001457	0.001196	0.003120	0.000043	0.000031	0.000053
34HP45-671-9	0.000078	0.001399	0.001134	0.003006	0.000026	0.000027	0.000521
34HP45-671-10	0.000190	0.003513	0.002826	0.007645	0.000085	0.001083	0.001019
34HP45-671-11	0.000126	0.002116	0.001724	0.004583	0.000046	0.000620	0.000634
34HP45-671-12	0.000136	0.002303	0.001879	0.004966	0.000043	0.000889	0.000649
34HP45-671-13	0.000073	0.000764	0.000623	0.001680	0.000084	0.000087	0.000767
34HP45-671-14	0.000060	0.000432	0.000365	0.000896	0.000039	0.000036	0.000699
34HP45-671-15	0.000059	0.000330	0.000272	0.000686	0.000016	0.000011	0.000534
34HP45-671-16	0.000070	0.000461	0.000401	0.000998	0.000041	0.000025	0.000936
34HP45-671-17	0.000044	0.000281	0.000240	0.000621	0.000011	0.000014	0.000827
34HP45-671-18	0.000047	0.000331	0.000261	0.000673	0.000014	0.000023	0.000858
SRM614-22	0.000104	0.001018	0.000932	0.002410	0.000984	0.000549	0.001320
SRM612-22	0.000770	0.012849	0.011645	0.028898	0.047696	0.029183	0.062601
SRM610-22	0.009051	0.177339	0.161746	0.445478	0.804492	0.488017	1.231830
AP1-22	0.000006	0.000062	0.000045	0.000123	0.000002	0.000002	0.000005
AP2-22	0.000109	0.002038	0.001659	0.004316	0.000130	0.000136	0.000141
AP3-22	0.000834	0.019985	0.016381	0.049908	0.01081	0.000643	0.000975
AP4-22	0.001129	0.028946	0.023622	0.073083	0.001365	0.000956	0.001411

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages AP							
AP1	0.000008	0.000124	0.000098	0.000259	0.000050	0.000015	0.000055
AP2	0.000121	0.002306	0.001917	0.004966	0.000150	0.000120	0.000138
AP3	0.000473	0.011059	0.009080	0.027261	0.000604	0.000371	0.000539
AP4	0.001309	0.034943	0.028370	0.088055	0.001609	0.000914	0.001452
linest from std sig ave							
	0.305196	0.011492	0.014151	0.004561	0.003851	0.011970	0.006151
standardize signal averages SRM							
srm614-2	0.000070	0.000985	0.000867	0.002204	0.000897	0.000410	0.000973
srm612-2	0.000728	0.012211	0.011039	0.027418	0.043602	0.020504	0.046523
srm610-2	0.008182	0.159105	0.145065	0.398869	0.744229	0.345674	0.904755
linest from std sig ave							
	0.589227	0.030329	0.033266	0.012103	0.005612	0.015220	0.005900
concentration data							
SRM614-21	0.94	0.94	0.97	0.78	0.27	0.28	0.33
SRM612-21	17.96	11.41	12.66	10.15	13.05	12.14	16.06
SRM610-21	191.42	138.84	155.81	137.78	225.89	208.73	304.74
AP1-21	1.19	0.85	0.85	0.72	0.15	0.13	0.26
AP2-21	16.25	11.80	12.28	10.22	0.26	0.50	0.33
AP3-21	13.62	9.78	10.05	8.40	0.19	0.48	0.26
AP4-21	181.42	187.69	186.97	187.45	2.85	4.17	3.66
34HP45-671-1	7.70	5.27	5.36	4.43	0.04	2.22	1.34
34HP45-671-2	8.33	5.52	5.54	4.70	0.04	2.25	1.07
34HP45-671-3	5.63	3.81	3.76	3.15	0.02	0.25	1.33
34HP45-671-4	9.32	6.86	6.90	5.82	0.06	0.44	1.74
34HP45-671-5	7.21	4.21	4.30	3.51	0.03	0.23	1.35
34HP45-671-6	7.40	4.93	5.15	4.19	0.04	0.30	1.38
34HP45-671-7	14.36	9.50	9.78	8.02	0.13	0.32	1.62
34HP45-671-8	10.01	6.68	6.75	5.68	0.07	0.15	1.41
34HP45-671-9	9.50	6.41	6.40	5.47	0.04	0.13	1.28
34HP45-671-10	23.08	16.10	15.96	13.91	0.13	5.17	2.50
34HP45-671-11	15.34	9.70	9.73	8.34	0.07	2.96	1.56
34HP45-671-12	16.61	10.56	10.61	9.03	0.07	4.25	1.59
34HP45-671-13	8.92	3.50	3.52	3.06	0.13	0.41	1.88
34HP45-671-14	7.30	1.98	2.06	1.63	0.06	0.17	1.71
34HP45-671-15	7.19	1.51	1.53	1.25	0.03	0.05	1.31
34HP45-671-16	8.50	2.11	2.27	1.82	0.06	0.12	2.30
34HP45-671-17	5.40	1.29	1.35	1.13	0.02	0.07	2.03
34HP45-671-18	5.73	1.52	1.47	1.22	0.02	0.11	2.10
SRM614-22	2.71	1.00	1.13	0.94	0.33	0.56	0.70
SRM612-22	20.16	12.66	14.13	11.30	15.75	29.96	33.02
SRM610-22	236.92	174.78	196.30	174.24	265.70	500.97	649.81
AP1-22	0.72	0.29	0.25	0.22	0.00	0.01	0.01
AP2-22	13.25	9.34	9.37	7.85	0.20	0.65	0.35
AP3-22	101.58	91.62	92.47	90.80	1.66	3.07	2.39
AP4-22	137.41	132.70	133.36	132.97	2.10	4.57	3.46
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-19	122.84	89.12	78.28	229.72	5.84	1.48	2.20
SRM614-19	411.04	3926.66	3315.82	8232.65	2047.53	730.92	2011.29
SRM612-19	1901.13	29504.69	26904.71	65446.85	94298.57	31164.22	72629.13
SRM610-19	6545.48	120817.44	109496.94	297581.63	523794.59	254210.83	674203.88
AP1-19	228.40	1240.97	1002.61	2500.09	77.40	19.72	215.76
AP2-19	3252.26	58749.09	49721.12	131651.66	3659.94	1991.73	2575.37
AP3-19	28402.96	780552.00	630564.00	1989230.30	39271.86	13890.48	23152.25
AP4-19	41139.47	1220181.30	989142.31	3058356.50	53110.50	20760.20	36674.69
34HP60-102-1	560.88	3148.82	2658.14	6815.96	69.20	1165.25	23888.41
34HP60-102-2	467.12	1738.25	1475.37	3759.90	29.92	998.09	14074.32
34HP60-102-3	477.20	1650.85	1390.97	3229.38	32.88	312.48	8346.93
34HP60-102-4	559.28	2105.01	1754.73	4444.23	40.00	427.04	1544.25
34HP60-102-5	697.16	3725.66	3138.46	7474.52	98.36	942.57	6903.92
34HP60-102-6	1047.61	7013.04	5720.03	14564.48	101.00	507.84	26684.75
34HP60-102-7	619.56	2634.65	2206.05	5719.55	53.80	269.80	7042.24

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-8	639.64	4062.34	3387.14	8938.25	65.72	737.00	32014.30
34HP60-102-9	644.36	5313.43	4430.11	11180.66	64.84	936.49	48044.83
34HP60-102-10	690.44	6261.96	5178.99	13148.07	87.84	90.76	137740.58
34HP60-102-11	629.28	5250.87	4280.26	10982.02	57.20	111.80	111276.78
34HP60-102-12	781.96	8280.41	6783.80	17455.82	117.40	165.68	163021.36
34HP60-102-13	1149.77	16596.61	13415.96	34133.51	189.16	1052.33	216061.38
34HP60-102-14	1133.01	15550.05	12580.79	32559.38	190.92	951.45	209248.70
34HP60-102-15	931.77	12038.35	9823.58	25188.62	116.40	648.16	179304.61
34HP60-102-16	654.28	6856.52	5569.07	14045.04	103.12	276.16	105862.20
34HP60-102-17	601.76	5798.71	4907.43	12237.71	72.48	246.36	111802.11
34HP60-102-18	498.64	3186.26	2564.41	6699.96	33.84	33.16	29768.57
SRM614-20	317.84	1812.49	1584.85	3821.34	1273.05	734.56	1755.37
SRM612-20	1246.13	18094.18	16532.90	40547.83	66813.18	37385.21	83354.83
SRM610-20	6476.52	123249.09	112801.88	311825.88	549608.63	321559.34	851649.00
AP1-20	206.60	646.48	502.40	1289.49	49.44	15.08	55.60
AP2-20	1429.45	24948.02	21237.84	55007.87	1462.81	1527.85	1466.33
AP3-20	12604.39	305107.00	248168.31	764438.06	16904.74	8461.85	12461.35
AP4-20	23606.41	650775.44	527561.13	1650044.80	29637.21	16636.05	26449.23
blank-20	184.36	154.56	134.72	328.04	8.04	3.36	32.96
blank average	153.60	121.84	106.50	278.88	6.94	2.42	17.58
blank subtraction							
SRM614-19	257.44	3804.82	3209.32	7953.76	2040.59	728.50	1993.71
SRM612-19	1747.53	29382.85	26798.21	65167.97	94291.63	31161.79	72611.54
SRM610-19	6391.88	120695.60	109390.44	297302.75	523787.65	254208.41	674186.30
AP1-19	74.80	1119.13	896.11	2221.21	70.46	17.30	198.18
AP2-19	3098.66	58627.25	49614.62	131372.78	3653.00	1989.31	2557.79
AP3-19	28249.36	780430.16	630457.50	1988951.42	39264.92	13888.06	23134.67
AP4-19	40985.87	1220059.46	989035.81	3058077.62	53103.56	20757.78	36657.11
34HP60-102-1	407.28	3026.98	2551.63	6537.08	62.26	1162.83	23870.83
34HP60-102-2	313.52	1616.41	1368.87	3481.02	22.98	995.67	14056.74
34HP60-102-3	323.60	1529.01	1284.47	2950.50	25.94	310.06	8329.35
34HP60-102-4	405.68	1983.17	1648.23	4165.34	33.06	424.62	1526.67
34HP60-102-5	543.56	3603.82	3031.96	7195.64	91.42	940.15	6886.34
34HP60-102-6	894.01	6891.20	5613.53	14285.60	94.06	505.42	26667.17
34HP60-102-7	465.96	2512.81	2099.55	5440.67	46.86	267.38	7024.66
34HP60-102-8	486.04	3940.50	3280.64	8659.37	58.78	734.58	31996.72
34HP60-102-9	490.76	5191.59	4323.60	10901.78	57.90	934.07	48027.25
34HP60-102-10	536.84	6140.11	5072.49	12869.19	80.90	88.34	137723.00
34HP60-102-11	475.68	5129.03	4173.76	10703.14	50.26	109.38	111259.20
34HP60-102-12	628.36	8158.57	6677.30	17176.94	110.46	163.26	163003.78
34HP60-102-13	996.17	16474.77	13309.45	33854.63	182.22	1049.91	216043.80
34HP60-102-14	979.41	15428.21	12474.29	32280.50	183.98	949.03	209231.12
34HP60-102-15	778.16	11916.51	9717.07	24909.74	109.46	645.74	179287.03
34HP60-102-16	500.68	6734.68	5462.57	13766.16	96.18	273.74	105844.62
34HP60-102-17	448.16	5676.87	4800.93	11958.83	65.54	243.94	111784.53
34HP60-102-18	345.04	3064.42	2457.91	6421.08	26.90	30.74	29750.99
SRM614-20	164.24	1690.65	1478.35	3542.46	1266.11	732.14	1737.79
SRM612-20	1092.53	17972.34	16426.39	40268.95	66806.24	37382.79	83337.25
SRM610-20	6322.92	123127.25	112695.38	311547.00	549601.69	321556.92	851631.42
AP1-20	53.00	524.64	395.90	1010.61	42.50	12.66	38.02
AP2-20	1275.85	24826.18	21131.34	54728.99	1455.87	1525.43	1448.75
AP3-20	12450.79	304985.16	248061.81	764159.18	16897.80	8459.43	12443.77
AP4-20	23452.81	650653.60	527454.63	1649765.92	29630.27	16633.63	26431.65
zero correction							
SRM614-19	257.44	3804.82	3209.32	7953.76	2040.59	728.50	1993.71
SRM612-19	1747.53	29382.85	26798.21	65167.97	94291.63	31161.79	72611.54
SRM610-19	6391.88	120695.60	109390.44	297302.75	523787.65	254208.41	674186.30
AP1-19	74.80	1119.13	896.11	2221.21	70.46	17.30	198.18
AP2-19	3098.66	58627.25	49614.62	131372.78	3653.00	1989.31	2557.79
AP3-19	28249.36	780430.16	630457.50	1988951.42	39264.92	13888.06	23134.67
AP4-19	40985.87	1220059.46	989035.81	3058077.62	53103.56	20757.78	36657.11
34HP60-102-1	407.28	3026.98	2551.63	6537.08	62.26	1162.83	23870.83
34HP60-102-2	313.52	1616.41	1368.87	3481.02	22.98	995.67	14056.74
34HP60-102-3	323.60	1529.01	1284.47	2950.50	25.94	310.06	8329.35
34HP60-102-4	405.68	1983.17	1648.23	4165.34	33.06	424.62	1526.67
34HP60-102-5	543.56	3603.82	3031.96	7195.64	91.42	940.15	6886.34
34HP60-102-6	894.01	6891.20	5613.53	14285.60	94.06	505.42	26667.17
34HP60-102-7	465.96	2512.81	2099.55	5440.67	46.86	267.38	7024.66
34HP60-102-8	486.04	3940.50	3280.64	8659.37	58.78	734.58	31996.72
34HP60-102-9	490.76	5191.59	4323.60	10901.78	57.90	934.07	48027.25
34HP60-102-10	536.84	6140.11	5072.49	12869.19	80.90	88.34	137723.00
34HP60-102-11	475.68	5129.03	4173.76	10703.14	50.26	109.38	111259.20
34HP60-102-12	628.36	8158.57	6677.30	17176.94	110.46	163.26	163003.78
34HP60-102-13	996.17	16474.77	13309.45	33854.63	182.22	1049.91	216043.80
34HP60-102-14	979.41	15428.21	12474.29	32280.50	183.98	949.03	209231.12
34HP60-102-15	778.16	11916.51	9717.07	24909.74	109.46	645.74	179287.03

Appendix A. Raw trace element datasheets from laser ablation.

34HP60-102-16	500.68	6734.68	5462.57	13766.16	96.18	273.74	105844.62
34HP60-102-17	448.16	5676.87	4800.93	11958.83	65.54	243.94	111784.53
34HP60-102-18	345.04	3064.42	2457.91	6421.08	26.90	30.74	29750.99
SRM614-20	164.24	1690.65	1478.35	3542.46	1266.11	732.14	1737.79
SRM612-20	1092.53	17972.34	16426.39	40268.95	66806.24	37382.79	83337.25
SRM610-20	6322.92	123127.25	112695.38	311547.00	549601.69	321556.92	851631.42
AP1-20	53.00	524.64	395.90	1010.61	42.50	12.66	38.02
AP2-20	1275.85	24826.18	21131.34	54728.99	1455.87	1525.43	1448.75
AP3-20	12450.79	304985.16	248061.81	764159.18	16897.80	8459.43	12443.77
AP4-20	23452.81	650653.60	527454.63	1649765.92	29630.27	16633.63	26431.65

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-19	0.000109	0.001606	0.001354	0.003356	0.000861	0.000307	0.000841
SRM612-19	0.000928	0.015609	0.014236	0.034618	0.050089	0.016554	0.038572
SRM610-19	0.006650	0.125562	0.113801	0.309290	0.544907	0.264458	0.701370
AP1-19	0.000006	0.000097	0.000077	0.000192	0.000006	0.000001	0.000017
AP2-19	0.000191	0.003611	0.003056	0.008092	0.000225	0.000123	0.000158
AP3-19	0.001365	0.037699	0.030454	0.096077	0.001897	0.000671	0.001118
AP4-19	0.002001	0.059555	0.048278	0.149273	0.002592	0.001013	0.001789
34HP60-102-1	0.000034	0.000252	0.000213	0.000545	0.000005	0.000097	0.001990
34HP60-102-2	0.000039	0.000201	0.000171	0.000434	0.000003	0.000124	0.001751
34HP60-102-3	0.000056	0.000265	0.000223	0.000512	0.000004	0.000054	0.001444
34HP60-102-4	0.000107	0.000521	0.000433	0.001094	0.000009	0.000112	0.000401
34HP60-102-5	0.000097	0.000641	0.000539	0.001280	0.000016	0.000167	0.001225
34HP60-102-6	0.000076	0.000584	0.000476	0.001211	0.000008	0.000043	0.002261
34HP60-102-7	0.000111	0.000601	0.000502	0.001301	0.000011	0.000064	0.001680
34HP60-102-8	0.000084	0.000681	0.000567	0.001497	0.000010	0.000127	0.005532
34HP60-102-9	0.000074	0.000781	0.000650	0.001639	0.000009	0.000140	0.007222
34HP60-102-10	0.000046	0.000530	0.000438	0.001112	0.000007	0.000008	0.011896
34HP60-102-11	0.000045	0.000484	0.000394	0.001010	0.000005	0.000010	0.010500
34HP60-102-12	0.000055	0.000712	0.000583	0.001499	0.000010	0.000014	0.014223
34HP60-102-13	0.000079	0.001308	0.001057	0.002688	0.000014	0.000083	0.017153
34HP60-102-14	0.000076	0.001204	0.000973	0.002518	0.000014	0.000074	0.016324
34HP60-102-15	0.000065	0.001000	0.000816	0.002091	0.000009	0.000054	0.015051
34HP60-102-16	0.000060	0.000807	0.000654	0.001649	0.000012	0.000033	0.012680
34HP60-102-17	0.000051	0.000646	0.000546	0.001360	0.000007	0.000028	0.012715
34HP60-102-18	0.000052	0.000462	0.000370	0.000968	0.000004	0.000005	0.004484
SRM614-20	0.000114	0.001172	0.001025	0.002456	0.000878	0.000508	0.001205
SRM612-20	0.000733	0.012051	0.011014	0.027001	0.044794	0.025066	0.055879
SRM610-20	0.008012	0.156015	0.142797	0.394763	0.696404	0.407447	1.079107
AP1-20	0.000005	0.000051	0.000039	0.000099	0.000004	0.000001	0.000004
AP2-20	0.000117	0.002283	0.001943	0.005032	0.000134	0.000140	0.000133
AP3-20	0.000888	0.021760	0.017699	0.054521	0.001206	0.000604	0.000888
AP4-20	0.001500	0.041628	0.033746	0.105549	0.001896	0.001064	0.001691

standardize signal averages AP

AP1	0.000006	0.000074	0.000058	0.000145	0.000005	0.000001	0.000010
AP2	0.000154	0.002947	0.002500	0.006562	0.000179	0.000131	0.000145
AP3	0.001126	0.029729	0.024077	0.075299	0.001551	0.000637	0.001003
AP4	0.001751	0.050591	0.041012	0.127411	0.002244	0.001039	0.001740

linest from std sig ave

	0.207511	0.007360	0.009083	0.002917	0.002461	0.009842	0.004824
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standardize signal averages SRM

srm614-2	0.000111	0.001389	0.001190	0.002906	0.000869	0.000407	0.001023
srm612-2	0.000830	0.013830	0.012625	0.030809	0.047442	0.020810	0.047225
srm610-2	0.007331	0.140789	0.128299	0.352027	0.620655	0.335952	0.890238

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.655895	0.034215	0.037545	0.013697	0.006724	0.015659	0.005996
concentration data							
SRM614-19	1.93	1.01	1.05	0.84	0.18	0.26	0.35
SRM612-19	16.52	9.85	11.09	8.66	10.57	13.97	15.96
SRM610-19	118.34	79.26	88.65	77.37	115.00	223.22	290.17
AP1-19	0.53	0.28	0.28	0.22	0.01	0.01	0.03
AP2-19	15.80	10.60	11.07	9.42	0.22	0.48	0.30
AP3-19	112.97	110.69	110.35	111.80	1.86	2.63	2.15
AP4-19	165.62	174.86	174.93	173.71	2.54	3.98	3.44
34HP60-102-1	2.81	0.74	0.77	0.63	0.01	0.38	3.83
34HP60-102-2	3.23	0.59	0.62	0.50	0.00	0.49	3.37
34HP60-102-3	4.64	0.78	0.81	0.60	0.00	0.21	2.78
34HP60-102-4	8.82	1.53	1.57	1.27	0.01	0.44	0.77
34HP60-102-5	8.00	1.88	1.95	1.49	0.02	0.66	2.36
34HP60-102-6	6.28	1.72	1.72	1.41	0.01	0.17	4.35
34HP60-102-7	9.22	1.76	1.82	1.51	0.01	0.25	3.23
34HP60-102-8	6.96	2.00	2.06	1.74	0.01	0.50	10.65
34HP60-102-9	6.11	2.29	2.36	1.91	0.01	0.55	13.90
34HP60-102-10	3.84	1.56	1.59	1.29	0.01	0.03	22.89
34HP60-102-11	3.72	1.42	1.43	1.18	0.00	0.04	20.21
34HP60-102-12	4.54	2.09	2.11	1.74	0.01	0.06	27.37
34HP60-102-13	6.55	3.84	3.83	3.13	0.01	0.33	33.01
34HP60-102-14	6.33	3.53	3.53	2.93	0.01	0.29	31.41
34HP60-102-15	5.41	2.94	2.96	2.43	0.01	0.21	28.97
34HP60-102-16	4.97	2.37	2.37	1.92	0.01	0.13	24.40
34HP60-102-17	4.22	1.90	1.98	1.58	0.01	0.11	24.47
34HP60-102-18	4.30	1.36	1.34	1.13	0.00	0.02	8.63
SRM614-20	2.03	0.74	0.80	0.61	0.19	0.43	0.50
SRM612-20	13.04	7.61	8.58	6.75	9.45	21.16	23.12
SRM610-20	142.58	98.48	111.23	98.76	146.98	343.91	446.44
AP1-20	0.43	0.15	0.14	0.12	0.00	0.00	0.01
AP2-20	9.71	6.70	7.04	5.86	0.13	0.55	0.26
AP3-20	73.54	63.89	64.13	63.44	1.18	2.37	1.71
AP4-20	124.21	122.23	122.27	122.83	1.86	4.18	3.25

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-17	103.52	312.88	277.96	641.28	19.88	1.88	16.24
SRM614-17	273.72	2894.10	2597.85	6558.36	1448.85	344.88	1295.61
SRM612-17	1512.17	24058.50	21871.28	53705.14	72078.28	16739.57	47016.59
SRM610-17	9361.73	183123.34	167409.98	467662.84	952200.19	174938.34	554438.50
AP1-17	430.88	5367.15	4572.47	11266.50	338.52	124.60	211.84
AP2-17	2498.73	48036.35	40017.91	106836.24	3264.90	1335.93	2161.89
AP3-17	14587.56	355195.13	289708.47	893729.81	20164.47	6426.08	10191.34
AP4-17	32181.30	924793.88	747245.38	2351747.00	44495.21	15919.05	27083.19
34HP60-24-1	716.56	3166.66	2581.77	6519.12	106.88	307.96	3176.74
34HP60-24-2	632.12	2853.58	2348.25	6043.79	658.04	214.56	3135.10
34HP60-24-3	668.48	3508.78	2953.46	7381.68	50.12	498.72	3376.98
34HP60-24-4	1162.73	12120.87	9933.94	24389.02	162.32	301.28	19551.91
34HP60-24-5	1499.61	20793.92	17054.02	44100.41	310.44	351.28	52246.70
34HP60-24-6	1696.85	23721.09	19136.51	50046.64	321.40	549.92	51656.49
34HP60-24-7	1363.73	15491.09	12488.79	32438.14	198.36	109.08	25516.90
34HP60-24-8	1388.05	16957.26	13944.12	36218.97	296.28	45.40	22662.49
34HP60-24-9	1635.97	22291.53	18033.98	47302.91	274.36	59.36	32268.38
34HP60-24-10	1536.13	20704.12	16851.46	43851.97	307.20	152.52	63757.96
34HP60-24-11	1451.45	21435.44	17457.30	44933.09	269.68	189.16	70188.71
34HP60-24-12	1519.65	24256.22	19851.19	51084.65	394.20	207.96	84984.16
SRM614-18	325.56	1547.81	1462.53	3549.94	1186.97	650.12	1643.09
SRM612-18	1439.09	20154.39	18151.30	45137.54	67149.14	38357.73	90425.91
SRM610-18	6917.72	133522.55	121567.96	337610.66	620044.69	348051.72	880249.63
AP1-18	267.56	1717.33	1501.89	3691.74	65.00	16.36	55.44
AP2-18	2044.41	35960.12	30225.57	79171.13	1915.53	1745.17	1861.53
AP3-18	12116.87	292296.94	239940.34	728924.75	16797.65	8322.25	11419.78
AP4-18	25487.78	718524.19	582686.56	1824502.00	33491.63	18794.99	30383.73
blank-18	197.52	126.60	102.32	277.80	9.84	0.00	0.28
blank average	150.52	219.74	190.14	459.54	14.86	0.94	8.26

blank subtraction

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-17	123.20	2674.36	2407.71	6098.81	1433.99	343.94	1287.35
SRM612-17	1361.65	23838.75	21681.14	53245.60	72063.42	16738.63	47008.33
SRM610-17	9211.21	182903.60	167219.84	467203.30	952185.33	174937.40	554430.24
AP1-17	280.36	5147.41	4382.32	10806.96	323.66	123.66	203.58
AP2-17	2348.21	47816.61	39827.76	106376.70	3250.04	1334.99	2153.63
AP3-17	14437.04	354975.39	289518.33	893270.27	20149.61	6425.14	10183.08
AP4-17	32030.78	924574.14	747055.24	2351287.46	44480.35	15918.11	27074.93
34HP60-24-1	566.04	2946.92	2391.63	6059.57	92.02	307.02	3168.48
34HP60-24-2	481.60	2633.83	2158.11	5584.25	643.18	213.62	3126.84
34HP60-24-3	517.96	3289.04	2763.32	6922.14	35.26	497.78	3368.72
34HP60-24-4	1012.21	11901.13	9743.79	23929.48	147.46	300.34	19543.65
34HP60-24-5	1349.09	20574.17	16863.87	43640.87	295.58	350.34	52238.43
34HP60-24-6	1546.33	23501.35	18946.37	49587.10	306.54	548.98	51648.23
34HP60-24-7	1213.21	15271.35	12298.65	31978.60	183.50	108.14	25508.64
34HP60-24-8	1237.53	16737.51	13753.98	35759.42	281.42	44.46	22654.23
34HP60-24-9	1485.45	22071.78	17843.84	46843.36	259.50	58.42	32260.12
34HP60-24-10	1385.61	20484.38	16661.31	43392.42	292.34	151.58	63749.70
34HP60-24-11	1300.93	21215.70	17267.16	44473.55	254.82	188.22	70180.45
34HP60-24-12	1369.13	24036.48	19661.05	50625.11	379.34	207.02	84975.90
SRM614-18	175.04	1328.07	1272.39	3090.40	1172.11	649.18	1634.83
SRM612-18	1288.57	19934.65	17961.16	44677.99	67134.28	38356.79	90417.65
SRM610-18	6767.20	133302.81	121377.82	337151.12	620029.83	348050.78	880241.37
AP1-18	117.04	1497.59	1311.75	3232.20	50.14	15.42	47.18
AP2-18	1893.89	35740.38	30035.43	78711.58	1900.67	1744.23	1853.27
AP3-18	11966.35	292077.20	239750.20	728465.21	16782.79	8321.31	11411.52
AP4-18	25337.26	718304.45	582496.42	1824042.46	33476.77	18794.05	30375.47

zero correction

SRM614-17	123.20	2674.36	2407.71	6098.81	1433.99	343.94	1287.35
SRM612-17	1361.65	23838.75	21681.14	53245.60	72063.42	16738.63	47008.33
SRM610-17	9211.21	182903.60	167219.84	467203.30	952185.33	174937.40	554430.24
AP1-17	280.36	5147.41	4382.32	10806.96	323.66	123.66	203.58
AP2-17	2348.21	47816.61	39827.76	106376.70	3250.04	1334.99	2153.63
AP3-17	14437.04	354975.39	289518.33	893270.27	20149.61	6425.14	10183.08
AP4-17	32030.78	924574.14	747055.24	2351287.46	44480.35	15918.11	27074.93
34HP60-24-1	566.04	2946.92	2391.63	6059.57	92.02	307.02	3168.48
34HP60-24-2	481.60	2633.83	2158.11	5584.25	643.18	213.62	3126.84
34HP60-24-3	517.96	3289.04	2763.32	6922.14	35.26	497.78	3368.72
34HP60-24-4	1012.21	11901.13	9743.79	23929.48	147.46	300.34	19543.65
34HP60-24-5	1349.09	20574.17	16863.87	43640.87	295.58	350.34	52238.43
34HP60-24-6	1546.33	23501.35	18946.37	49587.10	306.54	548.98	51648.23
34HP60-24-7	1213.21	15271.35	12298.65	31978.60	183.50	108.14	25508.64
34HP60-24-8	1237.53	16737.51	13753.98	35759.42	281.42	44.46	22654.23
34HP60-24-9	1485.45	22071.78	17843.84	46843.36	259.50	58.42	32260.12
34HP60-24-10	1385.61	20484.38	16661.31	43392.42	292.34	151.58	63749.70
34HP60-24-11	1300.93	21215.70	17267.16	44473.55	254.82	188.22	70180.45
34HP60-24-12	1369.13	24036.48	19661.05	50625.11	379.34	207.02	84975.90
SRM614-18	175.04	1328.07	1272.39	3090.40	1172.11	649.18	1634.83
SRM612-18	1288.57	19934.65	17961.16	44677.99	67134.28	38356.79	90417.65
SRM610-18	6767.20	133302.81	121377.82	337151.12	620029.83	348050.78	880241.37
AP1-18	117.04	1497.59	1311.75	3232.20	50.14	15.42	47.18
AP2-18	1893.89	35740.38	30035.43	78711.58	1900.67	1744.23	1853.27
AP3-18	11966.35	292077.20	239750.20	728465.21	16782.79	8321.31	11411.52
AP4-18	25337.26	718304.45	582496.42	1824042.46	33476.77	18794.05	30375.47

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-17	0.000057	0.001243	0.001119	0.002836	0.000667	0.000160	0.000599
SRM612-17	0.000695	0.012170	0.011069	0.027183	0.036790	0.008545	0.023999
SRM610-17	0.007136	0.141688	0.129538	0.361923	0.737619	0.135517	0.429494
AP1-17	0.000018	0.000323	0.000275	0.000678	0.000020	0.000008	0.000013

Appendix A. Raw trace element datasheets from laser ablation.

AP2-17	0.000153	0.003116	0.002595	0.006931	0.000212	0.000087	0.000140
AP3-17	0.000870	0.021386	0.017442	0.053816	0.001214	0.000387	0.000613
AP4-17	0.001569	0.045290	0.036594	0.115177	0.002179	0.000780	0.001326
34HP60-24-1	0.000118	0.000614	0.000498	0.001263	0.000019	0.000064	0.000660
34HP60-24-2	0.000093	0.000507	0.000416	0.001076	0.000124	0.000041	0.000602
34HP60-24-3	0.000092	0.000584	0.000491	0.001229	0.000006	0.000088	0.000598
34HP60-24-4	0.000124	0.001460	0.001195	0.002935	0.000018	0.000037	0.002397
34HP60-24-5	0.000120	0.001825	0.001496	0.003871	0.000026	0.000031	0.004634
34HP60-24-6	0.000133	0.002024	0.001632	0.004270	0.000026	0.000047	0.004448
34HP60-24-7	0.000125	0.001568	0.001263	0.003284	0.000019	0.000011	0.002620
34HP60-24-8	0.000121	0.001643	0.001350	0.003510	0.000028	0.000004	0.002223
34HP60-24-9	0.000131	0.001947	0.001574	0.004133	0.000023	0.000005	0.002846
34HP60-24-10	0.000130	0.001927	0.001568	0.004083	0.000028	0.000014	0.005998
34HP60-24-11	0.000111	0.001805	0.001469	0.003784	0.000022	0.000016	0.005971
34HP60-24-12	0.000106	0.001862	0.001523	0.003921	0.000029	0.000016	0.006582
SRM614-18	0.000143	0.001082	0.001036	0.002517	0.000955	0.000529	0.001332
SRM612-18	0.000850	0.013155	0.011852	0.029483	0.044302	0.025311	0.059666
SRM610-18	0.008328	0.164045	0.149370	0.414904	0.763020	0.428318	1.083241
AP1-18	0.000010	0.000132	0.000116	0.000286	0.000004	0.000001	0.000004
AP2-18	0.000150	0.002824	0.002373	0.006220	0.000150	0.000138	0.000146
AP3-18	0.000858	0.020949	0.017196	0.052249	0.001204	0.000597	0.000818
AP4-18	0.001562	0.044278	0.035907	0.112439	0.002064	0.001159	0.001872

standardize signal averages AP

AP1	0.000014	0.000228	0.000195	0.000482	0.000012	0.000005	0.000008
AP2	0.000151	0.002970	0.002484	0.006575	0.000181	0.000112	0.000143
AP3	0.000864	0.021167	0.017319	0.053032	0.001209	0.000492	0.000716
AP4	0.001565	0.044784	0.036251	0.113808	0.002121	0.000969	0.001599

linest from std sig ave

	0.241671	0.008687	0.010715	0.003424	0.002754	0.010992	0.005471
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standardize signal averages SRM

srM614-2	0.000100	0.001163	0.001078	0.002676	0.000811	0.000344	0.000965
srM612-2	0.000773	0.012663	0.011461	0.028333	0.040546	0.016928	0.041833
srM610-2	0.007732	0.152866	0.139454	0.388414	0.750319	0.281917	0.756368

linest from std sig ave

	0.622884	0.031554	0.034590	0.012426	0.005567	0.018662	0.007057
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concentration data

SRM614-17	1.19	0.93	1.03	0.83	0.16	0.15	0.28
SRM612-17	14.41	9.07	10.17	7.98	8.69	8.06	11.26
SRM610-17	147.89	105.56	119.04	106.28	174.20	127.75	201.52
AP1-17	1.69	1.12	1.17	0.93	0.02	0.03	0.03
AP2-17	14.75	10.80	11.09	9.47	0.23	0.38	0.31
AP3-17	83.86	74.11	74.56	73.51	1.33	1.70	1.34
AP4-17	151.27	156.95	156.43	157.33	2.39	3.42	2.89
34HP60-24-1	11.37	2.13	2.13	1.72	0.02	0.28	1.44
34HP60-24-2	8.94	1.76	1.78	1.47	0.14	0.18	1.31
34HP60-24-3	8.87	2.02	2.10	1.68	0.01	0.39	1.31
34HP60-24-4	11.97	5.06	5.11	4.01	0.02	0.16	5.23
34HP60-24-5	11.54	6.32	6.39	5.29	0.03	0.14	10.11
34HP60-24-6	12.84	7.01	6.97	5.83	0.03	0.21	9.71
34HP60-24-7	12.01	5.44	5.40	4.49	0.02	0.05	5.72
34HP60-24-8	11.71	5.69	5.77	4.79	0.03	0.02	4.85
34HP60-24-9	12.64	6.75	6.73	5.65	0.03	0.02	6.21
34HP60-24-10	12.57	6.68	6.70	5.58	0.03	0.06	13.09
34HP60-24-11	10.67	6.26	6.28	5.17	0.02	0.07	13.03
34HP60-24-12	10.22	6.45	6.51	5.36	0.03	0.07	14.36
SRM614-18	2.95	0.81	0.95	0.74	0.23	0.50	0.62
SRM612-18	17.62	9.80	10.89	8.66	10.46	23.86	28.00
SRM610-18	172.61	122.22	137.27	121.84	180.19	403.78	508.26
AP1-18	1.00	0.46	0.50	0.39	0.00	0.01	0.01
AP2-18	14.43	9.79	10.15	8.50	0.16	0.60	0.32
AP3-18	82.75	72.60	73.51	71.37	1.32	2.62	1.79
AP4-18	150.58	153.45	153.49	153.59	2.27	5.08	4.09

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

Appendix A. Raw trace element datasheets from laser ablation.

raw data							
blank-15	89.48	232.00	204.84	559.40	7.88	2.24	7.40
SRM614-15	397.84	4035.82	3629.38	8539.21	2106.61	643.48	1867.81
SRM612-15	2701.54	44379.01	39725.34	101979.90	163426.20	34693.91	95995.82
SRM610-15	16408.09	351141.34	316630.19	927452.25	2141203.50	364191.81	1282552.60
AP1-15	216.56	825.24	656.04	1535.93	98.72	14.56	68.84
AP2-15	1733.57	30999.06	26039.63	67052.78	1913.93	1190.13	1414.41
AP3-15	12458.15	303010.31	247755.75	758145.88	15316.09	8462.13	12968.35
AP4-15	16982.18	430859.13	350285.84	1086299.80	20310.27	12372.03	17572.74
34BV166-1	392.84	377.84	317.20	860.64	26.68	15.28	997.81
34BV166-2	414.96	1034.45	979.57	1831.77	83.44	6.52	1353.21
34BV166-3	365.36	257.92	208.84	537.04	18.92	18.92	437.68
34BV166-4	911.13	2094.37	1981.05	3452.34	73.64	44.80	1321.09
34BV166-5	948.09	930.65	789.92	2083.37	32.92	33.44	990.65
34BV166-6	950.41	1023.53	828.88	2106.65	23.80	31.76	1574.61
SRM614-16	297.68	1925.69	1668.89	3891.02	1649.93	865.80	2088.13
SRM612-16	1847.09	28420.12	26000.99	65417.69	106352.36	57507.04	130584.70
SRM610-16	8764.57	175088.55	159878.91	453072.91	872350.69	465586.19	1166609.40
AP1-16	215.16	615.00	514.68	1252.21	60.28	17.32	91.80
AP2-16	1430.61	23929.06	20350.99	52371.06	1475.57	1529.97	1545.81
AP3-16	9652.01	230552.42	189788.88	569944.88	11095.02	8878.21	12597.15
AP4-16	11775.03	283640.47	232451.70	708181.50	12837.71	12461.31	16097.13
blank-16	146.40	147.16	124.44	335.24	9.40	0.00	3.24
blank average	117.94	189.58	164.64	447.32	8.64	1.12	5.32
blank subtraction							
SRM614-15	279.90	3846.24	3464.74	8091.89	2097.97	642.36	1862.49
SRM612-15	2583.59	44189.43	39560.70	101532.58	163417.56	34692.79	95990.50
SRM610-15	16290.15	350951.76	316465.55	927004.93	2141194.86	364190.69	1282547.28
AP1-15	98.62	635.66	491.40	1088.61	90.08	13.44	63.52
AP2-15	1615.63	30809.47	25874.99	66605.46	1905.29	1189.01	1409.09
AP3-15	12340.21	302820.73	247591.11	757698.56	15307.45	8461.01	12963.03
AP4-15	16864.24	430669.55	350121.20	1085852.48	20301.63	12370.91	17567.42
34BV166-1	274.90	188.26	152.56	413.32	18.04	14.16	992.49
34BV166-2	297.02	844.86	814.92	1384.45	74.80	5.40	1347.89
34BV166-3	247.42	68.34	44.20	89.72	10.28	17.80	432.36
34BV166-4	793.18	1904.79	1816.41	3005.02	65.00	43.68	1315.77
34BV166-5	830.14	741.06	625.28	1636.05	24.28	32.32	985.33
34BV166-6	832.46	833.94	664.24	1659.33	15.16	30.64	1569.29
SRM614-16	179.74	1736.11	1504.25	3443.70	1641.29	864.68	2082.81
SRM612-16	1729.15	28230.54	25836.35	64970.37	106343.72	57505.92	130579.38
SRM610-16	8646.63	174898.97	159714.27	452625.59	872342.05	465585.07	1166604.08
AP1-16	97.22	425.42	350.04	804.88	51.64	16.20	86.48
AP2-16	1312.67	23739.47	20186.35	51923.73	1466.93	1528.85	1540.49
AP3-16	9534.07	230362.84	189624.24	569497.56	11086.38	8877.09	12591.83
AP4-16	11657.09	283450.89	232287.06	707734.18	12829.07	12460.19	16091.81
zero correction							
SRM614-15	279.90	3846.24	3464.74	8091.89	2097.97	642.36	1862.49
SRM612-15	2583.59	44189.43	39560.70	101532.58	163417.56	34692.79	95990.50
SRM610-15	16290.15	350951.76	316465.55	927004.93	2141194.86	364190.69	1282547.28
AP1-15	98.62	635.66	491.40	1088.61	90.08	13.44	63.52
AP2-15	1615.63	30809.47	25874.99	66605.46	1905.29	1189.01	1409.09
AP3-15	12340.21	302820.73	247591.11	757698.56	15307.45	8461.01	12963.03
AP4-15	16864.24	430669.55	350121.20	1085852.48	20301.63	12370.91	17567.42
34BV166-1	274.90	188.26	152.56	413.32	18.04	14.16	992.49
34BV166-2	297.02	844.86	814.92	1384.45	74.80	5.40	1347.89
34BV166-3	247.42	68.34	44.20	89.72	10.28	17.80	432.36
34BV166-4	793.18	1904.79	1816.41	3005.02	65.00	43.68	1315.77
34BV166-5	830.14	741.06	625.28	1636.05	24.28	32.32	985.33
34BV166-6	832.46	833.94	664.24	1659.33	15.16	30.64	1569.29
SRM614-16	179.74	1736.11	1504.25	3443.70	1641.29	864.68	2082.81
SRM612-16	1729.15	28230.54	25836.35	64970.37	106343.72	57505.92	130579.38
SRM610-16	8646.63	174898.97	159714.27	452625.59	872342.05	465585.07	1166604.08
AP1-16	97.22	425.42	350.04	804.88	51.64	16.20	86.48
AP2-16	1312.67	23739.47	20186.35	51923.73	1466.93	1528.85	1540.49
AP3-16	9534.07	230362.84	189624.24	569497.56	11086.38	8877.09	12591.83
AP4-16	11657.09	283450.89	232287.06	707734.18	12829.07	12460.19	16091.81
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-15	0.000098	0.001351	0.001217	0.002841	0.000737	0.000226	0.000654
SRM612-15	0.000847	0.014482	0.012965	0.033275	0.053557	0.011370	0.031459
SRM610-15	0.008750	0.188506	0.169982	0.497920	1.150094	0.195617	0.688891
AP1-15	0.000007	0.000047	0.000037	0.000081	0.000007	0.000001	0.000005
AP2-15	0.000114	0.002174	0.001826	0.004699	0.000134	0.000084	0.000099
AP3-15	0.000661	0.016214	0.013257	0.040570	0.000820	0.000453	0.000694
AP4-15	0.000994	0.025375	0.020629	0.063979	0.001196	0.000729	0.001035
34BV166-1	0.000066	0.000045	0.000037	0.000099	0.000004	0.000003	0.000239
34BV166-2	0.000084	0.000238	0.000230	0.000390	0.000021	0.000002	0.000380
34BV166-3	0.000076	0.000021	0.000014	0.000028	0.000003	0.000005	0.000133
34BV166-4	0.000272	0.000654	0.000624	0.001032	0.000022	0.000015	0.000452
34BV166-5	0.000270	0.000241	0.000203	0.000532	0.000008	0.000011	0.000320
34BV166-6	0.000196	0.000197	0.000157	0.000391	0.000004	0.000007	0.000370
SRM614-16	0.000104	0.001008	0.000874	0.002000	0.000953	0.000502	0.001210
SRM612-16	0.000747	0.012188	0.011155	0.028050	0.045913	0.024828	0.056376
SRM610-16	0.007757	0.156904	0.143281	0.406055	0.782588	0.417682	1.046573
AP1-16	0.000008	0.000036	0.000029	0.000067	0.000004	0.000001	0.000007
AP2-16	0.000110	0.001981	0.001685	0.004334	0.000122	0.000128	0.000129
AP3-16	0.000585	0.014136	0.011636	0.034946	0.000680	0.000545	0.000773
AP4-16	0.000802	0.019511	0.015989	0.048716	0.000883	0.000858	0.001108
standardize signal averages AP							
AP1	0.000008	0.000041	0.000033	0.000074	0.000006	0.000001	0.000006
AP2	0.000112	0.002078	0.001755	0.004517	0.000128	0.000106	0.000114
AP3	0.000623	0.015175	0.012447	0.037758	0.000750	0.000499	0.000733
AP4	0.000898	0.022443	0.018309	0.056348	0.001040	0.000793	0.001071
linest from std sig ave							
	0.394354	0.015927	0.019488	0.006362	0.005251	0.012797	0.007502
standardize signal averages SRM							
srM614-2	0.000101	0.001179	0.001045	0.002421	0.000845	0.000364	0.000932
srM612-2	0.000797	0.013335	0.012060	0.030663	0.049735	0.018099	0.043918
srM610-2	0.008253	0.172705	0.156632	0.451988	0.966341	0.306649	0.867732
linest from std sig ave							
	0.583718	0.027940	0.030808	0.010681	0.004323	0.017157	0.006152
concentration data							
SRM614-15	3.32	1.84	2.03	1.55	0.33	0.25	0.42
SRM612-15	28.64	19.78	21.67	18.16	24.12	12.48	20.24
SRM610-15	295.93	257.49	284.09	271.67	517.95	214.70	443.24
AP1-15	1.16	0.30	0.28	0.21	0.01	0.01	0.01
AP2-15	17.93	13.81	14.19	11.93	0.28	0.43	0.30
AP3-15	103.95	103.02	103.07	102.97	1.72	2.31	2.08
AP4-15	156.32	161.23	160.38	162.38	2.51	3.72	3.10
34BV166-1	10.40	0.29	0.29	0.25	0.01	0.02	0.71
34BV166-2	13.18	1.51	1.79	0.99	0.04	0.01	1.14
34BV166-3	11.98	0.13	0.11	0.07	0.01	0.03	0.40
34BV166-4	42.86	4.16	4.85	2.62	0.05	0.08	1.35
34BV166-5	42.48	1.53	1.58	1.35	0.02	0.05	0.96
34BV166-6	30.87	1.25	1.22	0.99	0.01	0.04	1.11
SRM614-16	3.53	1.38	1.46	1.09	0.43	0.55	0.78
SRM612-16	25.25	16.65	18.64	15.30	20.68	27.25	36.27
SRM610-16	262.35	214.32	239.47	221.55	352.44	458.42	673.38
AP1-16	1.28	0.23	0.23	0.17	0.01	0.01	0.02
AP2-16	17.24	12.59	13.10	11.00	0.26	0.65	0.38
AP3-16	92.04	89.82	90.46	88.69	1.43	2.78	2.31
AP4-16	126.24	123.97	124.31	123.64	1.85	4.38	3.32
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Appendix A. Raw trace element datasheets from laser ablation.

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-13	193.84	130.96	119.48	308.32	5.60	1.24	0.32
SRM614-13	514.76	2277.69	1982.61	4789.71	2157.13	685.20	2058.61
SRM612-13	2177.97	29214.60	26573.63	66748.98	109945.66	38974.34	97297.59
SRM610-13	10372.38	199602.08	181064.94	510141.97	937068.75	311529.44	892809.94
AP1-13	374.84	1325.73	1050.61	2962.74	575.76	155.36	749.16
AP2-13	2221.77	37102.05	30962.69	81185.86	2441.93	1652.61	2252.29
AP3-13	11224.38	252982.06	207254.28	622595.69	13358.28	7629.36	11176.42
AP4-13	16081.61	394908.63	321249.09	988990.81	17533.14	11941.79	16902.02
W3-1	1739.45	3898.10	3280.34	8396.01	265.88	98.72	341.16
W3-2	1706.89	4081.70	3432.78	8434.09	113.36	90.92	63.40
W3-3	1803.65	4259.18	3564.54	8941.01	200.64	96.24	145.16
W3-4	2204.57	5925.83	4775.51	12123.39	304.76	114.48	201.80
W3-5	2202.57	6899.08	5933.75	15151.49	206.24	141.16	50.04
W3-6	2069.57	6394.44	5565.27	13297.44	384.16	151.56	48.04
W3-7	2365.77	6711.44	5805.99	13625.64	1126.41	637.76	197.48
W3-8	2314.09	7898.92	6824.24	15854.57	1191.25	292.80	115.32
W3-9	2025.33	6292.44	5255.51	13232.40	300.08	224.08	90.20
W3-10	3152.66	9748.66	8169.85	20726.20	455.16	692.72	444.60
W3-11	2910.46	8776.05	7335.84	18716.27	366.68	735.96	322.92
W3-12	2661.41	7729.32	6516.28	16222.29	190.20	498.00	144.04
SRM614-14	755.16	2244.49	1942.29	4854.15	2306.93	1232.73	3125.66
SRM612-14	2627.29	33962.51	31052.85	78824.00	134394.47	66577.38	165573.09
SRM610-14	8607.93	160491.27	146465.22	411367.63	732963.06	421659.06	1117350.10
AP1-14	312.64	579.52	485.12	1245.17	58.76	23.72	99.20
AP2-14	1579.65	24837.06	20673.48	54149.27	1459.53	1717.49	1878.29
AP3-14	10134.86	236660.13	194413.66	590509.56	12106.71	8956.77	12403.07
AP4-14	13368.84	332013.53	270885.72	832930.94	14607.80	13390.64	18306.82
blank-14	367.68	125.96	115.44	322.64	6.24	1.08	4.92
blank average	280.76	128.46	117.46	315.48	5.92	1.16	2.62
blank subtraction							
SRM614-13	234.00	2149.23	1865.15	4474.23	2151.21	684.04	2055.99
SRM612-13	1897.21	29086.14	26456.17	66433.50	109939.74	38973.18	97294.97
SRM610-13	10091.62	199473.62	180947.48	509826.49	937062.83	311528.28	892807.32
AP1-13	94.08	1197.27	933.15	2647.25	569.84	154.20	746.54
AP2-13	1941.01	36973.59	30845.23	80870.38	2436.01	1651.45	2249.67
AP3-13	10943.62	252853.60	207136.82	622280.21	13352.35	7628.20	11173.80
AP4-13	15800.85	394780.17	321131.63	988675.33	17527.22	11940.63	16899.40
W3-1	1458.69	3769.64	3162.88	8080.53	259.96	97.56	338.54
W3-2	1426.13	3953.24	3315.32	8118.61	107.44	89.76	60.78
W3-3	1522.89	4130.72	3447.08	8625.53	194.72	95.08	142.54
W3-4	1923.81	5797.37	4658.05	11807.91	298.84	113.32	199.18
W3-5	1921.81	6770.62	5816.29	14836.00	200.32	140.00	47.42
W3-6	1788.81	6265.98	5447.81	12981.95	378.24	150.40	45.42
W3-7	2085.01	6582.98	5688.53	13310.16	1120.49	636.60	194.86
W3-8	2033.33	7770.46	6706.78	15539.09	1185.33	291.64	112.70
W3-9	1744.57	6163.97	5138.05	12916.91	294.16	222.92	87.58
W3-10	2871.90	9620.19	8052.39	20410.72	449.24	691.56	441.98
W3-11	2629.69	8647.59	7218.38	18400.78	360.76	734.80	320.30
W3-12	2380.65	7600.86	6398.82	15906.81	184.28	496.84	141.42
SRM614-14	474.40	2116.03	1824.83	4538.67	2301.01	1231.57	3123.04
SRM612-14	2346.53	33834.05	30935.39	78508.52	134388.55	66576.21	165570.47
SRM610-14	8327.17	160362.81	146347.76	411052.15	732957.14	421657.90	1117347.48
AP1-14	31.88	451.06	367.66	929.69	52.84	22.56	96.58
AP2-14	1298.89	24708.60	20556.02	53833.78	1453.61	1716.33	1875.67
AP3-14	9854.10	236531.67	194296.20	590194.08	12100.79	8955.61	12400.45
AP4-14	13088.07	331885.07	270768.26	832615.46	14601.88	13389.48	18304.20
zero correction							
SRM614-13	234.00	2149.23	1865.15	4474.23	2151.21	684.04	2055.99
SRM612-13	1897.21	29086.14	26456.17	66433.50	109939.74	38973.18	97294.97
SRM610-13	10091.62	199473.62	180947.48	509826.49	937062.83	311528.28	892807.32
AP1-13	94.08	1197.27	933.15	2647.25	569.84	154.20	746.54
AP2-13	1941.01	36973.59	30845.23	80870.38	2436.01	1651.45	2249.67
AP3-13	10943.62	252853.60	207136.82	622280.21	13352.35	7628.20	11173.80
AP4-13	15800.85	394780.17	321131.63	988675.33	17527.22	11940.63	16899.40
W3-1	1458.69	3769.64	3162.88	8080.53	259.96	97.56	338.54
W3-2	1426.13	3953.24	3315.32	8118.61	107.44	89.76	60.78
W3-3	1522.89	4130.72	3447.08	8625.53	194.72	95.08	142.54
W3-4	1923.81	5797.37	4658.05	11807.91	298.84	113.32	199.18
W3-5	1921.81	6770.62	5816.29	14836.00	200.32	140.00	47.42
W3-6	1788.81	6265.98	5447.81	12981.95	378.24	150.40	45.42
W3-7	2085.01	6582.98	5688.53	13310.16	1120.49	636.60	194.86
W3-8	2033.33	7770.46	6706.78	15539.09	1185.33	291.64	112.70
W3-9	1744.57	6163.97	5138.05	12916.91	294.16	222.92	87.58

Appendix A. Raw trace element datasheets from laser ablation.

W3-10	2871.90	9620.19	8052.39	20410.72	449.24	691.56	441.98
W3-11	2629.69	8647.59	7218.38	18400.78	360.76	734.80	320.30
W3-12	2380.65	7600.86	6398.82	15906.81	184.28	496.84	141.42
SRM614-14	474.40	2116.03	1824.83	4538.67	2301.01	1231.57	3123.04
SRM612-14	2346.53	33834.05	30935.39	78508.52	134388.55	66576.21	165570.47
SRM610-14	8327.17	160362.81	146347.76	411052.15	732957.14	421657.90	1117347.48
AP1-14	31.88	451.06	367.66	929.69	52.84	22.56	96.58
AP2-14	1298.89	24708.60	20556.02	53833.78	1453.61	1716.33	1875.67
AP3-14	9854.10	236531.67	194296.20	590194.08	12100.79	8955.61	12400.45
AP4-14	13088.07	331885.07	270768.26	832615.46	14601.88	13389.48	18304.20

certified concentration							
SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-13	0.000080	0.000737	0.000640	0.001535	0.000738	0.000235	0.000705
SRM612-13	0.000651	0.009987	0.009084	0.022811	0.037749	0.013382	0.033407
SRM610-13	0.008526	0.168533	0.152880	0.430746	0.791712	0.263206	0.754321
AP1-13	0.000006	0.000077	0.000060	0.000169	0.000036	0.000010	0.000048
AP2-13	0.000119	0.002258	0.001884	0.004939	0.000149	0.000101	0.000137
AP3-13	0.000633	0.014619	0.011975	0.035977	0.000772	0.000441	0.000646
AP4-13	0.000904	0.022577	0.018365	0.056541	0.001002	0.000683	0.000966
W3-1	0.000242	0.000625	0.000525	0.001341	0.000043	0.000016	0.000056
W3-2	0.000221	0.000612	0.000513	0.001256	0.000017	0.000014	0.000009
W3-3	0.000243	0.000659	0.000550	0.001375	0.000031	0.000015	0.000023
W3-4	0.000333	0.001003	0.000806	0.002044	0.000052	0.000020	0.000034
W3-5	0.000305	0.001075	0.000923	0.002355	0.000032	0.000022	0.000008
W3-6	0.000279	0.000976	0.000849	0.002023	0.000059	0.000023	0.000007
W3-7	0.000396	0.001250	0.001080	0.002528	0.000213	0.000121	0.000037
W3-8	0.000338	0.001293	0.001116	0.002586	0.000197	0.000049	0.000019
W3-9	0.000280	0.000990	0.000825	0.002074	0.000047	0.000036	0.000014
W3-10	0.000328	0.001100	0.000920	0.002333	0.000051	0.000079	0.000051
W3-11	0.000300	0.000985	0.000822	0.002096	0.000041	0.000084	0.000036
W3-12	0.000267	0.000851	0.000717	0.001782	0.000021	0.000056	0.000016
SRM614-14	0.000201	0.000896	0.000773	0.001923	0.000975	0.000522	0.001323
SRM612-14	0.000936	0.013489	0.012334	0.031301	0.053580	0.026543	0.066012
SRM610-14	0.008923	0.171832	0.156815	0.440451	0.785379	0.451815	1.197262
AP1-14	0.000002	0.000035	0.000029	0.000072	0.000004	0.000002	0.000008
AP2-14	0.000097	0.001846	0.001536	0.004022	0.000109	0.000128	0.000140
AP3-14	0.000677	0.016251	0.013349	0.040549	0.000831	0.000615	0.000852
AP4-14	0.000890	0.022581	0.018422	0.056649	0.000993	0.000911	0.001245

standardize signal averages AP							
AP1	0.000004	0.000056	0.000044	0.000121	0.000020	0.000006	0.000028
AP2	0.000108	0.002052	0.001710	0.004480	0.000129	0.000115	0.000139
AP3	0.000655	0.015435	0.012662	0.038263	0.000802	0.000528	0.000749
AP4	0.000897	0.022579	0.018394	0.056595	0.000998	0.000797	0.001106

linest from std sig ave							
	0.387342	0.015771	0.019313	0.006315	0.005241	0.012539	0.007334

standardize signal averages SRM							
srm614-2	0.000141	0.000817	0.000707	0.001729	0.000856	0.000378	0.001014
srm612-2	0.000793	0.011738	0.010709	0.027056	0.045665	0.019963	0.049710
srm610-2	0.008725	0.170182	0.154847	0.435598	0.788546	0.357511	0.975791

linest from std sig ave							
	0.552437	0.028367	0.031176	0.011085	0.005297	0.014718	0.005470

concentration data							
SRM614-13	2.67	1.00	1.06	0.83	0.33	0.25	0.44
SRM612-13	21.64	13.51	15.05	12.35	16.97	14.39	21.01
SRM610-13	283.24	227.96	253.22	233.28	355.89	283.05	474.44

Appendix A. Raw trace element datasheets from laser ablation.

AP1-13	0.93	0.48	0.46	0.43	0.08	0.05	0.14
AP2-13	18.32	14.21	14.51	12.44	0.31	0.50	0.40
AP3-13	97.77	91.98	92.27	90.63	1.61	2.21	1.89
AP4-13	139.63	142.05	141.50	142.44	2.10	3.42	2.83
W3-1	37.40	3.94	4.04	3.38	0.09	0.08	0.16
W3-2	34.10	3.85	3.95	3.17	0.03	0.07	0.03
W3-3	37.52	4.14	4.23	3.46	0.06	0.08	0.07
W3-4	51.45	6.31	6.21	5.15	0.11	0.10	0.10
W3-5	47.13	6.76	7.11	5.93	0.07	0.11	0.02
W3-6	43.07	6.14	6.54	5.10	0.12	0.12	0.02
W3-7	61.19	7.87	8.32	6.37	0.44	0.60	0.11
W3-8	52.28	8.14	8.60	6.51	0.41	0.24	0.05
W3-9	43.29	6.23	6.36	5.23	0.10	0.18	0.04
W3-10	50.73	6.92	7.09	5.88	0.11	0.40	0.15
W3-11	46.29	6.20	6.33	5.28	0.09	0.42	0.11
W3-12	41.20	5.36	5.52	4.49	0.04	0.28	0.05
SRM614-14	6.68	1.21	1.28	1.04	0.44	0.56	0.83
SRM612-14	31.08	18.25	20.43	16.95	24.09	28.54	41.52
SRM610-14	296.41	232.42	259.73	238.54	353.05	485.87	753.04
AP1-14	0.38	0.22	0.22	0.18	0.01	0.01	0.02
AP2-14	14.99	11.61	11.83	10.13	0.23	0.64	0.41
AP3-14	104.62	102.25	102.85	102.15	1.74	3.08	2.49
AP4-14	137.60	142.07	141.94	142.71	2.08	4.56	3.64

certified concentration							
SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-11	751.68	846.00	702.48	2000.41	95.96	1.88	127.72
SRM614-11	855.60	2855.06	2555.57	6177.59	2913.94	1267.17	3524.66
SRM612-11	2620.13	34423.88	30908.69	78148.48	127255.52	62673.91	141514.67
SRM610-11	10288.30	194997.38	176608.36	501274.81	836188.50	482180.72	1261750.40
AP1-11	625.32	3376.70	2680.02	7248.04	714.00	214.28	2044.65
AP2-11	2920.30	50962.53	42574.32	112381.91	3490.46	2645.25	4934.75
AP3-11	21996.96	581646.38	473574.16	1471999.50	27963.56	13913.12	23988.10
AP4-11	18140.86	463896.53	377302.53	1166309.00	21128.68	15026.77	21049.56
W1-1	1095.45	3246.50	2668.98	6669.28	161.20	40.04	421.12
W1-2	1034.05	2481.41	1941.93	5036.15	85.24	25.00	231.84
W1-3	1069.61	1861.77	1490.21	3869.58	43.56	14.72	209.92
W1-4	1704.97	3511.06	2897.74	7517.48	274.84	77.56	2186.29
W1-5	1553.85	2519.93	2174.17	5454.23	85.16	24.92	776.24
W1-6	1465.93	1819.45	1558.69	3815.66	94.52	17.48	771.80
W1-7	1853.53	4993.31	4121.78	10650.50	444.28	221.80	2548.77
W1-8	1615.37	3540.54	2888.10	7391.48	93.76	66.92	824.72
W1-9	1799.61	3502.70	2843.94	7331.56	134.72	114.20	1306.45
W1-10	1873.77	3897.30	3184.66	8043.97	324.80	125.84	2134.45
W1-11	1757.53	3154.78	2717.82	6718.68	112.08	143.40	1031.45
W1-12	1811.45	3604.18	3007.34	7120.08	121.32	54.28	1272.73
W1-13	1907.89	2307.65	1910.57	4808.91	201.24	72.16	1011.37
W1-14	1776.49	1572.97	1364.57	3317.78	44.32	42.08	410.00
W1-15	1744.89	1824.61	1566.37	3826.02	53.84	17.76	450.12
W1-16	2362.57	2154.09	1826.01	4514.47	233.88	52.16	802.80
W1-17	2173.53	1845.33	1510.37	3846.78	36.04	36.64	191.72
W1-18	2147.65	2042.69	1746.93	4452.46	67.60	11.32	206.04
SRM614-12	631.56	2349.93	2137.29	5056.63	2274.29	1291.09	3421.30
SRM612-12	2025.09	26500.87	24234.90	60172.34	101084.09	68793.66	151845.45
SRM610-12	8154.49	153704.91	140411.91	394999.16	690224.88	529719.25	1280748.40
AP1-12	362.40	876.88	720.08	1736.69	56.20	29.04	130.64
AP2-12	1658.97	27434.56	22855.21	59898.22	1596.61	1873.09	1951.93
AP3-12	10991.50	264767.47	215770.14	661502.00	13697.24	9724.65	13700.92
AP4-12	16214.25	426790.16	347483.16	1079888.30	18419.42	15959.49	22774.01
blank-12	429.52	282.36	193.12	599.96	15.12	1.72	21.40
blank average	590.60	564.18	447.80	1300.19	55.54	1.80	74.56

blank subtraction							
SRM614-11	265.00	2290.87	2107.77	4877.41	2858.40	1265.37	3450.10
SRM612-11	2029.53	33859.69	30460.89	76848.29	127199.98	62672.11	141440.11
SRM610-11	9697.69	194433.20	176160.56	499974.62	836132.96	482178.92	1261675.84
AP1-11	34.72	2812.52	2232.21	5947.85	658.46	212.48	1970.09
AP2-11	2329.69	50398.34	42126.52	111081.72	3434.92	2643.45	4860.19
AP3-11	21406.36	581082.20	473126.36	1470699.31	27908.02	13911.32	23913.54

Appendix A. Raw trace element datasheets from laser ablation.

AP4-11	17550.26	463332.35	376854.73	1165008.81	21073.14	15024.96	20975.00
W1-1	504.84	2682.32	2221.17	5369.09	105.66	38.24	346.56
W1-2	443.44	1917.23	1494.13	3735.96	29.70	23.20	157.28
W1-3	479.00	1297.59	1042.41	2569.39	-11.98	12.92	135.36
W1-4	1114.37	2946.88	2449.93	6217.29	219.30	75.76	2111.73
W1-5	963.25	1955.75	1726.37	4154.04	29.62	23.12	701.68
W1-6	875.32	1255.27	1110.89	2515.47	38.98	15.68	697.24
W1-7	1262.93	4429.12	3673.98	9350.31	388.74	220.00	2474.21
W1-8	1024.77	2976.36	2440.29	6091.29	38.22	65.12	750.16
W1-9	1209.01	2938.52	2396.13	6031.37	79.18	112.40	1231.89
W1-10	1283.17	3333.12	2736.86	6743.78	269.26	124.04	2059.89
W1-11	1166.93	2590.59	2270.01	5418.49	56.54	141.60	956.89
W1-12	1220.85	3040.00	2559.53	5819.89	65.78	52.48	1198.17
W1-13	1317.29	1743.47	1462.77	3508.72	145.70	70.36	936.81
W1-14	1185.89	1008.79	916.77	2017.59	-11.22	40.28	335.44
W1-15	1154.29	1260.43	1118.57	2525.83	-1.70	15.96	375.56
W1-16	1771.97	1589.91	1378.21	3214.28	178.34	50.36	728.24
W1-17	1582.93	1281.15	1062.57	2546.59	-19.50	34.84	117.16
W1-18	1557.05	1478.51	1299.13	3152.28	12.06	9.52	131.48
SRM614-12	40.96	1785.75	1689.49	3756.44	2218.75	1289.29	3346.74
SRM612-12	1434.49	25936.69	23787.09	58872.15	101028.55	68791.86	151770.89
SRM610-12	7563.88	153140.73	139964.11	393698.97	690169.34	529717.45	1280673.84
AP1-12	-228.20	312.70	272.28	436.50	0.66	27.24	56.08
AP2-12	1068.37	26870.37	22407.41	58598.03	1541.07	1871.29	1877.37
AP3-12	10400.90	264203.29	215322.34	660201.81	13641.70	9722.85	13626.36
AP4-12	15623.65	426225.98	347035.36	1078588.11	18363.88	15957.69	22699.45

zero correction

SRM614-11	265.00	2290.87	2107.77	4877.41	2858.40	1265.37	3450.10
SRM612-11	2029.53	33859.69	30460.89	76848.29	127199.98	62672.11	141440.11
SRM610-11	9697.69	194433.20	176160.56	499974.62	836132.96	482178.92	1261675.84
AP1-11	34.72	2812.52	2232.21	5947.85	658.46	212.48	1970.09
AP2-11	2329.69	50398.34	42126.52	111081.72	3434.92	2643.45	4860.19
AP3-11	21406.36	581082.20	473126.36	1470699.31	27908.02	13911.32	23913.54
AP4-11	17550.26	463332.35	376854.73	1165008.81	21073.14	15024.96	20975.00
W1-1	504.84	2682.32	2221.17	5369.09	105.66	38.24	346.56
W1-2	443.44	1917.23	1494.13	3735.96	29.70	23.20	157.28
W1-3	479.00	1297.59	1042.41	2569.39	0.00	12.92	135.36
W1-4	1114.37	2946.88	2449.93	6217.29	219.30	75.76	2111.73
W1-5	963.25	1955.75	1726.37	4154.04	29.62	23.12	701.68
W1-6	875.32	1255.27	1110.89	2515.47	38.98	15.68	697.24
W1-7	1262.93	4429.12	3673.98	9350.31	388.74	220.00	2474.21
W1-8	1024.77	2976.36	2440.29	6091.29	38.22	65.12	750.16
W1-9	1209.01	2938.52	2396.13	6031.37	79.18	112.40	1231.89
W1-10	1283.17	3333.12	2736.86	6743.78	269.26	124.04	2059.89
W1-11	1166.93	2590.59	2270.01	5418.49	56.54	141.60	956.89
W1-12	1220.85	3040.00	2559.53	5819.89	65.78	52.48	1198.17
W1-13	1317.29	1743.47	1462.77	3508.72	145.70	70.36	936.81
W1-14	1185.89	1008.79	916.77	2017.59	0.00	40.28	335.44
W1-15	1154.29	1260.43	1118.57	2525.83	0.00	15.96	375.56
W1-16	1771.97	1589.91	1378.21	3214.28	178.34	50.36	728.24
W1-17	1582.93	1281.15	1062.57	2546.59	0.00	34.84	117.16
W1-18	1557.05	1478.51	1299.13	3152.28	12.06	9.52	131.48
SRM614-12	40.96	1785.75	1689.49	3756.44	2218.75	1289.29	3346.74
SRM612-12	1434.49	25936.69	23787.09	58872.15	101028.55	68791.86	151770.89
SRM610-12	7563.88	153140.73	139964.11	393698.97	690169.34	529717.45	1280673.84
AP1-12	0.00	312.70	272.28	436.50	0.66	27.24	56.08
AP2-12	1068.37	26870.37	22407.41	58598.03	1541.07	1871.29	1877.37
AP3-12	10400.90	264203.29	215322.34	660201.81	13641.70	9722.85	13626.36
AP4-12	15623.65	426225.98	347035.36	1078588.11	18363.88	15957.69	22699.45

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

Appendix A. Raw trace element datasheets from laser ablation.

standardized signal							
SRM614-11	0.000076	0.000656	0.000603	0.001396	0.000818	0.000362	0.000987
SRM612-11	0.000661	0.011032	0.009925	0.025038	0.041444	0.020420	0.046084
SRM610-11	0.007296	0.146276	0.132529	0.376142	0.629041	0.362754	0.949186
AP1-11	0.000002	0.000153	0.000122	0.000324	0.000036	0.000012	0.000107
AP2-11	0.000133	0.002868	0.002398	0.006322	0.000195	0.000150	0.000277
AP3-11	0.001159	0.031461	0.025616	0.079627	0.001511	0.000753	0.001295
AP4-11	0.001081	0.028547	0.023219	0.071779	0.001298	0.000926	0.001292
W1-1	0.000039	0.000207	0.000171	0.000414	0.000008	0.000003	0.000027
W1-2	0.000043	0.000187	0.000146	0.000364	0.000003	0.000002	0.000015
W1-3	0.000057	0.000153	0.000123	0.000303	0.000000	0.000002	0.000016
W1-4	0.000061	0.000161	0.000134	0.000341	0.000012	0.000004	0.000116
W1-5	0.000058	0.000118	0.000104	0.000250	0.000002	0.000001	0.000042
W1-6	0.000052	0.000074	0.000066	0.000149	0.000002	0.000001	0.000041
W1-7	0.000068	0.000239	0.000199	0.000506	0.000021	0.000012	0.000134
W1-8	0.000060	0.000173	0.000142	0.000354	0.000002	0.000004	0.000044
W1-9	0.000069	0.000168	0.000137	0.000345	0.000005	0.000006	0.000071
W1-10	0.000062	0.000162	0.000133	0.000327	0.000013	0.000006	0.000100
W1-11	0.000056	0.000124	0.000109	0.000260	0.000003	0.000007	0.000046
W1-12	0.000063	0.000156	0.000132	0.000300	0.000003	0.000003	0.000062
W1-13	0.000070	0.000093	0.000078	0.000187	0.000008	0.000004	0.000050
W1-14	0.000061	0.000052	0.000047	0.000104	0.000000	0.000002	0.000017
W1-15	0.000061	0.000067	0.000059	0.000134	0.000000	0.000001	0.000020
W1-16	0.000128	0.000115	0.000100	0.000233	0.000013	0.000004	0.000053
W1-17	0.000115	0.000093	0.000077	0.000184	0.000000	0.000003	0.000008
W1-18	0.000116	0.000110	0.000097	0.000235	0.000001	0.000001	0.000010
SRM614-12	0.000018	0.000775	0.000733	0.001631	0.000963	0.000560	0.001453
SRM612-12	0.000651	0.011772	0.010796	0.026721	0.045855	0.031223	0.068885
SRM610-12	0.007703	0.155959	0.142539	0.400943	0.702868	0.539464	1.304238
AP1-12	0.000000	0.000024	0.000021	0.000033	0.000000	0.000002	0.000004
AP2-12	0.000087	0.002199	0.001834	0.004796	0.000126	0.000153	0.000154
AP3-12	0.000797	0.020236	0.016492	0.050567	0.001045	0.000745	0.001044
AP4-12	0.001145	0.031238	0.025434	0.079049	0.001346	0.001170	0.001664
standardize signal averages AP							
AP1	0.000001	0.000089	0.000071	0.000179	0.000018	0.000007	0.000056
AP2	0.000110	0.002534	0.002116	0.005559	0.000161	0.000152	0.000215
AP3	0.000978	0.025849	0.021054	0.065097	0.001278	0.000749	0.001169
AP4	0.001113	0.029892	0.024326	0.075414	0.001322	0.001048	0.001478
linest from std sig ave							
	0.286714	0.010762	0.013219	0.004268	0.003590	0.009296	0.005199
standardize signal averages SRM							
srM614-2	0.000047	0.000715	0.000668	0.001513	0.000891	0.000461	0.001220
srM612-2	0.000656	0.011402	0.010361	0.025880	0.043649	0.025821	0.057484
srM610-2	0.007499	0.151117	0.137534	0.388542	0.665955	0.451109	1.126712
linest from std sig ave							
	0.642971	0.031935	0.035089	0.012426	0.006270	0.011664	0.004738
concentration data							
SRM614-11	1.86	0.61	0.68	0.51	0.25	0.29	0.44
SRM612-11	16.26	10.18	11.25	9.17	12.76	16.28	20.55
SRM610-11	179.40	135.01	150.25	137.68	193.67	289.20	423.23
AP1-11	0.22	0.66	0.64	0.55	0.05	0.04	0.22
AP2-11	15.17	12.31	12.64	10.76	0.28	0.56	0.57
AP3-11	132.57	135.07	135.09	135.58	2.16	2.79	2.69
AP4-11	123.68	122.56	122.45	122.22	1.86	3.43	2.68
W1-1	4.46	0.89	0.90	0.71	0.01	0.01	0.06
W1-2	4.94	0.80	0.77	0.62	0.00	0.01	0.03
W1-3	6.47	0.66	0.65	0.52	0.00	0.01	0.03
W1-4	6.98	0.69	0.71	0.58	0.02	0.02	0.24
W1-5	6.64	0.51	0.55	0.43	0.00	0.01	0.09
W1-6	5.94	0.32	0.35	0.25	0.00	0.00	0.09
W1-7	7.81	1.03	1.05	0.86	0.03	0.04	0.28
W1-8	6.81	0.74	0.75	0.60	0.00	0.01	0.09
W1-9	7.92	0.72	0.72	0.59	0.01	0.02	0.15
W1-10	7.12	0.69	0.70	0.56	0.02	0.02	0.21
W1-11	6.40	0.53	0.57	0.44	0.00	0.03	0.10
W1-12	7.19	0.67	0.69	0.51	0.00	0.01	0.13
W1-13	8.03	0.40	0.41	0.32	0.01	0.01	0.10
W1-14	6.96	0.22	0.25	0.18	0.00	0.01	0.04
W1-15	7.00	0.29	0.31	0.23	0.00	0.00	0.04
W1-16	14.67	0.49	0.53	0.40	0.02	0.01	0.11
W1-17	13.11	0.40	0.41	0.31	0.00	0.01	0.02
W1-18	13.25	0.47	0.51	0.40	0.00	0.00	0.02

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-12	0.44	0.72	0.83	0.60	0.30	0.45	0.65
SRM612-12	16.01	10.87	12.24	9.78	14.12	24.89	30.72
SRM610-12	189.41	143.95	161.60	146.76	216.40	430.08	581.54
AP1-12	0.00	0.10	0.11	0.06	0.00	0.01	0.01
AP2-12	10.00	9.44	9.67	8.17	0.18	0.57	0.32
AP3-12	91.12	86.88	86.97	86.10	1.50	2.76	2.16
AP4-12	130.97	134.12	134.13	134.60	1.93	4.34	3.45

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U	
raw data								
blank-9	107.72	207.72	174.32	426.28		3.76	1.60	2.20
SRM614-9	262.44	2262.45	2025.29	4834.71		2157.21	904.05	2398.01
SRM612-9	2195.93	34269.67	31204.14	77563.88		128194.37	57742.13	132879.19
SRM610-9	8440.53	164421.16	149461.95	413942.97		698884.38	459123.44	1088418.00
AP1-9	277.96	3155.90	2486.53	6254.40		839.20	233.76	1201.33
AP2-9	2971.70	57242.52	47789.75	128380.48		3769.18	2667.38	3838.18
AP3-9	15722.41	387275.34	314656.66	962131.56		19747.27	11449.06	17602.58
AP4-9	22038.81	585971.00	474548.78	1467141.40		26264.55	17867.58	26243.91
T2-1	361.12	2767.34	2221.33	5255.39		197.56	53.32	189.24
T2-2	326.16	1803.89	1524.81	3869.30		95.60	6.80	269.24
T2-3	301.28	1796.37	1454.49	3779.14		63.00	20.40	95.84
T2-4	405.92	2304.61	1922.49	4777.83		126.44	24.00	145.48
T2-5	447.52	1920.17	1620.05	3971.06		56.72	4.52	31.40
T2-6	419.16	1346.01	1183.85	2903.74		33.32	5.12	20.40
T2-7	434.12	3120.78	2671.58	6657.96		160.40	44.56	327.72
T2-8	425.76	3346.98	2977.50	7110.20		69.60	5.96	35.24
T2-9	473.08	3547.02	2866.38	7276.56		70.96	12.12	110.16
T2-10	400.32	1883.93	1560.21	3980.02		159.16	35.20	251.96
T2-11	364.24	2070.77	1717.25	4489.91		98.52	9.16	64.00
T2-12	379.08	1730.17	1455.77	3454.98		50.04	6.84	79.20
T2-13	401.32	2304.57	1955.57	4789.79		475.56	115.48	683.60
T2-14	358.16	2021.41	1762.33	4245.78		124.16	19.24	143.44
T2-15	356.52	2266.49	1937.97	4800.11		115.56	17.00	233.32
T2-16	434.68	3338.98	2879.62	7207.96		633.96	90.32	1029.73
T2-17	689.68	4785.27	4263.62	9375.85		328.32	17.20	240.80
T2-18	410.96	3465.74	2968.54	7183.64		110.44	28.56	190.44
SRM614-10	238.36	1680.81	1478.53	3610.38		1656.21	1080.05	2440.73
SRM612-10	1720.49	26580.83	24030.34	60847.82		102473.78	64959.36	144136.73
SRM610-10	7575.16	149506.80	136157.77	382145.03		633181.81	530142.25	1272767.40
AP1-10	178.08	916.57	710.96	1974.49		47.44	22.92	74.76
AP2-10	1763.09	34641.72	28581.84	75761.34		1994.85	2429.69	2359.61
AP3-10	10322.02	247556.52	202885.73	615199.31		12902.11	10322.22	14520.60
AP4-10	16289.69	431829.31	351380.84	1085528.50		19011.71	15686.85	22571.13
blank-10	139.84	382.16	304.80	695.52		66.72	8.08	45.56
blank average	123.78	294.94	239.56	560.90		35.24	4.84	23.88

blank subtraction								
SRM614-9	138.66	1967.51	1785.73	4273.80		2121.97	899.21	2374.13
SRM612-9	2072.15	33974.73	30964.57	77002.97		128159.13	57737.28	132855.31
SRM610-9	8316.75	164126.22	149222.39	413382.07		698849.14	459118.60	1088394.12
AP1-9	154.18	2860.96	2246.97	5693.49		803.96	228.92	1177.45
AP2-9	2847.92	56947.58	47550.19	127819.58		3733.94	2662.53	3814.30
AP3-9	15598.63	386980.40	314417.10	961570.66		19712.03	11444.22	17578.70
AP4-9	21915.02	585676.06	474309.22	1466580.50		26229.31	17862.74	26220.03
T2-1	237.34	2472.39	1981.77	4694.49		162.32	48.48	165.36
T2-2	202.38	1508.95	1285.25	3308.40		60.36	1.96	245.36
T2-3	177.50	1501.43	1214.93	3218.24		27.76	15.56	71.96
T2-4	282.14	2009.67	1682.93	4216.92		91.20	19.16	121.60
T2-5	323.74	1625.23	1380.49	3410.16		21.48	-0.32	7.52
T2-6	295.38	1051.07	944.29	2342.83		-1.92	0.28	-3.48
T2-7	310.34	2825.84	2432.01	6097.05		125.16	39.72	303.84
T2-8	301.98	3052.04	2737.94	6549.30		34.36	1.12	11.36
T2-9	349.30	3252.08	2626.81	6715.66		35.72	7.28	86.28
T2-10	276.54	1588.99	1320.65	3419.12		123.92	30.36	228.08
T2-11	240.46	1775.83	1477.69	3929.00		63.28	4.32	40.12
T2-12	255.30	1435.23	1216.21	2894.08		14.80	2.00	55.32
T2-13	277.54	2009.63	1716.01	4228.88		440.32	110.64	659.72
T2-14	234.38	1726.47	1522.77	3684.88		88.92	14.40	119.56
T2-15	232.74	1971.55	1698.41	4239.20		80.32	12.16	209.44

Appendix A. Raw trace element datasheets from laser ablation.

T2-16	310.90	3044.04	2640.05	6647.06	598.72	85.48	1005.85
T2-17	565.90	4490.33	4024.06	8814.95	293.08	12.36	216.92
T2-18	287.18	3170.80	2728.98	6622.74	75.20	23.72	166.56
SRM614-10	114.58	1385.87	1238.97	3049.48	1620.97	1075.21	2416.85
SRM612-10	1596.71	26285.89	23790.77	60286.92	102438.54	64954.52	144112.85
SRM610-10	7451.38	149211.86	135918.21	381584.13	633146.57	530137.41	1272743.52
AP1-10	54.30	621.62	471.40	1413.59	12.20	18.08	50.88
AP2-10	1639.31	34346.77	28342.28	75200.44	1959.61	2424.85	2335.73
AP3-10	10198.24	247261.58	202646.17	614638.41	12866.87	10317.38	14496.72
AP4-10	16165.91	431534.37	351141.28	1084967.60	18976.47	15682.01	22547.25
zero correction							
SRM614-9	138.66	1967.51	1785.73	4273.80	2121.97	899.21	2374.13
SRM612-9	2072.15	33974.73	30964.57	77002.97	128159.13	57737.28	132855.31
SRM610-9	8316.75	164126.22	149222.39	413382.07	698849.14	459118.60	1088394.12
AP1-9	154.18	2860.96	2246.97	5693.49	803.96	228.92	1177.45
AP2-9	2847.92	56947.58	47550.19	127819.58	3733.94	2662.53	3814.30
AP3-9	15598.63	386980.40	314417.10	961570.66	19712.03	11444.22	17578.70
AP4-9	21915.02	585676.06	474309.22	1466580.50	26229.31	17862.74	26220.03
T2-1	237.34	2472.39	1981.77	4694.49	162.32	48.48	165.36
T2-2	202.38	1508.95	1285.25	3308.40	60.36	1.96	245.36
T2-3	177.50	1501.43	1214.93	3218.24	27.76	15.56	71.96
T2-4	282.14	2009.67	1682.93	4216.92	91.20	19.16	121.60
T2-5	323.74	1625.23	1380.49	3410.16	21.48	0.00	7.52
T2-6	295.38	1051.07	944.29	2342.83	0.00	0.28	0.00
T2-7	310.34	2825.84	2432.01	6097.05	125.16	39.72	303.84
T2-8	301.98	3052.04	2737.94	6549.30	34.36	1.12	11.36
T2-9	349.30	3252.08	2626.81	6715.66	35.72	7.28	86.28
T2-10	276.54	1588.99	1320.65	3419.12	123.92	30.36	228.08
T2-11	240.46	1775.83	1477.69	3929.00	63.28	4.32	40.12
T2-12	255.30	1435.23	1216.21	2894.08	14.80	2.00	55.32
T2-13	277.54	2009.63	1716.01	4228.88	440.32	110.64	659.72
T2-14	234.38	1726.47	1522.77	3684.88	88.92	14.40	119.56
T2-15	232.74	1971.55	1698.41	4239.20	80.32	12.16	209.44
T2-16	310.90	3044.04	2640.05	6647.06	598.72	85.48	1005.85
T2-17	565.90	4490.33	4024.06	8814.95	293.08	12.36	216.92
T2-18	287.18	3170.80	2728.98	6622.74	75.20	23.72	166.56
SRM614-10	114.58	1385.87	1238.97	3049.48	1620.97	1075.21	2416.85
SRM612-10	1596.71	26285.89	23790.77	60286.92	102438.54	64954.52	144112.85
SRM610-10	7451.38	149211.86	135918.21	381584.13	633146.57	530137.41	1272743.52
AP1-10	54.30	621.62	471.40	1413.59	12.20	18.08	50.88
AP2-10	1639.31	34346.77	28342.28	75200.44	1959.61	2424.85	2335.73
AP3-10	10198.24	247261.58	202646.17	614638.41	12866.87	10317.38	14496.72
AP4-10	16165.91	431534.37	351141.28	1084967.60	18976.47	15682.01	22547.25
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-9	0.000052	0.000733	0.000665	0.001592	0.000790	0.000335	0.000884
SRM612-9	0.000685	0.011229	0.010234	0.025450	0.042357	0.019082	0.043909
SRM610-9	0.006264	0.123616	0.112391	0.311350	0.526357	0.345798	0.819753
AP1-9	0.000008	0.000156	0.000123	0.000311	0.000044	0.000012	0.000064
AP2-9	0.000153	0.003065	0.002559	0.006880	0.000201	0.000143	0.000205
AP3-9	0.000845	0.020976	0.017042	0.052120	0.001068	0.000620	0.000953
AP4-9	0.001181	0.031573	0.025570	0.079062	0.001414	0.000963	0.001414
T2-1	0.000011	0.000112	0.000090	0.000212	0.000007	0.000002	0.000007
T2-2	0.000010	0.000078	0.000066	0.000170	0.000003	0.000000	0.000013
T2-3	0.000011	0.000092	0.000075	0.000198	0.000002	0.000001	0.000004
T2-4	0.000016	0.000113	0.000095	0.000238	0.000005	0.000001	0.000007
T2-5	0.000020	0.000102	0.000087	0.000215	0.000001	0.000000	0.000000
T2-6	0.000021	0.000075	0.000067	0.000166	0.000000	0.000000	0.000000
T2-7	0.000019	0.000172	0.000148	0.000372	0.000008	0.000002	0.000019

Appendix A. Raw trace element datasheets from laser ablation.

T2-8	0.000018	0.000181	0.000163	0.000389	0.000002	0.000000	0.000001
T2-9	0.000022	0.000200	0.000162	0.000414	0.000002	0.000000	0.000005
T2-10	0.000037	0.000211	0.000175	0.000454	0.000016	0.000004	0.000030
T2-11	0.000028	0.000207	0.000172	0.000458	0.000007	0.000001	0.000005
T2-12	0.000028	0.000156	0.000132	0.000314	0.000002	0.000000	0.000006
T2-13	0.000028	0.000202	0.000173	0.000426	0.000044	0.000011	0.000066
T2-14	0.000022	0.000161	0.000142	0.000343	0.000008	0.000001	0.000011
T2-15	0.000020	0.000172	0.000148	0.000370	0.000007	0.000001	0.000018
T2-16	0.000022	0.000213	0.000185	0.000466	0.000042	0.000006	0.000070
T2-17	0.000036	0.000285	0.000256	0.000560	0.000019	0.000001	0.000014
T2-18	0.000017	0.000186	0.000160	0.000389	0.000004	0.000001	0.000010
SRM614-10	0.000061	0.000743	0.000664	0.001634	0.000869	0.000576	0.001295
SRM612-10	0.000751	0.012364	0.011191	0.028357	0.048184	0.030553	0.067787
SRM610-10	0.007220	0.144587	0.131705	0.369756	0.613521	0.513705	1.233293
AP1-10	0.000004	0.000045	0.000034	0.000102	0.000001	0.000001	0.000004
AP2-10	0.000115	0.002408	0.001987	0.005273	0.000137	0.000170	0.000164
AP3-10	0.000730	0.017700	0.014506	0.043997	0.000921	0.000739	0.001038
AP4-10	0.001148	0.030654	0.024943	0.077070	0.001348	0.001114	0.001602
standardize signal averages AP							
AP1	0.000006	0.000101	0.000078	0.000207	0.000022	0.000007	0.000034
AP2	0.000134	0.002737	0.002273	0.006076	0.000169	0.000157	0.000185
AP3	0.000788	0.019338	0.015774	0.048059	0.000995	0.000679	0.000995
AP4	0.001165	0.031114	0.025256	0.078066	0.001381	0.001038	0.001508
linest from std sig ave							
	0.306801	0.011797	0.014513	0.004714	0.003959	0.009658	0.005419
standardize signal averages SRM							
srm614-2	0.000057	0.000738	0.000665	0.001613	0.000830	0.000456	0.001090
srm612-2	0.000718	0.011796	0.010712	0.026903	0.045271	0.024818	0.055848
srm610-2	0.006742	0.134101	0.122048	0.340553	0.569939	0.429751	1.026523
linest from std sig ave							
	0.713831	0.035956	0.039508	0.014168	0.007320	0.012243	0.005200
concentration data							
SRM614-9	1.36	0.74	0.83	0.64	0.27	0.28	0.41
SRM612-9	18.02	11.36	12.74	10.29	14.38	15.81	20.41
SRM610-9	164.82	125.07	139.89	125.87	178.71	286.43	380.98
AP1-9	1.03	0.73	0.71	0.58	0.07	0.05	0.14
AP2-9	18.76	14.43	14.82	12.94	0.32	0.55	0.44
AP3-9	103.48	98.72	98.67	98.01	1.69	2.39	2.06
AP4-9	144.60	148.60	148.04	148.68	2.23	3.71	3.06
T2-1	1.31	0.53	0.52	0.40	0.01	0.01	0.02
T2-2	1.27	0.37	0.38	0.32	0.00	0.00	0.03
T2-3	1.33	0.43	0.43	0.37	0.00	0.00	0.01
T2-4	1.95	0.53	0.55	0.45	0.01	0.00	0.01
T2-5	2.49	0.48	0.50	0.40	0.00	0.00	0.00
T2-6	2.57	0.35	0.39	0.31	0.00	0.00	0.00
T2-7	2.31	0.81	0.86	0.70	0.01	0.01	0.04
T2-8	2.20	0.85	0.94	0.73	0.00	0.00	0.00
T2-9	2.63	0.94	0.94	0.78	0.00	0.00	0.01
T2-10	4.50	0.99	1.02	0.85	0.03	0.02	0.07
T2-11	3.43	0.97	1.00	0.86	0.01	0.00	0.01
T2-12	3.39	0.73	0.76	0.59	0.00	0.00	0.01
T2-13	3.42	0.95	1.00	0.80	0.07	0.04	0.14
T2-14	2.67	0.76	0.82	0.65	0.01	0.01	0.02
T2-15	2.49	0.81	0.86	0.70	0.01	0.00	0.04
T2-16	2.67	1.00	1.07	0.88	0.07	0.02	0.15
T2-17	4.40	1.34	1.48	1.05	0.03	0.00	0.03
T2-18	2.06	0.88	0.93	0.73	0.01	0.01	0.02
SRM614-10	1.62	0.75	0.83	0.66	0.29	0.48	0.60
SRM612-10	19.76	12.51	13.93	11.46	16.36	25.31	31.50
SRM610-10	189.98	146.29	163.93	149.48	208.31	425.51	573.17
AP1-10	0.48	0.21	0.20	0.19	0.00	0.01	0.01
AP2-10	14.07	11.33	11.51	9.92	0.22	0.66	0.35
AP3-10	89.35	83.30	83.99	82.74	1.45	2.85	2.24
AP4-10	140.55	144.27	144.42	144.93	2.13	4.29	3.46
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Appendix A. Raw trace element datasheets from laser ablation.

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-1	373.44	77.12	74.44	146.36	13.68	2.88	44.64
SRM614-1	501.00	2112.45	1894.09	4535.87	2036.25	424.16	1413.49
SRM612-1	2113.61	29257.65	26471.31	66271.77	103024.38	19505.59	55342.15
SRM610-1	7703.40	141246.03	127776.00	355097.28	632808.25	140900.75	365577.84
AP1-1	412.00	1651.33	1367.49	3528.54	294.16	45.00	1910.73
AP2-1	2321.37	39774.02	33344.75	88504.02	3027.14	968.89	5234.47
AP3-1	26215.23	752611.75	607675.00	1919747.00	35953.44	8173.45	17529.74
AP4-1	13079.79	320233.03	260034.34	803121.31	16719.06	5952.11	11854.03
41LU1-REDO-1	846.44	4205.46	3515.26	9062.17	211.92	43.24	10729.30
41LU1-REDO-2	765.88	3830.18	3169.30	7855.96	109.92	200.96	9669.41
41LU1-REDO-3	748.96	4100.66	3252.30	8484.65	128.80	17.60	10497.86
41LU1-REDO-4	913.73	2792.86	2356.17	6072.51	153.00	15.88	18159.58
41LU1-REDO-5	1263.41	4088.30	3435.86	8509.65	109.44	13.80	36175.40
41LU1-REDO-6	938.89	2615.49	2200.09	5523.47	73.84	10.72	12312.43
41LU1-REDO-7	2992.30	2315.37	1890.49	4805.11	157.32	34.56	8716.01
41LU1REDO-8	2181.09	1953.89	1560.33	4200.94	94.96	7.00	5098.51
41LU1-REDO-9	1736.33	1666.01	1397.85	3507.38	109.40	10.88	7354.36
41LU1REDO-10	1306.81	3273.74	2716.26	7068.84	149.24	61.28	23653.69
41LU1-REDO-11	1172.17	3124.82	2562.81	6460.60	83.80	47.68	19537.63
41LU1REDO-12	1069.97	2534.89	2035.69	5187.15	116.76	35.36	12081.87
41LU1-REDO-13	1027.53	2320.05	1955.45	4808.63	102.16	9.56	4864.19
41LU1-REDO-14	991.05	2399.73	1892.25	4826.55	60.76	15.32	3495.86
41LU1-REDO-15	934.97	1798.13	1523.97	3748.90	41.88	9.96	2027.09
SRM614-2	651.12	1926.81	1754.93	4289.42	2046.29	565.28	1702.89
SRM612-2	1943.73	25833.35	23487.69	57790.52	97543.71	30669.53	74675.06
SRM610-2	8102.13	149741.05	135577.28	376932.72	704480.94	232381.75	577897.19
AP1-2	424.36	756.96	657.24	1632.93	30.68	10.40	124.48
AP2-2	1913.53	30061.57	25326.06	65624.93	1760.05	1031.05	1295.69
AP3-2	15840.57	393813.66	320247.41	1003777.60	20946.28	6883.00	12005.07
AP4-2	11108.02	259631.75	212227.88	642965.25	12742.43	6738.48	9104.09
blank-2	521.52	35.12	30.76	90.04	2.88	2.84	4.96
blank average	447.48	56.12	52.60	118.20	8.28	2.86	24.80
blank subtraction							
SRM614-1	53.52	2056.33	1841.49	4417.67	2027.97	421.30	1388.69
SRM612-1	1666.13	29201.52	26418.71	66153.57	103016.10	19502.73	55317.35
SRM610-1	7255.92	141189.91	127723.40	354979.08	632799.97	140897.89	365553.04
AP1-1	-35.48	1595.21	1314.89	3410.34	285.88	42.14	1885.93
AP2-1	1873.89	39717.90	33292.15	88385.82	3018.86	966.03	5209.67
AP3-1	25767.74	752555.63	607622.40	1919628.80	35945.16	8170.59	17504.94
AP4-1	12632.31	320176.91	259981.74	803003.11	16710.77	5949.25	11829.23
41LU1-REDO-1	398.96	4149.34	3462.66	8943.97	203.64	40.38	10704.50
41LU1-REDO-2	318.40	3774.06	3116.70	7737.76	101.64	198.10	9644.61
41LU1-REDO-3	301.48	4044.54	3199.70	8366.45	120.52	14.74	10473.06
41LU1-REDO-4	466.24	2736.74	2303.57	5954.31	144.72	13.02	18134.78
41LU1-REDO-5	815.92	4032.18	3383.26	8391.45	101.16	10.94	36150.60
41LU1-REDO-6	491.40	2559.37	2147.49	5405.27	65.56	7.86	12287.63
41LU1-REDO-7	2544.81	2259.25	1837.89	4686.91	149.04	31.70	8691.21
41LU1REDO-8	1733.61	1897.77	1507.73	4082.74	86.68	4.14	5073.71
41LU1-REDO-9	1288.85	1609.89	1345.25	3389.18	101.12	8.02	7329.56
41LU1REDO-10	859.32	3217.62	2663.66	6950.64	140.96	58.42	23628.89
41LU1-REDO-11	724.68	3068.70	2510.21	6342.40	75.52	44.82	19512.83
41LU1REDO-12	622.48	2478.77	1983.09	5068.95	108.48	32.50	12057.07
41LU1-REDO-13	580.04	2263.93	1902.85	4690.43	93.88	6.70	4839.39
41LU1-REDO-14	543.56	2343.61	1839.65	4708.35	52.48	12.46	3471.06
41LU1-REDO-15	487.48	1742.01	1471.37	3630.70	33.60	7.10	2002.29
SRM614-2	203.64	1870.69	1702.33	4171.22	2038.01	562.42	1678.09
SRM612-2	1496.25	25777.23	23435.09	57672.32	97535.43	30666.67	74650.26
SRM610-2	7654.64	149684.93	135524.68	376814.52	704472.66	232378.89	577872.39
AP1-2	-23.12	700.84	604.64	1514.73	22.40	7.54	99.68
AP2-2	1466.05	30005.45	25273.46	65506.73	1751.77	1028.19	1270.89
AP3-2	15393.09	393757.54	320194.81	1003659.40	20938.00	6880.14	11980.27
AP4-2	10660.54	259575.63	212175.28	642847.05	12734.15	6735.62	9079.29
zero correction							
SRM614-1	53.52	2056.33	1841.49	4417.67	2027.97	421.30	1388.69
SRM612-1	1666.13	29201.52	26418.71	66153.57	103016.10	19502.73	55317.35
SRM610-1	7255.92	141189.91	127723.40	354979.08	632799.97	140897.89	365553.04
AP1-1	0.00	1595.21	1314.89	3410.34	285.88	42.14	1885.93
AP2-1	1873.89	39717.90	33292.15	88385.82	3018.86	966.03	5209.67
AP3-1	25767.74	752555.63	607622.40	1919628.80	35945.16	8170.59	17504.94
AP4-1	12632.31	320176.91	259981.74	803003.11	16710.77	5949.25	11829.23
41LU1-REDO-1	398.96	4149.34	3462.66	8943.97	203.64	40.38	10704.50
41LU1-REDO-2	318.40	3774.06	3116.70	7737.76	101.64	198.10	9644.61
41LU1-REDO-3	301.48	4044.54	3199.70	8366.45	120.52	14.74	10473.06

Appendix A. Raw trace element datasheets from laser ablation.

41LU1-REDO-4	466.24	2736.74	2303.57	5954.31	144.72	13.02	18134.78
41LU1-REDO-5	815.92	4032.18	3383.26	8391.45	101.16	10.94	36150.60
41LU1-REDO-6	491.40	2559.37	2147.49	5405.27	65.56	7.86	12287.63
41LU1-REDO-7	2544.81	2259.25	1837.89	4686.91	149.04	31.70	8691.21
41LU1REDO-8	1733.61	1897.77	1507.73	4082.74	86.68	4.14	5073.71
41LU1-REDO-9	1288.85	1609.89	1345.25	3389.18	101.12	8.02	7329.56
41LU1REDO-10	859.32	3217.62	2663.66	6950.64	140.96	58.42	23628.89
41LU1-REDO-11	724.68	3068.70	2510.21	6342.40	75.52	44.82	19512.83
41LU1REDO-12	622.48	2478.77	1983.09	5068.95	108.48	32.50	12057.07
41LU1-REDO-13	580.04	2263.93	1902.85	4690.43	93.88	6.70	4839.39
41LU1-REDO-14	543.56	2343.61	1839.65	4708.35	52.48	12.46	3471.06
41LU1-REDO-15	487.48	1742.01	1471.37	3630.70	33.60	7.10	2002.29
SRM614-2	203.64	1870.69	1702.33	4171.22	2038.01	562.42	1678.09
SRM612-2	1496.25	25777.23	23435.09	57672.32	97535.43	30666.67	74650.26
SRM610-2	7654.64	149684.93	135524.68	376814.52	704472.66	232378.89	577872.39
AP1-2	0.00	700.84	604.64	1514.73	22.40	7.54	99.68
AP2-2	1466.05	30005.45	25273.46	65506.73	1751.77	1028.19	1270.89
AP3-2	15393.09	393757.54	320194.81	1003659.40	20938.00	6880.14	11980.27
AP4-2	10660.54	259575.63	212175.28	642847.05	12734.15	6735.62	9079.29

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-1	0.000017	0.000640	0.000573	0.001376	0.000631	0.000131	0.000432
SRM612-1	0.000562	0.009844	0.008906	0.022301	0.034727	0.006574	0.018648
SRM610-1	0.005047	0.098207	0.088840	0.246911	0.440153	0.098004	0.254266
AP1-1	0.000000	0.000175	0.000144	0.000375	0.000031	0.000005	0.000207
AP2-1	0.000123	0.002612	0.002189	0.005812	0.000199	0.000064	0.000343
AP3-1	0.001175	0.034326	0.027715	0.087560	0.001640	0.000373	0.000798
AP4-1	0.000845	0.021415	0.017389	0.053709	0.001118	0.000398	0.000791
41LU1-REDO-1	0.000071	0.000740	0.000617	0.001594	0.000036	0.000007	0.001908
41LU1-REDO-2	0.000047	0.000555	0.000459	0.001139	0.000015	0.000029	0.001419
41LU1-REDO-3	0.000038	0.000508	0.000402	0.001051	0.000015	0.000002	0.001316
41LU1-REDO-4	0.000094	0.000554	0.000466	0.001206	0.000029	0.000003	0.003672
41LU1-REDO-5	0.000138	0.000684	0.000574	0.001424	0.000017	0.000002	0.006133
41LU1-REDO-6	0.000092	0.000477	0.000400	0.001008	0.000012	0.000001	0.002291
41LU1-REDO-7	0.000623	0.000553	0.000450	0.001148	0.000036	0.000008	0.002128
41LU1REDO-8	0.000396	0.000433	0.000344	0.000932	0.000020	0.000001	0.001158
41LU1-REDO-9	0.000304	0.000380	0.000318	0.000800	0.000024	0.000002	0.001730
41LU1REDO-10	0.000181	0.000679	0.000562	0.001468	0.000030	0.000012	0.004990
41LU1-REDO-11	0.000157	0.000666	0.000545	0.001376	0.000016	0.000010	0.004233
41LU1REDO-12	0.000148	0.000588	0.000470	0.001203	0.000026	0.000008	0.002861
41LU1-REDO-13	0.000135	0.000526	0.000442	0.001089	0.000022	0.000002	0.001124
41LU1-REDO-14	0.000113	0.000489	0.000384	0.000982	0.000011	0.000003	0.000724
41LU1-REDO-15	0.000081	0.000290	0.000245	0.000605	0.000006	0.000001	0.000333
SRM614-2	0.000070	0.000644	0.000586	0.001436	0.000702	0.000194	0.000578
SRM612-2	0.000529	0.009118	0.008290	0.020401	0.034502	0.010848	0.026407
SRM610-2	0.005667	0.110812	0.100329	0.278957	0.521524	0.172031	0.427801
AP1-2	0.000000	0.000070	0.000060	0.000152	0.000002	0.000001	0.000010
AP2-2	0.000092	0.001883	0.001586	0.004111	0.000110	0.000065	0.000080
AP3-2	0.000710	0.018161	0.014768	0.046291	0.000966	0.000317	0.000553
AP4-2	0.000651	0.015850	0.012956	0.039254	0.000778	0.000411	0.000554

standardize signal averages AP							
AP1	0.000000	0.000123	0.000102	0.000263	0.000017	0.000003	0.000109
AP2	0.000108	0.002247	0.001888	0.004962	0.000154	0.000064	0.000211
AP3	0.000943	0.026244	0.021242	0.066926	0.001303	0.000345	0.000676
AP4	0.000748	0.018633	0.015172	0.046481	0.000948	0.000405	0.000673

lineat from std sig ave							
	0.335703	0.012276	0.015156	0.004824	0.003897	0.022320	0.010206

Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srM614-2	0.000043	0.000642	0.000580	0.001406	0.000667	0.000162	0.000505
srM612-2	0.000545	0.009481	0.008598	0.021351	0.034615	0.008711	0.022527
srM610-2	0.005357	0.104510	0.094585	0.262934	0.480839	0.135017	0.341034

linest from std sig ave							
	0.898909	0.046126	0.050965	0.018348	0.008681	0.038959	0.015644

concentration data							
SRM614-1	0.48	0.67	0.75	0.57	0.21	0.25	0.38
SRM612-1	16.17	10.36	11.58	9.23	11.61	12.58	16.32
SRM610-1	145.31	103.39	115.48	102.16	147.09	187.60	222.56
AP1-1	0.00	0.86	0.87	0.72	0.05	0.04	0.84
AP2-1	16.50	12.79	13.24	11.19	0.31	0.57	1.39
AP3-1	157.41	168.11	167.58	168.52	2.55	3.32	3.25
AP4-1	113.15	104.88	105.14	103.37	1.74	3.54	3.22
41LU1-REDO-1	9.52	3.62	3.73	3.07	0.06	0.06	7.77
41LU1-REDO-2	6.28	2.72	2.77	2.19	0.02	0.26	5.78
41LU1-REDO-3	5.07	2.49	2.43	2.02	0.02	0.02	5.36
41LU1-REDO-4	12.64	2.71	2.82	2.32	0.05	0.02	14.95
41LU1-REDO-5	18.54	3.35	3.47	2.74	0.03	0.02	24.97
41LU1-REDO-6	12.27	2.34	2.42	1.94	0.02	0.01	9.33
41LU1-REDO-7	83.46	2.71	2.72	2.21	0.06	0.07	8.67
41LU1REDO-8	52.99	2.12	2.08	1.79	0.03	0.01	4.72
41LU1-REDO-9	40.75	1.86	1.92	1.54	0.04	0.02	7.05
41LU1REDO-10	24.30	3.33	3.40	2.82	0.05	0.11	20.32
41LU1-REDO-11	21.06	3.26	3.29	2.65	0.03	0.09	17.24
41LU1REDO-12	19.78	2.88	2.84	2.31	0.04	0.07	11.65
41LU1-REDO-13	18.04	2.57	2.67	2.10	0.03	0.01	4.58
41LU1-REDO-14	15.18	2.39	2.32	1.89	0.02	0.02	2.95
41LU1-REDO-15	10.87	1.42	1.48	1.16	0.01	0.01	1.36
SRM614-2	2.02	0.68	0.76	0.59	0.23	0.37	0.51
SRM612-2	15.24	9.60	10.78	8.44	11.53	20.77	23.11
SRM610-2	163.15	116.67	130.41	115.42	174.28	329.30	374.45
AP1-2	0.00	0.34	0.37	0.29	0.00	0.01	0.04
AP2-2	12.32	9.22	9.59	7.91	0.17	0.57	0.32
AP3-2	95.08	88.94	89.29	89.09	1.50	2.83	2.25
AP4-2	87.18	77.62	78.34	75.55	1.21	3.66	2.26

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-17	399.12	349.00	290.44	738.44	30.56	9.00	57.56
SRM614-17	444.16	1344.69	1187.21	3041.42	1332.21	274.52	938.77
SRM612-17	1947.61	27323.19	24993.54	62738.99	102705.54	19958.35	60015.10
SRM610-17	7815.52	146894.59	133702.91	375317.88	730893.00	167890.58	422039.75
AP1-17	360.36	1513.77	1277.17	3569.82	251.64	174.76	884.53
AP2-17	1449.29	24241.18	20301.96	52822.42	1677.93	821.80	1504.97
AP3-17	7972.84	172496.61	142697.97	424395.59	10886.78	3121.66	6240.04
AP4-17	8077.77	177561.31	146081.83	435339.91	9382.89	4217.70	5885.19
41LU1-1	881.00	5627.07	4654.47	11776.27	128.36	3221.78	26596.55
41LU1-2	1256.89	6991.12	5941.03	14845.00	190.20	8591.97	28572.08
41LU1-3	707.56	3519.78	2872.46	7252.48	119.20	2233.97	15067.48
41LU1-4	1646.01	11690.59	9699.73	25082.22	223.28	8333.61	35674.00
41LU1-5	1151.45	6534.68	5403.03	13809.40	116.76	4168.10	24767.66
41LU1-6	1355.41	7479.64	6168.03	15959.09	153.32	4530.91	27109.59
41LU1-7	10537.86	116930.14	94628.85	271623.06	1835.13	69908.91	348147.19
41LU1-8	4811.87	41799.31	34098.11	92124.00	698.80	10104.82	190713.77
41LU1-9	5367.35	49232.04	40363.35	109401.66	807.44	10743.30	231553.83
41LU1-10	7967.44	93050.05	75806.11	212346.16	1610.57	37025.53	507034.75
41LU1-11	13217.31	185044.48	148946.56	440041.50	2724.02	131717.34	684219.81
41LU1-12	12399.87	156316.72	125304.15	368897.97	2305.85	94812.02	639002.75
SRM614-18	1705.09	1375.17	1194.57	2934.82	1531.49	480.68	1516.81
SRM612-18	3141.90	28834.12	25997.99	65520.73	113293.84	31063.38	95229.70
SRM610-18	10939.98	187028.38	169378.70	483756.31	972304.88	351827.78	867177.06
AP1-18	877.16	841.00	668.64	1627.53	40.80	12.64	85.72
AP2-18	2032.89	22960.61	19419.35	49936.64	1378.61	1009.57	1202.29
AP3-18	9469.49	200896.84	164517.97	493723.56	11770.27	4618.35	6772.76
AP4-18	7443.60	148764.56	122665.53	358304.47	7237.72	6121.55	7366.52
blank-18	2065.41	85.28	58.24	136.04	10.48	4.36	6.64

Appendix A. Raw trace element datasheets from laser ablation.

blank average	1232.27	217.14	174.34	437.24	20.52	6.68	32.10
blank subtraction							
SRM614-17	-788.10	1127.55	1012.87	2604.17	1311.69	267.84	906.67
SRM612-17	715.34	27106.05	24819.20	62301.75	102685.02	19951.67	59983.00
SRM610-17	6583.26	146677.45	133528.57	374880.64	730872.48	167883.90	422007.65
AP1-17	-871.90	1296.63	1102.83	3132.58	231.12	168.08	852.42
AP2-17	217.02	24024.03	20127.61	52385.18	1657.41	815.12	1472.87
AP3-17	6740.58	172279.47	142523.63	423958.35	10866.26	3114.98	6207.94
AP4-17	6845.50	177344.17	145907.49	434902.67	9362.37	4211.02	5853.09
41LU1-1	-351.26	5409.93	4480.13	11339.02	107.84	3215.10	26564.45
41LU1-2	24.62	6773.98	5766.69	14407.76	169.68	8585.29	28539.98
41LU1-3	-524.70	3302.64	2698.12	6815.24	98.68	2227.29	15035.38
41LU1-4	413.74	11473.44	9525.39	24644.98	202.76	8326.93	35641.90
41LU1-5	-80.82	6317.54	5228.69	13372.15	96.24	4161.42	24735.56
41LU1-6	123.14	7262.50	5993.69	15521.85	132.80	4524.23	27077.49
41LU1-7	9305.59	116713.00	94454.51	271185.82	1814.61	69902.23	348115.09
41LU1-8	3579.60	41582.17	33923.77	91686.76	678.28	10098.14	190681.67
41LU1-9	4135.08	49014.90	40189.01	108964.42	786.92	10736.62	231521.73
41LU1-10	6735.18	92832.91	75631.77	211908.92	1590.05	37018.85	507002.65
41LU1-11	11985.05	184827.34	148772.22	439604.26	2703.50	131710.66	684187.71
41LU1-12	11167.60	156099.58	125129.81	368460.73	2285.33	94805.34	638970.65
SRM614-18	472.82	1158.03	1020.23	2497.57	1510.97	474.00	1484.71
SRM612-18	1909.63	28616.98	25823.65	65083.49	113273.32	31056.69	95197.59
SRM610-18	9707.71	186811.24	169204.36	483319.07	972284.36	351821.10	867144.96
AP1-18	-355.10	623.86	494.30	1190.29	20.28	5.96	53.62
AP2-18	800.62	22743.47	19245.01	49499.40	1358.09	1002.89	1170.19
AP3-18	8237.23	200679.70	164343.63	493286.32	11749.75	4611.67	6740.66
AP4-18	6211.34	148547.42	122491.19	357867.23	7217.20	6114.87	7334.42
zero correction							
SRM614-17	0.00	1127.55	1012.87	2604.17	1311.69	267.84	906.67
SRM612-17	715.34	27106.05	24819.20	62301.75	102685.02	19951.67	59983.00
SRM610-17	6583.26	146677.45	133528.57	374880.64	730872.48	167883.90	422007.65
AP1-17	0.00	1296.63	1102.83	3132.58	231.12	168.08	852.42
AP2-17	217.02	24024.03	20127.61	52385.18	1657.41	815.12	1472.87
AP3-17	6740.58	172279.47	142523.63	423958.35	10866.26	3114.98	6207.94
AP4-17	6845.50	177344.17	145907.49	434902.67	9362.37	4211.02	5853.09
41LU1-1	0.00	5409.93	4480.13	11339.02	107.84	3215.10	26564.45
41LU1-2	24.62	6773.98	5766.69	14407.76	169.68	8585.29	28539.98
41LU1-3	0.00	3302.64	2698.12	6815.24	98.68	2227.29	15035.38
41LU1-4	413.74	11473.44	9525.39	24644.98	202.76	8326.93	35641.90
41LU1-5	0.00	6317.54	5228.69	13372.15	96.24	4161.42	24735.56
41LU1-6	123.14	7262.50	5993.69	15521.85	132.80	4524.23	27077.49
41LU1-7	9305.59	116713.00	94454.51	271185.82	1814.61	69902.23	348115.09
41LU1-8	3579.60	41582.17	33923.77	91686.76	678.28	10098.14	190681.67
41LU1-9	4135.08	49014.90	40189.01	108964.42	786.92	10736.62	231521.73
41LU1-10	6735.18	92832.91	75631.77	211908.92	1590.05	37018.85	507002.65
41LU1-11	11985.05	184827.34	148772.22	439604.26	2703.50	131710.66	684187.71
41LU1-12	11167.60	156099.58	125129.81	368460.73	2285.33	94805.34	638970.65
SRM614-18	472.82	1158.03	1020.23	2497.57	1510.97	474.00	1484.71
SRM612-18	1909.63	28616.98	25823.65	65083.49	113273.32	31056.69	95197.59
SRM610-18	9707.71	186811.24	169204.36	483319.07	972284.36	351821.10	867144.96
AP1-18	0.00	623.86	494.30	1190.29	20.28	5.96	53.62
AP2-18	800.62	22743.47	19245.01	49499.40	1358.09	1002.89	1170.19
AP3-18	8237.23	200679.70	164343.63	493286.32	11749.75	4611.67	6740.66
AP4-18	6211.34	148547.42	122491.19	357867.23	7217.20	6114.87	7334.42
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-17	0.000000	0.000596	0.000536	0.001377	0.000694	0.000142	0.000479

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-17	0.000295	0.011192	0.010247	0.025723	0.042397	0.008238	0.024766
SRM610-17	0.005574	0.124191	0.113057	0.317408	0.618823	0.142146	0.357310
AP1-17	0.000000	0.000097	0.000083	0.000235	0.000017	0.000013	0.000064
AP2-17	0.000017	0.001909	0.001600	0.004163	0.000132	0.000065	0.000117
AP3-17	0.000583	0.014908	0.012333	0.036686	0.000940	0.000270	0.000537
AP4-17	0.000629	0.016307	0.013417	0.039991	0.000861	0.000387	0.000538
41LU1-1	0.000000	0.000812	0.000672	0.001701	0.000016	0.000482	0.003985
41LU1-2	0.000004	0.001063	0.000905	0.002260	0.000027	0.001347	0.004477
41LU1-3	0.000000	0.000616	0.000503	0.001270	0.000018	0.000415	0.002803
41LU1-4	0.000075	0.002079	0.001726	0.004466	0.000037	0.001509	0.006459
41LU1-5	0.000000	0.001466	0.001214	0.003104	0.000022	0.000966	0.005741
41LU1-6	0.000031	0.001845	0.001523	0.003943	0.000034	0.001149	0.006879
41LU1-7	0.000635	0.007967	0.006448	0.018512	0.000124	0.004772	0.023764
41LU1-8	0.000344	0.003993	0.003258	0.008804	0.000065	0.000970	0.018311
41LU1-9	0.000395	0.004688	0.003844	0.010422	0.000075	0.001027	0.022143
41LU1-10	0.000459	0.006327	0.005154	0.014442	0.000108	0.002523	0.034553
41LU1-11	0.000596	0.009184	0.007393	0.021845	0.000134	0.006545	0.033999
41LU1-12	0.000589	0.008236	0.006602	0.019440	0.000121	0.005002	0.033712
SRM614-18	0.000278	0.000681	0.000600	0.001469	0.000889	0.000279	0.000873
SRM612-18	0.000865	0.012960	0.011695	0.029476	0.051301	0.014065	0.043114
SRM610-18	0.007366	0.141746	0.128387	0.366727	0.737737	0.266950	0.657961
AP1-18	0.000000	0.000042	0.000033	0.000080	0.000001	0.000000	0.000004
AP2-18	0.000059	0.001666	0.001410	0.003626	0.000099	0.000073	0.000086
AP3-18	0.000616	0.015018	0.012299	0.036916	0.000879	0.000345	0.000504
AP4-18	0.000502	0.012011	0.009905	0.028937	0.000584	0.000494	0.000593
standardize signal averages AP							
AP1	0.000000	0.000070	0.000058	0.000158	0.000009	0.000007	0.000034
AP2	0.000038	0.001788	0.001505	0.003894	0.000116	0.000069	0.000101
AP3	0.000600	0.014963	0.012316	0.036801	0.000910	0.000307	0.000521
AP4	0.000566	0.014159	0.011661	0.034464	0.000722	0.000441	0.000566
linest from std sig ave							
	0.503164	0.020182	0.024515	0.008233	0.005487	0.022282	0.012691
standardize signal averages SRM							
srm614-2	0.000139	0.000639	0.000568	0.001423	0.000791	0.000210	0.000676
srm612-2	0.000580	0.012076	0.010971	0.027600	0.046849	0.011152	0.033940
srm610-2	0.006470	0.132968	0.120722	0.342067	0.678280	0.204548	0.507636
linest from std sig ave							
	0.744900	0.036254	0.039931	0.014104	0.006155	0.025725	0.010509
concentration data							
SRM614-17	0.00	1.03	1.13	0.97	0.33	0.27	0.52
SRM612-17	12.75	19.37	21.54	18.16	19.95	15.74	26.96
SRM610-17	240.53	214.95	237.70	224.12	291.23	271.63	388.91
AP1-17	0.00	0.78	0.81	0.77	0.04	0.11	0.32
AP2-17	3.46	15.37	15.64	13.67	0.29	0.58	0.59
AP3-17	117.08	120.03	120.61	120.50	2.06	2.40	2.72
AP4-17	126.35	131.29	131.21	131.35	1.88	3.44	2.72
41LU1-1	0.00	6.53	6.57	5.59	0.04	4.29	20.18
41LU1-2	0.78	8.56	8.85	7.42	0.06	11.97	22.67
41LU1-3	0.00	4.96	4.92	4.17	0.04	3.69	14.19
41LU1-4	15.05	16.74	16.88	14.67	0.08	13.41	32.70
41LU1-5	0.00	11.81	11.87	10.19	0.05	8.59	29.07
41LU1-6	6.28	14.85	14.89	12.95	0.07	10.22	34.83
41LU1-7	127.51	64.15	63.06	60.80	0.27	42.42	120.32
41LU1-8	69.00	32.15	31.86	28.92	0.14	8.62	92.71
41LU1-9	79.39	37.74	37.59	34.23	0.16	9.13	112.11
41LU1-10	92.14	50.94	50.41	47.43	0.24	22.43	174.94
41LU1-11	119.55	73.95	72.30	71.75	0.29	58.18	172.14
41LU1-12	118.27	66.31	64.56	63.85	0.26	44.46	170.68
SRM614-18	12.00	1.18	1.26	1.04	0.42	0.53	0.95
SRM612-18	37.32	22.43	24.59	20.81	24.14	26.88	46.93
SRM610-18	317.86	245.34	269.93	258.95	347.19	510.13	716.15
AP1-18	0.00	0.34	0.32	0.26	0.00	0.00	0.02
AP2-18	11.77	13.41	13.79	11.91	0.22	0.65	0.43
AP3-18	123.74	120.91	120.28	121.25	1.92	3.07	2.55
AP4-18	100.82	96.71	96.86	95.04	1.28	4.40	3.00
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13

Appendix A. Raw trace element datasheets from laser ablation.

STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-19	133.60	346.84	323.84	843.16	114.88	2.64	348.44
SRM614-19	282.72	1802.85	1605.17	3991.78	1787.77	787.20	2310.49
SRM612-19	1832.17	27245.07	24763.30	62008.59	99941.96	44451.05	112043.91
SRM610-19	7767.52	149593.81	136473.25	382300.44	732199.44	390698.38	1079333.80
AP1-19	179.40	757.28	721.76	1702.25	161.44	77.84	478.44
AP2-19	1537.73	27572.40	23189.05	60833.70	1918.21	1876.97	2441.53
AP3-19	6706.12	144414.17	118700.30	348411.81	8087.13	6891.28	8718.93
AP4-19	7489.56	165366.77	137013.50	403537.03	7770.96	9762.17	10603.42
THEO-1	1095.45	10505.70	9083.33	20820.88	318.96	745.60	12889.75
THEO-2	763.40	6571.24	5477.23	13065.11	159.96	741.32	24881.34
THEO-2	777.88	8040.53	6674.04	16415.21	124.52	604.72	22382.41
THEO-3	2006.69	19451.27	16247.37	40585.91	438.40	943.33	97919.35
THEO-4	1663.13	18421.70	15247.57	39686.50	429.84	5299.27	106895.68
THEO-5	1342.05	13660.92	11492.35	28880.40	256.88	1602.25	137392.34
THEO-6	1773.57	20264.27	16977.50	44233.81	406.52	9640.65	146844.67
THEO-7	1408.09	14823.56	12372.35	31771.14	281.88	8293.33	195662.14
THEO-8	833.56	4608.95	3746.54	9507.41	67.00	1972.57	194533.89
THEO-9	1185.45	12181.43	9929.34	25488.70	266.36	9182.13	204474.47
THEO-10	1368.13	9819.98	7986.40	20851.36	160.84	8318.09	211032.34
THEO-11	2717.14	27307.63	23192.05	60041.70	443.04	5645.99	201074.53
THEO-12	1982.77	13687.92	11274.42	27747.32	270.92	6531.92	156850.16
THEO-13	1750.09	15778.61	13584.60	31463.74	402.60	1907.85	119666.75
THEO-14	1640.85	17488.42	14782.24	37893.37	264.76	2215.77	103276.82
THEO-15	2344.73	22288.09	19010.63	44673.77	726.04	2392.49	109814.06
THEO-16	2964.10	38209.25	32660.47	77543.08	924.53	7986.40	156862.80
THEO-17	2179.49	27414.75	22696.21	61052.82	370.68	12391.31	179778.58
THEO-18	1784.13	18764.31	15757.17	40072.79	333.68	11362.50	224200.63
SRM614-20	420.64	1403.29	1196.33	2980.02	1482.13	861.40	2177.65
SRM612-20	1442.05	18739.91	16824.54	41984.96	70890.08	40530.95	94589.61
SRM610-20	6480.12	121495.16	110797.42	310113.34	573560.31	386529.66	966852.63
AP1-20	236.28	395.84	341.28	820.08	28.96	11.20	58.16
AP2-20	1054.09	17082.22	14176.60	36489.36	1043.17	1256.65	1315.61
AP3-20	7621.32	179530.09	147554.98	445840.19	9551.13	7307.20	10594.46
AP4-20	5576.87	116396.53	97252.47	280651.78	5610.27	8619.29	8835.13
blank-20	389.28	38.44	54.96	106.68	6.64	0.84	8.36
blank average	261.44	192.64	189.40	474.92	60.76	1.74	178.40
blank subtraction							
SRM614-19	21.28	1610.21	1415.77	3516.86	1727.01	785.46	2132.09
SRM612-19	1570.73	27052.43	24573.90	61533.67	99881.20	44449.31	111865.51
SRM610-19	7506.08	149401.17	136283.85	381825.52	732138.68	390696.64	1079155.40
AP1-19	-82.04	564.64	532.36	1227.33	100.68	76.10	300.04
AP2-19	1276.29	27379.75	22999.65	60358.78	1857.45	1875.23	2263.13
AP3-19	6444.68	144221.53	118510.90	347936.89	8026.37	6889.54	8040.53
AP4-19	7228.12	165174.13	136824.10	403062.11	7710.20	9760.43	10425.02
THEO-1	834.00	10313.06	8893.93	20345.95	258.20	743.86	12711.35
THEO-2	501.96	6378.60	5287.83	12590.19	99.20	739.58	24702.94
THEO-2	516.44	7847.88	6484.64	15940.29	63.76	602.98	22204.00
THEO-3	1745.25	19258.63	16057.97	40110.99	377.64	941.59	97740.95
THEO-4	1401.69	18229.06	15058.16	39211.58	369.08	5297.53	106717.28
THEO-5	1080.61	13468.28	11302.94	28405.48	196.12	1600.51	137213.94
THEO-6	1512.13	20071.63	16788.09	43758.89	345.76	9638.91	146666.27
THEO-7	1146.65	14630.92	12182.95	31296.22	221.12	8291.59	195483.74
THEO-8	572.12	4416.30	3557.14	9032.49	6.24	1970.83	194355.49
THEO-9	924.01	11988.79	9739.93	25013.78	205.60	9180.39	204296.07
THEO-10	1106.69	9627.33	7797.00	20376.43	100.08	8316.35	210853.94
THEO-11	2455.69	27114.99	23002.65	59566.78	382.28	5644.25	200896.13
THEO-12	1721.33	13495.28	11085.02	27272.39	210.16	6530.18	156671.76
THEO-13	1488.65	15585.97	13395.20	30988.82	341.84	1906.11	119488.35
THEO-14	1379.41	17295.78	14592.84	37418.45	204.00	2214.03	103098.42
THEO-15	2083.29	22095.44	18821.23	44198.85	665.28	2390.75	109635.66
THEO-16	2702.66	38016.61	32471.06	77068.16	863.76	7984.66	156684.40
THEO-17	1918.05	27222.11	22506.81	60577.90	309.92	12389.57	179600.18
THEO-18	1522.69	18571.66	15567.77	39597.86	272.92	11360.76	224022.23
SRM614-20	159.20	1210.65	1006.93	2505.09	1421.37	859.66	1999.25
SRM612-20	1180.61	18547.26	16635.13	41510.03	70829.32	40529.21	94411.21
SRM610-20	6218.67	121302.52	110608.02	309638.42	573499.55	386527.92	966674.23
AP1-20	-25.16	203.20	151.88	345.16	-31.80	9.46	-120.24
AP2-20	792.64	16889.58	13987.20	36014.44	982.41	1254.91	1137.21
AP3-20	7359.88	179337.45	147365.58	445365.27	9490.37	7305.46	10416.06
AP4-20	5315.43	116203.89	97063.07	280176.86	5549.51	8617.55	8656.73
zero correction							
SRM614-19	21.28	1610.21	1415.77	3516.86	1727.01	785.46	2132.09

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-19	1570.73	27052.43	24573.90	61533.67	99881.20	44449.31	111865.51
SRM610-19	7506.08	149401.17	136283.85	381825.52	732138.68	390696.64	1079155.40
AP1-19	0.00	564.64	532.36	1227.33	100.68	76.10	300.04
AP2-19	1276.29	27379.75	22999.65	60358.78	1857.45	1875.23	2263.13
AP3-19	6444.68	144221.53	118510.90	347936.89	8026.37	6889.54	8540.53
AP4-19	7228.12	165174.13	136824.10	403062.11	7710.20	9760.43	10425.02
THEO-1	834.00	10313.06	8893.93	20345.95	258.20	743.86	12711.35
THEO-2	501.96	6378.60	5287.83	12590.19	99.20	739.58	24702.94
THEO-2	516.44	7847.88	6484.64	15940.29	63.76	602.98	22204.00
THEO-3	1745.25	19258.63	16057.97	40110.99	377.64	941.59	97740.95
THEO-4	1401.69	18229.06	15058.16	39211.58	369.08	5297.53	106717.28
THEO-5	1080.61	13468.28	11302.94	28405.48	196.12	1600.51	137213.94
THEO-6	1512.13	20071.63	16788.09	43758.89	345.76	9638.91	146666.27
THEO-7	1146.65	14630.92	12182.95	31296.22	221.12	8291.59	195483.74
THEO-8	572.12	4416.30	3557.14	9032.49	6.24	1970.83	194355.49
THEO-9	924.01	11988.79	9739.93	25013.78	205.60	9180.39	204296.07
THEO-10	1106.69	9627.33	7797.00	20376.43	100.08	8316.35	210853.94
THEO-11	2455.69	27114.99	23002.65	59566.78	382.28	5644.25	200896.13
THEO-12	1721.33	13495.28	11085.02	27272.39	210.16	6530.18	156671.76
THEO-13	1488.65	15585.97	13395.20	30988.82	341.84	1906.11	119488.35
THEO-14	1379.41	17295.78	14592.84	37418.45	204.00	2214.03	103098.42
THEO-15	2083.29	22095.44	18821.23	44198.85	665.28	2390.75	109635.66
THEO-16	2702.66	38016.61	32471.06	77068.16	863.76	7984.66	156684.40
THEO-17	1918.05	27222.11	22506.81	60577.90	309.92	12389.57	179600.18
THEO-18	1522.69	18571.66	15567.77	39597.86	272.92	11360.76	224022.23
SRM614-20	159.20	1210.65	1006.93	2505.09	1421.37	859.66	1999.25
SRM612-20	1180.61	18547.26	16635.13	41510.03	70829.32	40529.21	94411.21
SRM610-20	6218.67	121302.52	110608.02	309638.42	573499.55	386527.92	966674.23
AP1-20	0.00	203.20	151.88	345.16	0.00	9.46	0.00
AP2-20	792.64	16889.58	13987.20	36014.44	982.41	1254.91	1137.21
AP3-20	7359.88	179337.45	147365.58	445365.27	9490.37	7305.46	10416.06
AP4-20	5315.43	116203.89	97063.07	280176.86	5549.51	8617.55	8656.73

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-19	0.000012	0.000896	0.000788	0.001957	0.000961	0.000437	0.001187
SRM612-19	0.000875	0.015079	0.013697	0.034298	0.055672	0.024775	0.062352
SRM610-19	0.008123	0.161674	0.147479	0.413190	0.792280	0.422790	1.167802
AP1-19	0.000000	0.000045	0.000042	0.000097	0.000008	0.000006	0.000024
AP2-19	0.000133	0.002853	0.002396	0.006289	0.000194	0.000195	0.000236
AP3-19	0.000482	0.010784	0.008861	0.026016	0.000600	0.000515	0.000639
AP4-19	0.000560	0.012801	0.010604	0.031236	0.000598	0.000756	0.000808
THEO-1	0.000182	0.002253	0.001943	0.004444	0.000056	0.000162	0.002777
THEO-2	0.000079	0.001006	0.000834	0.001986	0.000016	0.000117	0.003897
THEO-2	0.000068	0.001037	0.000857	0.002106	0.000008	0.000080	0.002934
THEO-3	0.000308	0.003398	0.002833	0.007078	0.000067	0.000166	0.017247
THEO-4	0.000227	0.002947	0.002434	0.006339	0.000060	0.000856	0.017252
THEO-5	0.000139	0.001730	0.001452	0.003649	0.000025	0.000206	0.017624
THEO-6	0.000292	0.003882	0.003247	0.008463	0.000067	0.001864	0.028366
THEO-7	0.000175	0.002237	0.001863	0.004785	0.000034	0.001268	0.029886
THEO-8	0.000105	0.000808	0.000651	0.001652	0.000001	0.000361	0.035553
THEO-9	0.000144	0.001862	0.001513	0.003886	0.000032	0.001426	0.031735
THEO-10	0.000157	0.001368	0.001108	0.002895	0.000014	0.001182	0.029959
THEO-11	0.000370	0.004086	0.003466	0.008976	0.000058	0.000850	0.030271
THEO-12	0.000324	0.002539	0.002085	0.005131	0.000040	0.001229	0.029475
THEO-13	0.000248	0.002598	0.002233	0.005166	0.000057	0.000318	0.019919
THEO-14	0.000248	0.003104	0.002619	0.006716	0.000037	0.000397	0.018506
THEO-15	0.000362	0.003834	0.003266	0.007670	0.000115	0.000415	0.019024
THEO-16	0.000504	0.007091	0.006057	0.014376	0.000161	0.001489	0.029227
THEO-17	0.000275	0.003898	0.003223	0.008674	0.000044	0.001774	0.025716
THEO-18	0.000224	0.002731	0.002289	0.005822	0.000040	0.001670	0.032940

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-20	0.000106	0.000806	0.000671	0.001669	0.000947	0.000573	0.001332
SRM612-20	0.000859	0.013490	0.012099	0.030192	0.051516	0.029478	0.068668
SRM610-20	0.008061	0.157245	0.143381	0.401384	0.743428	0.501056	1.253100
AP1-20	0.000000	0.000019	0.000014	0.000032	0.000000	0.000001	0.000000
AP2-20	0.000102	0.002175	0.001801	0.004637	0.000127	0.000162	0.000146
AP3-20	0.000588	0.014340	0.011783	0.035612	0.000759	0.000584	0.000833
AP4-20	0.000492	0.010764	0.008991	0.025952	0.000514	0.000798	0.000802

standardize signal averages AP

AP1	0.000000	0.000032	0.000028	0.000064	0.000004	0.000003	0.000012
AP2	0.000118	0.002514	0.002099	0.005463	0.000160	0.000178	0.000191
AP3	0.000535	0.012562	0.010322	0.030814	0.000679	0.000550	0.000736
AP4	0.000526	0.011782	0.009797	0.028594	0.000556	0.000777	0.000805

linest from std sig ave

	0.553987	0.024022	0.029114	0.009843	0.007294	0.012487	0.008920
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standardize signal averages SRM

srm614-2	0.000059	0.000851	0.000729	0.001813	0.000954	0.000505	0.001259
srm612-2	0.000867	0.014284	0.012898	0.032245	0.053594	0.027127	0.065510
srm610-2	0.008092	0.159459	0.145430	0.407287	0.767854	0.461923	1.210451

linest from std sig ave

	0.594721	0.030234	0.033153	0.011846	0.005437	0.011390	0.004410
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concentration data

SRM614-19	0.56	1.85	1.97	1.65	0.60	0.47	0.91
SRM612-19	41.60	31.07	34.20	28.95	34.83	26.53	47.70
SRM610-19	385.92	333.08	368.24	348.80	495.61	452.79	893.42
AP1-19	0.00	0.43	0.49	0.38	0.02	0.03	0.08
AP2-19	29.39	27.34	27.83	24.69	0.56	0.97	0.84
AP3-19	106.50	103.34	102.92	102.16	1.75	2.57	2.27
AP4-19	123.80	122.67	123.16	122.66	1.74	3.77	2.88
THEO-1	40.26	21.59	22.57	17.45	0.16	0.81	9.88
THEO-2	17.50	9.64	9.69	7.80	0.05	0.58	13.87
THEO-2	15.08	9.94	9.95	8.27	0.02	0.40	10.44
THEO-3	68.06	32.57	32.91	27.79	0.19	0.83	61.38
THEO-4	50.08	28.24	28.27	24.89	0.17	4.27	61.39
THEO-5	30.68	16.58	16.86	14.33	0.07	1.02	62.72
THEO-6	64.63	37.20	37.71	33.23	0.19	9.29	100.94
THEO-7	38.74	21.44	21.63	18.79	0.10	6.31	106.35
THEO-8	23.13	7.74	7.56	6.49	0.00	1.80	126.52
THEO-9	31.72	17.85	17.57	15.26	0.09	7.10	112.93
THEO-10	34.75	13.11	12.87	11.37	0.04	5.89	106.61
THEO-11	81.78	39.15	40.26	35.24	0.17	4.24	107.73
THEO-12	71.57	24.33	24.22	20.15	0.12	6.12	104.89
THEO-13	54.84	24.90	25.94	20.28	0.17	1.58	70.88
THEO-14	54.72	29.75	30.42	26.37	0.11	1.98	65.86
THEO-15	79.89	36.74	37.93	30.12	0.34	2.07	67.70
THEO-16	111.42	67.96	70.35	56.45	0.47	7.42	104.01
THEO-17	60.70	37.35	37.43	34.06	0.13	8.84	91.52
THEO-18	49.48	26.17	26.59	22.86	0.12	8.32	117.22
SRM614-20	5.04	1.66	1.67	1.41	0.59	0.61	1.02
SRM612-20	40.80	27.79	30.21	25.49	32.23	31.57	52.53
SRM610-20	383.00	323.96	358.01	338.83	465.05	536.61	958.67
AP1-20	0.00	0.18	0.16	0.13	0.00	0.00	0.00
AP2-20	22.56	20.84	20.92	18.21	0.37	0.80	0.52
AP3-20	130.06	137.42	136.86	139.84	2.21	2.91	2.96
AP4-20	108.81	103.15	104.42	101.91	1.50	3.98	2.85

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

raw data

blank-15	366.92	92.72	64.44	173.00	6.80	0.32	5.36
SRM614-15	499.32	1964.45	1712.93	3687.38	1280.13	411.20	1084.77
SRM612-15	1705.93	21282.04	19442.19	48249.91	83329.99	23217.69	59873.26
SRM610-15	7442.36	134337.36	123059.02	339596.72	593068.00	238451.27	666178.06
AP1-15	409.20	1458.37	1167.29	3072.22	288.04	76.60	479.32
AP2-15	1885.85	29123.64	24453.42	63915.32	2083.73	1420.61	2410.85
AP3-15	11535.67	271180.94	221639.77	680665.88	13315.56	8170.85	13450.32

Appendix A. Raw trace element datasheets from laser ablation.

AP4-15	10733.78	243984.69	200158.73	603851.06	11496.51	9718.49	12495.59
LA3324-2-1	1972.77	4325.62	3576.10	8658.09	182.24	401.24	3337.66
LA3324-2-2	1690.29	4448.50	3741.98	9343.69	654.96	730.80	3609.10
LA3324-2-3	2040.81	7164.16	5979.83	15223.25	402.52	1663.69	8021.29
LA3324-2-4	1692.81	2797.78	2342.21	5998.63	393.36	414.24	2201.33
LA3324-2-5	1752.81	2813.14	2336.81	5834.23	188.20	399.36	2369.85
LA3324-2-6	1737.57	3285.94	2709.50	6750.20	256.20	1203.93	5645.59
LA3324-2-7	4161.18	6525.72	5349.79	13440.56	569.92	4466.46	12567.03
LA3324-2-8	4077.34	6161.11	5156.83	13048.31	399.00	3038.10	9745.97
LA3324-2-9	4476.71	6779.52	5635.03	14216.64	486.04	4915.91	10646.30
LA3324-2-10	23877.62	6663.48	5505.99	13726.56	267.68	629.76	8091.85
LA3324-2-11	11854.39	6245.16	5122.07	12842.59	142.52	662.92	7808.80
LA3324-2-12	13795.68	19495.35	15872.61	41661.16	555.96	5958.15	45367.54
SRM614-16	676.12	1383.57	1158.45	2909.54	1522.21	676.40	1730.41
SRM612-16	1648.41	18411.86	16655.45	41497.27	71259.81	37633.49	86124.84
SRM610-16	7452.28	138217.86	126047.03	354852.31	652586.69	362383.25	939978.44
AP1-16	397.16	749.08	592.92	1530.81	45.68	17.72	73.64
AP2-16	1590.05	23186.01	19393.11	50848.81	1375.17	1498.81	1564.81
AP3-16	10977.54	259082.02	212002.03	654896.38	12495.39	9702.05	14408.24
AP4-16	9462.09	221737.20	182315.19	551512.88	10298.70	11575.75	13950.36
blank-16	680.36	74.88	57.20	142.64	6.28	0.64	0.00
blank average	523.64	83.80	60.82	157.82	6.54	0.48	2.68

blank subtraction							
SRM614-15	-24.32	1880.65	1652.11	3529.56	1273.59	410.72	1082.09
SRM612-15	1182.29	21198.24	19381.37	48092.09	83323.45	23217.21	59870.58
SRM610-15	6918.72	134253.56	122998.20	339438.90	593061.46	238450.79	666175.38
AP1-15	-114.44	1374.57	1106.47	2914.40	281.50	76.12	476.64
AP2-15	1362.21	29039.84	24392.60	63757.50	2077.19	1420.13	2408.17
AP3-15	11012.02	271097.14	221578.95	680508.06	13309.01	8170.37	13447.63
AP4-15	10210.14	243900.89	200097.91	603693.24	11489.96	9718.01	12492.91
LA3324-2-1	1449.13	4241.82	3515.28	8500.27	175.70	400.76	3334.98
LA3324-2-2	1166.65	4364.70	3681.16	9185.87	648.42	730.32	3606.42
LA3324-2-3	1517.17	7080.36	5919.01	15065.42	395.98	1663.21	8018.61
LA3324-2-4	1169.17	2713.98	2281.39	5840.81	386.82	413.76	2198.65
LA3324-2-5	1229.17	2729.34	2275.99	5676.41	181.66	398.88	2367.17
LA3324-2-6	1213.93	3202.14	2648.67	6592.38	249.66	1203.45	5642.91
LA3324-2-7	3637.54	6441.92	5288.97	13282.74	563.38	4465.98	12564.35
LA3324-2-8	3553.70	6077.31	5096.01	12890.49	392.46	3037.62	9743.29
LA3324-2-9	3953.06	6695.72	5574.21	14058.82	479.50	4915.43	10643.62
LA3324-2-10	23353.97	6579.68	5445.17	13568.74	261.14	629.28	8089.17
LA3324-2-11	11330.74	6161.35	5061.25	12684.77	135.98	662.44	7806.12
LA3324-2-12	13272.04	19411.55	15811.79	41503.34	549.42	5957.67	45364.85
SRM614-16	152.48	1299.77	1097.63	2751.72	1515.67	675.92	1727.73
SRM612-16	1124.77	18328.06	16594.63	41339.45	71253.26	37633.01	86122.16
SRM610-16	6928.64	138134.06	125986.21	354694.49	652580.15	362382.77	939975.76
AP1-16	-126.48	665.28	532.10	1372.99	39.14	17.24	70.96
AP2-16	1066.41	23102.21	19332.29	50690.98	1368.63	1498.33	1562.13
AP3-16	10453.90	258998.22	211941.21	654738.56	12488.85	9701.57	14405.56
AP4-16	8938.45	221653.40	182254.37	551355.06	10292.16	11575.26	13947.68

zero correction							
SRM614-15	0.00	1880.65	1652.11	3529.56	1273.59	410.72	1082.09
SRM612-15	1182.29	21198.24	19381.37	48092.09	83323.45	23217.21	59870.58
SRM610-15	6918.72	134253.56	122998.20	339438.90	593061.46	238450.79	666175.38
AP1-15	0.00	1374.57	1106.47	2914.40	281.50	76.12	476.64
AP2-15	1362.21	29039.84	24392.60	63757.50	2077.19	1420.13	2408.17
AP3-15	11012.02	271097.14	221578.95	680508.06	13309.01	8170.37	13447.63
AP4-15	10210.14	243900.89	200097.91	603693.24	11489.96	9718.01	12492.91
LA3324-2-1	1449.13	4241.82	3515.28	8500.27	175.70	400.76	3334.98
LA3324-2-2	1166.65	4364.70	3681.16	9185.87	648.42	730.32	3606.42
LA3324-2-3	1517.17	7080.36	5919.01	15065.42	395.98	1663.21	8018.61
LA3324-2-4	1169.17	2713.98	2281.39	5840.81	386.82	413.76	2198.65
LA3324-2-5	1229.17	2729.34	2275.99	5676.41	181.66	398.88	2367.17
LA3324-2-6	1213.93	3202.14	2648.67	6592.38	249.66	1203.45	5642.91
LA3324-2-7	3637.54	6441.92	5288.97	13282.74	563.38	4465.98	12564.35
LA3324-2-8	3553.70	6077.31	5096.01	12890.49	392.46	3037.62	9743.29
LA3324-2-9	3953.06	6695.72	5574.21	14058.82	479.50	4915.43	10643.62
LA3324-2-10	23353.97	6579.68	5445.17	13568.74	261.14	629.28	8089.17
LA3324-2-11	11330.74	6161.35	5061.25	12684.77	135.98	662.44	7806.12
LA3324-2-12	13272.04	19411.55	15811.79	41503.34	549.42	5957.67	45364.85
SRM614-16	152.48	1299.77	1097.63	2751.72	1515.67	675.92	1727.73
SRM612-16	1124.77	18328.06	16594.63	41339.45	71253.26	37633.01	86122.16
SRM610-16	6928.64	138134.06	125986.21	354694.49	652580.15	362382.77	939975.76
AP1-16	0.00	665.28	532.10	1372.99	39.14	17.24	70.96
AP2-16	1066.41	23102.21	19332.29	50690.98	1368.63	1498.33	1562.13
AP3-16	10453.90	258998.22	211941.21	654738.56	12488.85	9701.57	14405.56
AP4-16	8938.45	221653.40	182254.37	551355.06	10292.16	11575.26	13947.68

Appendix A. Raw trace element datasheets from laser ablation.

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-15	0.000000	0.001382	0.001214	0.002595	0.000936	0.000302	0.000795
SRM612-15	0.000825	0.014784	0.013517	0.033541	0.058112	0.016192	0.041756
SRM610-15	0.008914	0.172963	0.158463	0.437311	0.764061	0.307204	0.858256
AP1-15	0.000000	0.000119	0.000096	0.000253	0.000024	0.000007	0.000041
AP2-15	0.000111	0.002358	0.001981	0.005178	0.000169	0.000115	0.000196
AP3-15	0.000660	0.016247	0.013279	0.040783	0.000798	0.000490	0.000806
AP4-15	0.000677	0.016171	0.013267	0.040026	0.000762	0.000644	0.000828
LA3324-2-1	0.000378	0.001105	0.000916	0.002215	0.000046	0.000104	0.000869
LA3324-2-2	0.000250	0.000936	0.000789	0.001970	0.000139	0.000157	0.000773
LA3324-2-3	0.000288	0.001343	0.001123	0.002858	0.000075	0.000316	0.001521
LA3324-2-4	0.000165	0.000383	0.000322	0.000824	0.000055	0.000058	0.000310
LA3324-2-5	0.000170	0.000377	0.000314	0.000783	0.000025	0.000055	0.000327
LA3324-2-6	0.000168	0.000444	0.000367	0.000914	0.000035	0.000167	0.000782
LA3324-2-7	0.000760	0.001345	0.001105	0.002774	0.000118	0.000933	0.002624
LA3324-2-8	0.000663	0.001134	0.000951	0.002405	0.000073	0.000567	0.001818
LA3324-2-9	0.000721	0.001222	0.001017	0.002566	0.000088	0.000897	0.001943
LA3324-2-10	0.004250	0.001197	0.000991	0.002469	0.000048	0.000115	0.001472
LA3324-2-11	0.001671	0.000909	0.000746	0.001871	0.000020	0.000098	0.001151
LA3324-2-12	0.001368	0.002000	0.001629	0.004277	0.000057	0.000614	0.004675
SRM614-16	0.000113	0.000962	0.000812	0.002036	0.001122	0.000500	0.001279
SRM612-16	0.000795	0.012960	0.011735	0.029232	0.050385	0.026611	0.060899
SRM610-16	0.008365	0.166761	0.152095	0.428201	0.787820	0.437483	1.134775
AP1-16	0.000000	0.000062	0.000049	0.000127	0.000004	0.000002	0.000007
AP2-16	0.000092	0.002001	0.001674	0.004390	0.000119	0.000130	0.000135
AP3-16	0.000659	0.016323	0.013357	0.041264	0.000787	0.000611	0.000908
AP4-16	0.000616	0.015263	0.012550	0.037967	0.000709	0.000797	0.000960
standardize signal averages AP							
AP1	0.000000	0.000090	0.000073	0.000190	0.000014	0.000004	0.000024
AP2	0.000101	0.002180	0.001828	0.004784	0.000144	0.000123	0.000165
AP3	0.000659	0.016285	0.013318	0.041023	0.000792	0.000551	0.000857
AP4	0.000646	0.015717	0.012909	0.038997	0.000735	0.000721	0.000894
linest from std sig ave							
	0.452175	0.018418	0.022486	0.007350	0.006047	0.013157	0.007825
standardize signal averages SRM							
srm614-2	0.000056	0.001172	0.001013	0.002315	0.001029	0.000401	0.001037
srm612-2	0.000810	0.013872	0.012626	0.031387	0.054249	0.021402	0.051327
srm610-2	0.008639	0.169862	0.155279	0.432756	0.775941	0.372343	0.996516
linest from std sig ave							
	0.557849	0.028399	0.031067	0.011153	0.005380	0.014131	0.005357
concentration data							
SRM614-15	0.00	2.18	2.34	1.64	0.49	0.34	0.53
SRM612-15	31.98	23.35	26.07	21.14	30.14	18.27	28.02
SRM610-15	345.67	273.20	305.59	275.66	396.27	346.64	575.99
AP1-15	0.00	0.88	0.86	0.74	0.06	0.03	0.13
AP2-15	19.96	17.33	17.77	15.18	0.41	0.61	0.61
AP3-15	119.05	119.37	119.12	119.58	1.92	2.57	2.52
AP4-15	122.11	118.82	119.01	117.36	1.84	3.38	2.59
LA3324-2-1	68.11	8.12	8.22	6.49	0.11	0.55	2.71
LA3324-2-2	45.12	6.88	7.08	5.78	0.34	0.82	2.41
LA3324-2-3	51.92	9.87	10.07	8.38	0.18	1.66	4.75
LA3324-2-4	29.76	2.81	2.89	2.42	0.13	0.31	0.97
LA3324-2-5	30.59	2.77	2.82	2.30	0.06	0.29	1.02
LA3324-2-6	30.35	3.26	3.29	2.68	0.08	0.88	2.44

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-2-7	137.04	9.89	9.91	8.13	0.28	4.90	8.19
LA3324-2-8	119.62	8.33	8.53	7.05	0.18	2.98	5.68
LA3324-2-9	130.14	8.98	9.13	7.52	0.21	4.71	6.06
LA3324-2-10	766.69	8.80	8.89	7.24	0.11	0.60	4.60
LA3324-2-11	301.42	6.68	6.70	5.48	0.05	0.51	3.59
LA3324-2-12	246.73	14.70	14.62	12.54	0.14	3.22	14.59
SRM614-16	4.38	1.52	1.57	1.28	0.58	0.56	0.86
SRM612-16	30.84	20.47	22.63	18.43	26.13	30.03	40.87
SRM610-16	324.38	263.41	293.31	269.92	408.60	493.64	761.57
AP1-16	0.00	0.45	0.44	0.37	0.01	0.01	0.02
AP2-16	16.66	14.70	15.02	12.87	0.29	0.68	0.42
AP3-16	118.85	119.93	119.82	120.99	1.90	3.21	2.83
AP4-16	111.03	112.15	112.58	111.33	1.71	4.18	3.00

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-13	200.08	65.96	49.68	139.44	10.20	0.96	3.08
SRM614-13	373.76	1635.05	1441.65	3396.46	1690.41	573.68	1654.33
SRM612-13	1625.37	22029.40	20370.88	50463.56	84331.91	36408.93	82942.59
SRM610-13	8150.09	154156.70	140758.75	396869.69	738744.50	345224.75	898737.44
AP1-13	321.24	1722.61	1395.29	3553.18	329.84	109.88	2490.81
AP2-13	1532.53	26885.87	22399.77	57869.29	1785.29	1629.97	3573.78
AP3-13	8360.33	187542.17	153164.27	457339.31	9770.62	7861.52	12270.23
AP4-13	16832.38	435371.25	353835.84	1113414.50	19821.31	13819.32	20642.76
LA3324-1-1	3459.74	11076.82	9364.45	23614.77	2406.77	421.92	85845.88
LA3324-1-2	3196.30	7504.28	6422.76	16039.49	1296.97	214.16	56493.24
LA3324-1-3	3404.06	7093.04	6013.11	14776.00	572.68	144.20	48651.79
LA3324-1-4	5084.11	30015.49	25564.34	66125.85	3034.86	3017.78	450055.97
LA3324-1-5	4671.07	14658.68	12179.07	31051.70	1019.21	908.25	275729.50
LA3324-1-6	4643.75	19820.11	16527.01	42738.12	1333.13	1691.73	349497.69
LA3324-1-7	2909.58	21277.48	18100.62	46752.02	855.36	1479.53	405010.81
LA3324-1-8	3504.30	33104.75	27867.76	72460.97	1413.49	3015.94	601697.44
LA3324-1-9	3582.94	39096.94	32501.14	86247.28	2179.09	3961.26	734648.75
LA3324-1-10	2654.09	8802.29	7307.80	18064.06	1497.57	2548.97	88815.98
LA3324-1-11	1633.81	5613.87	4698.79	11892.07	4060.50	1797.41	34942.04
LA3324-1-12	1814.41	6530.72	5315.03	13437.20	1471.57	2313.65	51522.49
LA3324-1-13	2319.97	8102.65	6941.84	17297.22	2847.74	3183.90	133755.55
LA3324-1-14	2198.49	8950.69	7579.96	18796.31	1871.61	4092.22	108144.09
LA3324-1-15	2241.53	8940.09	7491.28	18839.95	1426.45	3494.18	111013.83
LA3324-1-16	1488.97	4954.39	4100.74	10449.10	1301.01	1944.05	119489.23
LA3324-1-17	1371.29	5470.07	4541.51	11435.02	1578.61	2107.81	136480.56
LA3324-1-18	1285.01	5278.63	4382.78	11077.54	787.48	2567.29	136818.73
SRM614-14	411.72	1210.61	1036.09	2654.29	1291.97	782.32	1992.73
SRM612-14	1402.21	18409.78	16697.29	41438.31	70343.80	42475.52	94345.93
SRM610-14	7169.32	133554.03	121925.80	345899.38	649700.63	444078.50	1071924.60
AP1-14	268.04	629.56	518.72	1261.29	20.28	17.36	72.48
AP2-14	1165.01	18034.02	15221.93	38689.26	1120.29	1327.05	1509.17
AP3-14	7201.76	157101.36	129050.13	386472.75	8041.17	8265.21	10658.54
AP4-14	9296.21	217550.19	177835.31	544214.56	10423.22	11258.98	13491.00
blank-14	318.04	41.84	29.68	72.96	2.64	0.56	3.68
blank average	259.06	53.90	39.68	106.20	6.42	0.76	3.38

blank subtraction							
SRM614-13	114.70	1581.15	1401.97	3290.26	1683.99	572.92	1650.95
SRM612-13	1366.31	21975.50	20331.19	50357.36	84325.49	36408.17	82939.21
SRM610-13	7891.02	154102.80	140719.07	396763.49	738738.08	345223.99	898734.06
AP1-13	62.18	1668.71	1355.61	3446.98	323.42	109.12	2487.43
AP2-13	1273.47	26831.97	22360.09	57763.08	1778.87	1629.21	3570.40
AP3-13	8101.27	187488.27	153124.59	457233.11	9764.20	7860.76	12266.85
AP4-13	16573.31	435317.35	353796.16	1113308.30	19814.89	13818.56	20639.38
LA3324-1-1	3200.68	11022.92	9324.77	23508.57	2400.35	421.16	85842.50
LA3324-1-2	2937.24	7450.38	6383.08	15933.29	1290.55	213.40	56489.86
LA3324-1-3	3145.00	7039.14	5973.43	14669.80	566.26	143.44	48648.41
LA3324-1-4	4825.05	29961.59	25524.66	66019.65	3028.44	3017.02	450052.59
LA3324-1-5	4412.00	14604.78	12139.39	30945.49	1012.79	907.49	275726.12
LA3324-1-6	4384.68	19766.21	16487.33	42631.92	1326.71	1690.97	349494.31
LA3324-1-7	2650.51	21223.58	18060.94	46645.82	848.94	1478.77	405007.43
LA3324-1-8	3245.24	33050.85	27828.08	72354.77	1407.07	3015.18	601694.06
LA3324-1-9	3323.88	39043.04	32461.46	86141.08	2172.67	3960.50	734645.37

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-10	2395.03	8748.39	7268.12	17957.86	1491.15	2548.21	88812.60
LA3324-1-11	1374.75	5559.97	4659.11	11785.87	4054.08	1796.65	34938.65
LA3324-1-12	1555.35	6476.82	5275.35	13330.99	1465.15	2312.89	51519.11
LA3324-1-13	2060.91	8048.75	6902.16	17191.02	2841.32	3183.14	133752.17
LA3324-1-14	1939.43	8896.79	7540.28	18690.11	1865.19	4091.46	108140.71
LA3324-1-15	1982.47	8886.19	7451.60	18733.74	1420.03	3493.42	111010.45
LA3324-1-16	1229.91	4900.49	4061.06	10342.90	1294.59	1943.29	119485.85
LA3324-1-17	1112.23	5416.17	4501.83	11328.82	1572.19	2107.05	136477.18
LA3324-1-18	1025.95	5224.73	4343.10	10971.34	781.06	2566.53	136815.35
SRM614-14	152.66	1156.71	996.41	2548.09	1285.55	781.56	1989.35
SRM612-14	1143.15	18355.88	16657.61	41332.11	70337.38	42474.76	94342.55
SRM610-14	6910.26	133500.13	121886.12	345793.18	649694.21	444077.74	1071921.22
AP1-14	8.98	575.66	479.04	1155.09	13.86	16.60	69.10
AP2-14	905.95	17980.12	15182.25	38583.06	1113.87	1326.29	1505.79
AP3-14	6942.70	157047.46	129010.45	386366.55	8034.75	8264.45	10655.16
AP4-14	9037.15	217496.29	177795.63	544108.36	10416.80	11258.22	13487.62

zero correction							
SRM614-13	114.70	1581.15	1401.97	3290.26	1683.99	572.92	1650.95
SRM612-13	1366.31	21975.50	20331.19	50357.36	84325.49	36408.17	82939.21
SRM610-13	7891.02	154102.80	140719.07	396763.49	738738.08	345223.99	898734.06
AP1-13	62.18	1668.71	1355.61	3446.98	323.42	109.12	2487.43
AP2-13	1273.47	26831.97	22360.09	57763.08	1778.87	1629.21	3570.40
AP3-13	8101.27	187488.27	153124.59	457233.11	9764.20	7860.76	12266.85
AP4-13	16573.31	435317.35	353796.16	1113308.30	19814.89	13818.56	20639.38
LA3324-1-1	3200.68	11022.92	9324.77	23508.57	2400.35	421.16	85842.50
LA3324-1-2	2937.24	7450.38	6383.08	15933.29	1290.55	213.40	56489.86
LA3324-1-3	3145.00	7039.14	5973.43	14669.80	566.26	143.44	48648.41
LA3324-1-4	4825.05	29961.59	25524.66	66019.65	3028.44	3017.02	450052.59
LA3324-1-5	4412.00	14604.78	12139.39	30945.49	1012.79	907.49	275726.12
LA3324-1-6	4384.68	19766.21	16487.33	42631.92	1326.71	1690.97	349494.31
LA3324-1-7	2650.51	21223.58	18060.94	46645.82	848.94	1478.77	405007.43
LA3324-1-8	3245.24	33050.85	27828.08	72354.77	1407.07	3015.18	601694.06
LA3324-1-9	3323.88	39043.04	32461.46	86141.08	2172.67	3960.50	734645.37
LA3324-1-10	2395.03	8748.39	7268.12	17957.86	1491.15	2548.21	88812.60
LA3324-1-11	1374.75	5559.97	4659.11	11785.87	4054.08	1796.65	34938.65
LA3324-1-12	1555.35	6476.82	5275.35	13330.99	1465.15	2312.89	51519.11
LA3324-1-13	2060.91	8048.75	6902.16	17191.02	2841.32	3183.14	133752.17
LA3324-1-14	1939.43	8896.79	7540.28	18690.11	1865.19	4091.46	108140.71
LA3324-1-15	1982.47	8886.19	7451.60	18733.74	1420.03	3493.42	111010.45
LA3324-1-16	1229.91	4900.49	4061.06	10342.90	1294.59	1943.29	119485.85
LA3324-1-17	1112.23	5416.17	4501.83	11328.82	1572.19	2107.05	136477.18
LA3324-1-18	1025.95	5224.73	4343.10	10971.34	781.06	2566.53	136815.35
SRM614-14	152.66	1156.71	996.41	2548.09	1285.55	781.56	1989.35
SRM612-14	1143.15	18355.88	16657.61	41332.11	70337.38	42474.76	94342.55
SRM610-14	6910.26	133500.13	121886.12	345793.18	649694.21	444077.74	1071921.22
AP1-14	8.98	575.66	479.04	1155.09	13.86	16.60	69.10
AP2-14	905.95	17980.12	15182.25	38583.06	1113.87	1326.29	1505.79
AP3-14	6942.70	157047.46	129010.45	386366.55	8034.75	8264.45	10655.16
AP4-14	9037.15	217496.29	177795.63	544108.36	10416.80	11258.22	13487.62

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-13	0.000059	0.000816	0.000724	0.001699	0.000870	0.000296	0.000853
SRM612-13	0.000790	0.012713	0.011762	0.029132	0.048783	0.021062	0.047981
SRM610-13	0.008179	0.159731	0.145858	0.411254	0.765718	0.357832	0.931557
AP1-13	0.000004	0.000111	0.000090	0.000230	0.000022	0.000007	0.000166
AP2-13	0.000105	0.002211	0.001843	0.004760	0.000147	0.000134	0.000294
AP3-13	0.000451	0.010440	0.008526	0.025460	0.000544	0.000438	0.000683
AP4-13	0.001042	0.027370	0.022244	0.069997	0.001246	0.000869	0.001298
LA3324-1-1	0.000389	0.001339	0.001133	0.002856	0.000292	0.000051	0.010428

Appendix A. Raw trace element datasheets from laser ablation.

LA3324-1-2	0.000418	0.001061	0.000909	0.002270	0.000184	0.000030	0.008048
LA3324-1-3	0.000542	0.001212	0.001029	0.002527	0.000098	0.000025	0.008380
LA3324-1-4	0.000416	0.002583	0.002201	0.005692	0.000261	0.000260	0.038804
LA3324-1-5	0.000451	0.001494	0.001242	0.003166	0.000104	0.000093	0.028210
LA3324-1-6	0.000411	0.001852	0.001545	0.003994	0.000124	0.000158	0.032745
LA3324-1-7	0.000238	0.001902	0.001619	0.004181	0.000076	0.000133	0.036298
LA3324-1-8	0.000255	0.002600	0.002189	0.005692	0.000111	0.000237	0.047333
LA3324-1-9	0.000269	0.003156	0.002624	0.006963	0.000176	0.000320	0.059387
LA3324-1-10	0.000422	0.001540	0.001279	0.003161	0.000262	0.000449	0.015632
LA3324-1-11	0.000280	0.001131	0.000948	0.002398	0.000825	0.000365	0.007107
LA3324-1-12	0.000311	0.001294	0.001054	0.002663	0.000293	0.000462	0.010292
LA3324-1-13	0.000287	0.001121	0.000961	0.002394	0.000396	0.000443	0.018627
LA3324-1-14	0.000268	0.001232	0.001044	0.002587	0.000258	0.000566	0.014969
LA3324-1-15	0.000278	0.001248	0.001046	0.002631	0.000199	0.000491	0.015590
LA3324-1-16	0.000193	0.000769	0.000637	0.001623	0.000203	0.000305	0.018749
LA3324-1-17	0.000156	0.000757	0.000630	0.001584	0.000220	0.000295	0.019087
LA3324-1-18	0.000141	0.000718	0.000596	0.001507	0.000107	0.000352	0.018790
SRM614-14	0.000115	0.000875	0.000754	0.001928	0.000972	0.000591	0.001505
SRM612-14	0.000845	0.013570	0.012314	0.030555	0.051998	0.031400	0.069744
SRM610-14	0.008440	0.163045	0.148860	0.422320	0.793476	0.542355	1.309145
AP1-14	0.000001	0.000046	0.000038	0.000093	0.000001	0.000001	0.000006
AP2-14	0.000096	0.001904	0.001608	0.004087	0.000118	0.000140	0.000159
AP3-14	0.000476	0.010770	0.008847	0.026496	0.000551	0.000567	0.000731
AP4-14	0.000723	0.017391	0.014216	0.043506	0.000833	0.000900	0.001078

standardize signal averages AP

AP1	0.000002	0.000079	0.000064	0.000161	0.000011	0.000004	0.000086
AP2	0.000100	0.002058	0.001725	0.004424	0.000132	0.000137	0.000227
AP3	0.000464	0.010605	0.008687	0.025978	0.000547	0.000502	0.000707
AP4	0.000882	0.022380	0.018230	0.056752	0.001039	0.000885	0.001188

linest from std sig ave

	0.433067	0.017385	0.021325	0.006889	0.005733	0.011767	0.007147
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standardize signal averages SRM

srM614-2	0.000087	0.000846	0.000739	0.001813	0.000921	0.000444	0.001179
srM612-2	0.000818	0.013141	0.012038	0.029844	0.050390	0.026231	0.058862
srM610-2	0.008309	0.161388	0.147359	0.416787	0.779597	0.450094	1.120351

linest from std sig ave

	0.579695	0.029891	0.032737	0.011581	0.005356	0.011690	0.004764
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concentration data

SRM614-13	2.20	1.22	1.32	1.00	0.43	0.30	0.52
SRM612-13	29.36	18.95	21.51	17.21	23.99	21.26	29.41
SRM610-13	303.79	238.16	266.75	242.96	376.49	361.12	570.96
AP1-13	0.72	0.77	0.77	0.63	0.05	0.03	0.47
AP2-13	18.13	15.34	15.68	13.08	0.34	0.63	0.84
AP3-13	77.93	72.41	72.53	69.97	1.24	2.05	1.95
AP4-13	180.02	189.82	189.23	192.36	2.85	4.08	3.70
LA3324-1-1	67.17	9.29	9.64	7.85	0.67	0.24	29.73
LA3324-1-2	72.30	7.36	7.74	6.24	0.42	0.14	22.95
LA3324-1-3	93.59	8.41	8.75	6.94	0.22	0.12	23.89
LA3324-1-4	71.87	17.92	18.72	15.64	0.60	1.22	110.63
LA3324-1-5	77.99	10.36	10.57	8.70	0.24	0.44	80.43
LA3324-1-6	70.97	12.84	13.14	10.98	0.28	0.74	93.36
LA3324-1-7	41.04	13.19	13.77	11.49	0.17	0.62	103.49
LA3324-1-8	44.11	18.03	18.62	15.64	0.25	1.11	134.95
LA3324-1-9	46.42	21.89	22.32	19.14	0.40	1.50	169.31
LA3324-1-10	72.83	10.68	10.88	8.69	0.60	2.11	44.57
LA3324-1-11	48.32	7.84	8.06	6.59	1.89	1.72	20.26
LA3324-1-12	53.68	8.97	8.97	7.32	0.67	2.17	29.34
LA3324-1-13	49.59	7.77	8.18	6.58	0.91	2.08	53.11
LA3324-1-14	46.38	8.54	8.88	7.11	0.59	2.66	42.68
LA3324-1-15	48.10	8.65	8.90	7.23	0.46	2.30	44.45
LA3324-1-16	33.34	5.33	5.42	4.46	0.46	1.43	53.45
LA3324-1-17	26.87	5.25	5.36	4.35	0.50	1.38	54.42
LA3324-1-18	24.34	4.98	5.07	4.14	0.25	1.65	53.57
SRM614-14	4.29	1.30	1.38	1.14	0.48	0.60	0.92
SRM612-14	31.39	20.23	22.52	18.05	25.57	31.69	42.75
SRM610-14	313.45	243.10	272.24	249.50	390.13	547.35	802.38
AP1-14	0.12	0.32	0.33	0.25	0.00	0.01	0.02
AP2-14	16.58	13.21	13.68	11.23	0.27	0.66	0.45
AP3-14	82.26	74.69	75.26	72.81	1.26	2.66	2.08
AP4-14	124.84	120.61	120.94	119.56	1.90	4.23	3.07

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-11	77.96	177.32	136.44	409.00	16.36	0.84	1.84
SRM614-11	150.36	1332.85	1213.37	2882.54	1275.05	331.36	918.01
SRM612-11	1323.57	20326.15	18440.94	45584.22	76635.75	18070.30	44879.29
SRM610-11	6509.56	124729.18	113965.64	318040.63	582644.44	147098.23	392894.97
AP1-11	139.48	1841.69	1503.93	3950.90	388.64	44.60	339.32
AP2-11	1185.49	21250.60	17669.10	46390.14	1393.69	680.08	1050.89
AP3-11	7158.84	164461.92	135160.92	403855.22	8745.17	3427.26	5657.15
AP4-11	8699.33	201532.94	164949.05	498614.13	10071.82	4933.03	6546.04
M17-24-141-1	135.48	521.20	428.00	1125.97	31.32	236.92	880.72
M17-24-141-2	147.04	487.20	413.48	1020.77	10.12	164.52	928.85
M17-24-141-3	148.96	558.56	456.84	1217.69	16.00	169.44	1099.05
M17-24-141-4	168.12	839.64	701.48	1733.97	42.44	339.96	1486.69
M17-24-141-5	179.00	749.40	699.20	1623.81	19.32	275.12	1727.13
M17-24-141-6	157.44	931.89	694.96	1923.81	53.84	210.52	1322.41
M17-24-141-7	217.12	963.65	756.20	1961.53	41.28	130.32	1529.77
M17-24-141-8	223.84	878.36	664.92	1677.77	13.52	115.84	1133.77
M17-24-141-9	212.12	857.20	697.80	1780.29	26.20	145.68	1421.01
M17-24-141-10	353.04	2417.09	1949.05	4996.39	92.00	483.20	11252.66
M17-24-141-11	410.84	3860.54	3026.50	7591.20	92.20	704.00	20374.75
M17-24-141-12	503.36	5530.19	4695.31	11322.18	150.36	1182.13	35317.56
M17-24-141-13	1046.53	15989.37	13085.91	33340.79	325.96	2330.25	160494.59
M17-24-141-14	1049.29	15879.09	12783.71	33334.79	251.60	2749.42	165051.00
M17-24-141-15	1026.89	17086.78	13742.56	35234.52	297.44	2525.65	173920.02
M17-24-141-16	918.05	10654.78	8765.37	22543.25	275.84	957.05	215231.81
M17-24-141-17	872.48	10310.98	8352.49	21259.32	177.76	221.16	223642.94
M17-24-141-18	840.96	9513.61	7685.72	19447.63	195.00	385.40	231087.42
SRM614-12	231.40	1251.37	1073.93	2525.01	1272.61	511.84	1284.57
SRM612-12	1565.93	22854.65	20905.24	52277.18	90701.52	32299.06	77719.20
SRM610-12	8269.45	160900.22	146324.11	414628.06	786757.13	293169.69	777432.13
AP1-12	192.40	756.92	624.60	1448.85	23.84	10.60	52.72
AP2-12	1249.77	22536.25	18949.55	49302.80	1354.85	1019.89	1167.81
AP3-12	8149.17	186629.69	152461.58	458519.63	9740.58	5602.63	7724.80
AP4-12	12947.99	319654.19	259355.91	809558.56	14395.32	9200.97	12392.67
blank-12	191.56	42.88	35.76	90.24	1.56	1.64	8.60
blank average	134.76	110.10	86.10	249.62	8.96	1.24	5.22

blank subtraction							
SRM614-11	15.60	1222.75	1127.27	2632.91	1266.09	330.12	912.79
SRM612-11	1188.81	20216.05	18354.84	45334.59	76626.79	18069.06	44874.07
SRM610-11	6374.80	124619.08	113879.54	317791.01	582635.48	147096.99	392889.75
AP1-11	4.72	1731.59	1417.83	3701.28	379.68	43.36	334.10
AP2-11	1050.73	21140.50	17583.00	46140.52	1384.73	678.84	1045.67
AP3-11	7024.08	164351.82	135074.82	403605.60	8736.21	3426.02	5651.93
AP4-11	8564.57	201422.84	164862.95	498364.51	10062.86	4931.79	6540.82
M17-24-141-1	0.72	411.10	341.90	876.34	22.36	235.68	875.50
M17-24-141-2	12.28	377.10	327.38	771.14	1.16	163.28	923.63
M17-24-141-3	14.20	448.46	370.74	968.07	7.04	168.20	1093.83
M17-24-141-4	33.36	729.54	615.38	1484.35	33.48	338.72	1481.47
M17-24-141-5	44.24	639.30	613.10	1374.19	10.36	273.88	1721.91
M17-24-141-6	22.68	821.78	608.86	1674.19	44.88	209.28	1317.19
M17-24-141-7	82.36	853.54	670.10	1711.91	32.32	129.08	1524.55
M17-24-141-8	89.08	768.26	578.82	1428.15	4.56	114.60	1128.55
M17-24-141-9	77.36	747.10	611.70	1530.67	17.24	144.44	1415.79
M17-24-141-10	218.28	2306.99	1862.95	4746.77	83.04	481.96	11247.44
M17-24-141-11	276.08	3750.44	2940.40	7341.58	83.24	702.76	20369.53
M17-24-141-12	368.60	5420.09	4609.21	11072.56	141.40	1180.89	35312.34
M17-24-141-13	911.77	15879.27	12999.81	33091.17	317.00	2329.01	160489.37
M17-24-141-14	914.53	15768.99	12697.61	33085.17	242.64	2748.18	165045.78
M17-24-141-15	892.12	16976.67	13656.46	34984.90	288.48	2524.41	173914.80
M17-24-141-16	783.28	10544.68	8679.27	22293.62	266.88	955.81	215226.59
M17-24-141-17	737.72	10200.88	8266.39	21009.70	168.80	219.92	223637.72
M17-24-141-18	706.20	9403.51	7599.62	19198.01	186.04	384.16	231082.20
SRM614-12	96.64	1141.27	987.83	2275.39	1263.65	510.60	1279.35
SRM612-12	1431.17	22744.55	20819.14	52027.55	90692.56	32297.82	77713.97
SRM610-12	8134.69	160790.12	146238.01	414378.44	786748.17	293168.45	777426.91
AP1-12	57.64	646.82	538.50	1199.23	14.88	9.36	47.50
AP2-12	1115.01	22426.15	18863.45	49053.18	1345.89	1018.65	1162.59
AP3-12	8014.41	186519.59	152375.48	458270.01	9731.62	5601.39	7191.58
AP4-12	12813.23	319544.09	259269.81	809308.94	14386.36	9199.73	12387.45

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-11	15.60	1222.75	1127.27	2632.91	1266.09	330.12	912.79
SRM612-11	1188.81	20216.05	18354.84	45334.59	76626.79	18069.06	44874.07
SRM610-11	6374.80	124619.08	113879.54	317791.01	582635.48	147096.99	392889.75
AP1-11	4.72	1731.59	1417.83	3701.28	379.68	43.36	334.10
AP2-11	1050.73	21140.50	17583.00	46140.52	1384.73	678.84	1045.67
AP3-11	7024.08	164351.82	135074.82	403605.60	8736.21	3426.02	5651.93
AP4-11	8564.57	201422.84	164862.95	498364.51	10062.86	4931.79	6540.82
M17-24-141-1	0.72	411.10	341.90	876.34	22.36	235.68	875.50
M17-24-141-2	12.28	377.10	327.38	771.14	1.16	163.28	923.63
M17-24-141-3	14.20	448.46	370.74	968.07	7.04	168.20	1093.83
M17-24-141-4	33.36	729.54	615.38	1484.35	33.48	338.72	1481.47
M17-24-141-5	44.24	639.30	613.10	1374.19	10.36	273.88	1721.91
M17-24-141-6	22.68	821.78	608.86	1674.19	44.88	209.28	1317.19
M17-24-141-7	82.36	853.54	670.10	1711.91	32.32	129.08	1524.55
M17-24-141-8	89.08	768.26	578.82	1428.15	4.56	114.60	1128.55
M17-24-141-9	77.36	747.10	611.70	1530.67	17.24	144.44	1415.79
M17-24-141-10	218.28	2306.99	1862.95	4746.77	83.04	481.96	11247.44
M17-24-141-11	276.08	3750.44	2940.40	7341.58	83.24	702.76	20369.53
M17-24-141-12	368.60	5420.09	4609.21	11072.56	141.40	1180.89	35312.34
M17-24-141-13	911.77	15879.27	12999.81	33091.17	317.00	2329.01	160489.37
M17-24-141-14	914.53	15768.99	12697.61	33085.17	242.64	2748.18	165045.78
M17-24-141-15	892.12	16976.67	13656.46	34984.90	288.48	2524.41	173914.80
M17-24-141-16	783.28	10544.68	8679.27	22293.62	266.88	955.81	215226.59
M17-24-141-17	737.72	10200.88	8266.39	21009.70	168.80	219.92	223637.72
M17-24-141-18	706.20	9403.51	7599.62	19198.01	186.04	384.16	231082.20
SRM614-12	96.64	1141.27	987.83	2275.39	1263.65	510.60	1279.35
SRM612-12	1431.17	22744.55	20819.14	52027.55	90692.56	32297.82	77713.97
SRM610-12	8134.69	160790.12	146238.01	414378.44	786748.17	293168.45	777426.91
AP1-12	57.64	646.82	538.50	1199.23	14.88	9.36	47.50
AP2-12	1115.01	22426.15	18863.45	49053.18	1345.89	1018.65	1162.59
AP3-12	8014.41	186519.59	152375.48	458270.01	9731.62	5601.39	7719.58
AP4-12	12813.23	319544.09	259269.81	809308.94	14386.36	9199.73	12387.45
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-11	0.000008	0.000657	0.000606	0.001415	0.000681	0.000177	0.000491
SRM612-11	0.000615	0.010453	0.009491	0.023442	0.039623	0.009343	0.023204
SRM610-11	0.006237	0.121919	0.111412	0.310906	0.570012	0.143910	0.384377
AP1-11	0.000000	0.000151	0.000124	0.000323	0.000033	0.000004	0.000029
AP2-11	0.000098	0.001969	0.001638	0.004298	0.000129	0.000063	0.000097
AP3-11	0.000494	0.011548	0.009491	0.028358	0.000614	0.000241	0.000397
AP4-11	0.000631	0.014831	0.012139	0.036696	0.000741	0.000363	0.000482
M17-24-141-1	0.000000	0.000187	0.000156	0.000399	0.000010	0.000107	0.000399
M17-24-141-2	0.000005	0.000154	0.000134	0.000315	0.000000	0.000067	0.000378
M17-24-141-3	0.000005	0.000167	0.000138	0.000360	0.000003	0.000063	0.000407
M17-24-141-4	0.000010	0.000216	0.000183	0.000440	0.000010	0.000100	0.000439
M17-24-141-5	0.000014	0.000200	0.000192	0.000430	0.000003	0.000086	0.000539
M17-24-141-6	0.000007	0.000261	0.000193	0.000531	0.000014	0.000066	0.000418
M17-24-141-7	0.000028	0.000289	0.000227	0.000580	0.000011	0.000044	0.000517
M17-24-141-8	0.000031	0.000271	0.000204	0.000504	0.000002	0.000040	0.000398
M17-24-141-9	0.000026	0.000246	0.000202	0.000505	0.000006	0.000048	0.000467
M17-24-141-10	0.000047	0.000497	0.000401	0.001022	0.000018	0.000104	0.002421
M17-24-141-11	0.000043	0.000587	0.000460	0.001149	0.000013	0.000110	0.003187
M17-24-141-12	0.000050	0.000732	0.000623	0.001496	0.000019	0.000160	0.004770
M17-24-141-13	0.000055	0.000949	0.000777	0.001978	0.000019	0.000139	0.009594
M17-24-141-14	0.000054	0.000938	0.000755	0.001968	0.000014	0.000163	0.009817
M17-24-141-15	0.000053	0.001000	0.000805	0.002062	0.000017	0.000149	0.010249
M17-24-141-16	0.000044	0.000591	0.000486	0.001248	0.000015	0.000054	0.012053
M17-24-141-17	0.000040	0.000555	0.000450	0.001143	0.000009	0.000012	0.012163

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-141-18	0.000038	0.000507	0.000410	0.001035	0.000010	0.000021	0.012453
SRM614-12	0.000066	0.000775	0.000671	0.001546	0.000858	0.000347	0.000869
SRM612-12	0.000757	0.012035	0.011016	0.027530	0.047989	0.017090	0.041122
SRM610-12	0.008070	0.159504	0.145068	0.411063	0.780454	0.290823	0.771207
AP1-12	0.000005	0.000054	0.000045	0.000099	0.000001	0.000001	0.000004
AP2-12	0.000092	0.001842	0.001549	0.004028	0.000111	0.000084	0.000095
AP3-12	0.000483	0.011252	0.009192	0.027645	0.000587	0.000338	0.000466
AP4-12	0.000793	0.019788	0.016055	0.050117	0.000891	0.000570	0.000767

standardize signal averages AP

AP1	0.000003	0.000102	0.000084	0.000211	0.000017	0.000002	0.000017
AP2	0.000095	0.001905	0.001593	0.004163	0.000120	0.000073	0.000096
AP3	0.000488	0.011400	0.009341	0.028001	0.000600	0.000289	0.000431
AP4	0.000712	0.017310	0.014097	0.043406	0.000816	0.000466	0.000624

linest from std sig ave

0.499130	0.020831	0.025526	0.008363	0.006655	0.021830	0.012944
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standardize signal averages SRM

srm614-2	0.000037	0.000716	0.000638	0.001480	0.000769	0.000262	0.000680
srm612-2	0.000686	0.011244	0.010254	0.025486	0.043806	0.013217	0.032163
srm610-2	0.007153	0.140711	0.128240	0.360984	0.675233	0.217366	0.577792

linest from std sig ave

0.673601	0.034287	0.037622	0.013372	0.006184	0.024203	0.009238
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concentration data

SRM614-11	0.36	1.17	1.33	1.02	0.39	0.33	0.54
SRM612-11	26.31	18.68	20.78	16.81	22.62	17.49	25.76
SRM610-11	266.97	217.82	243.90	222.99	325.35	269.43	426.70
AP1-11	0.08	1.25	1.26	1.08	0.09	0.03	0.15
AP2-11	19.49	16.36	16.68	14.34	0.34	0.55	0.50
AP3-11	98.27	95.96	96.64	94.61	1.63	2.10	2.05
AP4-11	125.57	123.26	123.62	122.43	1.97	3.16	2.49
M17-24-141-1	0.07	1.56	1.58	1.33	0.03	0.93	2.06
M17-24-141-2	1.00	1.28	1.36	1.05	0.00	0.58	1.95
M17-24-141-3	1.05	1.39	1.41	1.20	0.01	0.55	2.10
M17-24-141-4	1.97	1.80	1.86	1.47	0.03	0.88	2.27
M17-24-141-5	2.76	1.66	1.96	1.44	0.01	0.75	2.78
M17-24-141-6	1.43	2.17	1.97	1.77	0.04	0.58	2.16
M17-24-141-7	5.56	2.40	2.31	1.94	0.03	0.38	2.67
M17-24-141-8	6.26	2.25	2.08	1.68	0.00	0.35	2.06
M17-24-141-9	5.08	2.05	2.05	1.68	0.02	0.41	2.41
M17-24-141-10	9.36	4.13	4.08	3.41	0.05	0.90	12.50
M17-24-141-11	8.60	4.88	4.68	3.83	0.03	0.96	16.46
M17-24-141-12	9.91	6.08	6.34	4.99	0.05	1.39	24.63
M17-24-141-13	10.85	7.89	7.91	6.60	0.05	1.21	49.54
M17-24-141-14	10.83	7.79	7.69	6.57	0.04	1.42	50.69
M17-24-141-15	10.47	8.31	8.20	6.88	0.05	1.30	52.93
M17-24-141-16	8.73	4.91	4.95	4.17	0.04	0.47	62.24
M17-24-141-17	7.99	4.61	4.58	3.81	0.02	0.10	62.81
M17-24-141-18	7.58	4.21	4.17	3.45	0.03	0.18	64.30
SRM614-12	2.81	1.38	1.47	1.11	0.49	0.65	0.96
SRM612-12	32.42	21.50	24.12	19.75	27.39	32.00	45.65
SRM610-12	345.43	284.96	317.58	294.82	445.47	544.48	856.12
AP1-12	0.95	0.45	0.45	0.33	0.00	0.01	0.02
AP2-12	18.23	15.30	15.77	13.44	0.29	0.73	0.49
AP3-12	96.27	93.51	93.60	92.23	1.56	2.94	2.40
AP4-12	158.00	164.45	163.49	167.20	2.37	4.96	3.96

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

raw data

blank-9	77.16	52.68	50.20	143.48	3.48	0.84	0.56
SRM614-9	219.68	1926.41	1631.01	4020.54	1909.13	757.88	2106.05
SRM612-9	1376.09	20328.43	18344.50	45687.90	76010.95	35777.12	80119.41
SRM610-9	8619.01	173382.94	157419.61	448285.00	837479.44	373165.34	1002642.00
AP1-9	179.00	1225.65	933.77	2520.29	251.76	117.44	543.20
AP2-9	1610.61	29131.68	24335.86	63100.16	1891.29	1684.21	2053.85
AP3-9	8230.93	187976.38	155177.63	466456.66	9143.49	8032.97	10883.46

Appendix A. Raw trace element datasheets from laser ablation.

AP4-9	16954.78	451439.25	366599.81	1154208.80	19215.03	13622.44	19232.03
M17-24-97-1	564.08	5151.15	4217.70	11025.58	160.24	17143.34	79385.84
M17-24-97-2	458.08	4360.54	3510.62	8740.01	86.56	10917.14	76483.23
M17-24-97-3	441.40	4557.15	3776.78	9666.81	78.64	11034.62	88418.09
M17-24-97-4	405.00	2360.33	1907.33	5044.39	111.48	511.40	50936.49
M17-24-97-5	352.32	1738.17	1401.05	3602.34	39.08	153.96	48553.87
M17-24-97-6	371.88	1742.57	1462.25	3698.54	52.76	222.04	50859.37
M17-24-97-7	390.36	1480.05	1304.13	3165.06	189.80	321.84	26485.75
M17-24-97-8	352.80	1344.57	1040.53	2630.85	47.76	247.00	20169.03
M17-24-97-9	382.12	1451.17	1185.85	2931.02	36.92	148.88	24136.50
M17-24-97-10	389.60	1254.09	1047.21	2609.77	80.40	221.32	12988.03
M17-24-97-11	374.60	1428.37	1172.77	2908.62	54.52	170.08	17994.54
M17-24-97-12	387.08	1457.37	1227.13	3056.50	42.36	244.48	18573.06
M17-24-97-13	527.80	2106.73	1657.73	4276.86	146.96	1295.29	21433.32
M17-24-97-14	436.56	1598.33	1230.65	3123.14	57.20	496.24	19041.07
M17-24-97-15	411.28	1498.33	1222.73	2983.26	54.04	376.60	14521.60
M17-24-97-16	544.04	2652.05	2108.89	5594.83	228.52	1111.81	19842.39
M17-24-97-17	440.40	2153.37	1622.93	4245.34	77.16	704.92	20864.52
M17-24-97-18	403.72	2308.73	1850.77	4701.03	124.84	1354.21	31922.30
SRM614-10	229.72	1826.77	1487.17	3802.74	1905.97	1154.41	2897.62
SRM612-10	1322.77	19399.51	17604.86	43773.13	76266.31	44400.81	97319.11
SRM610-10	6813.04	133345.47	120696.68	343566.78	650335.75	459220.31	1086587.80
AP1-10	127.88	590.76	452.96	1219.01	27.76	17.88	59.76
AP2-10	1108.85	19062.35	16201.73	41799.75	1100.09	1554.93	1622.09
AP3-10	7947.33	197638.67	159642.63	491169.84	9591.81	8484.53	12188.71
AP4-10	13677.04	366652.19	296535.91	936215.06	15943.41	13911.20	19028.83
blank-10	130.56	109.80	99.00	239.76	11.40	2.60	2.80
blank average	103.86	81.24	74.60	191.62	7.44	1.72	1.68

blank subtraction							
SRM614-9	115.82	1845.17	1556.41	3828.92	1901.69	756.16	2104.37
SRM612-9	1272.23	20247.19	18269.90	45496.28	76003.50	35775.40	80117.73
SRM610-9	8515.15	173301.70	157345.01	448093.38	837472.00	373163.62	1002640.32
AP1-9	75.14	1144.41	859.16	2328.67	244.32	115.72	541.52
AP2-9	1506.75	29050.44	24261.26	62908.53	1883.85	1682.49	2052.17
AP3-9	8127.07	187895.14	155103.03	466265.04	9136.05	8031.25	10881.78
AP4-9	16850.91	451358.01	366525.21	1154017.18	19207.59	13620.72	19230.35
M17-24-97-1	460.22	5069.91	4143.10	10833.96	152.80	17141.62	79384.16
M17-24-97-2	354.22	4279.30	3436.02	8548.39	79.12	10915.42	76481.55
M17-24-97-3	337.54	4475.91	3702.18	9475.19	71.20	11032.90	88416.41
M17-24-97-4	301.14	2279.09	1832.73	4852.77	104.04	509.68	50934.81
M17-24-97-5	248.46	1656.93	1326.45	3410.72	31.64	152.24	48552.19
M17-24-97-6	268.02	1661.33	1387.65	3506.92	45.32	220.32	50857.69
M17-24-97-7	286.50	1398.81	1229.53	2973.44	182.36	320.12	26484.07
M17-24-97-8	248.94	1263.33	965.93	2439.23	40.32	245.28	20167.35
M17-24-97-9	278.26	1369.93	1111.25	2739.40	29.48	147.16	24134.82
M17-24-97-10	285.74	1172.85	972.61	2418.15	72.96	219.60	12986.35
M17-24-97-11	270.74	1347.13	1098.17	2717.00	47.08	168.36	17992.86
M17-24-97-12	283.22	1376.13	1152.53	2864.88	34.92	242.76	18571.38
M17-24-97-13	423.94	2025.49	1583.13	4085.24	139.52	1293.57	21431.64
M17-24-97-14	332.70	1517.09	1156.05	2931.52	49.76	494.52	19039.39
M17-24-97-15	307.42	1417.09	1148.13	2791.64	46.60	374.88	14519.92
M17-24-97-16	440.18	2570.81	2034.29	5403.21	221.08	1110.09	19840.71
M17-24-97-17	336.54	2072.13	1548.33	4053.72	69.72	703.20	20862.84
M17-24-97-18	299.86	2227.49	1776.17	4509.41	117.40	1352.49	31920.62
SRM614-10	125.86	1745.53	1412.57	3611.12	1898.53	1152.69	2895.94
SRM612-10	1218.91	19318.27	17530.26	43581.50	76258.87	44399.09	97317.43
SRM610-10	6709.18	133264.23	120622.08	343375.16	650328.31	459218.59	1086586.12
AP1-10	24.02	509.52	378.36	1027.39	20.32	16.16	58.08
AP2-10	1004.99	18981.11	16127.13	41608.13	1092.65	1553.21	1620.41
AP3-10	7843.46	197557.43	159568.03	490978.22	9584.37	8482.81	12187.03
AP4-10	13573.18	366570.95	296461.31	936023.44	15935.97	13909.48	19027.15

zero correction							
SRM614-9	115.82	1845.17	1556.41	3828.92	1901.69	756.16	2104.37
SRM612-9	1272.23	20247.19	18269.90	45496.28	76003.50	35775.40	80117.73
SRM610-9	8515.15	173301.70	157345.01	448093.38	837472.00	373163.62	1002640.32
AP1-9	75.14	1144.41	859.16	2328.67	244.32	115.72	541.52
AP2-9	1506.75	29050.44	24261.26	62908.53	1883.85	1682.49	2052.17
AP3-9	8127.07	187895.14	155103.03	466265.04	9136.05	8031.25	10881.78
AP4-9	16850.91	451358.01	366525.21	1154017.18	19207.59	13620.72	19230.35
M17-24-97-1	460.22	5069.91	4143.10	10833.96	152.80	17141.62	79384.16
M17-24-97-2	354.22	4279.30	3436.02	8548.39	79.12	10915.42	76481.55
M17-24-97-3	337.54	4475.91	3702.18	9475.19	71.20	11032.90	88416.41
M17-24-97-4	301.14	2279.09	1832.73	4852.77	104.04	509.68	50934.81
M17-24-97-5	248.46	1656.93	1326.45	3410.72	31.64	152.24	48552.19
M17-24-97-6	268.02	1661.33	1387.65	3506.92	45.32	220.32	50857.69
M17-24-97-7	286.50	1398.81	1229.53	2973.44	182.36	320.12	26484.07

Appendix A. Raw trace element datasheets from laser ablation.

M17-24-97-8	248.94	1263.33	965.93	2439.23	40.32	245.28	20167.35
M17-24-97-9	278.26	1369.93	1111.25	2739.40	29.48	147.16	24134.82
M17-24-97-10	285.74	1172.85	972.61	2418.15	72.96	219.60	12986.35
M17-24-97-11	270.74	1347.13	1098.17	2717.00	47.08	168.36	17992.86
M17-24-97-12	283.22	1376.13	1152.53	2864.88	34.92	242.76	18571.38
M17-24-97-13	423.94	2025.49	1583.13	4085.24	139.52	1293.57	21431.64
M17-24-97-14	332.70	1517.09	1156.05	2931.52	49.76	494.52	19039.39
M17-24-97-15	307.42	1417.09	1148.13	2791.64	46.60	374.88	14519.92
M17-24-97-16	440.18	2570.81	2034.29	5403.21	221.08	1110.09	19840.71
M17-24-97-17	336.54	2072.13	1548.33	4053.72	69.72	703.20	20862.84
M17-24-97-18	299.86	2227.49	1776.17	4509.41	117.40	1352.49	31920.62
SRM614-10	125.86	1745.53	1412.57	3611.12	1898.53	1152.69	2895.94
SRM612-10	1218.91	19318.27	17530.26	43581.50	76258.87	44399.09	97317.43
SRM610-10	6709.18	133264.23	120622.08	343375.16	650328.31	459218.59	1086586.12
AP1-10	24.02	509.52	378.36	1027.39	20.32	16.16	58.08
AP2-10	1004.99	18981.11	16127.13	41608.13	1092.65	1553.21	1620.41
AP3-10	7843.46	197557.43	159568.03	490978.22	9584.37	8482.81	12187.03
AP4-10	13573.18	366570.95	296461.31	936023.44	15935.97	13909.48	19027.15

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-9	0.000049	0.000785	0.000662	0.001629	0.000809	0.000322	0.000895
SRM612-9	0.000703	0.011193	0.010099	0.025150	0.042014	0.019776	0.044289
SRM610-9	0.008484	0.172672	0.156774	0.446466	0.834430	0.371808	0.998999
AP1-9	0.000006	0.000090	0.000067	0.000183	0.000019	0.000009	0.000043
AP2-9	0.000112	0.002166	0.001809	0.004689	0.000140	0.000125	0.000153
AP3-9	0.000455	0.010515	0.008680	0.026093	0.000511	0.000449	0.000609
AP4-9	0.001038	0.027811	0.022584	0.071106	0.001184	0.000839	0.001185
M17-24-97-1	0.000061	0.000675	0.000552	0.001443	0.000020	0.002283	0.010573
M17-24-97-2	0.000051	0.000618	0.000496	0.001234	0.000011	0.001576	0.011041
M17-24-97-3	0.000044	0.000582	0.000481	0.001231	0.000009	0.001434	0.011489
M17-24-97-4	0.000056	0.000423	0.000340	0.000901	0.000019	0.000095	0.009453
M17-24-97-5	0.000046	0.000306	0.000245	0.000630	0.000006	0.000028	0.008964
M17-24-97-6	0.000047	0.000289	0.000242	0.000611	0.000008	0.000038	0.008855
M17-24-97-7	0.000058	0.000282	0.000248	0.000600	0.000037	0.000065	0.005348
M17-24-97-8	0.000055	0.000277	0.000212	0.000534	0.000009	0.000054	0.004418
M17-24-97-9	0.000054	0.000265	0.000215	0.000530	0.000006	0.000028	0.004666
M17-24-97-10	0.000071	0.000291	0.000241	0.000600	0.000018	0.000055	0.003224
M17-24-97-11	0.000058	0.000290	0.000237	0.000586	0.000010	0.000036	0.003878
M17-24-97-12	0.000057	0.000278	0.000232	0.000578	0.000007	0.000049	0.003746
M17-24-97-13	0.000097	0.000465	0.000363	0.000938	0.000032	0.000297	0.004919
M17-24-97-14	0.000070	0.000321	0.000245	0.000620	0.000011	0.000105	0.004028
M17-24-97-15	0.000066	0.000304	0.000246	0.000599	0.000010	0.000080	0.003115
M17-24-97-16	0.000082	0.000478	0.000378	0.001005	0.000041	0.000206	0.003689
M17-24-97-17	0.000057	0.000350	0.000261	0.000684	0.000012	0.000119	0.003522
M17-24-97-18	0.000050	0.000371	0.000296	0.000752	0.000020	0.000225	0.005321
SRM614-10	0.000064	0.000883	0.000715	0.001827	0.000960	0.000583	0.001465
SRM612-10	0.000893	0.014145	0.012836	0.031912	0.055839	0.032510	0.071259
SRM610-10	0.008363	0.166120	0.150361	0.428033	0.810665	0.572438	1.354481
AP1-10	0.000002	0.000049	0.000036	0.000099	0.000002	0.000002	0.000006
AP2-10	0.000093	0.001757	0.001492	0.003850	0.000101	0.000144	0.000150
AP3-10	0.000537	0.013515	0.010916	0.033589	0.000656	0.000580	0.000834
AP4-10	0.000988	0.026685	0.021581	0.068138	0.001160	0.001013	0.001385

standardize signal averages AP

AP1	0.000004	0.000069	0.000052	0.000141	0.000011	0.000005	0.000024
AP2	0.000103	0.001961	0.001650	0.004270	0.000121	0.000135	0.000151
AP3	0.000496	0.012015	0.009798	0.029841	0.000583	0.000515	0.000721
AP4	0.001013	0.027248	0.022083	0.069622	0.001172	0.000926	0.001285

linest from std sig ave

Appendix A. Raw trace element datasheets from laser ablation.

	0.382083	0.014413	0.017773	0.005657	0.005127	0.011299	0.006618
standardize signal averages SRM							
srm614-2	0.000056	0.000834	0.000688	0.001728	0.000885	0.000452	0.001180
srm612-2	0.000798	0.012669	0.011468	0.028531	0.048927	0.026143	0.057774
srm610-2	0.008424	0.169396	0.153567	0.437250	0.822548	0.472123	1.176740
linest from std sig ave							
	0.572055	0.028490	0.031427	0.011042	0.005078	0.011145	0.004536
concentration data							
SRM614-9	1.61	0.97	1.01	0.79	0.36	0.31	0.51
SRM612-9	23.05	13.84	15.39	12.20	18.47	19.16	25.14
SRM610-9	278.02	213.45	238.96	216.61	366.92	360.28	567.04
AP1-9	0.90	0.52	0.48	0.41	0.04	0.04	0.11
AP2-9	17.12	12.45	12.82	10.58	0.29	0.57	0.40
AP3-9	69.32	60.46	61.54	58.88	1.05	2.03	1.61
AP4-9	158.26	159.92	160.13	160.47	2.42	3.78	3.13
M17-24-97-1	9.34	3.88	3.91	3.26	0.04	10.29	27.92
M17-24-97-2	7.79	3.55	3.52	2.79	0.02	7.10	29.15
M17-24-97-3	6.69	3.34	3.41	2.78	0.02	6.46	30.33
M17-24-97-4	8.52	2.43	2.41	2.03	0.04	0.43	24.96
M17-24-97-5	6.99	1.76	1.74	1.42	0.01	0.13	23.67
M17-24-97-6	7.11	1.66	1.71	1.38	0.02	0.17	23.38
M17-24-97-7	8.82	1.62	1.76	1.36	0.08	0.29	14.12
M17-24-97-8	8.31	1.59	1.50	1.21	0.02	0.24	11.66
M17-24-97-9	8.20	1.52	1.52	1.20	0.01	0.13	12.32
M17-24-97-10	10.81	1.67	1.71	1.35	0.04	0.25	8.51
M17-24-97-11	8.89	1.67	1.68	1.32	0.02	0.16	10.24
M17-24-97-12	8.71	1.60	1.65	1.30	0.01	0.22	9.89
M17-24-97-13	14.83	2.67	2.58	2.12	0.07	1.34	12.99
M17-24-97-14	10.73	1.85	1.73	1.40	0.02	0.47	10.64
M17-24-97-15	10.05	1.75	1.75	1.35	0.02	0.36	8.22
M17-24-97-16	12.47	2.75	2.68	2.27	0.08	0.93	9.74
M17-24-97-17	8.66	2.01	1.85	1.54	0.02	0.54	9.30
M17-24-97-18	7.62	2.13	2.10	1.70	0.04	1.02	14.05
SRM614-10	2.09	1.09	1.09	0.89	0.42	0.57	0.83
SRM612-10	29.25	17.49	19.57	15.48	24.55	31.50	40.45
SRM610-10	274.05	205.35	229.19	207.66	356.47	554.69	768.82
AP1-10	0.35	0.28	0.26	0.22	0.00	0.01	0.01
AP2-10	14.18	10.10	10.58	8.69	0.21	0.65	0.40
AP3-10	81.79	77.71	77.40	75.80	1.34	2.62	2.20
AP4-10	150.61	153.44	153.02	153.77	2.37	4.56	3.66
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-7	125.00	961.53	929.37	1537.85	56.68	0.56	6.20
SRM614-7	136.40	1396.33	1155.01	2864.86	1365.69	332.12	940.89
SRM612-7	1089.77	16854.98	15217.45	38161.06	62144.03	16168.21	39626.06
SRM610-7	5110.71	97516.59	88966.98	243785.09	435087.16	130732.02	327843.72
AP1-7	131.24	1013.77	893.25	2191.29	215.16	61.40	215.28
AP2-7	1350.73	25753.47	21336.04	54982.15	1693.33	851.84	1060.09
AP3-7	11163.94	276635.56	224997.86	702024.88	14475.16	4792.55	8381.45
AP4-7	11588.35	292801.97	238571.22	746225.38	14451.84	5856.59	8902.37
34HP45-837-1	495.60	6403.80	5304.35	13499.12	237.40	1799.81	1178.05
34HP45-837-2	509.52	7014.60	5719.27	14653.76	293.04	1880.81	1355.29
34HP45-837-3	430.28	5489.59	4424.98	11856.11	218.92	2529.25	1165.53
34HP45-837-4	892.89	15496.33	12858.59	32989.55	557.32	9220.37	2752.94
34HP45-837-5	848.64	14857.28	12359.43	31405.98	513.64	4481.19	2900.70
34HP45-837-6	897.05	14464.80	11963.91	30977.90	472.64	3145.50	2721.78
34HP45-837-7	753.12	12110.43	9917.78	25393.22	429.60	5720.87	4425.46
34HP45-837-8	734.48	11106.10	9273.45	23679.98	352.76	6706.28	3870.62
34HP45-837-9	660.80	10276.70	8491.33	21883.52	338.24	10369.02	2891.30
34HP45-837-10	332.64	4047.46	3328.74	8427.09	200.28	44.96	1428.97
34HP45-837-11	351.36	4178.86	3261.74	8407.17	114.64	9.76	1413.33
34HP45-837-12	399.72	4413.26	3623.54	8892.57	132.60	23.00	1733.85
34HP45-837-13	422.88	4870.39	3885.26	10675.34	297.88	146.24	2996.30
34HP45-837-14	343.76	2942.82	2299.81	6163.11	82.28	57.68	1689.97
34HP45-837-15	338.88	3023.14	2623.81	6461.72	151.16	69.80	1940.01

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-8	238.68	1688.13	1428.85	3548.34	1779.45	776.28	1991.97
SRM612-8	1345.29	20666.76	18939.51	47430.39	80454.93	39063.62	88774.42
SRM610-8	8472.53	170627.84	155289.63	446735.78	824406.69	429167.81	1104275.80
AP1-8	191.08	951.97	784.00	2036.85	60.08	59.80	83.72
AP2-8	1896.37	35343.20	29569.45	78481.81	2070.33	1767.29	1881.53
AP3-8	14033.00	365859.97	298712.75	941572.63	18663.06	9827.54	15273.81
AP4-8	15909.89	423412.06	342522.84	1082349.10	18325.26	12764.07	16931.90
blank-8	117.76	49.80	43.12	102.68	8.36	0.56	0.56
blank average	121.38	505.66	486.24	820.26	32.52	0.56	3.38
blank subtraction							
SRM614-7	15.02	890.67	668.76	2044.59	1333.17	331.56	937.51
SRM612-7	968.39	16349.31	14731.20	37340.79	62111.51	16167.65	39622.68
SRM610-7	4989.33	97010.92	88480.74	242964.83	435054.64	130731.46	327840.34
AP1-7	9.86	508.10	407.00	1371.03	182.64	60.84	211.90
AP2-7	1229.35	25247.80	20849.80	54161.88	1660.81	851.28	1056.71
AP3-7	11042.56	276129.90	224511.62	701204.62	14442.64	4791.99	8378.07
AP4-7	11466.96	292296.31	238084.98	745405.12	14419.32	5856.03	8898.99
34HP45-837-1	374.22	5898.13	4818.11	12678.85	204.88	1799.25	1174.67
34HP45-837-2	388.14	6508.94	5233.03	13833.50	260.52	1880.25	1351.91
34HP45-837-3	308.90	4983.93	3938.74	11035.84	186.40	2528.69	1162.15
34HP45-837-4	771.50	14990.66	12372.35	32169.28	524.80	9219.81	2749.56
34HP45-837-5	727.26	14351.62	11873.19	30585.71	481.12	4480.63	2897.32
34HP45-837-6	775.66	13959.14	11477.66	30157.63	440.12	3144.94	2718.40
34HP45-837-7	631.74	11604.77	9431.53	24572.96	397.08	5720.31	4422.08
34HP45-837-8	613.10	10600.44	8787.21	22859.71	320.24	6705.72	3867.24
34HP45-837-9	539.42	9771.04	8005.09	21063.26	305.72	10368.46	2887.92
34HP45-837-10	211.26	3541.80	2842.50	7606.82	167.76	44.40	1425.59
34HP45-837-11	229.98	3673.20	2775.50	7586.90	82.12	9.20	1409.95
34HP45-837-12	278.34	3907.60	3137.30	8072.31	100.08	22.44	1730.47
34HP45-837-13	301.50	4364.72	3399.02	9855.08	265.36	145.68	2992.92
34HP45-837-14	222.38	2437.15	1813.57	5342.85	49.76	57.12	1686.59
34HP45-837-15	217.50	2517.47	2137.57	5641.45	118.64	69.24	1936.63
SRM614-8	117.30	1182.47	942.61	2728.08	1746.93	775.72	1988.59
SRM612-8	1223.91	20161.09	18453.26	46610.12	80422.41	39063.06	88771.04
SRM610-8	8351.15	170122.18	154803.39	445915.52	824374.17	429167.25	1104272.42
AP1-8	69.70	446.30	297.76	1216.59	27.56	59.24	80.34
AP2-8	1774.99	34837.54	29083.20	77661.54	2037.81	1766.73	1878.15
AP3-8	13911.62	365354.31	298226.51	940752.37	18630.54	9826.98	15270.43
AP4-8	15788.51	422906.40	342036.60	1081528.84	18292.74	12763.51	16928.52
zero correction							
SRM614-7	15.02	890.67	668.76	2044.59	1333.17	331.56	937.51
SRM612-7	968.39	16349.31	14731.20	37340.79	62111.51	16167.65	39622.68
SRM610-7	4989.33	97010.92	88480.74	242964.83	435054.64	130731.46	327840.34
AP1-7	9.86	508.10	407.00	1371.03	182.64	60.84	211.90
AP2-7	1229.35	25247.80	20849.80	54161.88	1660.81	851.28	1056.71
AP3-7	11042.56	276129.90	224511.62	701204.62	14442.64	4791.99	8378.07
AP4-7	11466.96	292296.31	238084.98	745405.12	14419.32	5856.03	8898.99
34HP45-837-1	374.22	5898.13	4818.11	12678.85	204.88	1799.25	1174.67
34HP45-837-2	388.14	6508.94	5233.03	13833.50	260.52	1880.25	1351.91
34HP45-837-3	308.90	4983.93	3938.74	11035.84	186.40	2528.69	1162.15
34HP45-837-4	771.50	14990.66	12372.35	32169.28	524.80	9219.81	2749.56
34HP45-837-5	727.26	14351.62	11873.19	30585.71	481.12	4480.63	2897.32
34HP45-837-6	775.66	13959.14	11477.66	30157.63	440.12	3144.94	2718.40
34HP45-837-7	631.74	11604.77	9431.53	24572.96	397.08	5720.31	4422.08
34HP45-837-8	613.10	10600.44	8787.21	22859.71	320.24	6705.72	3867.24
34HP45-837-9	539.42	9771.04	8005.09	21063.26	305.72	10368.46	2887.92
34HP45-837-10	211.26	3541.80	2842.50	7606.82	167.76	44.40	1425.59
34HP45-837-11	229.98	3673.20	2775.50	7586.90	82.12	9.20	1409.95
34HP45-837-12	278.34	3907.60	3137.30	8072.31	100.08	22.44	1730.47
34HP45-837-13	301.50	4364.72	3399.02	9855.08	265.36	145.68	2992.92
34HP45-837-14	222.38	2437.15	1813.57	5342.85	49.76	57.12	1686.59
34HP45-837-15	217.50	2517.47	2137.57	5641.45	118.64	69.24	1936.63
SRM614-8	117.30	1182.47	942.61	2728.08	1746.93	775.72	1988.59
SRM612-8	1223.91	20161.09	18453.26	46610.12	80422.41	39063.06	88771.04
SRM610-8	8351.15	170122.18	154803.39	445915.52	824374.17	429167.25	1104272.42
AP1-8	69.70	446.30	297.76	1216.59	27.56	59.24	80.34
AP2-8	1774.99	34837.54	29083.20	77661.54	2037.81	1766.73	1878.15
AP3-8	13911.62	365354.31	298226.51	940752.37	18630.54	9826.98	15270.43
AP4-8	15788.51	422906.40	342036.60	1081528.84	18292.74	12763.51	16928.52
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36

Appendix A. Raw trace element datasheets from laser ablation.

STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-7	0.000007	0.000401	0.000301	0.000921	0.000601	0.000149	0.000422
SRM612-7	0.000521	0.008794	0.007924	0.020086	0.033410	0.008697	0.021313
SRM610-7	0.005153	0.100192	0.091382	0.250932	0.449322	0.135019	0.338591
AP1-7	0.000001	0.000049	0.000039	0.000132	0.000018	0.000006	0.000020
AP2-7	0.000102	0.002094	0.001729	0.004491	0.000138	0.000071	0.000088
AP3-7	0.000671	0.016777	0.013640	0.042602	0.000877	0.000291	0.000509
AP4-7	0.000792	0.020199	0.016453	0.051512	0.000996	0.000405	0.000615
34HP45-837-1	0.000092	0.001447	0.001182	0.003111	0.000050	0.000441	0.000288
34HP45-837-2	0.000098	0.001637	0.001316	0.003480	0.000066	0.000473	0.000340
34HP45-837-3	0.000093	0.001505	0.001189	0.003333	0.000056	0.000764	0.000351
34HP45-837-4	0.000084	0.001629	0.001344	0.003495	0.000057	0.001002	0.000299
34HP45-837-5	0.000085	0.001682	0.001392	0.003586	0.000056	0.000525	0.000340
34HP45-837-6	0.000098	0.001761	0.001448	0.003805	0.000056	0.000397	0.000343
34HP45-837-7	0.000080	0.001465	0.001191	0.003102	0.000050	0.000722	0.000558
34HP45-837-8	0.000076	0.001322	0.001096	0.002851	0.000040	0.000836	0.000482
34HP45-837-9	0.000084	0.001515	0.001241	0.003266	0.000047	0.001608	0.000448
34HP45-837-10	0.000043	0.000729	0.000585	0.001566	0.000035	0.000009	0.000293
34HP45-837-11	0.000043	0.000692	0.000523	0.001428	0.000015	0.000002	0.000265
34HP45-837-12	0.000049	0.000684	0.000549	0.001412	0.000018	0.000004	0.000303
34HP45-837-13	0.000083	0.001209	0.000941	0.002729	0.000073	0.000040	0.000829
34HP45-837-14	0.000060	0.000661	0.000492	0.001449	0.000013	0.000015	0.000458
34HP45-837-15	0.000054	0.000630	0.000535	0.001411	0.000030	0.000017	0.000485
SRM614-8	0.000065	0.000660	0.000526	0.001523	0.000975	0.000433	0.001110
SRM612-8	0.000750	0.012353	0.011307	0.028559	0.049277	0.023935	0.054392
SRM610-8	0.008434	0.171800	0.156330	0.450313	0.832504	0.433400	1.115163
AP1-8	0.000005	0.000034	0.000022	0.000092	0.000002	0.000004	0.000006
AP2-8	0.000114	0.002235	0.001866	0.004982	0.000131	0.000113	0.000120
AP3-8	0.000714	0.018760	0.015313	0.048306	0.000957	0.000505	0.000784
AP4-8	0.000936	0.025061	0.020269	0.064090	0.001084	0.000756	0.001003
standardize signal averages AP							
AP1	0.000003	0.000041	0.000031	0.000112	0.000010	0.000005	0.000013
AP2	0.000108	0.002164	0.001797	0.004736	0.000134	0.000092	0.000104
AP3	0.000693	0.017768	0.014477	0.045454	0.000917	0.000398	0.000647
AP4	0.000864	0.022630	0.018361	0.057801	0.001040	0.000581	0.000809
linest from std sig ave							
	0.386416	0.014895	0.018324	0.005826	0.004802	0.017016	0.009411
standardize signal averages SRM							
srm614-2	0.000036	0.000531	0.000414	0.001222	0.000788	0.000291	0.000766
srm612-2	0.000635	0.010574	0.009615	0.024322	0.041343	0.016316	0.037853
srm610-2	0.006793	0.135996	0.123856	0.350623	0.640913	0.284209	0.726877
linest from std sig ave							
	0.709447	0.035481	0.038959	0.013768	0.006515	0.018513	0.007344
concentration data							
SRM614-7	0.22	0.51	0.47	0.46	0.25	0.22	0.34
SRM612-7	17.26	11.23	12.45	10.04	13.76	12.69	17.20
SRM610-7	170.77	127.99	143.61	125.38	185.06	197.04	273.30
AP1-7	0.15	0.29	0.29	0.31	0.03	0.04	0.08
AP2-7	15.71	12.44	12.64	10.44	0.26	0.48	0.33
AP3-7	103.42	99.69	99.72	99.02	1.68	1.98	1.91
AP4-7	122.16	120.03	120.28	119.72	1.91	2.75	2.31
34HP45-837-1	14.15	8.60	8.64	7.23	0.10	3.00	1.08
34HP45-837-2	15.05	9.73	9.62	8.09	0.13	3.21	1.28
34HP45-837-3	14.38	8.94	8.70	7.75	0.11	5.18	1.32
34HP45-837-4	12.92	9.68	9.83	8.12	0.11	6.80	1.12
34HP45-837-5	13.14	10.00	10.17	8.33	0.11	3.57	1.28
34HP45-837-6	15.09	10.47	10.59	8.84	0.11	2.69	1.29
34HP45-837-7	12.30	8.71	8.70	7.21	0.10	4.90	2.10
34HP45-837-8	11.79	7.86	8.01	6.63	0.08	5.68	1.81
34HP45-837-9	12.90	9.00	9.07	7.59	0.09	10.92	1.68
34HP45-837-10	6.70	4.33	4.28	3.64	0.07	0.06	1.10

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-837-11	6.67	4.11	3.82	3.32	0.03	0.01	1.00
34HP45-837-12	7.51	4.06	4.01	3.28	0.03	0.03	1.14
34HP45-837-13	12.87	7.18	6.88	6.34	0.14	0.27	3.11
34HP45-837-14	9.30	3.93	3.60	3.37	0.03	0.11	1.72
34HP45-837-15	8.39	3.74	3.91	3.28	0.06	0.12	1.82
SRM614-8	2.17	0.84	0.83	0.76	0.40	0.63	0.90
SRM612-8	24.85	15.78	17.77	14.27	20.30	34.93	43.90
SRM610-8	279.49	219.46	245.68	225.00	342.89	632.49	900.11
AP1-8	0.81	0.20	0.16	0.21	0.00	0.03	0.02
AP2-8	17.55	13.28	13.64	11.58	0.25	0.77	0.45
AP3-8	110.12	111.48	111.95	112.27	1.83	3.43	2.94
AP4-8	144.23	148.92	148.17	148.96	2.08	5.13	3.77

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-5	278.76	1307.33	1273.33	2158.73	222.96	42.24	65.44
SRM614-5	210.44	1152.05	988.69	2451.13	1013.01	288.80	677.00
SRM612-5	1123.33	17397.42	15724.77	39163.02	63438.16	16684.54	40441.23
SRM610-5	6074.75	113697.20	103280.78	283504.97	503592.53	150950.89	408591.13
AP1-5	244.08	1835.01	1498.77	3698.66	232.04	79.24	243.84
AP2-5	1680.17	31072.02	25993.87	67485.22	2106.49	1021.97	1358.89
AP3-5	12332.95	298311.75	242608.88	751611.13	15374.65	5687.15	9680.09
AP4-5	9604.49	220961.84	180742.58	546902.06	11109.06	6274.88	7768.96
34HP45-718-1	1372.85	9157.85	7649.72	19820.75	229.48	981.97	5061.19
34HP45-718-2	1510.09	12855.27	10603.90	27182.51	282.00	2955.90	9562.05
34HP45-718-3	1608.49	14477.44	12036.31	30500.01	329.24	4052.06	8354.73
34HP45-718-4	4039.86	58082.73	47445.87	128031.16	1210.21	7114.12	85258.56
34HP45-718-5	3640.38	51531.85	42073.52	113695.64	1163.49	4460.54	68108.82
34HP45-718-6	4271.90	66227.97	53959.38	148788.80	1501.17	5311.15	63647.88
34HP45-718-7	2808.18	34180.91	28184.96	73724.77	851.12	7719.68	81672.94
34HP45-718-8	2686.54	34638.40	28713.88	75559.98	808.32	7820.12	89214.78
34HP45-718-9	2889.74	38299.14	31274.78	82565.23	883.84	12290.27	94042.85
34HP45-718-10	3126.18	33997.55	28196.72	73662.26	1381.41	3144.58	91101.19
34HP45-718-11	3113.30	36574.41	31004.57	80788.73	1535.61	3312.14	102335.98
34HP45-718-12	3641.46	40745.99	33623.63	89572.70	1763.13	2359.97	116446.13
34HP45-718-13	1936.77	8686.93	7136.32	18056.26	686.52	4330.50	27271.27
34HP45-718-14	1441.01	6719.32	5630.31	14067.60	470.68	4810.55	33209.54
34HP45-718-15	1213.17	8016.92	6709.80	16661.01	515.32	4423.15	43172.61
34HP45-718-16	1894.29	11692.07	9673.49	24478.86	852.48	973.01	120489.20
34HP45-718-17	1750.13	10257.98	8520.01	21636.20	844.28	323.28	142268.44
34HP45-718-18	1649.65	10987.22	8903.89	23425.69	809.40	565.00	119738.27
SRM614-6	376.40	1193.21	1061.81	2549.21	1135.69	570.00	1419.81
SRM612-6	1408.97	19297.23	17436.78	43836.57	75358.55	34487.07	80551.34
SRM610-6	8616.09	168089.50	152380.30	443138.22	810035.19	402336.03	1114822.10
AP1-6	285.68	1028.09	903.49	2183.93	62.44	17.60	71.52
AP2-6	1785.09	32056.10	26697.19	70641.56	1887.65	1575.33	1771.41
AP3-6	15522.89	415437.31	334656.81	1067872.10	19376.79	10509.82	16938.10
AP4-6	10126.54	241135.08	196800.34	609444.44	10880.26	11232.78	12862.39
blank-6	225.28	54.36	46.16	93.28	7.40	0.00	6.24
blank average	252.02	680.84	659.74	1126.01	115.18	21.12	35.84

blank subtraction

SRM614-5	-41.58	471.20	328.94	1325.13	897.83	267.68	641.16
SRM612-5	871.30	16716.57	15065.03	38037.01	63322.98	16663.41	40405.39
SRM610-5	5822.73	113016.36	102621.04	282378.96	503477.35	150929.77	408555.29
AP1-5	-7.94	1154.17	839.02	2572.65	116.86	58.12	208.00
AP2-5	1428.15	30391.17	25334.12	66359.21	1991.31	1000.85	1323.05
AP3-5	12080.93	297630.91	241949.14	750485.12	15259.47	5666.03	9644.25
AP4-5	9352.47	220281.00	180082.84	545776.05	10993.88	6253.75	7733.12
34HP45-718-1	1120.83	8477.01	6989.98	18694.75	114.30	960.85	5025.35
34HP45-718-2	1258.07	12174.43	9944.16	26056.51	166.82	2934.78	9526.21
34HP45-718-3	1356.47	13796.60	11376.56	29374.01	214.06	4030.94	8318.89
34HP45-718-4	3787.84	57401.88	46786.12	126905.15	1095.03	7093.00	85222.72
34HP45-718-5	3388.36	50851.01	41413.77	112569.63	1048.31	4439.42	68072.98
34HP45-718-6	4019.88	65547.13	53299.64	147662.79	1385.99	5290.03	63612.04
34HP45-718-7	2556.15	33500.07	27525.22	72598.77	735.94	7698.56	81637.10
34HP45-718-8	2434.51	33957.55	28054.14	74433.98	693.14	7799.00	89178.94
34HP45-718-9	2637.71	37618.29	30615.03	81439.22	768.66	12269.15	94007.01
34HP45-718-10	2874.16	33316.71	27536.98	72536.25	1266.23	3123.46	91065.35

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-11	2861.28	35893.56	30344.83	79662.73	1420.43	3291.02	102300.14
34HP45-718-12	3389.44	40065.14	32963.89	88446.70	1647.95	2338.85	116410.29
34HP45-718-13	1684.75	8006.08	6476.58	16930.26	571.34	4309.38	27235.43
34HP45-718-14	1188.99	6038.47	4970.57	12941.59	355.50	4789.43	33173.70
34HP45-718-15	961.15	7336.08	6050.05	15535.01	400.14	4402.02	43136.76
34HP45-718-16	1642.27	11011.22	9013.75	23352.85	737.30	951.89	120453.36
34HP45-718-17	1498.11	9577.13	7860.26	20510.19	729.10	302.16	142232.60
34HP45-718-18	1397.63	10306.38	8244.15	22299.68	694.22	543.88	119702.43
SRM614-6	124.38	512.36	402.06	1423.21	1020.51	548.88	1383.97
SRM612-6	1156.95	18616.39	16777.03	42710.56	75243.37	34465.95	80515.50
SRM610-6	8364.07	167408.66	151720.56	442012.21	809920.01	402314.91	1114786.26
AP1-6	33.66	347.24	243.74	1057.93	-52.74	-3.52	35.68
AP2-6	1533.07	31375.26	26037.45	69515.55	1772.47	1554.21	1735.57
AP3-6	15270.87	414756.47	333997.07	1066746.09	19261.61	10488.70	16902.26
AP4-6	9874.52	240454.24	196140.60	608318.43	10765.08	11211.66	12826.55

zero correction

SRM614-5	0.00	471.20	328.94	1325.13	897.83	267.68	641.16
SRM612-5	871.30	16716.57	15065.03	38037.01	63322.98	16663.41	40405.39
SRM610-5	5822.73	113016.36	102621.04	282378.96	503477.35	150929.77	408555.29
AP1-5	0.00	1154.17	839.02	2572.65	116.86	58.12	208.00
AP2-5	1428.15	30391.17	25334.12	66359.21	1991.31	1000.85	1323.05
AP3-5	12080.93	297630.91	241949.14	750485.12	15259.47	5666.03	9644.25
AP4-5	9352.47	220281.00	180082.84	545776.05	10993.88	6253.75	7733.12
34HP45-718-1	1120.83	8477.01	6989.98	18694.75	114.30	960.85	5025.35
34HP45-718-2	1258.07	12174.43	9944.16	26056.51	166.82	2934.78	9526.21
34HP45-718-3	1356.47	13796.60	11376.56	29374.01	214.06	4030.94	8318.89
34HP45-718-4	3787.84	57401.88	46786.12	126905.15	1095.03	7093.00	85222.72
34HP45-718-5	3388.36	50851.01	41413.77	112569.63	1048.31	4439.42	68072.98
34HP45-718-6	4019.88	65547.13	53299.64	147662.79	1385.99	5290.03	63612.04
34HP45-718-7	2556.15	33500.07	27525.22	72598.77	735.94	7698.56	81637.10
34HP45-718-8	2434.51	33957.55	28054.14	74433.98	693.14	7799.00	89178.94
34HP45-718-9	2637.71	37618.29	30615.03	81439.22	768.66	12269.15	94007.01
34HP45-718-10	2874.16	33316.71	27536.98	72536.25	1266.23	3123.46	91065.35
34HP45-718-11	2861.28	35893.56	30344.83	79662.73	1420.43	3291.02	102300.14
34HP45-718-12	3389.44	40065.14	32963.89	88446.70	1647.95	2338.85	116410.29
34HP45-718-13	1684.75	8006.08	6476.58	16930.26	571.34	4309.38	27235.43
34HP45-718-14	1188.99	6038.47	4970.57	12941.59	355.50	4789.43	33173.70
34HP45-718-15	961.15	7336.08	6050.05	15535.01	400.14	4402.02	43136.76
34HP45-718-16	1642.27	11011.22	9013.75	23352.85	737.30	951.89	120453.36
34HP45-718-17	1498.11	9577.13	7860.26	20510.19	729.10	302.16	142232.60
34HP45-718-18	1397.63	10306.38	8244.15	22299.68	694.22	543.88	119702.43
SRM614-6	124.38	512.36	402.06	1423.21	1020.51	548.88	1383.97
SRM612-6	1156.95	18616.39	16777.03	42710.56	75243.37	34465.95	80515.50
SRM610-6	8364.07	167408.66	151720.56	442012.21	809920.01	402314.91	1114786.26
AP1-6	33.66	347.24	243.74	1057.93	0.00	0.00	35.68
AP2-6	1533.07	31375.26	26037.45	69515.55	1772.47	1554.21	1735.57
AP3-6	15270.87	414756.47	333997.07	1066746.09	19261.61	10488.70	16902.26
AP4-6	9874.52	240454.24	196140.60	608318.43	10765.08	11211.66	12826.55

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-5	0.000000	0.000314	0.000219	0.000882	0.000597	0.000178	0.000427
SRM612-5	0.000502	0.009631	0.008679	0.021914	0.036481	0.009600	0.023278
SRM610-5	0.005466	0.106094	0.096335	0.265083	0.472638	0.141685	0.383530
AP1-5	0.000000	0.000088	0.000064	0.000196	0.000009	0.000004	0.000016
AP2-5	0.000101	0.002150	0.001793	0.004695	0.000141	0.000071	0.000094
AP3-5	0.000702	0.017291	0.014056	0.043601	0.000887	0.000329	0.000560
AP4-5	0.000562	0.013242	0.010825	0.032808	0.000661	0.000376	0.000465
34HP45-718-1	0.000132	0.001002	0.000826	0.002210	0.000014	0.000114	0.000594
34HP45-718-2	0.000099	0.000958	0.000783	0.002051	0.000013	0.000231	0.000750

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-718-3	0.000090	0.000920	0.000759	0.001960	0.000014	0.000269	0.000555
34HP45-718-4	0.000179	0.002710	0.002209	0.005992	0.000052	0.000335	0.004024
34HP45-718-5	0.000205	0.003083	0.002511	0.006826	0.000064	0.000269	0.004128
34HP45-718-6	0.000255	0.004163	0.003385	0.009378	0.000088	0.000336	0.004040
34HP45-718-7	0.000148	0.001943	0.001596	0.004211	0.000043	0.000447	0.004735
34HP45-718-8	0.000134	0.001865	0.001541	0.004088	0.000038	0.000428	0.004898
34HP45-718-9	0.000138	0.001971	0.001604	0.004267	0.000040	0.000643	0.004926
34HP45-718-10	0.000181	0.002099	0.001735	0.004570	0.000080	0.000197	0.005737
34HP45-718-11	0.000169	0.002115	0.001788	0.004694	0.000084	0.000194	0.006027
34HP45-718-12	0.000186	0.002202	0.001812	0.004862	0.000091	0.000129	0.006399
34HP45-718-13	0.000106	0.000504	0.000407	0.001065	0.000036	0.000271	0.001713
34HP45-718-14	0.000074	0.000374	0.000308	0.000801	0.000022	0.000296	0.002053
34HP45-718-15	0.000054	0.000411	0.000339	0.000870	0.000022	0.000247	0.002416
34HP45-718-16	0.000103	0.000691	0.000565	0.001465	0.000046	0.000060	0.007557
34HP45-718-17	0.000080	0.000514	0.000422	0.001101	0.000039	0.000016	0.007638
34HP45-718-18	0.000083	0.000612	0.000490	0.001325	0.000041	0.000032	0.007113
SRM614-6	0.000102	0.000422	0.000331	0.001172	0.000840	0.000452	0.001140
SRM612-6	0.000767	0.012342	0.011123	0.028316	0.049885	0.022850	0.053381
SRM610-6	0.008348	0.167089	0.151431	0.441168	0.808373	0.401546	1.112656
AP1-6	0.000002	0.000025	0.000017	0.000076	0.000000	0.000000	0.000003
AP2-6	0.000101	0.002063	0.001712	0.004572	0.000117	0.000102	0.000114
AP3-6	0.000819	0.022238	0.017908	0.057196	0.001033	0.000562	0.000906
AP4-6	0.000581	0.014150	0.011543	0.035799	0.000634	0.000660	0.000755

standardize signal averages AP

AP1	0.000001	0.000056	0.000041	0.000136	0.000004	0.000002	0.000009
AP2	0.000101	0.002107	0.001752	0.004633	0.000129	0.000087	0.000104
AP3	0.000760	0.019765	0.015982	0.050398	0.000960	0.000446	0.000733
AP4	0.000572	0.013696	0.011184	0.034303	0.000647	0.000518	0.000610

linest from std sig ave

	0.420215	0.016354	0.020202	0.006425	0.005347	0.017351	0.009869
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standardize signal averages SRM

srm614-2	0.000051	0.000368	0.000275	0.001027	0.000719	0.000315	0.000783
srm612-2	0.000635	0.010987	0.009901	0.025115	0.043183	0.016225	0.038329
srm610-2	0.006907	0.136591	0.123883	0.353125	0.640505	0.271616	0.748093

linest from std sig ave

	0.697848	0.035320	0.038945	0.013669	0.006519	0.019370	0.007135
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concentration data

SRM614-5	0.00	0.44	0.38	0.49	0.27	0.27	0.36
SRM612-5	18.09	13.51	15.04	12.07	16.73	14.29	19.70
SRM610-5	196.99	148.80	166.90	146.06	216.74	210.84	324.62
AP1-5	0.00	0.57	0.52	0.50	0.02	0.03	0.06
AP2-5	16.94	14.03	14.45	12.03	0.30	0.49	0.37
AP3-5	117.66	112.81	113.28	111.75	1.89	2.28	2.21
AP4-5	94.25	86.39	87.24	84.08	1.41	2.60	1.83
34HP45-718-1	22.21	6.54	6.66	5.66	0.03	0.79	2.34
34HP45-718-2	16.60	6.25	6.31	5.26	0.03	1.60	2.95
34HP45-718-3	15.17	6.00	6.12	5.02	0.03	1.86	2.18
34HP45-718-4	29.98	17.68	17.80	15.36	0.11	2.32	15.84
34HP45-718-5	34.44	20.12	20.24	17.49	0.14	1.86	16.25
34HP45-718-6	42.80	27.16	27.28	24.04	0.19	2.33	15.91
34HP45-718-7	24.85	12.68	12.87	10.79	0.09	3.09	18.64
34HP45-718-8	22.41	12.17	12.42	10.48	0.08	2.96	19.28
34HP45-718-9	23.17	12.86	12.93	10.94	0.09	4.45	19.39
34HP45-718-10	30.35	13.69	13.98	11.71	0.17	1.36	22.59
34HP45-718-11	28.26	13.80	14.41	12.03	0.18	1.34	23.73
34HP45-718-12	31.23	14.37	14.60	12.46	0.19	0.89	25.19
34HP45-718-13	17.77	3.29	3.28	2.73	0.08	1.88	6.75
34HP45-718-14	12.33	2.44	2.48	2.05	0.05	2.05	8.08
34HP45-718-15	9.02	2.68	2.73	2.23	0.05	1.71	9.51
34HP45-718-16	17.27	4.51	4.56	3.75	0.10	0.41	29.75
34HP45-718-17	13.49	3.36	3.40	2.82	0.08	0.11	30.07
34HP45-718-18	13.92	4.00	3.95	3.40	0.09	0.22	28.00
SRM614-6	3.69	0.59	0.57	0.65	0.39	0.67	0.96
SRM612-6	27.64	17.31	19.27	15.60	22.88	34.00	45.18
SRM610-6	300.86	234.35	262.36	243.08	370.70	597.53	941.74
AP1-6	0.40	0.16	0.14	0.19	0.00	0.00	0.01
AP2-6	16.90	13.46	13.80	11.72	0.25	0.71	0.45
AP3-6	137.26	145.08	144.32	146.59	2.20	3.89	3.57
AP4-6	97.42	92.32	93.02	91.75	1.35	4.57	2.97

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-3	144.68	77.64	75.16	156.12	18.00	3.00	15.52
SRM614-3	292.44	1781.49	1607.33	3923.30	1638.65	410.92	1182.77
SRM612-3	1797.89	27285.87	25032.62	62746.31	92646.28	21334.12	56302.44
SRM610-3	5497.75	99879.76	90486.15	244509.53	433297.66	160295.27	403905.53
AP1-3	288.72	3223.02	2669.53	6935.72	795.28	125.32	536.08
AP2-3	2083.93	39513.06	32893.31	86600.84	2911.58	1176.45	1916.97
AP3-3	27473.12	785954.63	631339.63	2016361.60	37518.89	10384.70	19189.51
AP4-3	12912.15	317258.25	258193.77	797824.19	15010.73	8123.93	11261.58
34HP45-856-1	1296.01	13656.36	11372.38	29057.24	5131.23	537.04	44643.89
34HP45-856-2	1011.69	10299.54	8511.29	21644.12	2667.74	765.24	43054.64
34HP45-856-3	984.61	8225.69	6916.52	17033.50	2613.81	557.60	38496.74
34HP45-856-4	936.09	6318.56	5064.47	13201.03	29651.73	1934.29	28162.08
34HP45-856-5	898.05	5070.79	4300.02	10703.30	3879.18	3726.66	32714.34
34HP45-856-6	964.89	6527.04	5270.99	13496.72	5144.39	2608.49	34483.72
34HP45-856-7	993.57	4207.74	3554.46	9000.57	7245.44	2660.98	23058.73
34HP45-856-8	1062.37	5312.95	4426.23	11346.46	13001.31	3102.82	26460.87
34HP45-856-9	1164.41	6631.52	5589.83	13815.60	15087.53	3296.98	25801.71
34HP45-856-10	1109.85	3315.46	2788.58	6990.20	2933.46	691.08	36704.37
34HP45-856-11	1003.53	3025.38	2499.17	6418.68	1389.53	683.64	38658.58
34HP45-856-12	1119.25	3525.78	3008.62	7332.24	1656.69	1096.21	39617.34
34HP45-856-13	1263.81	4764.67	3968.38	9959.82	9081.69	431.00	27246.31
34HP45-856-14	1286.81	4833.59	3950.34	9856.58	2744.54	471.40	20963.24
34HP45-856-15	1165.33	4199.02	3465.62	8683.97	1073.01	315.32	14076.64
34HP45-856-16	1243.89	4527.95	3774.10	9400.09	1838.01	2190.85	3651.26
34HP45-856-17	1223.49	4158.94	3527.86	8488.09	1373.97	1092.05	3564.06
34HP45-856-18	1094.73	3577.42	2979.98	7438.80	971.49	1286.57	3930.82
SRM614-4	480.76	1566.57	1423.25	3302.02	1569.77	763.72	1586.49
SRM612-4	1700.97	23839.93	21527.76	53362.46	89436.02	45549.10	108898.05
SRM610-4	9698.01	193474.84	175616.75	508358.53	920180.56	522940.63	1442396.00
AP1-4	349.80	1713.61	1407.89	3587.74	120.60	32.08	91.68
AP2-4	2162.81	38530.06	32352.86	85563.56	2173.81	1942.69	2141.25
AP3-4	28450.24	859706.94	690644.25	2179747.80	38448.06	16524.69	29044.64
AP4-4	20369.99	568652.88	460318.84	1447277.60	23241.33	16755.01	23699.65
blank-4	365.80	163.12	134.64	382.48	57.92	1.68	47.80
blank average	255.24	120.38	104.90	269.30	37.96	2.34	31.66

blank subtraction							
SRM614-3	37.20	1661.11	1502.43	3654.00	1600.69	408.58	1151.11
SRM612-3	1542.65	27165.49	24927.72	62477.01	92608.32	21331.78	56270.78
SRM610-3	5242.51	99759.38	90381.25	244240.23	433259.70	160292.93	403873.87
AP1-3	33.48	3102.64	2564.63	6666.42	757.32	122.98	504.42
AP2-3	1828.69	39392.68	32788.40	86331.54	2873.62	1174.11	1885.31
AP3-3	27217.87	785834.25	631234.73	2016092.30	37480.93	10382.36	19157.85
AP4-3	12656.91	317137.87	258088.87	797554.89	14972.76	8121.59	11229.92
34HP45-856-1	1040.77	13535.98	11267.48	28787.94	5093.27	534.70	44612.23
34HP45-856-2	756.44	10179.16	8406.39	21374.82	2629.77	762.90	43022.98
34HP45-856-3	729.36	8105.31	6811.62	16764.19	2575.85	555.26	38465.08
34HP45-856-4	680.84	6198.18	4959.57	12931.73	29613.77	1931.95	28130.42
34HP45-856-5	642.80	4950.41	4195.12	10434.00	3841.22	3724.32	32682.68
34HP45-856-6	709.64	6406.66	5166.09	13227.42	5106.43	2606.15	34452.05
34HP45-856-7	738.32	4087.36	3449.56	8731.27	7207.48	2658.64	23027.07
34HP45-856-8	807.12	5192.57	4321.32	11077.16	12963.35	3100.48	26429.21
34HP45-856-9	909.17	6511.14	5484.93	13546.30	15049.56	3294.64	25770.04
34HP45-856-10	854.60	3195.08	2683.68	6720.90	2895.50	688.74	36672.71
34HP45-856-11	748.28	2905.00	2394.27	6149.37	1351.57	681.30	38626.92
34HP45-856-12	864.00	3405.40	2903.72	7062.94	1618.73	1093.87	39585.68
34HP45-856-13	1008.57	4644.29	3863.48	9690.51	9043.73	428.66	27214.65
34HP45-856-14	1031.57	4713.21	3845.44	9587.27	2706.58	469.06	20931.58
34HP45-856-15	910.09	4078.64	3360.72	8414.67	1035.05	312.98	14044.98
34HP45-856-16	988.65	4407.56	3669.20	9130.79	1800.05	2188.51	3619.60
34HP45-856-17	968.25	4038.56	3422.96	8218.79	1336.01	1089.71	3532.40
34HP45-856-18	839.48	3457.04	2875.08	7169.50	933.53	1284.23	3899.16
SRM614-4	225.52	1446.19	1318.35	3032.72	1531.81	761.38	1854.83
SRM612-4	1445.73	23719.55	21422.86	53093.16	89398.06	45546.76	108866.39
SRM610-4	9442.77	193354.46	175511.85	508089.23	920142.60	522938.29	1442364.34
AP1-4	94.56	1593.23	1302.99	3318.44	82.64	29.74	60.02
AP2-4	1907.57	38409.67	32247.96	85294.26	2135.85	1940.35	2109.59
AP3-4	28195.00	859586.56	690539.35	2179478.50	38410.09	16522.35	29012.98
AP4-4	20114.75	568532.50	460213.94	1447008.30	23203.37	16752.67	23667.99

Appendix A. Raw trace element datasheets from laser ablation.

zero correction							
SRM614-3	37.20	1661.11	1502.43	3654.00	1600.69	408.58	1151.11
SRM612-3	1542.65	27165.49	24927.72	62477.01	92608.32	21331.78	56270.78
SRM610-3	5242.51	99759.38	90381.25	244240.23	433259.70	160292.93	403873.87
AP1-3	33.48	3102.64	2564.63	6666.42	757.32	122.98	504.42
AP2-3	1828.69	39392.68	32788.40	86331.54	2873.62	1174.11	1885.31
AP3-3	27217.87	785834.25	631234.73	2016092.30	37480.93	10382.36	19157.85
AP4-3	12656.91	317137.87	258088.87	797554.89	14972.76	8121.59	11229.92
34HP45-856-1	1040.77	13535.98	11267.48	28787.94	5093.27	534.70	44612.23
34HP45-856-2	756.44	10179.16	8406.39	21374.82	2629.77	762.90	43022.98
34HP45-856-3	729.36	8105.31	6811.62	16764.19	2575.85	555.26	38465.08
34HP45-856-4	680.84	6198.18	4959.57	12931.73	29613.77	1931.95	28130.42
34HP45-856-5	642.80	4950.41	4195.12	10434.00	3841.22	3724.32	32682.68
34HP45-856-6	709.64	6406.66	5166.09	13227.42	5106.43	2606.15	34452.05
34HP45-856-7	738.32	4087.36	3449.56	8731.27	7207.48	2658.64	23027.07
34HP45-856-8	807.12	5192.57	4321.32	11077.16	12963.35	3100.48	26429.21
34HP45-856-9	909.17	6511.14	5484.93	13546.30	15049.56	3294.64	25770.04
34HP45-856-10	854.60	3195.08	2683.68	6720.90	2895.50	688.74	36672.71
34HP45-856-11	748.28	2905.00	2394.27	6149.37	1351.57	681.30	38626.92
34HP45-856-12	864.00	3405.40	2903.72	7062.94	1618.73	1093.87	39585.68
34HP45-856-13	1008.57	4644.29	3863.48	9690.51	9043.73	428.66	27214.65
34HP45-856-14	1031.57	4713.21	3845.44	9587.27	2706.58	469.06	20931.58
34HP45-856-15	910.09	4078.64	3360.72	8414.67	1035.05	312.98	14044.98
34HP45-856-16	988.65	4407.56	3669.20	9130.79	1800.05	2188.51	3619.60
34HP45-856-17	968.25	4038.56	3422.96	8218.79	1336.01	1089.71	3532.40
34HP45-856-18	839.48	3457.04	2875.08	7169.50	933.53	1284.23	3899.16
SRM614-4	225.52	1446.19	1318.35	3032.72	1531.81	761.38	1854.83
SRM612-4	1445.73	23719.55	21422.86	53093.16	89398.06	45546.76	108866.39
SRM610-4	9442.77	193354.46	175511.85	508089.23	920142.60	522938.29	1442364.34
AP1-4	94.56	1593.23	1302.99	3318.44	82.64	29.74	60.02
AP2-4	1907.57	38409.67	32247.96	85294.26	2135.85	1940.35	2109.59
AP3-4	28195.00	859586.56	690539.35	2179478.50	38410.09	16522.35	29012.98
AP4-4	20114.75	568532.50	460213.94	1447008.30	23203.37	16752.67	23667.99

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-3	0.000016	0.000701	0.000634	0.001542	0.000676	0.000172	0.000486
SRM612-3	0.000624	0.010992	0.010087	0.025281	0.037473	0.008632	0.022769
SRM610-3	0.003791	0.072132	0.065351	0.176601	0.313273	0.115902	0.292025
AP1-3	0.000002	0.000204	0.000169	0.000439	0.000050	0.000008	0.000033
AP2-3	0.000112	0.002419	0.002013	0.005301	0.000176	0.000072	0.000116
AP3-3	0.001220	0.035218	0.028290	0.090353	0.001680	0.000465	0.000859
AP4-3	0.000672	0.016844	0.013708	0.042361	0.000795	0.000431	0.000596
34HP45-856-1	0.000061	0.000796	0.000663	0.001693	0.000300	0.000031	0.000263
34HP45-856-2	0.000046	0.000620	0.000512	0.001302	0.000160	0.000046	0.000260
34HP45-856-3	0.000048	0.000536	0.000450	0.001109	0.000170	0.000037	0.000254
34HP45-856-4	0.000054	0.000488	0.000390	0.001017	0.002330	0.000152	0.000213
34HP45-856-5	0.000045	0.000344	0.000291	0.000724	0.000267	0.000259	0.000269
34HP45-856-6	0.000045	0.000409	0.000330	0.000845	0.000326	0.000167	0.000220
34HP45-856-7	0.000055	0.000303	0.000255	0.000647	0.000534	0.000197	0.0001705
34HP45-856-8	0.000058	0.000374	0.000311	0.000797	0.000933	0.000223	0.0001903
34HP45-856-9	0.000068	0.000484	0.000408	0.001008	0.001120	0.000245	0.0001917
34HP45-856-10	0.000057	0.000215	0.000180	0.000452	0.000195	0.000046	0.0002466
34HP45-856-11	0.000049	0.000191	0.000158	0.000405	0.000089	0.000045	0.0002546
34HP45-856-12	0.000057	0.000223	0.000190	0.000463	0.000106	0.000072	0.0002594
34HP45-856-13	0.000064	0.000296	0.000246	0.000617	0.000576	0.000027	0.0001732
34HP45-856-14	0.000072	0.000327	0.000267	0.000666	0.000188	0.000033	0.0001454
34HP45-856-15	0.000073	0.000325	0.000268	0.000671	0.000083	0.000025	0.0001121
34HP45-856-16	0.000105	0.000467	0.000389	0.000968	0.000191	0.000232	0.000384
34HP45-856-17	0.000101	0.000420	0.000356	0.000854	0.000139	0.000113	0.000367
34HP45-856-18	0.000107	0.000439	0.000365	0.000911	0.000119	0.000163	0.000495

Appendix A. Raw trace element datasheets from laser ablation.

SRM614-4	0.000152	0.000973	0.000887	0.002041	0.001031	0.000512	0.001248
SRM612-4	0.000767	0.012581	0.011363	0.028162	0.047418	0.024159	0.057745
SRM610-4	0.007626	0.156151	0.141742	0.410328	0.743099	0.422320	1.164841
AP1-4	0.000006	0.000103	0.000084	0.000215	0.000005	0.000002	0.000004
AP2-4	0.000113	0.002285	0.001918	0.005073	0.000127	0.000115	0.000125
AP3-4	0.001220	0.037185	0.029872	0.094283	0.001662	0.000715	0.001255
AP4-4	0.000977	0.027601	0.022343	0.070250	0.001126	0.000813	0.001149

standardize signal averages AP

AP1	0.000004	0.000154	0.000127	0.000327	0.000028	0.000005	0.000019
AP2	0.000113	0.002352	0.001966	0.005187	0.000152	0.000094	0.000121
AP3	0.001220	0.036202	0.029081	0.092318	0.001671	0.000590	0.001057
AP4	0.000824	0.022223	0.018025	0.056306	0.000961	0.000622	0.000873

linest from std sig ave

	0.265641	0.008999	0.011200	0.003528	0.003098	0.013721	0.006843
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standardize signal averages SRM

srm614-2	0.000084	0.000837	0.000761	0.001792	0.000853	0.000342	0.000867
srm612-2	0.000696	0.011787	0.010725	0.026721	0.042446	0.016395	0.040257
srm610-2	0.005708	0.114142	0.103546	0.293464	0.528186	0.269111	0.728433

linest from std sig ave

	0.841326	0.042181	0.046495	0.016426	0.007898	0.019549	0.007327
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concentration data

SRM614-3	0.36	0.54	0.61	0.47	0.18	0.20	0.29
SRM612-3	14.22	8.48	9.69	7.65	9.96	10.16	13.36
SRM610-3	86.36	55.67	62.77	53.43	83.24	136.38	171.37
AP1-3	0.23	0.73	0.76	0.62	0.06	0.04	0.09
AP2-3	11.90	8.68	9.00	7.46	0.22	0.39	0.32
AP3-3	129.27	126.44	126.40	127.16	2.08	2.55	2.34
AP4-3	71.24	60.47	61.25	59.62	0.98	2.36	1.63
34HP45-856-1	6.49	2.86	2.96	2.38	0.37	0.17	7.16
34HP45-856-2	4.88	2.23	2.29	1.83	0.20	0.25	7.15
34HP45-856-3	5.11	1.92	2.01	1.56	0.21	0.20	6.94
34HP45-856-4	5.68	1.75	1.74	1.43	2.88	0.83	6.04
34HP45-856-5	4.73	1.23	1.30	1.02	0.33	1.42	6.19
34HP45-856-6	4.80	1.47	1.47	1.19	0.40	0.91	6.01
34HP45-856-7	5.79	1.09	1.14	0.91	0.66	1.08	4.66
34HP45-856-8	6.16	1.34	1.39	1.12	1.15	1.22	5.19
34HP45-856-9	7.17	1.74	1.82	1.42	1.38	1.34	5.23
34HP45-856-10	6.09	0.77	0.81	0.64	0.24	0.25	6.73
34HP45-856-11	5.23	0.69	0.70	0.57	0.11	0.25	6.95
34HP45-856-12	6.00	0.80	0.85	0.65	0.13	0.39	7.08
34HP45-856-13	6.80	1.06	1.10	0.87	0.71	0.15	4.73
34HP45-856-14	7.59	1.18	1.19	0.94	0.23	0.18	3.97
34HP45-856-15	7.70	1.17	1.20	0.94	0.10	0.14	3.06
34HP45-856-16	11.11	1.68	1.74	1.36	0.24	1.27	1.05
34HP45-856-17	10.66	1.51	1.59	1.20	0.17	0.62	1.00
34HP45-856-18	11.30	1.58	1.63	1.28	0.15	0.89	1.35
SRM614-4	3.46	0.75	0.85	0.62	0.27	0.60	0.73
SRM612-4	17.47	9.71	10.91	8.52	12.60	28.43	33.89
SRM610-4	173.73	120.52	136.15	124.14	197.45	496.96	683.58
AP1-4	0.14	0.08	0.08	0.07	0.00	0.00	0.00
AP2-4	2.58	1.76	1.84	1.53	0.03	0.14	0.07
AP3-4	27.79	28.70	28.69	28.52	0.44	0.84	0.74
AP4-4	103.49	99.09	99.83	98.86	1.39	4.45	3.14

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Pb204 Pb206 Pb207 Pb208 Bi Th U

raw data

blank-1	74.68	85.00	76.32	208.28	4.96	4.16	4.76
SRM614-1	231.96	1487.45	1213.61	3075.98	1394.89	482.00	1079.61
SRM612-1	1490.85	22310.93	20121.31	50223.80	83025.63	24660.90	59577.73
SRM610-1	10091.98	203031.67	184689.44	529142.25	1078090.50	252780.02	742011.56
AP1-1	180.64	1305.41	1082.33	2784.26	222.04	60.32	202.32
AP2-1	1765.89	31758.14	26866.99	69920.67	2100.29	1352.05	1577.89
AP3-1	13157.59	322435.03	262443.41	812360.75	17338.46	7268.52	11414.27
AP4-1	17621.34	468355.19	378220.72	1191175.60	22254.32	11635.51	16653.45

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-1	1032.01	13504.00	11384.82	27478.75	360.68	282.84	5496.27
34HP45-695-2	667.32	7317.40	5881.71	15241.93	194.64	426.00	3848.42
34HP45-695-3	684.36	7234.12	5886.03	14706.44	192.56	773.72	3910.50
34HP45-695-4	557.76	5646.91	4851.43	12538.87	359.36	1432.25	9854.82
34HP45-695-5	421.28	3484.66	2928.74	7415.20	220.60	1466.89	9406.53
34HP45-695-6	490.00	4767.95	3898.70	10196.54	364.52	1668.01	6422.40
34HP45-695-7	595.04	4331.02	3700.98	9627.09	283.76	1347.17	18773.71
34HP45-695-8	542.84	4002.62	3290.82	8513.97	205.24	864.08	21359.84
34HP45-695-9	466.84	3568.26	2860.14	7366.76	213.88	1295.85	17596.22
34HP45-695-10	611.32	3375.42	2784.50	6965.88	268.04	1058.49	9517.93
34HP45-695-11	572.60	3150.98	2593.57	6360.00	138.08	1531.49	8582.65
34HP45-695-12	578.80	3237.82	2719.58	6749.36	185.80	1601.57	7038.24
34HP45-695-13	718.56	4334.30	3540.66	8824.97	223.52	1622.13	12476.95
34HP45-695-14	638.60	3243.94	2662.49	6658.84	115.44	1008.85	11824.03
34HP45-695-15	644.80	3856.54	3191.66	8032.96	130.92	1324.61	11162.70
34HP45-695-16	620.80	4121.70	3422.98	8587.25	205.72	1190.65	18609.55
34HP45-695-17	547.44	3218.34	2599.17	6517.92	90.76	1026.01	18097.66
34HP45-695-18	566.20	3921.02	3296.26	7990.04	145.56	1202.01	19956.87
SRM614-2	306.72	1589.69	1471.05	3361.22	1656.09	842.68	2022.29
SRM612-2	1711.69	25053.58	22967.81	57800.77	100401.37	50642.45	111848.59
SRM610-2	11037.30	234473.88	212071.88	617787.25	1196407.50	585950.38	1497723.90
AP1-2	226.08	977.25	824.32	1987.85	38.20	26.68	65.36
AP2-2	1838.61	31244.54	26143.47	69341.11	1876.65	1920.73	2069.93
AP3-2	14263.68	365746.97	297837.03	926524.31	17595.18	11762.71	16814.98
AP4-2	22215.05	622909.00	503320.00	1587655.10	27182.47	20699.32	28185.88
blank-2	155.28	71.60	60.92	124.08	12.16	2.04	3.44
blank average	114.98	78.30	68.62	166.18	8.56	3.10	4.10

blank subtraction							
SRM614-1	116.98	1409.15	1144.99	2909.80	1386.33	478.90	1075.51
SRM612-1	1375.87	22232.63	20052.69	50057.62	83017.06	24657.80	59573.63
SRM610-1	9977.00	202953.37	184620.82	528976.07	1078081.94	252776.92	742007.46
AP1-1	65.66	1227.11	1013.71	2618.07	213.48	57.22	198.22
AP2-1	1650.91	31679.84	26798.37	69754.49	2091.73	1348.95	1573.79
AP3-1	13042.61	322356.73	262374.79	812194.57	17329.90	7265.42	11410.16
AP4-1	17506.36	468276.89	378152.10	1191009.42	22245.76	11632.41	16649.35
34HP45-695-1	917.03	13425.70	11316.20	27312.57	352.12	279.74	5492.17
34HP45-695-2	552.34	7239.10	5813.09	15075.75	186.08	422.90	3844.32
34HP45-695-3	569.38	7155.82	5817.41	14540.26	184.00	770.62	3906.40
34HP45-695-4	442.78	5568.61	4782.81	12372.69	350.80	1429.15	9850.72
34HP45-695-5	306.30	3406.36	2860.12	7249.02	212.04	1463.79	9402.43
34HP45-695-6	375.02	4689.65	3830.08	10030.36	355.96	1664.91	6418.30
34HP45-695-7	480.06	4252.72	3632.36	9460.91	275.20	1344.07	18769.61
34HP45-695-8	427.86	3924.32	3222.20	8347.79	196.68	860.98	21355.74
34HP45-695-9	351.86	3489.96	2791.52	7200.58	205.32	1292.75	17592.12
34HP45-695-10	496.34	3297.12	2715.88	6799.70	259.48	1055.39	9513.83
34HP45-695-11	457.62	3072.68	2524.95	6193.81	129.52	1528.39	8578.55
34HP45-695-12	463.82	3159.52	2650.95	6583.18	177.24	1598.47	7034.14
34HP45-695-13	603.58	4256.00	3472.04	8658.79	214.96	1619.03	12472.85
34HP45-695-14	523.62	3165.64	2593.87	6492.66	106.88	1005.75	11819.93
34HP45-695-15	529.82	3778.24	3123.04	7866.78	122.36	1321.51	11158.60
34HP45-695-16	505.82	4043.40	3354.36	8421.07	197.16	1187.55	18605.44
34HP45-695-17	432.46	3140.04	2530.55	6351.74	82.20	1022.91	18093.56
34HP45-695-18	451.22	3842.72	3227.64	7823.86	137.00	1198.91	19952.77
SRM614-2	191.74	1511.39	1402.43	3195.04	1647.53	839.58	2018.19
SRM612-2	1596.71	24975.28	22899.19	57634.59	100392.81	50639.34	111844.49
SRM610-2	10922.32	234395.58	212003.26	617621.07	1196398.94	585947.28	1497719.80
AP1-2	111.10	898.95	755.70	1821.67	29.64	23.58	61.26
AP2-2	1723.63	31166.23	26074.85	69174.93	1868.09	1917.63	2065.83
AP3-2	14148.70	365668.67	297768.41	926358.13	17586.62	11759.61	16810.87
AP4-2	22100.06	622830.70	503251.38	1587488.92	27173.91	20696.22	28181.78

zero correction							
SRM614-1	116.98	1409.15	1144.99	2909.80	1386.33	478.90	1075.51
SRM612-1	1375.87	22232.63	20052.69	50057.62	83017.06	24657.80	59573.63
SRM610-1	9977.00	202953.37	184620.82	528976.07	1078081.94	252776.92	742007.46
AP1-1	65.66	1227.11	1013.71	2618.07	213.48	57.22	198.22
AP2-1	1650.91	31679.84	26798.37	69754.49	2091.73	1348.95	1573.79
AP3-1	13042.61	322356.73	262374.79	812194.57	17329.90	7265.42	11410.16
AP4-1	17506.36	468276.89	378152.10	1191009.42	22245.76	11632.41	16649.35
34HP45-695-1	917.03	13425.70	11316.20	27312.57	352.12	279.74	5492.17
34HP45-695-2	552.34	7239.10	5813.09	15075.75	186.08	422.90	3844.32
34HP45-695-3	569.38	7155.82	5817.41	14540.26	184.00	770.62	3906.40
34HP45-695-4	442.78	5568.61	4782.81	12372.69	350.80	1429.15	9850.72
34HP45-695-5	306.30	3406.36	2860.12	7249.02	212.04	1463.79	9402.43
34HP45-695-6	375.02	4689.65	3830.08	10030.36	355.96	1664.91	6418.30
34HP45-695-7	480.06	4252.72	3632.36	9460.91	275.20	1344.07	18769.61
34HP45-695-8	427.86	3924.32	3222.20	8347.79	196.68	860.98	21355.74

Appendix A. Raw trace element datasheets from laser ablation.

34HP45-695-9	351.86	3489.96	2791.52	7200.58	205.32	1292.75	17592.12
34HP45-695-10	496.34	3297.12	2715.88	6799.70	259.48	1055.39	9513.83
34HP45-695-11	457.62	3072.68	2524.95	6193.81	129.52	1528.39	8578.55
34HP45-695-12	463.82	3159.52	2650.95	6583.18	177.24	1598.47	7034.14
34HP45-695-13	603.58	4256.00	3472.04	8658.79	214.96	1619.03	12472.85
34HP45-695-14	523.62	3165.64	2593.87	6492.66	106.88	1005.75	11819.93
34HP45-695-15	529.82	3778.24	3123.04	7866.78	122.36	1321.51	11158.60
34HP45-695-16	505.82	4043.40	3354.36	8421.07	197.16	1187.55	18605.44
34HP45-695-17	432.46	3140.04	2530.55	6351.74	82.20	1022.91	18093.56
34HP45-695-18	451.22	3842.72	3227.64	7823.86	137.00	1198.91	19952.77
SRM614-2	191.74	1511.39	1402.43	3195.04	1647.53	839.58	2018.19
SRM612-2	1596.71	24975.28	22899.19	57634.59	100392.81	50639.34	111844.49
SRM610-2	10922.32	234395.58	212003.26	617621.07	1196398.94	585947.28	1497719.80
AP1-2	111.10	898.95	755.70	1821.67	29.64	23.58	61.26
AP2-2	1723.63	31166.23	26074.85	69174.93	1868.09	1917.63	2065.83
AP3-2	14148.70	365668.67	297768.41	926358.13	17586.62	11759.61	16810.87
AP4-2	22100.06	622830.70	503251.38	1587488.92	27173.91	20696.22	28181.78

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-1	0.000057	0.000691	0.000561	0.001427	0.000680	0.000235	0.000527
SRM612-1	0.000596	0.009633	0.008688	0.021689	0.035969	0.010684	0.025812
SRM610-1	0.006498	0.132188	0.120248	0.344535	0.702181	0.164640	0.483287
AP1-1	0.000004	0.000077	0.000064	0.000165	0.000013	0.000004	0.000012
AP2-1	0.000093	0.001785	0.001510	0.003931	0.000118	0.000076	0.000089
AP3-1	0.000583	0.014408	0.011727	0.036302	0.000775	0.000325	0.000510
AP4-1	0.000774	0.020714	0.016728	0.052684	0.000984	0.000515	0.000736
34HP45-695-1	0.000083	0.001217	0.001026	0.002475	0.000032	0.000025	0.000498
34HP45-695-2	0.000067	0.000872	0.000700	0.001816	0.000022	0.000051	0.000463
34HP45-695-3	0.000066	0.000826	0.000671	0.001678	0.000021	0.000089	0.000451
34HP45-695-4	0.000026	0.000333	0.000286	0.000740	0.000021	0.000086	0.000589
34HP45-695-5	0.000021	0.000231	0.000194	0.000492	0.000014	0.000099	0.000638
34HP45-695-6	0.000031	0.000390	0.000318	0.000834	0.000030	0.000138	0.000534
34HP45-695-7	0.000031	0.000277	0.000237	0.000616	0.000018	0.000088	0.001222
34HP45-695-8	0.000028	0.000258	0.000212	0.000549	0.000013	0.000057	0.001405
34HP45-695-9	0.000022	0.000218	0.000175	0.000450	0.000013	0.000081	0.001100
34HP45-695-10	0.000038	0.000253	0.000208	0.000521	0.000020	0.000081	0.000729
34HP45-695-11	0.000036	0.000241	0.000198	0.000486	0.000010	0.000120	0.000674
34HP45-695-12	0.000042	0.000284	0.000238	0.000591	0.000016	0.000144	0.000632
34HP45-695-13	0.000045	0.000314	0.000256	0.000639	0.000016	0.000120	0.000921
34HP45-695-14	0.000041	0.000249	0.000204	0.000510	0.000008	0.000079	0.000928
34HP45-695-15	0.000041	0.000293	0.000242	0.000611	0.000010	0.000103	0.000866
34HP45-695-16	0.000041	0.000329	0.000273	0.000686	0.000016	0.000097	0.001515
34HP45-695-17	0.000037	0.000268	0.000216	0.000541	0.000007	0.000087	0.001541
34HP45-695-18	0.000036	0.000308	0.000259	0.000627	0.000011	0.000096	0.001600
SRM614-2	0.000122	0.000961	0.000892	0.002031	0.001047	0.000534	0.001283
SRM612-2	0.000910	0.014235	0.013052	0.032849	0.057220	0.028862	0.063747
SRM610-2	0.009427	0.202311	0.182984	0.533080	1.032634	0.505742	1.292709
AP1-2	0.000008	0.000064	0.000054	0.000129	0.000002	0.000002	0.000004
AP2-2	0.000116	0.002089	0.001748	0.004637	0.000125	0.000129	0.000138
AP3-2	0.000749	0.019345	0.015753	0.049007	0.000930	0.000622	0.000889
AP4-2	0.001095	0.030849	0.024927	0.078630	0.001346	0.001025	0.001396

standardize signal averages AP

AP1	0.000006	0.000070	0.000059	0.000147	0.000008	0.000003	0.000008
AP2	0.000104	0.001937	0.001629	0.004284	0.000122	0.000102	0.000114
AP3	0.000666	0.016877	0.013740	0.042654	0.000852	0.000473	0.000700
AP4	0.000935	0.025782	0.020827	0.065657	0.001165	0.000770	0.001066

linest from std sig ave

	0.375386	0.014010	0.017300	0.005512	0.004655	0.013270	0.007642
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Appendix A. Raw trace element datasheets from laser ablation.

standardize signal averages SRM							
srm614-2	0.000090	0.000826	0.000726	0.001729	0.000864	0.000384	0.000905
srm612-2	0.000753	0.011934	0.010870	0.027269	0.046595	0.019773	0.044779
srm610-2	0.007963	0.167250	0.151616	0.438808	0.867407	0.335191	0.887998
linest from std sig ave							
	0.605150	0.028861	0.031836	0.011004	0.004816	0.015696	0.006011
concentration data							
SRM614-1	1.85	0.83	0.83	0.67	0.27	0.27	0.35
SRM612-1	19.19	11.57	12.89	10.25	14.36	12.16	16.92
SRM610-1	209.21	158.83	178.42	162.88	280.35	187.37	316.75
AP1-1	0.62	0.43	0.44	0.36	0.02	0.02	0.04
AP2-1	13.93	9.98	10.42	8.64	0.22	0.40	0.27
AP3-1	87.30	80.53	80.94	79.83	1.44	1.72	1.55
AP4-1	115.97	115.77	115.45	115.86	1.83	2.72	2.25
34HP45-695-1	12.45	6.80	7.08	5.44	0.06	0.13	1.52
34HP45-695-2	9.97	4.87	4.83	3.99	0.04	0.27	1.41
34HP45-695-3	9.84	4.61	4.63	3.69	0.04	0.47	1.37
34HP45-695-4	3.97	1.86	1.98	1.63	0.04	0.45	1.80
34HP45-695-5	3.11	1.29	1.34	1.08	0.03	0.53	1.94
34HP45-695-6	4.67	2.18	2.20	1.83	0.05	0.73	1.63
34HP45-695-7	4.68	1.55	1.63	1.35	0.03	0.46	3.73
34HP45-695-8	4.22	1.44	1.46	1.21	0.02	0.30	4.28
34HP45-695-9	3.29	1.22	1.20	0.99	0.02	0.43	3.35
34HP45-695-10	5.70	1.41	1.44	1.15	0.04	0.43	2.22
34HP45-695-11	5.38	1.35	1.37	1.07	0.02	0.64	2.05
34HP45-695-12	6.24	1.59	1.64	1.30	0.03	0.76	1.93
34HP45-695-13	6.67	1.76	1.77	1.41	0.03	0.63	2.81
34HP45-695-14	6.16	1.39	1.41	1.12	0.02	0.42	2.83
34HP45-695-15	6.16	1.64	1.67	1.34	0.02	0.54	2.64
34HP45-695-16	6.17	1.84	1.88	1.51	0.03	0.51	4.62
34HP45-695-17	5.52	1.50	1.49	1.19	0.01	0.46	4.70
34HP45-695-18	5.42	1.72	1.79	1.38	0.02	0.51	4.88
SRM614-2	3.92	1.15	1.32	0.96	0.42	0.61	0.84
SRM612-2	29.30	17.10	19.37	15.53	22.85	32.85	41.78
SRM610-2	303.50	243.08	271.50	252.02	412.28	575.56	847.26
AP1-2	1.18	0.36	0.37	0.28	0.00	0.01	0.01
AP2-2	17.30	11.68	12.06	10.20	0.23	0.68	0.42
AP3-2	112.09	108.12	108.72	107.77	1.73	3.29	2.71
AP4-2	163.93	172.42	172.04	172.92	2.50	5.43	4.26
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-1	316.48	1902.33	1843.41	3280.06	110.48	3.20	16.88
SRM614-1	1566.13	13510.36	12145.19	26555.27	3768.82	5466.39	4981.23
SRM612-1	2439.29	24109.86	22566.69	47813.35	32492.86	31075.33	72170.41
SRM610-1	4548.83	74022.73	67333.78	171686.20	372949.97	279151.75	711960.88
AP1-1	2408.05	33508.63	29498.85	69903.23	4491.67	959.73	5569.63
AP2-1	3511.98	60724.90	51694.17	131747.50	5664.99	2965.94	5599.35
AP3-1	18427.02	424957.28	352533.88	1014756.80	22589.73	12683.99	21398.56
AP4-1	35020.40	903777.81	737356.06	2185121.00	45661.10	26471.07	33762.91
MZ1-1	1323.85	21109.44	17501.94	46429.94	915.73	201.00	940.13
MZ1-2	768.64	6755.52	5716.79	13667.16	977.33	138.08	286.64
MZ1-3	815.00	8025.36	7118.88	15677.05	286.84	140.44	179.92
MZ1-4	1285.17	12614.51	10918.38	25416.18	556.56	208.96	851.80
MZ1-5	1004.65	10529.78	9298.29	20020.15	325.52	267.24	830.72
MZ1-6	2345.05	14382.96	13698.04	24729.34	1273.33	450.24	662.12
MZ1-7	2075.25	17945.58	17075.82	30077.89	968.13	1964.69	588.52
MZ1-8	4069.38	30707.25	29452.61	51315.65	2047.29	889.28	685.04
MZ1-9	3362.86	30411.89	28991.76	50888.77	1507.97	1051.09	563.52
MZ1-10	1168.33	6607.88	6063.27	12195.63	540.76	1512.05	593.88
MZ1-11	615.20	4269.70	3648.78	8642.81	154.32	801.68	324.24
MZ1-12	745.88	4872.75	4352.06	9091.85	276.12	3274.54	283.76
MZ1-13	1115.21	11734.63	10056.30	23913.86	513.68	865.08	768.72
MZ1-14	719.48	9433.81	8010.69	20036.71	317.48	908.01	627.76
MZ1-15	765.44	10152.78	8529.05	21175.12	318.60	1233.81	569.40
MZ1-16	1279.09	9283.89	8338.57	17223.34	763.08	1220.93	591.32

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-17	552.20	4995.39	4231.06	10190.38	149.20	367.64	221.64
MZ1-18	731.60	7494.28	6192.36	15717.09	642.00	291.32	361.52
MZ1-19	838.20	7472.76	6349.84	15725.61	293.28	543.96	568.92
MZ1-20	744.36	5971.47	5084.11	12438.11	339.08	160.80	435.08
MZ1-21	677.32	6611.52	5609.19	13848.08	189.92	90.36	440.68
srm614-2	528.12	3752.42	3312.06	8225.65	2871.70	1897.49	5428.55
srm612-2	900.81	9877.90	9025.69	22111.89	26725.03	27166.91	72749.97
srm610-2	3535.62	57848.52	52694.82	136026.05	257523.05	298111.56	774062.75
AP1-2	468.52	3220.30	2692.86	6697.60	160.20	39.44	232.24
AP2-2	1373.53	21836.08	18737.43	47743.47	1238.57	2027.73	1813.49
AP3-2	11569.51	267069.16	219809.83	640478.44	14164.12	9969.30	14869.96
AP4-2	22313.01	556650.56	455707.38	1355386.40	28015.36	19137.91	26566.15
blank-2	187.48	181.04	130.00	361.68	11.12	1.48	2.48
blank ave	251.98	1041.69	986.71	1820.87	60.80	2.34	9.68

blank subtraction							
SRM614-1	1314.15	12468.67	11158.48	24734.40	3708.02	5464.05	4971.55
SRM612-1	2187.31	23068.17	21579.98	45992.48	32432.06	31072.99	72160.73
SRM610-1	4296.84	72981.05	66347.08	169865.33	372889.17	279149.41	711951.20
AP1-1	2156.07	32466.94	28512.14	68082.36	4430.86	957.39	5559.95
AP2-1	3260.00	59683.22	50707.47	129926.63	5604.19	2963.60	5589.67
AP3-1	18175.04	423915.59	351547.17	1012935.93	22528.93	12681.65	21388.88
AP4-1	34768.42	902736.12	736369.35	2183300.13	45600.30	26468.73	33753.23
MZ1-1	1071.87	20067.75	16515.23	44609.07	854.92	198.66	930.45
MZ1-2	516.66	5713.83	4730.09	11846.29	916.53	135.74	276.96
MZ1-3	563.02	6983.68	6132.17	13856.18	226.04	138.10	170.24
MZ1-4	1033.19	11572.83	9931.68	23595.31	495.76	206.62	842.12
MZ1-5	752.66	9488.09	8311.59	18199.28	264.72	264.90	821.04
MZ1-6	2093.07	13341.28	12711.33	22908.47	1212.53	447.90	652.44
MZ1-7	1823.27	16903.89	16089.11	28257.02	907.33	1962.35	578.84
MZ1-8	3817.40	29665.57	28465.90	49494.78	1986.49	886.94	675.36
MZ1-9	3110.88	29370.21	28005.06	49067.90	1447.17	1048.75	553.84
MZ1-10	916.35	5566.19	5076.57	10374.76	479.96	1509.71	584.20
MZ1-11	363.22	3228.02	2662.07	6821.94	93.52	799.34	314.56
MZ1-12	493.90	3831.06	3365.36	7270.98	215.32	3272.20	274.08
MZ1-13	863.22	10692.94	9069.59	22092.98	452.88	862.74	759.04
MZ1-14	467.50	8392.13	7023.98	18215.84	256.68	905.67	618.08
MZ1-15	513.46	9111.09	7542.34	19354.25	257.80	1231.47	559.72
MZ1-16	1027.11	8242.21	7351.86	15402.47	702.28	1218.59	581.64
MZ1-17	300.22	3953.70	3244.36	8369.51	88.40	365.30	211.96
MZ1-18	479.62	6452.60	5205.65	13896.22	581.20	288.98	351.84
MZ1-19	586.22	6431.08	5363.13	13904.74	232.48	541.62	559.24
MZ1-20	492.38	4929.79	4097.40	10617.24	278.28	158.46	425.40
MZ1-21	425.34	5569.83	4622.49	12027.21	129.12	88.02	431.00
srm614-2	276.14	2710.74	2325.35	6404.78	2810.90	1895.15	5418.87
srm612-2	648.82	8836.21	8038.98	20291.01	26664.23	27164.57	72740.29
srm610-2	3283.64	56806.84	51708.11	134205.18	257462.25	298109.22	774053.07
AP1-2	216.54	2178.61	1706.15	4876.73	99.40	37.10	222.56
AP2-2	1121.55	20794.40	17750.72	45922.59	1177.77	2025.39	1803.81
AP3-2	11317.52	266027.47	218823.12	638657.57	14103.32	9966.96	14860.28
AP4-2	22061.02	555608.87	454720.67	1353565.53	27954.56	19135.57	26556.47

zero correction							
SRM614-1	1314.15	12468.67	11158.48	24734.40	3708.02	5464.05	4971.55
SRM612-1	2187.31	23068.17	21579.98	45992.48	32432.06	31072.99	72160.73
SRM610-1	4296.84	72981.05	66347.08	169865.33	372889.17	279149.41	711951.20
AP1-1	2156.07	32466.94	28512.14	68082.36	4430.86	957.39	5559.95
AP2-1	3260.00	59683.22	50707.47	129926.63	5604.19	2963.60	5589.67
AP3-1	18175.04	423915.59	351547.17	1012935.93	22528.93	12681.65	21388.88
AP4-1	34768.42	902736.12	736369.35	2183300.13	45600.30	26468.73	33753.23
MZ1-1	1071.87	20067.75	16515.23	44609.07	854.92	198.66	930.45
MZ1-2	516.66	5713.83	4730.09	11846.29	916.53	135.74	276.96
MZ1-3	563.02	6983.68	6132.17	13856.18	226.04	138.10	170.24
MZ1-4	1033.19	11572.83	9931.68	23595.31	495.76	206.62	842.12
MZ1-5	752.66	9488.09	8311.59	18199.28	264.72	264.90	821.04
MZ1-6	2093.07	13341.28	12711.33	22908.47	1212.53	447.90	652.44
MZ1-7	1823.27	16903.89	16089.11	28257.02	907.33	1962.35	578.84
MZ1-8	3817.40	29665.57	28465.90	49494.78	1986.49	886.94	675.36
MZ1-9	3110.88	29370.21	28005.06	49067.90	1447.17	1048.75	553.84
MZ1-10	916.35	5566.19	5076.57	10374.76	479.96	1509.71	584.20
MZ1-11	363.22	3228.02	2662.07	6821.94	93.52	799.34	314.56
MZ1-12	493.90	3831.06	3365.36	7270.98	215.32	3272.20	274.08
MZ1-13	863.22	10692.94	9069.59	22092.98	452.88	862.74	759.04
MZ1-14	467.50	8392.13	7023.98	18215.84	256.68	905.67	618.08
MZ1-15	513.46	9111.09	7542.34	19354.25	257.80	1231.47	559.72
MZ1-16	1027.11	8242.21	7351.86	15402.47	702.28	1218.59	581.64
MZ1-17	300.22	3953.70	3244.36	8369.51	88.40	365.30	211.96
MZ1-18	479.62	6452.60	5205.65	13896.22	581.20	288.98	351.84

Appendix A. Raw trace element datasheets from laser ablation.

MZ1-19	586.22	6431.08	5363.13	13904.74	232.48	541.62	559.24
MZ1-20	492.38	4929.79	4097.40	10617.24	278.28	158.46	425.40
MZ1-21	425.34	5569.83	4622.49	12027.21	129.12	88.02	431.00
srm614-2	276.14	2710.74	2325.35	6404.78	2810.90	1895.15	5418.87
srm612-2	648.82	8836.21	8038.98	20291.01	26664.23	27164.57	72740.29
srm610-2	3283.64	56806.84	51708.11	134205.18	257462.25	298109.22	774053.07
AP1-2	216.54	2178.61	1706.15	4876.73	99.40	37.10	222.56
AP2-2	1121.55	20794.40	17750.72	45922.59	1177.77	2025.39	1803.81
AP3-2	11317.52	266027.47	218823.12	638657.57	14103.32	9966.96	14860.28
AP4-2	22061.02	555608.87	454720.67	1353565.53	27954.56	19135.57	26556.47

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-1	0.000293	0.002782	0.002489	0.005518	0.000827	0.001219	0.001109
SRM612-1	0.001712	0.018059	0.016894	0.036004	0.025389	0.024325	0.056490
SRM610-1	0.006256	0.106263	0.096604	0.247330	0.542940	0.406452	1.036626
AP1-1	0.000125	0.001888	0.001658	0.003959	0.000258	0.000056	0.000323
AP2-1	0.000225	0.004123	0.003503	0.008975	0.000387	0.000205	0.000386
AP3-1	0.000965	0.022509	0.018666	0.053785	0.001196	0.000673	0.001136
AP4-1	0.002024	0.052547	0.042863	0.127086	0.002654	0.001541	0.001965
MZ1-1	0.000092	0.001725	0.001420	0.003835	0.000073	0.000017	0.000080
MZ1-2	0.000050	0.000558	0.000462	0.001156	0.000089	0.000013	0.000027
MZ1-3	0.000063	0.000782	0.000687	0.001552	0.000025	0.000015	0.000019
MZ1-4	0.000098	0.001102	0.000945	0.002246	0.000047	0.000020	0.000080
MZ1-5	0.000075	0.000947	0.000829	0.001816	0.000026	0.000026	0.000082
MZ1-6	0.000241	0.001538	0.001465	0.002641	0.000140	0.000052	0.000075
MZ1-7	0.000154	0.001426	0.001357	0.002384	0.000077	0.000166	0.000049
MZ1-8	0.000303	0.002352	0.002256	0.003923	0.000157	0.000070	0.000054
MZ1-9	0.000279	0.002638	0.002515	0.004407	0.000130	0.000094	0.000050
MZ1-10	0.000115	0.000700	0.000638	0.001304	0.000060	0.000190	0.000073
MZ1-11	0.000044	0.000389	0.000320	0.000821	0.000011	0.000096	0.000038
MZ1-12	0.000059	0.000456	0.000401	0.000866	0.000026	0.000390	0.000033
MZ1-13	0.000088	0.001093	0.000927	0.002259	0.000046	0.000088	0.000078
MZ1-14	0.000039	0.000701	0.000586	0.001521	0.000021	0.000076	0.000052
MZ1-15	0.000043	0.000758	0.000627	0.001609	0.000021	0.000102	0.000047
MZ1-16	0.000130	0.001047	0.000934	0.001957	0.000089	0.000155	0.000074
MZ1-17	0.000033	0.000429	0.000352	0.000908	0.000010	0.000040	0.000023
MZ1-18	0.000036	0.000482	0.000389	0.001038	0.000043	0.000022	0.000026
MZ1-19	0.000032	0.000355	0.000296	0.000768	0.000013	0.000030	0.000031
MZ1-20	0.000027	0.000274	0.000228	0.000591	0.000015	0.000009	0.000024
MZ1-21	0.000022	0.000294	0.000244	0.000635	0.000007	0.000005	0.000023
srm614-2	0.000098	0.000962	0.000825	0.002272	0.000997	0.000672	0.001922
srm612-2	0.000847	0.011533	0.010492	0.026483	0.034801	0.035454	0.094937
srm610-2	0.005960	0.103105	0.093850	0.243583	0.467295	0.541070	1.404910
AP1-2	0.000023	0.000229	0.000179	0.000512	0.000010	0.000004	0.000023
AP2-2	0.000138	0.002560	0.002185	0.005653	0.000145	0.000249	0.000222
AP3-2	0.000909	0.021368	0.017576	0.051299	0.001133	0.000801	0.001194
AP4-2	0.001773	0.044652	0.036544	0.108780	0.002247	0.001538	0.002134

standardize signal averages AP							
AP1	0.000074	0.001058	0.000919	0.002236	0.000134	0.000030	0.000173
AP2	0.000182	0.003341	0.002844	0.007314	0.000266	0.000227	0.000304
AP3	0.000937	0.021939	0.018121	0.052542	0.001165	0.000737	0.001165
AP4	0.001898	0.048599	0.039703	0.117933	0.002450	0.001539	0.002049

linest from std sig ave							
	0.203440	0.008055	0.009846	0.003324	0.002477	0.006978	0.004182

standardize signal averages SRM							
srm614-2	0.000196	0.001872	0.001657	0.003895	0.000912	0.000946	0.001516
srm612-2	0.001280	0.014796	0.013693	0.031244	0.030095	0.029889	0.075714

Appendix A. Raw trace element datasheets from laser ablation.

srn610-2	0.006108	0.104684	0.095227	0.245457	0.505118	0.473761	1.220768
linest from std sig ave							
	0.770111	0.045725	0.050243	0.019549	0.008269	0.011104	0.004371
concentration data							
SRM614-1	5.11	1.92	2.10	1.57	0.18	0.73	0.40
SRM612-1	29.88	12.47	14.26	10.26	5.39	14.56	20.26
SRM610-1	109.16	73.41	81.57	70.51	115.35	243.23	371.82
AP1-1	10.18	6.07	6.51	5.25	0.25	0.15	0.54
AP2-1	18.28	13.25	13.76	11.90	0.38	0.57	0.64
AP3-1	78.32	72.33	73.32	71.32	1.18	1.87	1.89
AP4-1	164.25	168.85	168.36	168.53	2.62	4.29	3.28
MZ1-1	7.48	5.54	5.58	5.09	0.07	0.05	0.13
MZ1-2	4.09	1.79	1.81	1.53	0.09	0.04	0.05
MZ1-3	5.12	2.51	2.70	2.06	0.03	0.04	0.03
MZ1-4	7.98	3.54	3.71	2.98	0.05	0.05	0.13
MZ1-5	6.09	3.04	3.26	2.41	0.03	0.07	0.14
MZ1-6	19.58	4.94	5.76	3.50	0.14	0.14	0.13
MZ1-7	12.48	4.58	5.33	3.16	0.08	0.46	0.08
MZ1-8	24.56	7.56	8.86	5.20	0.16	0.20	0.09
MZ1-9	22.68	8.48	9.88	5.84	0.13	0.26	0.08
MZ1-10	9.35	2.25	2.51	1.73	0.06	0.53	0.12
MZ1-11	3.55	1.25	1.26	1.09	0.01	0.27	0.06
MZ1-12	4.78	1.47	1.57	1.15	0.03	1.09	0.05
MZ1-13	7.16	3.51	3.64	3.00	0.05	0.25	0.13
MZ1-14	3.17	2.25	2.30	2.02	0.02	0.21	0.09
MZ1-15	3.46	2.43	2.46	2.13	0.02	0.29	0.08
MZ1-16	10.59	3.36	3.67	2.60	0.09	0.43	0.12
MZ1-17	2.64	1.38	1.38	1.20	0.01	0.11	0.04
MZ1-18	2.91	1.55	1.53	1.38	0.04	0.06	0.04
MZ1-19	2.63	1.14	1.16	1.02	0.01	0.08	0.05
MZ1-20	2.22	0.88	0.90	0.78	0.02	0.02	0.04
MZ1-21	1.82	0.94	0.96	0.84	0.01	0.01	0.04
srn614-2	1.71	0.66	0.70	0.65	0.21	0.40	0.69
srn612-2	14.77	7.97	8.86	7.55	7.39	21.22	34.05
srn610-2	103.98	71.22	79.25	69.44	99.28	323.78	503.92
AP1-2	1.85	0.74	0.70	0.68	0.01	0.01	0.04
AP2-2	11.21	8.23	8.58	7.50	0.14	0.69	0.37
AP3-2	73.78	68.66	69.04	68.03	1.12	2.23	1.99
AP4-2	143.89	143.48	143.54	144.25	2.22	4.28	3.56
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-5	35.28	115.68	124.00	294.40	10.08	7.08	5.40
SRM614-5	510.16	4149.94	3481.78	8392.21	1444.29	734.08	2276.89
SRM612-5	1906.17	27908.48	24862.14	62324.59	99061.52	48233.71	148724.52
SRM610-5	6479.04	114697.09	104994.19	277139.13	484111.97	402724.38	901945.75
AP1-5	404.24	2656.29	2336.65	5303.31	276.76	33.88	70.84
AP2-5	1409.89	21473.12	18029.46	46101.66	1344.89	1378.45	1409.17
AP3-5	6197.51	130222.89	108345.21	301965.06	7590.52	5417.11	7386.64
AP4-5	9774.69	217181.75	179519.50	512654.69	10714.86	10897.18	12811.15
MZ2-1b	303.72	1259.81	1142.69	2272.89	87.44	6.40	74.04
MZ2-2b	261.28	1086.41	906.49	2275.65	63.32	16.56	134.16
MZ2-3b	228.24	797.84	739.24	1732.57	46.12	18.84	78.24
MZ2-4b	303.20	2022.21	1725.81	4180.78	58.24	23.12	135.40
MZ2-5b	320.16	2084.25	1755.53	4439.19	70.24	58.88	169.04
MZ2-6b	263.24	1473.29	1224.01	2974.82	38.24	12.72	70.56
MZ2-7b	362.20	2798.30	2418.81	5675.63	86.84	229.60	297.24
MZ2-8b	411.40	2941.66	2579.65	5882.43	121.20	153.92	218.40
MZ2-9b	724.52	4985.59	4867.87	8697.09	322.56	45.72	113.84
MZ2-10b	277.80	1651.89	1393.49	3541.70	54.72	67.52	131.64
MZ2-11b	449.64	3796.02	3411.90	7097.04	87.32	54.88	156.36
MZ2-12b	568.60	3085.82	2843.90	5590.59	209.00	39.68	93.40
MZ2-13b	274.36	1737.41	1476.53	3475.70	50.04	56.08	159.68
MZ2-14b	293.32	1986.69	1646.73	4075.82	47.48	66.60	169.96
MZ2-15b	341.20	2381.61	2001.85	4912.67	73.64	259.64	273.36
srn614-6	274.08	1303.73	1107.93	2724.74	1066.73	589.52	1948.69
srn612-6	1388.09	20027.95	18278.30	44658.41	73243.01	38692.30	117126.18

Appendix A. Raw trace element datasheets from laser ablation.

srm610-6	5167.35	91441.84	83431.87	217093.78	385386.22	351317.31	727419.00
AP1-6	204.12	907.21	753.08	1818.37	47.36	22.16	40.16
AP2-6	956.77	14729.16	12252.75	31447.14	877.56	1066.81	1121.25
AP3-6	5033.35	107002.56	88643.74	245030.89	6081.51	4954.87	6658.28
AP4-6	8951.81	200899.53	165608.25	473964.31	10475.14	10659.78	13375.48
blank-6	135.08	156.24	130.24	314.60	16.04	5.88	2.92
blank ave	85.18	135.96	127.12	304.50	13.06	6.48	4.16
blank subtraction							
SRM614-5	424.98	4013.98	3354.66	8087.71	1431.23	727.60	2272.73
SRM612-5	1820.99	27772.52	24735.02	62020.09	99048.46	48227.23	148720.36
SRM610-5	6393.86	114561.13	104867.07	276834.63	484098.91	402717.90	901941.59
AP1-5	319.06	2520.33	2209.53	4998.81	263.70	27.40	66.68
AP2-5	1324.71	21337.16	17902.34	45797.16	1331.83	1371.97	1405.01
AP3-5	6112.33	130086.93	108218.09	301660.56	7577.46	5410.63	7382.48
AP4-5	9689.51	217045.79	179392.38	512350.19	10701.80	10890.70	12806.99
MZ2-1b	218.54	1123.85	1015.57	1968.39	74.38	-0.08	69.88
MZ2-2b	176.10	950.45	779.36	1971.15	50.26	10.08	130.00
MZ2-3b	143.06	661.88	612.12	1428.07	33.06	12.36	74.08
MZ2-4b	218.02	1886.25	1598.69	3876.28	45.18	16.64	131.24
MZ2-5b	234.98	1948.29	1628.41	4134.68	57.18	52.40	164.88
MZ2-6b	178.06	1337.33	1096.89	2670.31	25.18	6.24	66.40
MZ2-7b	277.02	2662.33	2291.69	5371.13	73.78	223.12	293.08
MZ2-8b	326.22	2805.70	2452.53	5577.93	108.14	147.44	214.24
MZ2-9b	639.34	4849.63	4740.75	8392.59	309.50	39.24	109.68
MZ2-10b	192.62	1515.93	1266.37	3237.20	41.66	61.04	127.48
MZ2-11b	364.46	3660.06	3284.78	6792.54	74.26	48.40	152.20
MZ2-12b	483.42	2949.86	2716.78	5286.09	195.94	33.20	89.24
MZ2-13b	189.18	1601.45	1349.41	3171.20	36.98	49.60	155.52
MZ2-14b	208.14	1850.73	1519.61	3771.32	34.42	60.12	165.80
MZ2-15b	256.02	2245.65	1874.73	4608.17	60.58	253.16	269.20
srm614-6	188.90	1167.77	980.81	2420.23	1053.67	583.04	1944.53
srm612-6	1302.91	19891.99	18151.18	44353.91	73229.95	38685.82	117122.02
srm610-6	5082.17	91305.88	83304.75	216789.28	385373.16	351310.83	727414.84
AP1-6	118.94	771.24	625.96	1513.87	34.30	15.68	36.00
AP2-6	871.58	14593.20	12125.63	31142.64	864.50	1060.33	1117.09
AP3-6	4948.17	106866.60	88516.62	244726.39	6068.45	4948.39	6654.12
AP4-6	8866.63	200763.57	165481.13	473659.81	10462.08	10653.30	13371.32
zero correction							
SRM614-5	424.98	4013.98	3354.66	8087.71	1431.23	727.60	2272.73
SRM612-5	1820.99	27772.52	24735.02	62020.09	99048.46	48227.23	148720.36
SRM610-5	6393.86	114561.13	104867.07	276834.63	484098.91	402717.90	901941.59
AP1-5	319.06	2520.33	2209.53	4998.81	263.70	27.40	66.68
AP2-5	1324.71	21337.16	17902.34	45797.16	1331.83	1371.97	1405.01
AP3-5	6112.33	130086.93	108218.09	301660.56	7577.46	5410.63	7382.48
AP4-5	9689.51	217045.79	179392.38	512350.19	10701.80	10890.70	12806.99
MZ2-1b	218.54	1123.85	1015.57	1968.39	74.38	0.00	69.88
MZ2-2b	176.10	950.45	779.36	1971.15	50.26	10.08	130.00
MZ2-3b	143.06	661.88	612.12	1428.07	33.06	12.36	74.08
MZ2-4b	218.02	1886.25	1598.69	3876.28	45.18	16.64	131.24
MZ2-5b	234.98	1948.29	1628.41	4134.68	57.18	52.40	164.88
MZ2-6b	178.06	1337.33	1096.89	2670.31	25.18	6.24	66.40
MZ2-7b	277.02	2662.33	2291.69	5371.13	73.78	223.12	293.08
MZ2-8b	326.22	2805.70	2452.53	5577.93	108.14	147.44	214.24
MZ2-9b	639.34	4849.63	4740.75	8392.59	309.50	39.24	109.68
MZ2-10b	192.62	1515.93	1266.37	3237.20	41.66	61.04	127.48
MZ2-11b	364.46	3660.06	3284.78	6792.54	74.26	48.40	152.20
MZ2-12b	483.42	2949.86	2716.78	5286.09	195.94	33.20	89.24
MZ2-13b	189.18	1601.45	1349.41	3171.20	36.98	49.60	155.52
MZ2-14b	208.14	1850.73	1519.61	3771.32	34.42	60.12	165.80
MZ2-15b	256.02	2245.65	1874.73	4608.17	60.58	253.16	269.20
srm614-6	188.90	1167.77	980.81	2420.23	1053.67	583.04	1944.53
srm612-6	1302.91	19891.99	18151.18	44353.91	73229.95	38685.82	117122.02
srm610-6	5082.17	91305.88	83304.75	216789.28	385373.16	351310.83	727414.84
AP1-6	118.94	771.24	625.96	1513.87	34.30	15.68	36.00
AP2-6	871.58	14593.20	12125.63	31142.64	864.50	1060.33	1117.09
AP3-6	4948.17	106866.60	88516.62	244726.39	6068.45	4948.39	6654.12
AP4-6	8866.63	200763.57	165481.13	473659.81	10462.08	10653.30	13371.32
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

Appendix A. Raw trace element datasheets from laser ablation.

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008
standardized signal							
SRM614-5	0.000355	0.003357	0.002806	0.006764	0.001197	0.000609	0.001901
SRM612-5	0.001225	0.018683	0.016640	0.041723	0.066633	0.032444	0.100049
SRM610-5	0.009530	0.170759	0.156309	0.412635	0.721572	0.600270	1.344386
AP1-5	0.000044	0.000345	0.000303	0.000685	0.000036	0.000004	0.000009
AP2-5	0.000169	0.002725	0.002286	0.005848	0.000170	0.000175	0.000179
AP3-5	0.000901	0.019166	0.015944	0.044445	0.001116	0.000797	0.001088
AP4-5	0.000956	0.021410	0.017696	0.050541	0.001056	0.001074	0.001263
MZ2-1b	0.000065	0.000334	0.000301	0.000584	0.000022	0.000000	0.000021
MZ2-2b	0.000047	0.000255	0.000209	0.000528	0.000013	0.000003	0.000035
MZ2-3b	0.000043	0.000199	0.000184	0.000429	0.000010	0.000004	0.000022
MZ2-4b	0.000048	0.000413	0.000350	0.000848	0.000010	0.000004	0.000029
MZ2-5b	0.000050	0.000415	0.000347	0.000881	0.000012	0.000011	0.000035
MZ2-6b	0.000044	0.000329	0.000270	0.000657	0.000006	0.000002	0.000016
MZ2-7b	0.000053	0.000514	0.000443	0.001037	0.000014	0.000043	0.000057
MZ2-8b	0.000062	0.000537	0.000470	0.001068	0.000021	0.000028	0.000041
MZ2-9b	0.000139	0.001058	0.001034	0.001831	0.000068	0.000009	0.000024
MZ2-10b	0.000047	0.000373	0.000311	0.000796	0.000010	0.000015	0.000031
MZ2-11b	0.000098	0.000979	0.000879	0.001818	0.000020	0.000013	0.000041
MZ2-12b	0.000150	0.000918	0.000846	0.001646	0.000061	0.000010	0.000028
MZ2-13b	0.000040	0.000341	0.000287	0.000674	0.000008	0.000011	0.000033
MZ2-14b	0.000038	0.000335	0.000275	0.000683	0.000006	0.000011	0.000030
MZ2-15b	0.000043	0.000377	0.000315	0.000773	0.000010	0.000042	0.000045
srM614-6	0.000208	0.001289	0.001082	0.002671	0.001163	0.000643	0.002146
srM612-6	0.001207	0.018426	0.016814	0.041085	0.067833	0.035835	0.108491
srM610-6	0.009190	0.165104	0.150636	0.392011	0.696853	0.635260	1.315352
AP1-6	0.000021	0.000137	0.000111	0.000269	0.000006	0.000003	0.000006
AP2-6	0.000141	0.002357	0.001959	0.005030	0.000140	0.000171	0.000180
AP3-6	0.000825	0.017808	0.014750	0.040780	0.001011	0.000825	0.001109
AP4-6	0.000982	0.022238	0.018330	0.052466	0.001159	0.001180	0.001481
standardize signal averages AP							
AP1	0.000032	0.000241	0.000207	0.000477	0.000021	0.000003	0.000008
AP2	0.000155	0.002541	0.002122	0.005439	0.000155	0.000173	0.000180
AP3	0.000863	0.018487	0.015347	0.042612	0.001064	0.000811	0.001098
AP4	0.000969	0.021824	0.018013	0.051504	0.001107	0.001127	0.001372
linest from std sig ave							
	0.326517	0.014900	0.018000	0.006388	0.004308	0.008617	0.005538
standardize signal averages SRM							
srM614-2	0.000282	0.002323	0.001944	0.004717	0.001180	0.000626	0.002023
srM612-2	0.001216	0.018555	0.016727	0.041404	0.067233	0.034139	0.104270
srM610-2	0.009360	0.167932	0.153473	0.402323	0.709213	0.617765	1.329869
linest from std sig ave							
	1.018226	1.016797	1.018271	1.025499	1.017192	0.971615	1.010602
concentration data							
SRM614-5	9.95	4.29	4.33	3.71	0.44	0.45	0.90
SRM612-5	34.30	23.88	25.69	22.86	24.62	23.98	47.52
SRM610-5	266.88	218.21	241.31	226.06	266.62	443.60	638.48
AP1-5	5.70	2.05	2.17	1.75	0.06	0.01	0.02
AP2-5	22.04	16.20	16.42	14.90	0.29	0.60	0.40
AP3-5	117.31	113.93	114.50	113.26	1.92	2.74	2.40
AP4-5	124.50	127.27	127.08	128.80	1.81	3.69	2.79
MZ2-1b	8.45	1.98	2.16	1.49	0.04	0.00	0.05
MZ2-2b	6.15	1.51	1.50	1.35	0.02	0.01	0.08
MZ2-3b	5.60	1.18	1.32	1.09	0.02	0.01	0.05
MZ2-4b	6.21	2.45	2.51	2.16	0.02	0.01	0.06
MZ2-5b	6.52	2.47	2.49	2.25	0.02	0.04	0.08
MZ2-6b	5.71	1.96	1.94	1.68	0.01	0.01	0.04
MZ2-7b	6.97	3.06	3.18	2.64	0.02	0.15	0.13
MZ2-8b	8.14	3.19	3.37	2.72	0.04	0.10	0.09
MZ2-9b	18.17	6.29	7.43	4.67	0.12	0.03	0.05
MZ2-10b	6.17	2.22	2.24	2.03	0.02	0.05	0.07
MZ2-11b	12.70	5.82	6.31	4.63	0.03	0.04	0.09
MZ2-12b	19.60	5.46	6.07	4.19	0.10	0.04	0.06

Appendix A. Raw trace element datasheets from laser ablation.

MZ2-13b	5.24	2.02	2.06	1.72	0.01	0.04	0.07
MZ2-14b	4.91	1.99	1.98	1.74	0.01	0.04	0.07
MZ2-15b	5.59	2.24	2.26	1.97	0.02	0.15	0.10
srm614-6	5.84	1.65	1.67	1.46	0.43	0.48	1.02
srm612-6	33.80	23.55	25.96	22.51	25.06	26.48	51.52
srm610-6	257.34	210.99	232.55	214.76	257.49	469.45	624.69
AP1-6	2.76	0.82	0.80	0.69	0.01	0.01	0.01
AP2-6	18.34	14.01	14.06	12.82	0.24	0.59	0.40
AP3-6	107.40	105.86	105.92	103.92	1.74	2.83	2.45
AP4-6	127.93	132.19	131.63	133.70	1.99	4.06	3.27

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-7	122.00	188.56	160.20	357.80	13.00	2.24	12.12
SRM614-7	371.08	2186.09	1967.49	4898.39	2159.77	759.60	2141.17
SRM612-7	1990.17	30044.25	27104.39	68063.95	114490.96	45179.93	107072.00
SRM610-7	14399.64	295342.69	267952.81	771082.75	1540753.80	535940.63	1359447.30
AP1-7	265.76	1163.05	978.09	2477.81	590.56	165.92	714.52
AP2-7	1702.13	29499.89	24372.22	63628.60	2438.05	1965.45	2910.34
AP3-7	10034.86	231637.86	188651.83	562986.19	11487.63	8702.97	11879.39
AP4-7	13294.12	314786.94	257944.33	779511.63	15115.01	13830.80	17240.74
T1-1	966.93	2835.78	2395.65	5799.67	297.88	50.64	210.48
T1-2	797.36	2006.61	1681.65	4314.94	57.48	5.60	82.56
T1-3	803.76	1700.57	1362.17	3453.50	48.72	8.44	55.84
T1-4	1161.37	2991.14	2458.61	6142.39	198.12	28.72	264.48
T1-5	1020.85	3021.50	2521.41	6258.00	132.96	37.80	125.20
T1-6	1009.29	3108.50	2645.85	6607.52	234.68	104.20	195.28
T1-7	1338.77	2580.57	2156.97	5268.43	276.24	36.64	436.12
T1-8	1055.89	1441.77	1146.97	2869.10	95.28	12.12	109.64
T1-9	1013.21	2687.38	2318.17	5637.11	58.52	10.64	82.04
T1-10	1197.61	2486.37	2058.77	5410.03	240.84	53.60	368.24
T1-11	1061.61	2560.37	2102.01	5170.35	60.84	11.32	77.36
T1-12	957.45	2474.97	1937.41	5153.03	82.12	14.88	86.88
T1-13	976.09	1885.65	1609.81	3970.74	190.68	28.72	305.48
T1-14	893.36	1052.93	905.81	2324.89	46.44	8.52	55.60
T1-15	815.52	1182.49	1023.21	2472.73	55.48	19.76	78.04
T1-16	966.65	1508.61	1255.53	3025.82	111.72	56.44	148.12
T1-17	908.97	1868.45	1517.97	3854.50	83.80	15.16	161.24
T1-18	806.24	1835.17	1415.49	3821.94	82.24	11.96	122.80
SRM614-8	380.64	1683.93	1466.81	3657.86	1800.81	1079.33	2539.81
SRM612-8	1757.93	26784.63	24600.34	61230.22	107096.00	61151.50	134217.52
SRM610-8	10959.74	223590.66	202971.14	585264.00	1201422.50	685943.31	1520748.90
AP1-8	203.72	431.96	364.60	950.49	124.80	93.56	173.24
AP2-8	1430.49	24261.94	20041.31	52524.14	1539.97	2247.01	2253.53
AP3-8	10107.42	241675.52	198635.23	597302.75	11857.51	10694.78	14850.76
AP4-8	11170.98	273778.03	223682.47	679677.81	12883.47	13834.60	16955.98
blank-8	154.04	87.08	70.20	160.16	2.88	3.76	1.52
blank average	138.02	137.82	115.20	258.98	7.94	3.00	6.82

blank subtraction							
SRM614-7	233.06	2048.27	1852.29	4639.41	2151.83	756.60	2134.35
SRM612-7	1852.15	29906.43	26989.19	67804.96	114483.02	45176.93	107065.18
SRM610-7	14261.62	295204.87	267837.61	770823.77	1540745.86	535937.63	1359440.48
AP1-7	127.74	1025.23	862.88	2218.83	582.62	162.92	707.70
AP2-7	1564.11	29362.07	24257.02	63369.62	2430.11	1962.45	2903.52
AP3-7	9896.84	231500.04	188536.63	562727.21	11479.68	8699.97	11872.57
AP4-7	13156.09	314649.12	257829.13	779252.65	15107.06	13827.80	17233.92
T1-1	828.90	2697.96	2280.45	5540.69	289.94	47.64	203.66
T1-2	659.34	1868.79	1566.45	4055.96	49.54	2.60	75.74
T1-3	665.74	1562.75	1246.97	3194.52	40.78	5.44	49.02
T1-4	1023.35	2853.32	2343.41	5883.41	190.18	25.72	257.66
T1-5	882.83	2883.68	2406.21	5999.01	125.02	34.80	118.38
T1-6	871.26	2970.68	2530.65	6348.54	226.74	101.20	188.46
T1-7	1200.75	2442.75	2041.77	5009.45	268.30	33.64	429.30
T1-8	917.87	1303.95	1031.77	2610.11	87.34	9.12	102.82
T1-9	875.18	2549.55	2202.97	5378.13	50.58	7.64	75.22
T1-10	1059.59	2348.55	1943.57	5151.05	232.90	50.60	361.42
T1-11	923.59	2422.55	1986.81	4911.37	52.90	8.32	70.54
T1-12	819.42	2337.15	1822.21	4894.05	74.18	11.88	80.06

Appendix A. Raw trace element datasheets from laser ablation.

T1-13	838.06	1747.83	1494.61	3711.76	182.74	25.72	298.66
T1-14	755.34	915.11	790.60	2065.91	38.50	5.52	48.78
T1-15	677.50	1044.67	908.01	2213.75	47.54	16.76	71.22
T1-16	828.62	1370.79	1140.33	2766.84	103.78	53.44	141.30
T1-17	770.94	1730.63	1402.77	3595.52	75.86	12.16	154.42
T1-18	668.22	1697.35	1300.29	3562.96	74.30	8.96	115.98
SRM614-8	242.62	1546.11	1351.61	3398.88	1792.87	1076.33	2532.99
SRM612-8	1619.91	26646.81	24485.14	60971.24	107088.06	61148.50	134210.70
SRM610-8	10821.72	223452.84	202855.94	585005.02	1201414.56	685940.31	1520742.08
AP1-8	65.70	294.14	249.40	691.50	116.86	90.56	166.42
AP2-8	1292.47	24124.12	19926.11	52265.16	1532.03	2244.01	2246.71
AP3-8	9969.40	241537.70	198520.03	597043.77	11849.57	10691.78	14843.94
AP4-8	11032.96	273640.21	223567.27	679418.83	12875.53	13831.60	16949.15

zero correction

SRM614-7	233.06	2048.27	1852.29	4639.41	2151.83	756.60	2134.35
SRM612-7	1852.15	29906.43	26989.19	67804.96	114483.02	45176.93	107065.18
SRM610-7	14261.62	295204.87	267837.61	770823.77	1540745.86	535937.63	1359440.48
AP1-7	127.74	1025.23	862.88	2218.83	582.62	162.92	707.70
AP2-7	1564.11	29362.07	24257.02	63369.62	2430.11	1962.45	2903.52
AP3-7	9896.84	231500.04	188536.63	562727.21	11479.68	8699.97	11872.57
AP4-7	13156.09	314649.12	257829.13	779252.65	15107.06	13827.80	17233.92
T1-1	828.90	2697.96	2280.45	5540.69	289.94	47.64	203.66
T1-2	659.34	1868.79	1566.45	4055.96	49.54	2.60	75.74
T1-3	665.74	1562.75	1246.97	3194.52	40.78	5.44	49.02
T1-4	1023.35	2853.32	2343.41	5883.41	190.18	25.72	257.66
T1-5	882.83	2883.68	2406.21	5999.01	125.02	34.80	118.38
T1-6	871.26	2970.68	2530.65	6348.54	226.74	101.20	188.46
T1-7	1200.75	2442.75	2041.77	5009.45	268.30	33.64	429.30
T1-8	917.87	1303.95	1031.77	2610.11	87.34	9.12	102.82
T1-9	875.18	2549.55	2202.97	5378.13	50.58	7.64	75.22
T1-10	1059.59	2348.55	1943.57	5151.05	232.90	50.60	361.42
T1-11	923.59	2422.55	1986.81	4911.37	52.90	8.32	70.54
T1-12	819.42	2337.15	1822.21	4894.05	74.18	11.88	80.06
T1-13	838.06	1747.83	1494.61	3711.76	182.74	25.72	298.66
T1-14	755.34	915.11	790.60	2065.91	38.50	5.52	48.78
T1-15	677.50	1044.67	908.01	2213.75	47.54	16.76	71.22
T1-16	828.62	1370.79	1140.33	2766.84	103.78	53.44	141.30
T1-17	770.94	1730.63	1402.77	3595.52	75.86	12.16	154.42
T1-18	668.22	1697.35	1300.29	3562.96	74.30	8.96	115.98
SRM614-8	242.62	1546.11	1351.61	3398.88	1792.87	1076.33	2532.99
SRM612-8	1619.91	26646.81	24485.14	60971.24	107088.06	61148.50	134210.70
SRM610-8	10821.72	223452.84	202855.94	585005.02	1201414.56	685940.31	1520742.08
AP1-8	65.70	294.14	249.40	691.50	116.86	90.56	166.42
AP2-8	1292.47	24124.12	19926.11	52265.16	1532.03	2244.01	2246.71
AP3-8	9969.40	241537.70	198520.03	597043.77	11849.57	10691.78	14843.94
AP4-8	11032.96	273640.21	223567.27	679418.83	12875.53	13831.60	16949.15

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-7	0.000082	0.000722	0.000653	0.001635	0.000758	0.000267	0.000752
SRM612-7	0.000674	0.010875	0.009814	0.024657	0.041631	0.016428	0.038933
SRM610-7	0.008630	0.178645	0.162083	0.466468	0.932390	0.324325	0.822672
AP1-7	0.000008	0.000063	0.000053	0.000137	0.000036	0.000010	0.000044
AP2-7	0.000092	0.001734	0.001433	0.003743	0.000144	0.000116	0.000171
AP3-7	0.000483	0.011303	0.009205	0.027474	0.000560	0.000425	0.000580
AP4-7	0.000757	0.018097	0.014829	0.044819	0.000869	0.000795	0.000991
T1-1	0.000055	0.000180	0.000152	0.000369	0.000019	0.000003	0.000014
T1-2	0.000059	0.000166	0.000139	0.000360	0.000004	0.000000	0.000007
T1-3	0.000078	0.000183	0.000146	0.000374	0.000005	0.000001	0.000006
T1-4	0.000072	0.000202	0.000166	0.000416	0.000013	0.000002	0.000018

Appendix A. Raw trace element datasheets from laser ablation.

T1-5	0.000060	0.000197	0.000164	0.000409	0.000009	0.000002	0.000008
T1-6	0.000057	0.000195	0.000166	0.000417	0.000015	0.000007	0.000012
T1-7	0.000108	0.000220	0.000184	0.000451	0.000024	0.000003	0.000039
T1-8	0.000087	0.000124	0.000098	0.000247	0.000008	0.000001	0.000010
T1-9	0.000072	0.000211	0.000182	0.000445	0.000004	0.000001	0.000006
T1-10	0.000091	0.000202	0.000167	0.000443	0.000020	0.000004	0.000031
T1-11	0.000075	0.000196	0.000161	0.000397	0.000004	0.000001	0.000006
T1-12	0.000066	0.000189	0.000147	0.000395	0.000006	0.000001	0.000006
T1-13	0.000063	0.000131	0.000112	0.000277	0.000014	0.000002	0.000022
T1-14	0.000053	0.000064	0.000055	0.000145	0.000003	0.000000	0.000003
T1-15	0.000051	0.000078	0.000068	0.000165	0.000004	0.000001	0.000005
T1-16	0.000071	0.000118	0.000098	0.000237	0.000009	0.000005	0.000012
T1-17	0.000056	0.000126	0.000102	0.000262	0.000006	0.000001	0.000011
T1-18	0.000050	0.000126	0.000097	0.000265	0.000006	0.000001	0.000009
SRM614-8	0.000137	0.000874	0.000764	0.001922	0.001014	0.000609	0.001432
SRM612-8	0.000842	0.013844	0.012721	0.031677	0.055637	0.031769	0.069728
SRM610-8	0.009217	0.190317	0.172775	0.498255	1.023258	0.584223	1.295232
AP1-8	0.000006	0.000025	0.000021	0.000059	0.000010	0.000008	0.000014
AP2-8	0.000097	0.001810	0.001495	0.003922	0.000115	0.000168	0.000169
AP3-8	0.000616	0.014926	0.012268	0.036895	0.000732	0.000661	0.000917
AP4-8	0.000826	0.020488	0.016739	0.050869	0.000964	0.001036	0.001269
standardize signal averages AP							
AP1	0.000007	0.000044	0.000037	0.000098	0.000023	0.000009	0.000029
AP2	0.000095	0.001772	0.001464	0.003832	0.000129	0.000142	0.000170
AP3	0.000550	0.013114	0.010736	0.032185	0.000646	0.000543	0.000748
AP4	0.000791	0.019293	0.015784	0.047844	0.000916	0.000915	0.001130
linest from std sig ave							
	0.447361	0.018494	0.022600	0.007483	0.006021	0.011256	0.007245
standardize signal averages SRM							
srm614-2	0.000110	0.000798	0.000708	0.001778	0.000886	0.000438	0.001092
srm612-2	0.000758	0.012360	0.011268	0.028167	0.048634	0.024099	0.054331
srm610-2	0.008924	0.184481	0.167429	0.482361	0.977824	0.454274	1.058952
linest from std sig ave							
	0.540415	0.026170	0.028835	0.010012	0.004273	0.011584	0.005041
concentration data							
SRM614-7	3.15	1.14	1.26	1.05	0.39	0.26	0.47
SRM612-7	25.84	17.25	19.02	15.82	21.50	15.86	24.19
SRM610-7	331.13	283.35	314.16	299.35	481.44	313.08	511.18
AP1-7	1.41	0.47	0.48	0.41	0.09	0.05	0.13
AP2-7	16.49	12.79	12.92	11.17	0.34	0.52	0.50
AP3-7	86.23	83.39	82.99	82.01	1.35	1.91	1.68
AP4-7	135.04	133.52	133.70	133.79	2.09	3.57	2.86
T1-1	9.86	1.33	1.37	1.10	0.05	0.01	0.04
T1-2	10.46	1.23	1.25	1.08	0.01	0.00	0.02
T1-3	13.92	1.35	1.32	1.12	0.01	0.00	0.02
T1-4	12.90	1.49	1.49	1.24	0.03	0.01	0.05
T1-5	10.75	1.45	1.48	1.22	0.02	0.01	0.02
T1-6	10.21	1.44	1.50	1.24	0.04	0.03	0.04
T1-7	19.28	1.62	1.66	1.35	0.06	0.01	0.11
T1-8	15.53	0.91	0.88	0.74	0.02	0.00	0.03
T1-9	12.93	1.56	1.64	1.33	0.01	0.00	0.02
T1-10	16.27	1.49	1.51	1.32	0.05	0.02	0.09
T1-11	13.34	1.45	1.45	1.19	0.01	0.00	0.02
T1-12	11.81	1.39	1.33	1.18	0.01	0.00	0.02
T1-13	11.17	0.96	1.01	0.83	0.03	0.01	0.06
T1-14	9.45	0.47	0.50	0.43	0.01	0.00	0.01
T1-15	9.01	0.57	0.61	0.49	0.01	0.01	0.02
T1-16	12.68	0.87	0.88	0.71	0.02	0.02	0.04
T1-17	10.01	0.93	0.92	0.78	0.01	0.00	0.03
T1-18	8.86	0.93	0.87	0.79	0.01	0.00	0.02
SRM614-8	5.26	1.39	1.48	1.23	0.52	0.59	0.89
SRM612-8	32.29	21.96	24.66	20.33	28.73	30.67	43.33
SRM610-8	353.63	301.87	334.89	319.75	528.36	563.97	804.81
AP1-8	1.00	0.19	0.19	0.18	0.02	0.03	0.04
AP2-8	17.31	13.36	13.48	11.71	0.28	0.76	0.49
AP3-8	109.95	110.13	110.61	110.14	1.76	2.97	2.65
AP4-8	147.42	151.16	150.92	151.85	2.32	4.65	3.67
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87

Appendix A. Raw trace element datasheets from laser ablation.

STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-5	105.04	303.32	270.08	605.24	62.48	1.20	81.24
SRM614-5	312.16	3456.78	3014.10	7164.60	3424.14	1101.45	3540.86
SRM612-5	2446.69	39316.26	36393.16	90369.51	145275.94	56822.56	142991.08
SRM610-5	10463.34	214428.89	194588.25	545870.94	963314.69	407910.56	1228118.80
AP1-5	260.44	2608.33	2146.69	5701.63	815.52	169.84	931.13
AP2-5	2553.37	48393.11	40237.51	105596.84	3610.34	2531.97	4001.10
AP3-5	31163.86	869100.06	706929.75	2157133.00	40564.11	17492.98	34628.95
AP4-5	17416.26	428516.28	351065.41	1067030.30	20328.96	14467.60	19968.51
TGP12-1	298.28	2531.65	2083.25	5500.87	118.00	47.60	155.64
TGP12-2	291.92	2459.01	2182.81	5314.91	49.76	15.20	59.36
TGP12-3	290.64	2467.49	2134.97	5304.23	74.68	16.68	96.52
TGP12-4	407.96	4479.35	3770.38	9747.17	398.40	60.92	507.08
TGP12-5	403.00	4041.10	3327.10	8406.93	78.80	21.32	85.96
TGP12-6	455.16	5458.67	4709.19	11272.30	214.32	41.52	392.08
TGP12-7	512.00	5918.43	4887.19	12035.43	344.24	100.84	493.12
TGP12-8	455.72	4469.59	3712.78	9309.57	91.92	28.80	134.52
TGP12-9	399.72	4007.98	3324.22	8207.49	130.24	35.76	216.56
TGP12-10	508.08	5163.87	4385.54	10969.34	366.88	53.96	431.84
TGP12-11	433.16	3983.06	3467.38	8654.25	131.92	28.52	131.28
TGP12-12	423.12	4371.62	3696.34	9260.77	98.48	13.68	103.44
TGP12-13	354.68	3100.42	2512.17	6366.68	103.04	7.28	175.72
TGP12-14	364.96	3285.10	2666.18	6910.60	62.40	6.76	63.68
TGP12-15	356.00	3356.58	2828.90	7345.88	79.44	3.56	139.96
TGP12-16	582.56	7587.48	6365.60	16231.89	379.92	49.60	552.44
TGP12-17	608.84	8458.53	7240.48	17978.14	414.44	75.52	715.16
TGP12-18	482.04	6174.63	5272.31	13350.16	398.32	25.24	657.16
SRM614-6	242.20	2194.57	2029.73	4707.39	2446.81	1260.29	3456.42
SRM612-6	1639.29	25749.35	23696.73	59158.61	99202.04	60014.78	139381.30
SRM610-6	6972.92	133251.47	120891.56	335579.66	564486.13	434086.56	1125713.50
AP1-6	172.32	955.41	766.04	1984.33	53.72	24.00	88.40
AP2-6	1816.05	33889.23	28423.60	74373.34	1952.57	2332.01	2342.97
AP3-6	21307.04	562192.50	457588.13	1415335.10	27184.99	16260.61	28537.32
AP4-6	13023.59	320308.91	261148.94	792838.56	15095.93	13815.16	18176.54
blank-6	96.40	78.64	72.32	177.32	4.04	4.92	4.84
blank average	100.72	190.98	171.20	391.28	33.26	3.06	43.04

blank subtraction							
SRM614-5	211.44	3265.80	2842.90	6773.32	3390.88	1098.39	3497.82
SRM612-5	2345.97	39125.28	36221.96	89978.23	145242.68	56819.50	142948.04
SRM610-5	10362.62	214237.91	194417.05	545479.66	963281.43	407907.50	1228075.76
AP1-5	159.72	2417.35	1975.49	5310.35	782.26	166.78	888.08
AP2-5	2452.65	48202.13	40066.31	105205.56	3577.08	2528.91	3958.06
AP3-5	31063.13	868909.08	706758.55	2156741.72	40530.85	17489.92	34585.91
AP4-5	17315.54	428325.30	350894.21	1066639.02	20295.69	14464.54	19925.47
TGP12-1	197.56	2340.67	1912.05	5109.59	84.74	44.54	112.60
TGP12-2	191.20	2268.03	2011.61	4923.63	16.50	12.14	16.32
TGP12-3	189.92	2276.51	1963.77	4912.95	41.42	13.62	53.48
TGP12-4	307.24	4288.36	3599.18	9355.89	365.14	57.86	464.04
TGP12-5	302.28	3850.12	3155.90	8015.64	45.54	18.26	42.92
TGP12-6	354.44	5267.69	4537.99	10881.02	181.06	38.46	349.04
TGP12-7	411.28	5727.45	4715.99	11644.15	310.98	97.78	450.08
TGP12-8	355.00	4278.60	3541.58	8918.29	58.66	25.74	91.48
TGP12-9	299.00	3817.00	3153.02	7816.20	96.98	32.70	173.52
TGP12-10	407.36	4972.89	4214.34	10578.06	333.62	50.90	388.80
TGP12-11	332.44	3792.08	3296.18	8262.97	98.66	25.46	88.24
TGP12-12	322.40	4180.64	3525.14	8869.49	65.22	10.62	60.40
TGP12-13	253.96	2909.44	2340.97	5975.39	69.78	4.22	132.68
TGP12-14	264.24	3094.12	2494.97	6519.32	29.14	3.70	20.64
TGP12-15	255.28	3165.60	2657.70	6954.60	46.18	0.50	96.92
TGP12-16	481.84	7396.50	6194.39	15840.61	346.66	46.54	509.40
TGP12-17	508.12	8267.55	7069.28	17586.86	381.18	72.46	672.12
TGP12-18	381.32	5983.65	5101.11	12958.87	365.06	22.18	614.12
SRM614-6	141.48	2003.59	1858.53	4316.10	2413.55	1257.23	3413.38
SRM612-6	1538.57	25558.36	23525.53	58767.33	99168.78	60011.72	139338.26
SRM610-6	6872.20	133060.49	120720.36	335188.38	564452.87	434083.50	1125670.46
AP1-6	71.60	764.42	594.84	1593.05	20.46	20.94	45.36
AP2-6	1715.33	33698.25	28252.40	73982.05	1919.31	2328.95	2299.93
AP3-6	21206.32	562001.52	457416.93	1414943.82	27151.73	16257.55	28494.28
AP4-6	12922.87	320117.93	260977.74	792447.28	15062.67	13812.10	18133.50

zero correction							
SRM614-5	211.44	3265.80	2842.90	6773.32	3390.88	1098.39	3497.82

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-5	2345.97	39125.28	36221.96	89978.23	145242.68	56819.50	142948.04
SRM610-5	10362.62	214237.91	194417.05	545479.66	963281.43	407907.50	1228075.76
AP1-5	159.72	2417.35	1975.49	5310.35	782.26	166.78	888.08
AP2-5	2452.65	48202.13	40066.31	105205.56	3577.08	2528.91	3958.06
AP3-5	31063.13	868909.08	706758.55	2156741.72	40530.85	17489.92	34585.91
AP4-5	17315.54	428325.30	350894.21	1066639.02	20295.69	14464.54	19925.47
TGP12-1	197.56	2340.67	1912.05	5109.59	84.74	44.54	112.60
TGP12-2	191.20	2268.03	2011.61	4923.63	16.50	12.14	16.32
TGP12-3	189.92	2276.51	1963.77	4912.95	41.42	13.62	53.48
TGP12-4	307.24	4288.36	3599.18	9355.89	365.14	57.86	464.04
TGP12-5	302.28	3850.12	3155.90	8015.64	45.54	18.26	42.92
TGP12-6	354.44	5267.69	4537.99	10881.02	181.06	38.46	349.04
TGP12-7	411.28	5727.45	4715.99	11644.15	310.98	97.78	450.08
TGP12-8	355.00	4278.60	3541.58	8918.29	58.66	25.74	91.48
TGP12-9	299.00	3817.00	3153.02	7816.20	96.98	32.70	173.52
TGP12-10	407.36	4972.89	4214.34	10578.06	333.62	50.90	388.80
TGP12-11	332.44	3792.08	3296.18	8262.97	98.66	25.46	88.24
TGP12-12	322.40	4180.64	3525.14	8869.49	65.22	10.62	60.40
TGP12-13	253.96	2909.44	2340.97	5975.39	69.78	4.22	132.68
TGP12-14	264.24	3094.12	2494.97	6519.32	29.14	3.70	20.64
TGP12-15	255.28	3165.60	2657.70	6954.60	46.18	0.50	96.92
TGP12-16	481.84	7396.50	6194.39	15840.61	346.66	46.54	509.40
TGP12-17	508.12	8267.55	7069.28	17586.86	381.18	72.46	672.12
TGP12-18	381.32	5983.65	5101.11	12958.87	365.06	22.18	614.12
SRM614-6	141.48	2003.59	1858.53	4316.10	2413.55	1257.23	3413.38
SRM612-6	1538.57	25558.36	23525.53	58767.33	99168.78	60011.72	139338.26
SRM610-6	6872.20	133060.49	120720.36	335188.38	564452.87	434083.50	1125670.46
AP1-6	71.60	764.42	594.84	1593.05	20.46	20.94	45.36
AP2-6	1715.33	33698.25	28252.40	73982.05	1919.31	2328.95	2299.93
AP3-6	21206.32	562001.52	457416.93	1414943.82	27151.73	16257.55	28494.28
AP4-6	12922.87	320117.93	260977.74	792447.28	15062.67	13812.10	18133.50

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-5	0.000056	0.000868	0.000755	0.001800	0.000901	0.000292	0.000929
SRM612-5	0.000730	0.012178	0.011274	0.028007	0.045208	0.017686	0.044494
SRM610-5	0.007281	0.150528	0.136602	0.383266	0.676824	0.286605	0.862874
AP1-5	0.000010	0.000145	0.000119	0.000319	0.000047	0.000010	0.000053
AP2-5	0.000131	0.002584	0.002148	0.005639	0.000192	0.000136	0.000212
AP3-5	0.001199	0.033527	0.027270	0.083218	0.001564	0.000675	0.001334
AP4-5	0.001073	0.026548	0.021749	0.066112	0.001258	0.000897	0.001235
TGP12-1	0.000046	0.000549	0.000448	0.001198	0.000020	0.000010	0.000026
TGP12-2	0.000047	0.000562	0.000498	0.001219	0.000004	0.000003	0.000004
TGP12-3	0.000053	0.000634	0.000547	0.001368	0.000012	0.000004	0.000015
TGP12-4	0.000049	0.000689	0.000578	0.001502	0.000059	0.000009	0.000075
TGP12-5	0.000037	0.000477	0.000391	0.000992	0.000006	0.000002	0.000005
TGP12-6	0.000023	0.000335	0.000289	0.000693	0.000012	0.000002	0.000022
TGP12-7	0.000021	0.000298	0.000245	0.000606	0.000016	0.000005	0.000023
TGP12-8	0.000019	0.000226	0.000187	0.000471	0.000003	0.000001	0.000005
TGP12-9	0.000016	0.000206	0.000170	0.000421	0.000005	0.000002	0.000009
TGP12-10	0.000029	0.000356	0.000302	0.000758	0.000024	0.000004	0.000028
TGP12-11	0.000024	0.000269	0.000234	0.000587	0.000007	0.000002	0.000006
TGP12-12	0.000023	0.000302	0.000254	0.000640	0.000005	0.000001	0.000004
TGP12-13	0.000038	0.000433	0.000349	0.000890	0.000010	0.000001	0.000020
TGP12-14	0.000038	0.000449	0.000362	0.000946	0.000004	0.000001	0.000003
TGP12-15	0.000036	0.000446	0.000375	0.000981	0.000007	0.000000	0.000014
TGP12-16	0.000038	0.000588	0.000493	0.001260	0.000028	0.000004	0.000041
TGP12-17	0.000042	0.000679	0.000581	0.001445	0.000031	0.000006	0.000055
TGP12-18	0.000035	0.000552	0.000471	0.001196	0.000034	0.000002	0.000057
SRM614-6	0.000060	0.000843	0.000782	0.001815	0.001015	0.000529	0.001436
SRM612-6	0.000739	0.012268	0.011292	0.028208	0.047601	0.028806	0.066883

Appendix A. Raw trace element datasheets from laser ablation.

SRM610-6	0.007408	0.143444	0.130140	0.361344	0.608498	0.467956	1.213509
AP1-6	0.000005	0.000058	0.000045	0.000121	0.000002	0.000002	0.000003
AP2-6	0.000116	0.002287	0.001917	0.005021	0.000130	0.000158	0.000156
AP3-6	0.000999	0.026464	0.021539	0.066629	0.001279	0.000766	0.001342
AP4-6	0.000955	0.023649	0.019280	0.058543	0.001113	0.001020	0.001340

standardize signal averages AP

AP1	0.000008	0.000102	0.000082	0.000220	0.000024	0.000006	0.000028
AP2	0.000124	0.002435	0.002032	0.005330	0.000161	0.000147	0.000184
AP3	0.001099	0.029996	0.024405	0.074923	0.001421	0.000720	0.001338
AP4	0.001014	0.025099	0.020515	0.062328	0.001185	0.000958	0.001287

linest from std sig ave

	0.277093	0.010421	0.012795	0.004176	0.003470	0.009967	0.005156
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standardize signal averages SRM

srm614-2	0.000058	0.000855	0.000769	0.001808	0.000958	0.000410	0.001183
srm612-2	0.000734	0.012223	0.011283	0.028107	0.046405	0.023246	0.055688
srm610-2	0.007345	0.146986	0.133371	0.372305	0.642661	0.377281	1.038192

linest from std sig ave

	0.655747	0.032816	0.036162	0.012962	0.006495	0.013944	0.005141
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concentration data

SRM614-5	1.34	0.78	0.83	0.64	0.27	0.25	0.41
SRM612-5	17.35	10.88	12.37	10.03	13.45	15.12	19.68
SRM610-5	173.03	134.53	149.89	137.26	201.41	244.98	381.58
AP1-5	1.06	0.60	0.61	0.53	0.06	0.04	0.11
AP2-5	14.53	10.74	10.96	9.39	0.27	0.54	0.44
AP3-5	132.49	139.38	139.19	138.63	2.16	2.68	2.75
AP4-5	118.64	110.37	111.01	110.14	1.74	3.56	2.54
TGP12-1	5.12	2.28	2.29	2.00	0.03	0.04	0.05
TGP12-2	5.23	2.33	2.54	2.03	0.01	0.01	0.01
TGP12-3	5.85	2.63	2.79	2.28	0.02	0.02	0.03
TGP12-4	5.45	2.86	2.95	2.50	0.08	0.04	0.15
TGP12-5	4.14	1.98	1.99	1.65	0.01	0.01	0.01
TGP12-6	2.49	1.39	1.47	1.15	0.02	0.01	0.05
TGP12-7	2.36	1.24	1.25	1.01	0.02	0.02	0.05
TGP12-8	2.07	0.94	0.95	0.78	0.00	0.01	0.01
TGP12-9	1.78	0.86	0.87	0.70	0.01	0.01	0.02
TGP12-10	3.23	1.48	1.54	1.26	0.03	0.01	0.06
TGP12-11	2.61	1.12	1.19	0.98	0.01	0.01	0.01
TGP12-12	2.57	1.25	1.30	1.07	0.01	0.00	0.01
TGP12-13	4.18	1.80	1.78	1.48	0.01	0.00	0.04
TGP12-14	4.24	1.87	1.85	1.58	0.01	0.00	0.01
TGP12-15	3.98	1.86	1.91	1.63	0.01	0.00	0.03
TGP12-16	4.24	2.45	2.52	2.10	0.04	0.01	0.08
TGP12-17	4.62	2.82	2.97	2.41	0.04	0.02	0.11
TGP12-18	3.89	2.30	2.40	1.99	0.05	0.01	0.12
SRM614-6	1.41	0.75	0.86	0.65	0.30	0.45	0.63
SRM612-6	17.55	10.96	12.39	10.10	14.16	24.62	29.58
SRM610-6	176.06	128.20	142.80	129.41	181.07	400.00	536.63
AP1-6	0.60	0.24	0.23	0.20	0.00	0.01	0.01
AP2-6	12.87	9.51	9.79	8.36	0.18	0.63	0.32
AP3-6	110.39	110.02	109.94	111.00	1.77	3.04	2.76
AP4-6	105.53	98.31	98.41	97.53	1.54	4.06	2.76

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-1	436.72	1153.65	980.29	2123.49	273.88	1.88	181.64
SRM614-1	577.56	3693.50	3183.14	7798.60	3117.62	1395.73	4114.90
SRM612-1	2614.73	39074.14	35776.56	89643.95	148794.72	81443.10	177568.08
SRM610-1	9594.53	182174.59	165091.84	458015.19	756072.13	562468.06	1444549.60
AP1-1	513.04	4082.14	3308.14	8571.89	1006.21	339.44	1801.81
AP2-1	3975.14	76076.66	63759.08	172641.30	5136.51	4061.34	5988.79
AP3-1	26955.63	734786.69	594384.63	1835230.40	34670.32	19331.27	32126.42
AP4-1	35858.32	1034865.90	838421.75	2538250.80	42762.36	28119.72	43795.77
TGP18-1	835.08	11167.30	9244.81	23697.89	185.24	107.24	399.88
TGP18-2	761.24	9254.73	7816.52	19298.07	108.84	93.32	158.76

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-3	739.76	9157.25	7677.08	19008.79	106.40	59.00	159.00
TGP18-4	748.72	8884.17	7448.00	18604.58	304.76	242.84	384.48
TGP18-5	715.08	7602.92	6326.64	16296.01	266.12	219.96	267.64
TGP18-6	601.80	6084.55	5160.07	12804.03	74.40	63.44	74.00
TGP18-7	884.08	10990.10	9159.53	23558.01	302.00	61.80	481.68
TGP18-8	835.68	10436.14	8649.45	22067.05	125.20	68.32	156.32
TGP18-9	864.00	10426.38	8548.17	21826.44	130.80	80.32	187.76
TGP18-10	680.64	6458.48	5436.95	13549.64	144.44	140.12	228.04
TGP18-11	633.84	6463.84	5407.67	13533.00	111.08	123.64	173.00
TGP18-12	624.60	6045.99	5134.91	12312.95	100.40	189.64	177.84
SRM614-2	486.60	2724.74	2416.65	5715.79	2042.29	1104.89	2780.34
SRM612-2	2139.21	32871.11	30298.45	75449.63	127331.00	83611.03	177065.84
SRM610-2	8859.41	170718.25	155923.56	436872.56	751400.56	583768.94	1459731.40
AP1-2	354.24	1556.97	1281.41	3252.50	153.68	47.08	239.64
AP2-2	2778.42	52500.09	44037.41	117985.66	3010.38	3355.14	3398.54
AP3-2	23817.73	664671.81	539183.56	1665788.60	31372.62	19327.07	32056.70
AP4-2	34292.27	1013957.60	819673.06	2506537.30	41091.11	29207.37	46803.43
blank-2	274.44	335.08	275.96	730.88	27.60	2.80	64.96
blank ave	355.58	744.36	628.12	1427.19	150.74	2.34	123.30

blank subtraction

SRM614-1	221.98	2949.14	2555.01	6371.42	2966.88	1393.39	3991.60
SRM612-1	2259.15	38329.78	35148.44	88216.76	148643.98	81440.76	177444.78
SRM610-1	9238.95	181430.23	164463.72	456588.00	755921.39	562465.72	1444426.30
AP1-1	157.46	3337.78	2680.02	7144.70	855.46	337.10	1678.51
AP2-1	3619.56	75332.30	63130.95	171214.11	4985.77	4059.00	5865.49
AP3-1	26600.05	734042.33	593756.51	1833803.21	34519.58	19328.93	32003.12
AP4-1	35502.74	1034121.54	837793.63	2536823.61	42611.62	28117.38	43672.47
TGP18-1	479.50	10422.94	8616.69	22270.71	34.50	104.90	276.58
TGP18-2	405.66	8510.37	7188.40	17870.88	-41.90	90.98	35.46
TGP18-3	384.18	8412.89	7048.96	17581.60	-44.34	56.66	35.70
TGP18-4	393.14	8139.81	6819.88	17177.40	154.02	240.50	261.18
TGP18-5	359.50	6858.56	5698.51	14868.82	115.38	217.62	144.34
TGP18-6	246.22	5340.19	4531.95	11376.84	-76.34	61.10	-49.30
TGP18-7	528.50	10245.74	8531.41	22130.82	151.26	59.46	358.38
TGP18-8	480.10	9691.77	8021.32	20639.86	-25.54	65.98	33.02
TGP18-9	508.42	9682.01	7920.04	20399.26	-19.94	77.98	64.46
TGP18-10	325.06	5714.11	4808.83	12122.45	-6.30	137.78	104.74
TGP18-11	278.26	5719.47	4779.55	12105.81	-39.66	121.30	49.70
TGP18-12	269.02	5301.63	4506.79	10885.76	-50.34	187.30	54.54
SRM614-2	131.02	1980.37	1788.53	4288.60	1891.55	1102.55	2657.04
SRM612-2	1783.63	32126.74	29670.33	74022.44	127180.26	83608.69	176942.54
SRM610-2	8503.83	169973.89	155295.44	435445.37	751249.82	583766.60	1459608.10
AP1-2	-1.34	812.60	653.28	1825.31	2.94	44.74	116.34
AP2-2	2422.83	51755.73	43409.28	116558.47	2859.64	3352.80	3275.24
AP3-2	23462.15	663927.45	538555.44	1664361.41	31221.88	19324.73	31933.40
AP4-2	33936.69	1013213.24	819044.94	2505110.11	40940.37	29205.02	46680.13

zero correction

SRM614-1	221.98	2949.14	2555.01	6371.42	2966.88	1393.39	3991.60
SRM612-1	2259.15	38329.78	35148.44	88216.76	148643.98	81440.76	177444.78
SRM610-1	9238.95	181430.23	164463.72	456588.00	755921.39	562465.72	1444426.30
AP1-1	157.46	3337.78	2680.02	7144.70	855.46	337.10	1678.51
AP2-1	3619.56	75332.30	63130.95	171214.11	4985.77	4059.00	5865.49
AP3-1	26600.05	734042.33	593756.51	1833803.21	34519.58	19328.93	32003.12
AP4-1	35502.74	1034121.54	837793.63	2536823.61	42611.62	28117.38	43672.47
TGP18-1	479.50	10422.94	8616.69	22270.71	34.50	104.90	276.58
TGP18-2	405.66	8510.37	7188.40	17870.88	0.00	90.98	35.46
TGP18-3	384.18	8412.89	7048.96	17581.60	0.00	56.66	35.70
TGP18-4	393.14	8139.81	6819.88	17177.40	154.02	240.50	261.18
TGP18-5	359.50	6858.56	5698.51	14868.82	115.38	217.62	144.34
TGP18-6	246.22	5340.19	4531.95	11376.84	0.00	61.10	0.00
TGP18-7	528.50	10245.74	8531.41	22130.82	151.26	59.46	358.38
TGP18-8	480.10	9691.77	8021.32	20639.86	0.00	65.98	33.02
TGP18-9	508.42	9682.01	7920.04	20399.26	0.00	77.98	64.46
TGP18-10	325.06	5714.11	4808.83	12122.45	0.00	137.78	104.74
TGP18-11	278.26	5719.47	4779.55	12105.81	0.00	121.30	49.70
TGP18-12	269.02	5301.63	4506.79	10885.76	0.00	187.30	54.54
SRM614-2	131.02	1980.37	1788.53	4288.60	1891.55	1102.55	2657.04
SRM612-2	1783.63	32126.74	29670.33	74022.44	127180.26	83608.69	176942.54
SRM610-2	8503.83	169973.89	155295.44	435445.37	751249.82	583766.60	1459608.10
AP1-2	0.00	812.60	653.28	1825.31	2.94	44.74	116.34
AP2-2	2422.83	51755.73	43409.28	116558.47	2859.64	3352.80	3275.24
AP3-2	23462.15	663927.45	538555.44	1664361.41	31221.88	19324.73	31933.40
AP4-2	33936.69	1013213.24	819044.94	2505110.11	40940.37	29205.02	46680.13

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
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Appendix A. Raw trace element datasheets from laser ablation.

SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-1	0.000056	0.000745	0.000646	0.001610	0.000750	0.000352	0.001009
SRM612-1	0.000617	0.010470	0.009601	0.024096	0.040602	0.022245	0.048468
SRM610-1	0.006428	0.126233	0.114428	0.317678	0.525943	0.391344	1.004980
AP1-1	0.000007	0.000152	0.000122	0.000325	0.000039	0.000015	0.000076
AP2-1	0.000152	0.003169	0.002656	0.007203	0.000210	0.000171	0.000247
AP3-1	0.001112	0.030696	0.024829	0.076684	0.001444	0.000808	0.001338
AP4-1	0.001593	0.046405	0.037595	0.113837	0.001912	0.001262	0.001960
TGP18-1	0.000021	0.000447	0.000370	0.000956	0.000001	0.000005	0.000012
TGP18-2	0.000021	0.000437	0.000369	0.000917	0.000000	0.000005	0.000002
TGP18-3	0.000022	0.000473	0.000396	0.000988	0.000000	0.000003	0.000002
TGP18-4	0.000012	0.000258	0.000216	0.000545	0.000005	0.000008	0.000008
TGP18-5	0.000012	0.000224	0.000186	0.000486	0.000004	0.000007	0.000005
TGP18-6	0.000011	0.000228	0.000194	0.000486	0.000000	0.000003	0.000000
TGP18-7	0.000019	0.000368	0.000306	0.000794	0.000005	0.000002	0.000013
TGP18-8	0.000017	0.000346	0.000286	0.000737	0.000000	0.000002	0.000001
TGP18-9	0.000018	0.000336	0.000275	0.000709	0.000000	0.000003	0.000002
TGP18-10	0.000011	0.000192	0.000162	0.000408	0.000000	0.000005	0.000004
TGP18-11	0.000009	0.000178	0.000149	0.000377	0.000000	0.000004	0.000002
TGP18-12	0.000008	0.000162	0.000138	0.000333	0.000000	0.000006	0.000002
SRM614-2	0.000070	0.001065	0.000962	0.002306	0.001017	0.000593	0.001428
SRM612-2	0.000711	0.012813	0.011833	0.029523	0.050724	0.033346	0.070570
SRM610-2	0.007948	0.158864	0.145145	0.406983	0.702145	0.545609	1.364202
AP1-2	0.000000	0.000052	0.000041	0.000116	0.000000	0.000003	0.000007
AP2-2	0.000135	0.002874	0.002411	0.006473	0.000159	0.000186	0.000182
AP3-2	0.001248	0.035311	0.028643	0.088520	0.001661	0.001028	0.001698
AP4-2	0.001867	0.055737	0.045056	0.137806	0.002252	0.001607	0.002568

standardize signal averages AP							
AP1	0.000004	0.000102	0.000082	0.000221	0.000020	0.000009	0.000042
AP2	0.000143	0.003022	0.002533	0.006838	0.000184	0.000178	0.000214
AP3	0.001180	0.033003	0.026736	0.082602	0.001552	0.000918	0.001518
AP4	0.001730	0.051071	0.041325	0.125822	0.002082	0.001434	0.002264

linest from std sig ave							
	0.205965	0.007097	0.008768	0.002865	0.002583	0.007044	0.003575

standardize signal averages SRM							
srm614-2	0.000063	0.000905	0.000804	0.001958	0.000883	0.000472	0.001219
srm612-2	0.000664	0.011641	0.010717	0.026809	0.045663	0.027796	0.059519
srm610-2	0.007188	0.142548	0.129786	0.362330	0.614044	0.468476	1.184591

linest from std sig ave							
	0.894573	0.885633	0.881757	0.876881	0.856703	0.835231	0.848292

concentration data							
SRM614-1	0.99	0.45	0.49	0.40	0.17	0.21	0.31
SRM612-1	10.90	6.37	7.22	5.92	8.99	13.44	14.86
SRM610-1	113.55	76.83	86.05	78.06	116.50	236.43	308.14
AP1-1	0.59	0.43	0.43	0.37	0.04	0.04	0.11
AP2-1	12.51	8.97	9.29	8.23	0.22	0.48	0.35
AP3-1	91.40	86.90	86.85	87.65	1.49	2.27	1.91
AP4-1	130.90	131.38	131.50	130.12	1.97	3.55	2.80
TGP18-1	1.69	1.27	1.29	1.09	0.00	0.01	0.02
TGP18-2	1.71	1.24	1.29	1.05	0.00	0.01	0.00
TGP18-3	1.77	1.34	1.38	1.13	0.00	0.01	0.00
TGP18-4	1.02	0.73	0.76	0.62	0.01	0.02	0.01
TGP18-5	0.97	0.63	0.65	0.56	0.00	0.02	0.01
TGP18-6	0.86	0.65	0.68	0.56	0.00	0.01	0.00
TGP18-7	1.56	1.04	1.07	0.91	0.01	0.01	0.02
TGP18-8	1.41	0.98	1.00	0.84	0.00	0.01	0.00
TGP18-9	1.45	0.95	0.96	0.81	0.00	0.01	0.00

Appendix A. Raw trace element datasheets from laser ablation.

TGP18-10	0.90	0.54	0.57	0.47	0.00	0.01	0.01
TGP18-11	0.71	0.50	0.52	0.43	0.00	0.01	0.00
TGP18-12	0.68	0.46	0.48	0.38	0.00	0.02	0.00
SRM614-2	5.79	3.01	3.36	2.64	1.05	1.67	2.04
SRM612-2	12.57	7.80	8.90	7.25	11.24	20.15	21.64
SRM610-2	140.39	96.69	109.14	100.01	155.53	329.63	418.29
AP1-2	0.00	0.03	0.03	0.03	0.00	0.00	0.00
AP2-2	11.06	8.14	8.43	7.40	0.16	0.52	0.26
AP3-2	102.53	99.97	100.19	101.18	1.71	2.89	2.42
AP4-2	153.39	157.79	157.60	157.52	2.32	4.51	3.66

certified concentration

SRM614	2.40	2.40	2.40	2.40	0.74	0.83	
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-7b	33	108	99	217	14	8	4
SRM614-7b	646	3199	2841	6635	1763	841	2789
SRM612-7	2086	27977	25080	62282	101352	50120	149888
SRM610-7	7102	121132	111130	292804	526522	410560	885714
AP1-7	514	3317	2905	7228	360	57	407
AP2-7	1447	21761	18239	46878	1501	1473	1767
AP3-7	3654	70743	58513	157540	3880	4430	4899
AP4-7	8019	176290	145603	412347	9648	7117	9870
MZ3-1	352	1286	1123	2378	106	40	2449
MZ3-2	293	674	581	1476	64	24	2194
MZ3-3	299	1001	911	1997	62	30	1840
MZ3-4	444	1281	1196	2913	165	89	5812
MZ3-5	512	1932	1814	3767	320	83	4062
MZ3-6	475	2266	1982	4535	71	76	5102
MZ3-7	642	3505	3125	7066	130	99	3870
MZ3-8	683	3729	3512	7031	133	66	2942
MZ3-9	1046	6311	5827	10688	301	74	2216
srM614-8	374	1867	1652	4023	1339	648	2287
srM612-8	1358	19463	18279	44174	72521	38013	112448
srM610-8	5753	100750	92315	244159	445317	373641	756357
AP1-8	259	1227	1028	2559	66	20	68
AP2-8	994	14703	12437	31592	889	1247	1199
AP3-8	3437	67828	57105	152946	3662	4612	5020
AP4-8	6678	143328	117976	332959	7597	7512	8703
blank-8	176	143	155	381	16	5	9
blank ave	105	125	127	299	15	7	6

blank subtraction

SRM614-7b	540.90	3074.08	2713.34	6336.22	1747.95	834.56	2782.92
SRM612-7	1981.11	27851.94	24952.50	61983.17	101337.51	50113.76	149881.95
SRM610-7	6997.18	121006.54	111002.63	292504.50	526506.89	410553.02	885708.03
AP1-7	409.54	3192.00	2777.74	6928.98	345.18	50.84	401.14
AP2-7	1342.35	21635.30	18111.50	46579.08	1486.15	1466.77	1761.31
AP3-7	3548.88	70617.66	58385.81	157241.19	3864.96	4423.50	4892.65
AP4-7	7914.74	176164.58	145475.62	412048.22	9632.67	7109.96	9864.40
MZ3-1	247.10	1160.23	995.61	2078.63	91.30	33.32	2443.19
MZ3-2	187.98	548.26	453.72	1176.63	49.02	17.44	2187.79
MZ3-3	194.10	875.90	784.12	1697.79	46.94	23.28	1833.79
MZ3-4	339.34	1155.23	1068.45	2614.31	149.74	82.24	5805.61
MZ3-5	407.70	1806.47	1686.33	3468.40	305.10	76.60	4055.80
MZ3-6	370.22	2140.23	1854.81	4236.00	55.86	69.80	5095.81
MZ3-7	537.10	3380.00	2997.30	6766.94	114.90	92.80	3864.20
MZ3-8	578.10	3603.72	3384.90	6732.18	117.86	59.80	2935.44
MZ3-9	941.11	6186.09	5699.27	10389.16	286.38	67.16	2210.39
srM614-8	269.86	1741.55	1524.73	3723.76	1324.39	640.96	2280.91
srM612-8	1253.71	19337.53	18151.90	43874.47	72506.47	38006.85	112441.97
srM610-8	5648.57	100624.58	92187.32	243859.83	445301.77	373634.30	756350.40
AP1-8	154.02	1102.07	901.17	2260.39	51.34	13.12	62.18
AP2-8	889.11	14577.30	12309.87	31293.04	874.06	1240.65	1193.15
AP3-8	3332.80	67702.97	56977.88	152646.52	3647.60	4605.19	5014.13
AP4-8	6573.46	143202.75	117848.42	332660.32	7582.58	7505.68	8697.23

zero correction

SRM614-7b	540.90	3074.08	2713.34	6336.22	1747.95	834.56	2782.92
SRM612-7	1981.11	27851.94	24952.50	61983.17	101337.51	50113.76	149881.95
SRM610-7	6997.18	121006.54	111002.63	292504.50	526506.89	410553.02	885708.03

Appendix A. Raw trace element datasheets from laser ablation.

AP1-7	409.54	3192.00	2777.74	6928.98	345.18	50.84	401.14
AP2-7	1342.35	21635.30	18111.50	46579.08	1486.15	1466.77	1761.31
AP3-7	3548.88	70617.66	58385.81	157241.19	3864.96	4423.50	4892.65
AP4-7	7914.74	176164.58	145475.62	412048.22	9632.67	7109.96	9864.40
MZ3-1	247.10	1160.23	995.61	2078.63	91.30	33.32	2443.19
MZ3-2	187.98	548.26	453.72	1176.63	49.02	17.44	2187.79
MZ3-3	194.10	875.90	784.12	1697.79	46.94	23.28	1833.79
MZ3-4	339.34	1155.23	1068.45	2614.31	149.74	82.24	5805.61
MZ3-5	407.70	1806.47	1686.33	3468.40	305.10	76.60	4055.80
MZ3-6	370.22	2140.23	1854.81	4236.00	55.86	69.80	5095.81
MZ3-7	537.10	3380.00	2997.30	6766.94	114.90	92.80	3864.20
MZ3-8	578.10	3603.72	3384.90	6732.18	117.86	59.80	2935.44
MZ3-9	941.11	6186.09	5699.27	10389.16	286.38	67.16	2210.39
srm614-8	269.86	1741.55	1524.73	3723.76	1324.39	640.96	2280.91
srm612-8	1253.71	19337.53	18151.90	43874.47	72506.47	38006.85	112441.97
srm610-8	5648.57	100624.58	92187.32	243859.83	445301.77	373634.30	756350.40
AP1-8	154.02	1102.07	901.17	2260.39	51.34	13.12	62.18
AP2-8	889.11	14577.30	12309.87	31293.04	874.06	1240.65	1193.15
AP3-8	3332.80	67702.97	56977.88	152646.52	3647.60	4605.19	5014.13
AP4-8	6573.46	143202.75	117848.42	332660.32	7582.58	7505.68	8697.23

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-7b	0.000382	0.002170	0.001916	0.004473	0.001234	0.000589	0.001965
SRM612-7	0.001284	0.018048	0.016169	0.040165	0.065666	0.032473	0.097123
SRM610-7	0.009863	0.170561	0.156460	0.412290	0.742121	0.578682	1.248421
AP1-7	0.000045	0.000352	0.000307	0.000765	0.000038	0.000006	0.000044
AP2-7	0.000160	0.002580	0.002160	0.005555	0.000177	0.000175	0.000210
AP3-7	0.000425	0.008448	0.006985	0.018812	0.000462	0.000529	0.000585
AP4-7	0.001013	0.022551	0.018623	0.052748	0.001233	0.000910	0.001263
MZ3-1	0.000055	0.000256	0.000220	0.000459	0.000020	0.000007	0.000050
MZ3-2	0.000041	0.000120	0.000099	0.000257	0.000011	0.000004	0.000478
MZ3-3	0.000047	0.000213	0.000190	0.000412	0.000011	0.000006	0.000445
MZ3-4	0.000025	0.000086	0.000080	0.000195	0.000011	0.000006	0.000434
MZ3-5	0.000039	0.000174	0.000163	0.000335	0.000029	0.000007	0.000391
MZ3-6	0.000029	0.000168	0.000145	0.000332	0.000004	0.000005	0.000400
MZ3-7	0.000042	0.000267	0.000237	0.000535	0.000009	0.000007	0.000305
MZ3-8	0.000046	0.000289	0.000272	0.000541	0.000009	0.000005	0.000236
MZ3-9	0.000075	0.000495	0.000456	0.000831	0.000023	0.000005	0.000177
srm614-8	0.000266	0.001715	0.001502	0.003668	0.001305	0.000631	0.002247
srm612-8	0.001146	0.017672	0.016589	0.040096	0.066262	0.034734	0.102758
srm610-8	0.009063	0.161441	0.147904	0.391246	0.714437	0.599455	1.213480
AP1-8	0.000022	0.000156	0.000128	0.000321	0.000007	0.000002	0.000009
AP2-8	0.000126	0.002065	0.001744	0.004434	0.000124	0.000176	0.000169
AP3-8	0.000431	0.008762	0.007374	0.019755	0.000472	0.000596	0.000649
AP4-8	0.000933	0.020316	0.016719	0.047193	0.001076	0.001065	0.001234

standardize signal averages AP

AP1	0.000034	0.000254	0.000217	0.000543	0.000023	0.000004	0.000027
AP2	0.000143	0.002323	0.001952	0.004994	0.000151	0.000175	0.000190
AP3	0.000428	0.008605	0.007179	0.019283	0.000467	0.000563	0.000617
AP4	0.000973	0.021434	0.017671	0.049971	0.001154	0.000987	0.001248

linest from std sig ave

	0.402528	0.018499	0.022413	0.007962	0.005347	0.010514	0.006994
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standardize signal averages SRM

srm614-2	0.000324	0.001943	0.001709	0.004071	0.001269	0.000610	0.002106
srm612-2	0.001215	0.017860	0.016379	0.040130	0.065964	0.033604	0.099940
srm610-2	0.009463	0.166001	0.152182	0.401768	0.728279	0.589068	1.230951

Appendix A. Raw trace element datasheets from laser ablation.

linest from std sig ave							
	1.042672	1.027288	1.027654	1.025947	1.018815	0.982316	1.013915
concentration data							
SRM614-7b	13.18	3.44	3.68	3.05	0.57	0.53	1.18
SRM612-7	44.32	28.63	31.08	27.43	30.12	29.28	58.28
SRM610-7	340.48	270.60	300.75	281.52	340.35	521.80	748.82
AP1-7	7.26	2.60	2.74	2.43	0.08	0.02	0.12
AP2-7	25.71	19.04	19.31	17.64	0.38	0.73	0.59
AP3-7	68.18	62.35	62.46	59.75	0.99	2.22	1.63
AP4-7	162.70	166.43	166.51	167.54	2.63	3.82	3.52
MZ3-1	8.77	1.89	1.97	1.46	0.04	0.03	1.51
MZ3-2	6.60	0.88	0.89	0.82	0.02	0.02	1.33
MZ3-3	7.57	1.57	1.70	1.31	0.02	0.02	1.24
MZ3-4	4.07	0.64	0.71	0.62	0.02	0.03	1.21
MZ3-5	6.32	1.29	1.45	1.06	0.06	0.03	1.09
MZ3-6	4.66	1.24	1.30	1.06	0.01	0.02	1.12
MZ3-7	6.82	1.97	2.12	1.70	0.02	0.03	0.85
MZ3-8	7.46	2.14	2.43	1.72	0.02	0.02	0.66
MZ3-9	12.09	3.65	4.08	2.64	0.05	0.02	0.49
srm614-8	9.18	2.72	2.89	2.50	0.60	0.57	1.35
srm612-8	39.55	28.04	31.89	27.38	30.39	31.32	61.64
srm610-8	312.86	256.13	284.30	267.15	327.65	540.53	727.86
AP1-8	3.51	1.15	1.14	1.02	0.02	0.01	0.02
AP2-8	20.23	15.24	15.60	14.08	0.26	0.74	0.47
AP3-8	69.26	64.66	65.93	62.75	1.01	2.50	1.81
AP4-8	149.75	149.93	149.49	149.90	2.29	4.47	3.44
certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14
raw data							
	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
blank-5	1398.09	9171.61	8076.17	18943.83	441.44	8.52	173.96
SRM614-5	970.77	4490.99	3966.98	9636.93	3623.58	2075.25	5943.99
SRM612-5	3191.30	43934.49	40325.79	100820.05	166086.02	98335.39	253217.39
SRM610-5	8358.89	150598.13	138252.63	371494.94	565748.63	500211.19	1389464.30
AP1-5	1003.61	9872.14	8659.97	20341.20	1280.01	348.96	1960.45
AP2-5	4265.78	79076.60	66257.66	176900.88	5536.11	5129.43	6718.56
AP3-5	22539.45	550571.38	448951.69	1346324.60	29716.01	16601.61	25172.58
AP4-5	56526.28	1645355.10	1344899.60	3927312.00	74815.10	35413.92	64400.40
V1-1	1386.85	16024.49	13193.19	35625.84	687.48	1414.45	2602.29
V1-2	932.09	8732.57	7137.00	18718.66	470.00	875.28	1154.29
V1-3	978.09	8540.73	7062.40	18130.02	334.72	441.08	695.76
V1-4	1518.73	15498.33	13483.08	31587.22	786.16	853.64	1907.05
V1-5	969.85	9251.45	7612.08	19923.23	268.28	276.08	589.80
V1-6	965.69	9293.09	8054.89	19343.63	249.40	393.32	724.88
V1-7	2469.69	22555.41	20605.32	40037.27	1206.37	653.68	1055.21
V1-8	1059.05	10456.30	8982.85	21198.24	250.32	529.92	646.68
V1-9	1329.01	16999.74	14249.56	35222.24	324.36	1058.69	1048.05
V1-10	3418.50	21271.40	20685.84	34936.16	1746.05	2239.29	662.36
V1-11	1186.25	8448.65	7897.68	15774.93	446.92	1701.29	327.20
V1-12	1171.37	7135.44	6314.28	13041.59	470.16	644.64	251.24
V1-13	838.96	8248.73	6822.16	17258.06	223.08	777.60	815.44
V1-14	655.96	3472.22	2855.62	7322.08	250.56	300.56	305.04
V1-15	599.68	4613.03	3733.82	9365.57	168.32	324.20	612.52
SRM614-6	449.32	1468.09	1264.41	3179.30	1074.77	745.16	1823.37
SRM612-6	1985.33	28353.20	26077.59	64417.56	104125.83	72571.57	180324.58
SRM610-6	9169.25	176178.88	160416.98	441432.84	679610.38	565988.81	1585699.60
AP1-6	418.16	2244.85	1971.73	4416.19	387.96	62.92	148.84
AP2-6	2296.25	41352.87	34362.43	90536.99	2401.73	3088.34	2992.06
AP3-6	14487.24	341915.44	280945.13	836622.50	17917.58	13669.96	18507.39
AP4-6	32392.38	901898.06	731813.50	2214216.80	42939.36	23041.97	38834.30
blank-6	287.00	204.20	174.60	434.72	16.88	3.68	25.20
blank average	842.54	4687.91	4125.38	9689.28	229.16	6.10	99.58
blank subtraction							
SRM614-5	128.22	-196.92	-158.40	-52.34	3394.42	2069.15	5844.41
SRM612-5	2348.75	39246.58	36200.40	91130.77	165856.86	98329.29	253117.81
SRM610-5	7516.34	145910.22	134127.25	361805.66	565519.47	500205.09	1389364.72
AP1-5	161.06	5184.23	4534.59	10651.92	1050.85	342.86	1860.87
AP2-5	3423.24	74388.70	62132.27	167211.60	5306.95	5123.33	6618.98

Appendix A. Raw trace element datasheets from laser ablation.

AP3-5	21696.90	545883.47	444826.31	1336635.32	29486.85	16595.51	25073.00
AP4-5	55683.73	1640667.19	1340774.22	3917622.72	74585.94	35407.82	64300.82
V1-1	544.30	11336.58	9067.81	25936.56	458.32	1408.35	2502.71
V1-2	89.54	4044.66	3011.62	9029.39	240.84	869.18	1054.71
V1-3	135.54	3852.82	2937.02	8440.75	105.56	434.98	596.18
V1-4	676.18	10810.42	9357.69	21897.94	557.00	847.54	1807.47
V1-5	127.30	4563.55	3486.70	10233.96	39.12	269.98	490.22
V1-6	123.14	4605.19	3929.50	9654.35	20.24	387.22	625.30
V1-7	1627.15	17867.50	16479.93	30347.99	977.21	647.58	955.63
V1-8	216.50	5768.39	4857.47	11508.96	21.16	523.82	547.10
V1-9	486.46	12311.83	10124.18	25532.96	95.20	1052.59	948.47
V1-10	2575.95	16583.49	16560.45	25246.88	1516.89	2233.19	562.78
V1-11	343.70	3760.74	3772.30	6085.65	217.76	1695.19	227.62
V1-12	328.82	2447.53	2188.89	3352.32	241.00	638.54	151.66
V1-13	-3.58	3560.82	2696.77	7568.78	-6.08	771.50	715.86
V1-14	-186.58	-1215.69	-1269.77	-2367.19	21.40	294.46	205.46
V1-15	-242.86	-74.88	-391.56	-323.70	-60.84	318.10	512.94
SRM614-6	-393.22	-3219.82	-2860.98	-6509.98	845.60	739.06	1723.79
SRM612-6	1142.79	23665.29	21952.20	54728.29	103896.67	72565.47	180225.00
SRM610-6	8326.71	171490.97	156291.60	431743.56	679381.22	565982.71	1585600.02
AP1-6	-424.38	-2443.05	-2153.65	-5273.09	158.80	56.82	49.26
AP2-6	1453.71	36664.96	30237.05	80847.72	2172.57	3082.24	2892.48
AP3-6	13644.70	337227.53	276819.75	826933.22	17688.42	13663.86	18407.80
AP4-6	31549.84	897210.15	727688.12	2204527.52	42710.20	23035.87	38734.72

zero correction

SRM614-5	128.22	0.00	0.00	0.00	3394.42	2069.15	5844.41
SRM612-5	2348.75	39246.58	36200.40	91130.77	165856.86	98329.29	253117.81
SRM610-5	7516.34	145910.22	134127.25	361805.66	565519.47	500205.09	1389364.72
AP1-5	161.06	5184.23	4534.59	10651.92	1050.85	342.86	1860.87
AP2-5	3423.24	74388.70	62132.27	167211.60	5306.95	5123.33	6618.98
AP3-5	21696.90	545883.47	444826.31	1336635.32	29486.85	16595.51	25073.00
AP4-5	55683.73	1640667.19	1340774.22	3917622.72	74585.94	35407.82	64300.82
V1-1	544.30	11336.58	9067.81	25936.56	458.32	1408.35	2502.71
V1-2	89.54	4044.66	3011.62	9029.39	240.84	869.18	1054.71
V1-3	135.54	3852.82	2937.02	8440.75	105.56	434.98	596.18
V1-4	676.18	10810.42	9357.69	21897.94	557.00	847.54	1807.47
V1-5	127.30	4563.55	3486.70	10233.96	39.12	269.98	490.22
V1-6	123.14	4605.19	3929.50	9654.35	20.24	387.22	625.30
V1-7	1627.15	17867.50	16479.93	30347.99	977.21	647.58	955.63
V1-8	216.50	5768.39	4857.47	11508.96	21.16	523.82	547.10
V1-9	486.46	12311.83	10124.18	25532.96	95.20	1052.59	948.47
V1-10	2575.95	16583.49	16560.45	25246.88	1516.89	2233.19	562.78
V1-11	343.70	3760.74	3772.30	6085.65	217.76	1695.19	227.62
V1-12	328.82	2447.53	2188.89	3352.32	241.00	638.54	151.66
V1-13	0.00	3560.82	2696.77	7568.78	0.00	771.50	715.86
V1-14	0.00	0.00	0.00	0.00	21.40	294.46	205.46
V1-15	0.00	0.00	0.00	0.00	0.00	318.10	512.94
SRM614-6	0.00	0.00	0.00	0.00	845.60	739.06	1723.79
SRM612-6	1142.79	23665.29	21952.20	54728.29	103896.67	72565.47	180225.00
SRM610-6	8326.71	171490.97	156291.60	431743.56	679381.22	565982.71	1585600.02
AP1-6	0.00	0.00	0.00	0.00	158.80	56.82	49.26
AP2-6	1453.71	36664.96	30237.05	80847.72	2172.57	3082.24	2892.48
AP3-6	13644.70	337227.53	276819.75	826933.22	17688.42	13663.86	18407.80
AP4-6	31549.84	897210.15	727688.12	2204527.52	42710.20	23035.87	38734.72

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration

SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal

SRM614-5	0.000032	0.000000	0.000000	0.000000	0.000855	0.000521	0.001471
SRM612-5	0.000672	0.011222	0.010351	0.026058	0.047424	0.028116	0.072376
SRM610-5	0.006911	0.134151	0.123317	0.332647	0.519942	0.459892	1.277391

Appendix A. Raw trace element datasheets from laser ablation.

AP1-5	0.000010	0.000333	0.000291	0.000685	0.000068	0.000022	0.000120
AP2-5	0.000156	0.003383	0.002826	0.007605	0.000241	0.000233	0.000301
AP3-5	0.001120	0.028175	0.022959	0.068990	0.001522	0.000857	0.001294
AP4-5	0.002842	0.083742	0.068435	0.199960	0.003807	0.001807	0.003282
V1-1	0.000059	0.001219	0.000975	0.002790	0.000049	0.000151	0.000269
V1-2	0.000008	0.000359	0.000267	0.000801	0.000021	0.000077	0.000094
V1-3	0.000016	0.000454	0.000346	0.000995	0.000012	0.000051	0.000070
V1-4	0.000075	0.001206	0.001044	0.002442	0.000062	0.000095	0.000202
V1-5	0.000013	0.000473	0.000362	0.001061	0.000004	0.000028	0.000051
V1-6	0.000014	0.000524	0.000447	0.001098	0.000002	0.000044	0.000071
V1-7	0.000192	0.002106	0.001942	0.003577	0.000115	0.000076	0.000113
V1-8	0.000025	0.000660	0.000556	0.001317	0.000002	0.000060	0.000063
V1-9	0.000043	0.001088	0.000894	0.002256	0.000008	0.000093	0.000084
V1-10	0.000377	0.002429	0.002426	0.003698	0.000222	0.000327	0.000082
V1-11	0.000048	0.000524	0.000525	0.000848	0.000030	0.000236	0.000032
V1-12	0.000049	0.000368	0.000329	0.000504	0.000036	0.000096	0.000023
V1-13	0.000000	0.000568	0.000430	0.001208	0.000000	0.000123	0.000114
V1-14	0.000000	0.000000	0.000000	0.000000	0.000004	0.000050	0.000035
V1-15	0.000000	0.000000	0.000000	0.000000	0.000000	0.000049	0.000079
SRM614-6	0.000000	0.000000	0.000000	0.000000	0.000733	0.000640	0.001493
SRM612-6	0.000502	0.010396	0.009643	0.024041	0.045639	0.031876	0.079169
SRM610-6	0.007559	0.155675	0.141878	0.391926	0.616725	0.513785	1.439368
AP1-6	0.000000	0.000000	0.000000	0.000000	0.000015	0.000006	0.000005
AP2-6	0.000087	0.002188	0.001804	0.004824	0.000130	0.000184	0.000173
AP3-6	0.000767	0.018946	0.015553	0.046460	0.000994	0.000768	0.001034
AP4-6	0.002318	0.065920	0.053465	0.161971	0.003138	0.001692	0.002846

standardize signal averages AP

AP1	0.000005	0.000167	0.000146	0.000342	0.000041	0.000014	0.000062
AP2	0.000121	0.002786	0.002315	0.006215	0.000186	0.000208	0.000237
AP3	0.000943	0.023561	0.019256	0.057725	0.001258	0.000812	0.001164
AP4	0.002580	0.074831	0.060950	0.180966	0.003472	0.001750	0.003064

linest from std sig ave

0.154544	0.005357	0.006577	0.002214	0.001776	0.006170	0.002894
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standardize signal averages SRM

srm614-2	0.000016	0.000000	0.000000	0.000000	0.000794	0.000581	0.001482
srm612-2	0.000587	0.010809	0.009997	0.025049	0.046532	0.029996	0.075772
srm610-2	0.007235	0.144913	0.132598	0.362286	0.568334	0.486838	1.358380

linest from std sig ave

0.666822	0.033304	0.036395	0.013325	0.007340	0.010806	0.003929
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concentration data

SRM614-5	0.43	0.00	0.00	0.00	0.13	0.28	0.37
SRM612-5	8.90	5.16	5.84	4.95	7.22	14.88	17.96
SRM610-5	91.59	61.63	69.56	63.15	79.21	243.34	317.03
AP1-5	0.64	0.71	0.76	0.60	0.05	0.05	0.14
AP2-5	9.60	7.23	7.41	6.72	0.17	0.57	0.35
AP3-5	69.04	60.21	60.24	60.93	1.08	2.11	1.49
AP4-5	175.23	178.96	179.55	176.59	2.70	4.45	3.79
V1-1	3.61	2.61	2.56	2.46	0.03	0.37	0.31
V1-2	0.49	0.77	0.70	0.71	0.02	0.19	0.11
V1-3	0.98	0.97	0.91	0.88	0.01	0.13	0.08
V1-4	4.65	2.58	2.74	2.16	0.04	0.23	0.23
V1-5	0.81	1.01	0.95	0.94	0.00	0.07	0.06
V1-6	0.86	1.12	1.17	0.97	0.00	0.11	0.08
V1-7	11.82	4.50	5.10	3.16	0.08	0.19	0.13
V1-8	1.53	1.41	1.46	1.16	0.00	0.15	0.07
V1-9	2.65	2.32	2.35	1.99	0.01	0.23	0.10
V1-10	23.27	5.19	6.36	3.27	0.16	0.81	0.10
V1-11	2.95	1.12	1.38	0.75	0.02	0.58	0.04
V1-12	3.05	0.79	0.86	0.45	0.03	0.24	0.03
V1-13	0.00	1.21	1.13	1.07	0.00	0.30	0.13
V1-14	0.00	0.00	0.00	0.00	0.00	0.12	0.04
V1-15	0.00	0.00	0.00	0.00	0.00	0.12	0.09
SRM614-6	0.00	0.00	0.00	0.00	0.11	0.34	0.37
SRM612-6	6.65	4.78	5.44	4.56	6.95	16.87	19.65
SRM610-6	100.19	71.52	80.02	74.41	93.96	271.85	357.24
AP1-6	0.00	0.00	0.00	0.00	0.01	0.01	0.01
AP2-6	5.35	4.67	4.73	4.26	0.09	0.45	0.20
AP3-6	47.26	40.49	40.80	41.03	0.70	1.89	1.19
AP4-6	142.91	140.87	140.27	143.04	2.22	4.17	3.29

certified concentration

SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15

Appendix A. Raw trace element datasheets from laser ablation.

SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

	Pb204	Pb206	Pb207	Pb208	Bi	Th	U
raw data							
blank-3	705.80	982.77	812.12	2086.81	45.72	3.28	38.08
SRM614-3	1077.65	5951.15	5082.83	12788.51	2848.42	1380.69	4172.26
SRM612-3	2741.82	36318.97	32921.82	82150.14	134618.80	79192.37	184138.80
SRM610-3	7990.04	141226.23	129249.65	347145.59	515916.78	488462.06	1401907.60
AP1-3	758.92	6372.56	4987.11	13023.75	388.12	196.28	810.36
AP2-3	3965.74	70919.12	58850.17	158197.20	3988.54	3619.90	4065.54
AP3-3	19632.27	475002.16	387510.41	1168275.50	23373.33	16010.77	22990.49
AP4-3	33833.43	912786.88	743435.19	2238793.30	42553.00	26145.47	39198.46
V3-1	664.72	2634.65	2226.49	5621.79	195.88	240.44	951.65
V3-2	554.80	1172.89	943.81	2456.49	82.32	53.20	222.16
V3-3	518.60	1511.65	1177.97	3169.30	93.32	351.92	250.36
V3-4	666.16	3289.90	2695.22	7047.08	318.00	206.44	1143.21
V3-5	593.32	2368.69	1885.53	4920.63	95.44	112.76	369.24
V3-6	643.04	3349.54	2721.34	6947.96	135.36	87.08	403.56
V3-7	1237.05	14771.72	12218.39	31023.01	453.24	241.04	1690.33
V3-8	1165.29	14741.48	12323.87	30953.49	289.88	105.40	588.80
V3-9	1599.97	19239.67	16475.73	38868.10	390.68	137.44	396.72
SRM614-4	567.20	2551.65	2327.21	5523.63	1842.09	1284.97	3129.58
SRM612-4	1967.05	27287.11	24917.02	62595.31	101864.57	66919.58	153934.83
SRM610-4	7323.20	134302.03	122900.41	333048.59	471525.09	435349.50	1322926.80
AP1-4	395.24	2210.49	1889.01	4680.91	72.56	98.88	136.08
AP2-4	2265.65	40694.23	34238.35	89519.46	2519.69	2468.45	2522.33
AP3-4	16036.65	394707.78	322353.75	974131.19	19162.75	15267.17	21383.24
AP4-4	22415.93	582997.38	472686.09	1441891.00	28042.44	22356.65	28749.20
blank-4	325.00	397.08	335.64	912.53	26.24	3.60	170.12
blank average	515.40	689.92	573.88	1499.67	35.98	3.44	104.10

blank subtraction							
SRM614-3	562.24	5261.23	4508.95	11288.84	2812.44	1377.25	4068.16
SRM612-3	2226.41	35629.04	32347.94	80650.47	134582.82	79188.93	184034.70
SRM610-3	7474.64	140536.31	128675.77	345645.92	515880.80	488458.62	1401803.50
AP1-3	243.52	5682.63	4413.22	11524.08	352.14	192.84	706.26
AP2-3	3450.34	70229.19	58276.29	156697.53	3952.56	3616.46	3961.44
AP3-3	19116.87	474312.24	386936.53	1166775.83	23337.35	16007.33	22886.39
AP4-3	33318.03	912096.96	742861.31	2237293.63	42517.02	26142.03	39094.36
V3-1	149.32	1944.73	1652.61	4122.12	159.90	237.00	847.54
V3-2	39.40	482.96	369.92	956.83	46.34	49.76	118.06
V3-3	3.20	821.72	604.08	1669.63	57.34	348.48	146.26
V3-4	150.76	2599.97	2121.33	5547.41	282.02	203.00	1039.11
V3-5	77.92	1678.77	1311.65	3420.96	59.46	109.32	265.14
V3-6	127.64	2659.61	2147.45	5448.29	99.38	83.64	299.46
V3-7	721.64	14081.80	11644.51	29523.35	417.26	237.60	1586.23
V3-8	649.88	14051.56	11749.99	29453.83	253.90	101.96	484.70
V3-9	1084.57	18549.74	15901.85	37368.43	354.70	134.00	292.62
SRM614-4	51.80	1861.73	1753.33	4023.96	1806.11	1281.53	3025.48
SRM612-4	1451.65	26597.19	24343.14	61095.64	101828.59	66916.14	153830.73
SRM610-4	6807.80	133612.11	122326.53	331548.92	471489.11	435346.06	1322822.70
AP1-4	-120.16	1520.57	1315.13	3181.24	36.58	95.44	31.98
AP2-4	1750.25	40004.31	33664.47	88019.79	2483.71	2465.01	2418.23
AP3-4	15521.25	394017.86	321779.87	972631.52	19126.77	15263.73	21279.14
AP4-4	21900.52	582307.46	472112.21	1440391.33	28006.46	22353.21	28645.10

zero correction							
SRM614-3	562.24	5261.23	4508.95	11288.84	2812.44	1377.25	4068.16
SRM612-3	2226.41	35629.04	32347.94	80650.47	134582.82	79188.93	184034.70
SRM610-3	7474.64	140536.31	128675.77	345645.92	515880.80	488458.62	1401803.50
AP1-3	243.52	5682.63	4413.22	11524.08	352.14	192.84	706.26
AP2-3	3450.34	70229.19	58276.29	156697.53	3952.56	3616.46	3961.44
AP3-3	19116.87	474312.24	386936.53	1166775.83	23337.35	16007.33	22886.39
AP4-3	33318.03	912096.96	742861.31	2237293.63	42517.02	26142.03	39094.36
V3-1	149.32	1944.73	1652.61	4122.12	159.90	237.00	847.54
V3-2	39.40	482.96	369.92	956.83	46.34	49.76	118.06
V3-3	3.20	821.72	604.08	1669.63	57.34	348.48	146.26
V3-4	150.76	2599.97	2121.33	5547.41	282.02	203.00	1039.11
V3-5	77.92	1678.77	1311.65	3420.96	59.46	109.32	265.14
V3-6	127.64	2659.61	2147.45	5448.29	99.38	83.64	299.46
V3-7	721.64	14081.80	11644.51	29523.35	417.26	237.60	1586.23
V3-8	649.88	14051.56	11749.99	29453.83	253.90	101.96	484.70
V3-9	1084.57	18549.74	15901.85	37368.43	354.70	134.00	292.62
SRM614-4	51.80	1861.73	1753.33	4023.96	1806.11	1281.53	3025.48

Appendix A. Raw trace element datasheets from laser ablation.

SRM612-4	1451.65	26597.19	24343.14	61095.64	101828.59	66916.14	153830.73
SRM610-4	6807.80	133612.11	122326.53	331548.92	471489.11	435346.06	1322822.70
AP1-4	0.00	1520.57	1315.13	3181.24	36.58	95.44	31.98
AP2-4	1750.25	40004.31	33664.47	88019.79	2483.71	2465.01	2418.23
AP3-4	15521.25	394017.86	321779.87	972631.52	19126.77	15263.73	21279.14
AP4-4	21900.52	582307.46	472112.21	1440391.33	28006.46	22353.21	28645.10

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

standardized concentration							
SRM614	0.000028	0.000028	0.000028	0.000028	0.000000	0.000009	0.000010
SRM612	0.000454	0.000454	0.000454	0.000454	0.000348	0.000434	0.000433
SRM610	0.004819	0.004819	0.004819	0.004819	0.004171	0.005254	0.005330
STD AP1	0.000003	0.000003	0.000003	0.000003	0.000001	0.000000	0.000002
STD AP2	0.000071	0.000071	0.000071	0.000071	0.000002	0.000002	0.000003
STD AP3	0.000218	0.000218	0.000218	0.000218	0.000004	0.000006	0.000005
STD AP4	0.000370	0.000370	0.000370	0.000370	0.000006	0.000010	0.000008

standardized signal							
SRM614-3	0.000205	0.001921	0.001646	0.004121	0.001027	0.000503	0.001485
SRM612-3	0.000846	0.013538	0.012291	0.030645	0.051138	0.030090	0.069928
SRM610-3	0.007613	0.143141	0.131060	0.352052	0.525441	0.497511	1.427782
AP1-3	0.000010	0.000242	0.000188	0.000491	0.000015	0.000008	0.000030
AP2-3	0.000189	0.003844	0.003190	0.008578	0.000216	0.000198	0.000217
AP3-3	0.000883	0.021901	0.017867	0.053875	0.001078	0.000739	0.001057
AP4-3	0.001789	0.048963	0.039878	0.120101	0.002282	0.001403	0.002099
V3-1	0.000024	0.000318	0.000270	0.000674	0.000026	0.000039	0.000139
V3-2	0.000006	0.000068	0.000052	0.000135	0.000007	0.000007	0.000017
V3-3	0.000000	0.000103	0.000076	0.000209	0.000007	0.000044	0.000018
V3-4	0.000016	0.000276	0.000225	0.000589	0.000030	0.000022	0.000110
V3-5	0.000009	0.000185	0.000145	0.000377	0.000007	0.000012	0.000029
V3-6	0.000011	0.000223	0.000180	0.000456	0.000008	0.000007	0.000025
V3-7	0.000033	0.000639	0.000529	0.001341	0.000019	0.000011	0.000072
V3-8	0.000027	0.000591	0.000494	0.001239	0.000011	0.000004	0.000020
V3-9	0.000043	0.000741	0.000636	0.001493	0.000014	0.000005	0.000012
SRM614-4	0.000027	0.000987	0.000929	0.002133	0.000957	0.000679	0.001604
SRM612-4	0.000745	0.013655	0.012498	0.031366	0.052278	0.034355	0.078976
SRM610-4	0.008135	0.159653	0.146168	0.396167	0.563382	0.520194	1.580639
AP1-4	0.000000	0.000083	0.000072	0.000174	0.000002	0.000005	0.000002
AP2-4	0.000130	0.002980	0.002508	0.006556	0.000185	0.000184	0.000180
AP3-4	0.000833	0.021138	0.017262	0.052179	0.001026	0.000819	0.001142
AP4-4	0.001376	0.036582	0.029659	0.090489	0.001759	0.001404	0.001800

standardize signal averages AP							
AP1	0.000005	0.000163	0.000130	0.000332	0.000009	0.000007	0.000016
AP2	0.000160	0.003412	0.002849	0.007567	0.000201	0.000191	0.000198
AP3	0.000858	0.021519	0.017565	0.053027	0.001052	0.000779	0.001099
AP4	0.001582	0.042772	0.034769	0.105295	0.002021	0.001404	0.001949

linest from std sig ave							
	0.240040	0.009008	0.011074	0.003658	0.002948	0.007458	0.004342

standardize signal averages SRM							
srm614-2	0.000116	0.001454	0.001288	0.003127	0.000992	0.000591	0.001544
srm612-2	0.000796	0.013596	0.012395	0.031006	0.051708	0.032222	0.074452
srm610-2	0.007874	0.151397	0.138614	0.374109	0.544411	0.508853	1.504210

linest from std sig ave							
	0.611539	0.031842	0.034780	0.012893	0.007653	0.010338	0.003549

concentration data							
SRM614-3	4.23	1.48	1.56	1.29	0.26	0.32	0.55
SRM612-3	17.42	10.46	11.67	9.61	12.93	19.25	26.04
SRM610-3	156.73	110.58	124.47	110.44	132.85	318.23	531.65
AP1-3	0.99	0.87	0.83	0.72	0.02	0.02	0.05
AP2-3	18.09	13.82	14.09	12.52	0.25	0.59	0.38
AP3-3	84.53	78.70	78.93	78.61	1.27	2.20	1.83
AP4-3	171.27	175.95	176.17	175.25	2.68	4.18	3.63
V3-1	2.34	1.14	1.19	0.98	0.03	0.12	0.24
V3-2	0.53	0.24	0.23	0.20	0.01	0.02	0.03
V3-3	0.04	0.37	0.33	0.31	0.01	0.13	0.03

Appendix A. Raw trace element datasheets from laser ablation.

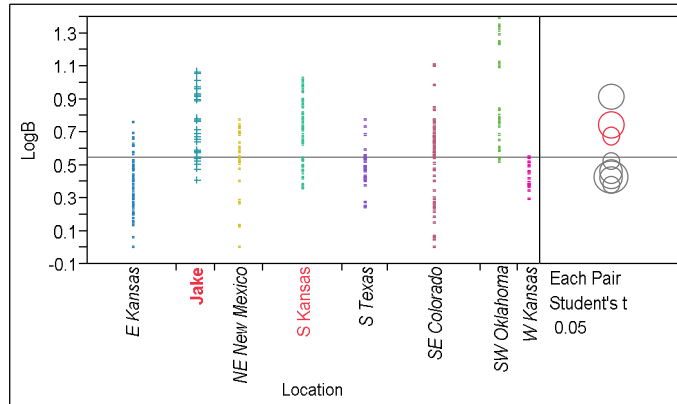
V3-4	1.53	0.99	0.99	0.86	0.04	0.06	0.19
V3-5	0.82	0.67	0.64	0.55	0.01	0.04	0.05
V3-6	1.02	0.80	0.79	0.67	0.01	0.02	0.04
V3-7	3.14	2.30	2.34	1.96	0.02	0.03	0.12
V3-8	2.62	2.12	2.18	1.81	0.01	0.01	0.04
V3-9	4.15	2.66	2.81	2.18	0.02	0.02	0.02
SRM614-4	0.57	0.76	0.88	0.67	0.24	0.43	0.60
SRM612-4	15.34	10.55	11.87	9.84	13.22	21.97	29.41
SRM610-4	167.46	123.34	138.82	124.28	142.44	332.74	588.56
AP1-4	0.00	0.30	0.32	0.25	0.00	0.02	0.00
AP2-4	12.48	10.71	11.08	9.57	0.22	0.55	0.31
AP3-4	79.74	75.96	76.26	76.14	1.21	2.44	1.98
AP4-4	131.75	131.46	131.03	132.04	2.07	4.18	3.12

certified concentration							
SRM614	2.40	2.40	2.40	2.40		0.74	0.83
SRM612	38.96	38.96	38.96	38.96	29.84	37.23	37.15
SRM610	413.30	413.30	413.30	413.30	357.70	450.60	457.10
STD AP1	1.30	1.30	1.30	1.30	0.34	0.16	0.87
STD AP2	28.21	28.21	28.21	28.21	0.72	0.95	1.36
STD AP3	87.10	87.10	87.10	87.10	1.41	2.52	2.13
STD AP4	147.51	147.51	147.51	147.51	2.24	4.01	3.14

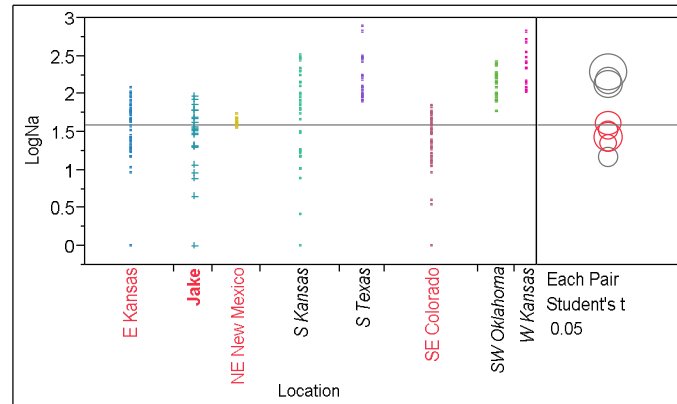
Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

JAKE BLUFF T-TESTS Oneway Analysis of LogB By Location

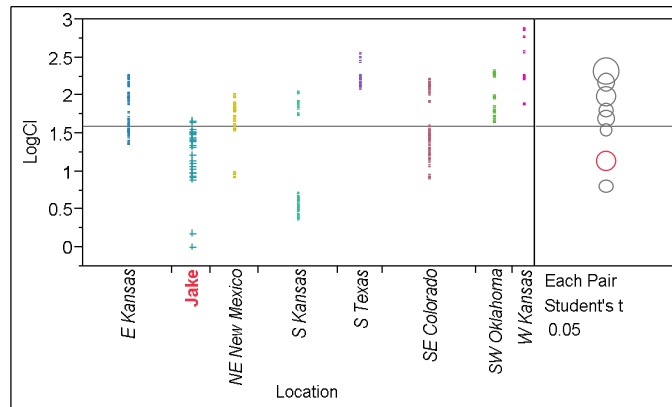


Oneway Analysis of LogNa By Location

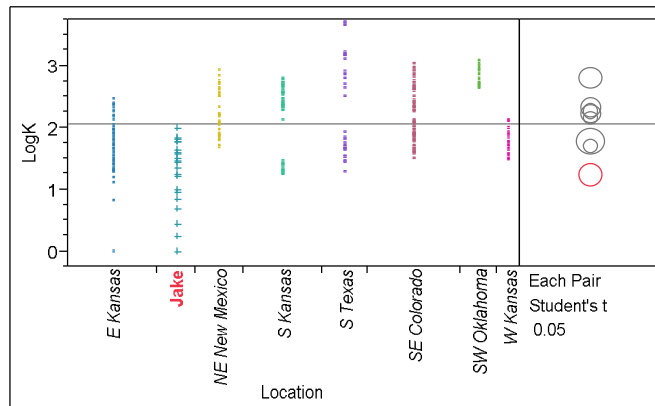


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogCI By Location

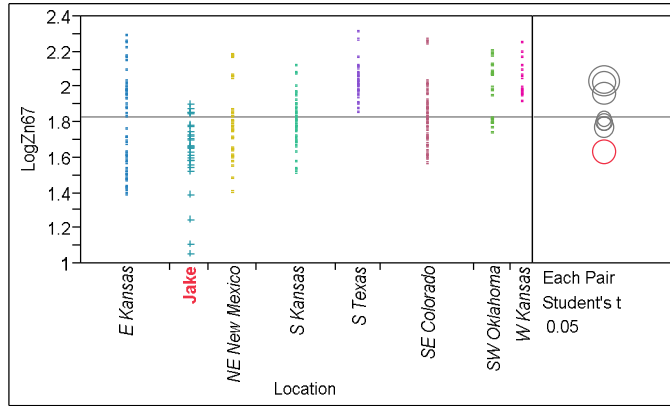


Oneway Analysis of LogK By Location

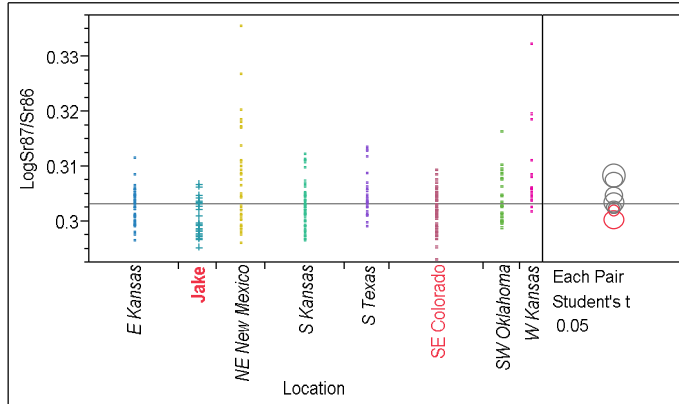


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogZn67 By Location

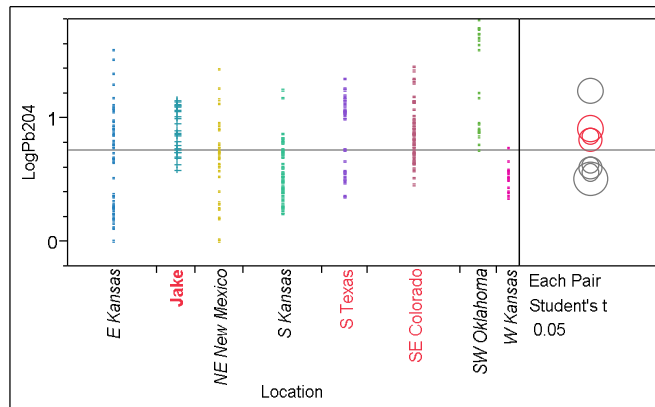


Oneway Analysis of LogSr87/Sr86 By Location

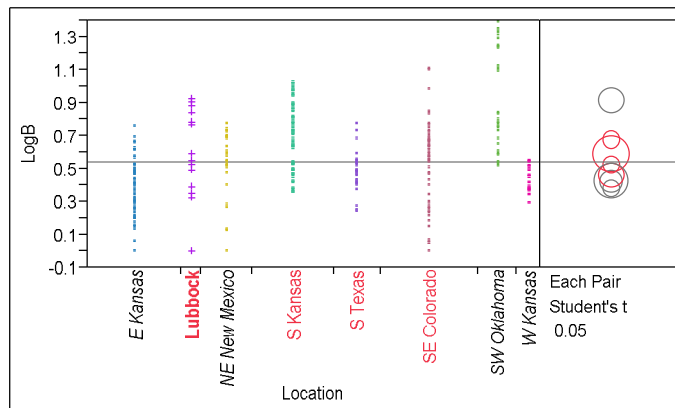


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogPb204 By Location

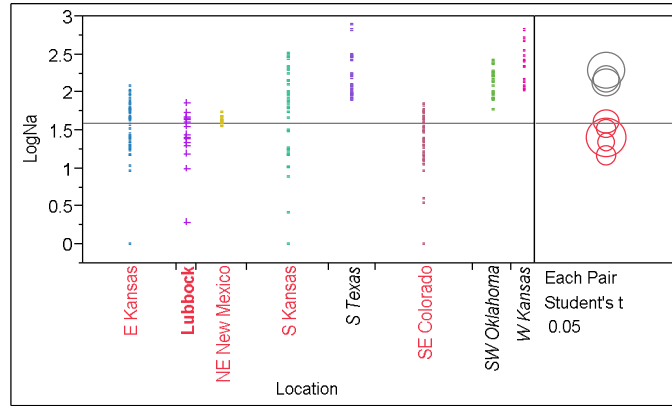


Lubbock Lake T-TEST Oneway Analysis of LogB By Location

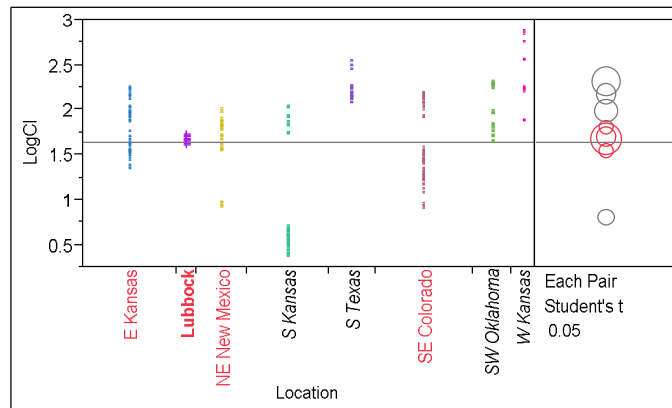


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogNa By Location

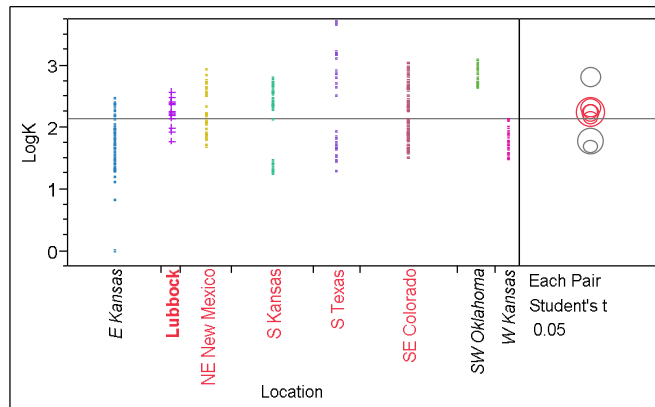


Oneway Analysis of LogCl By Location

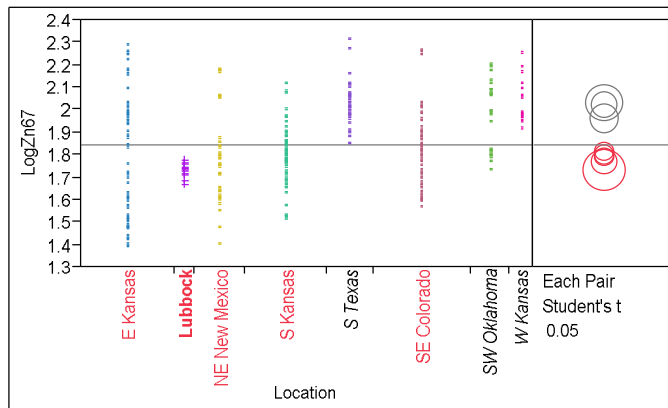


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogK By Location

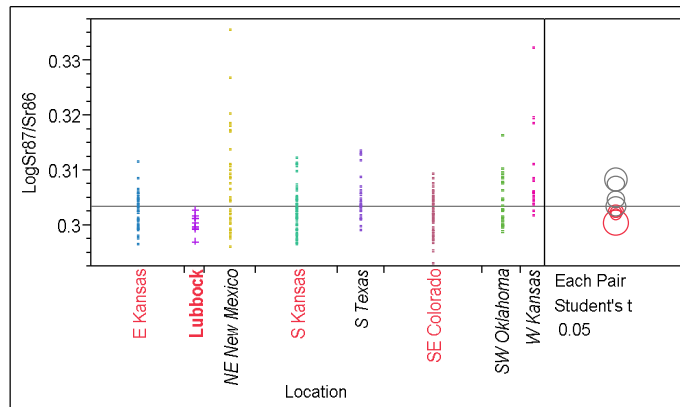


Oneway Analysis of LogZn67 By Location

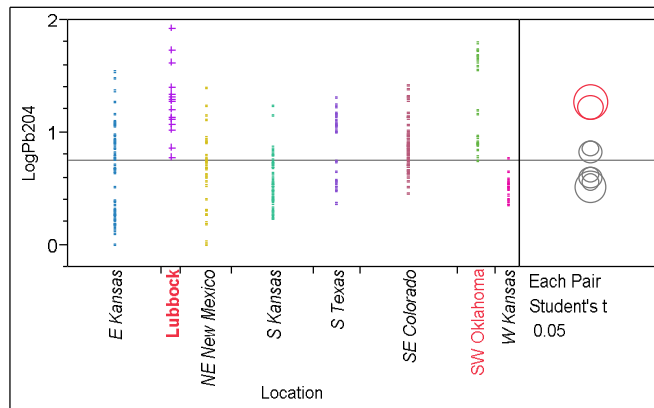


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogSr87/Sr86 By Location

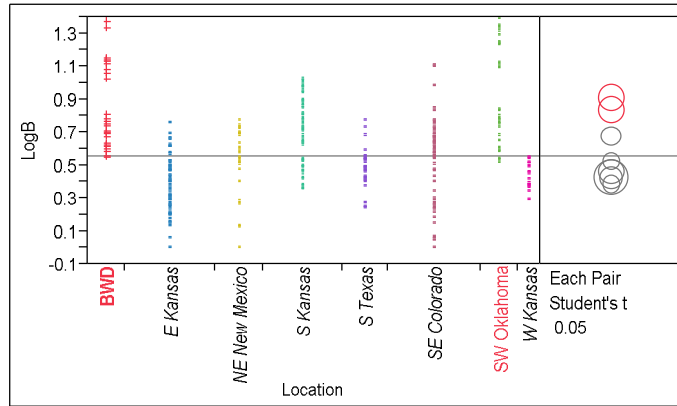


Oneway Analysis of LogPb204 By Location

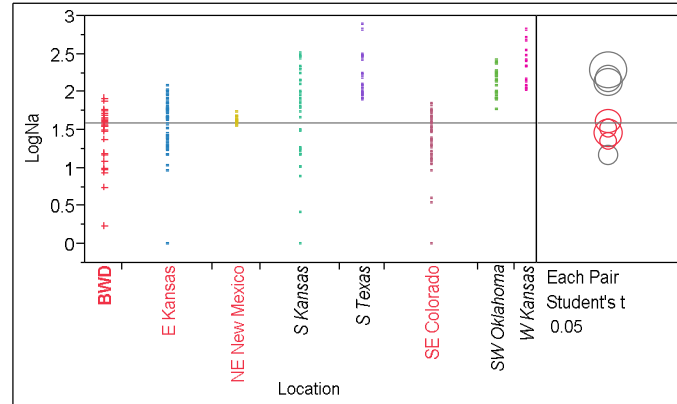


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

BWD T-TESTS Oneway Analysis of LogB By Location

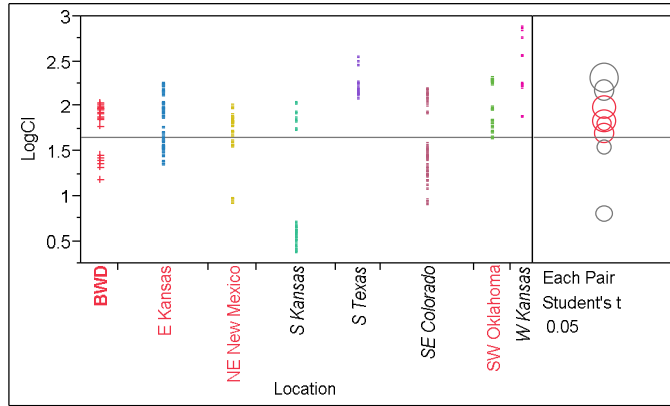


Oneway Analysis of LogNa By Location

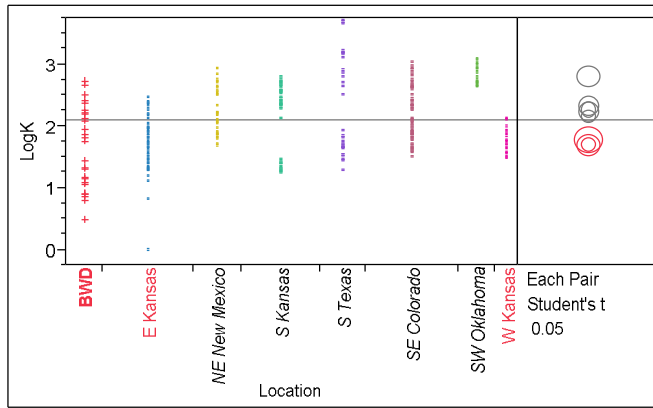


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogCI By Location

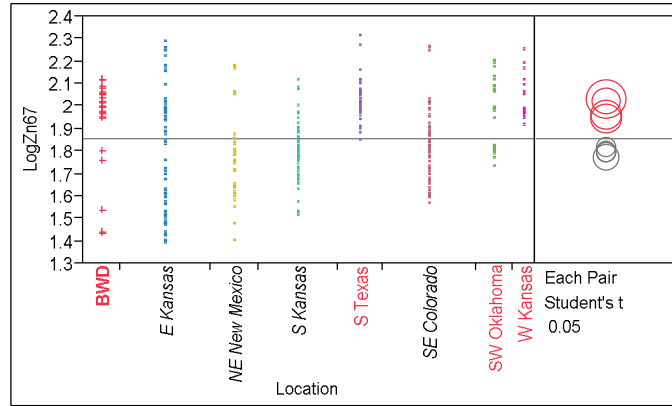


Oneway Analysis of LogK By Location

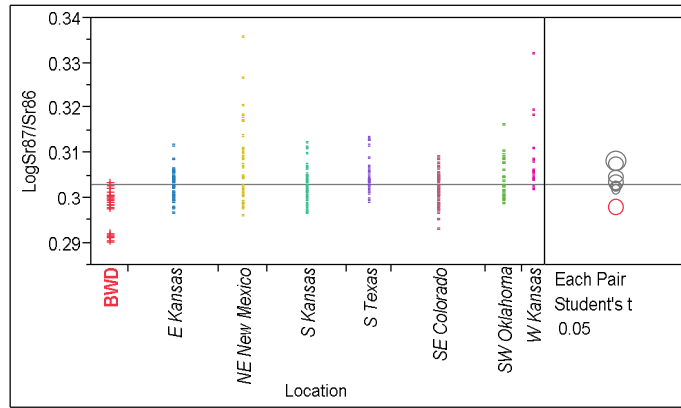


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogZn67 By Location

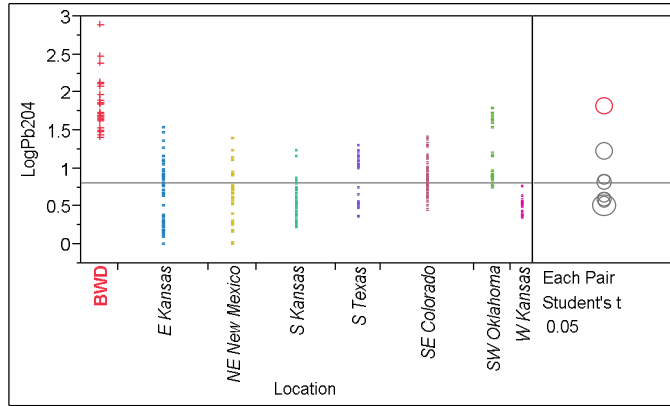


Oneway Analysis of LogSr87/Sr86 By Location

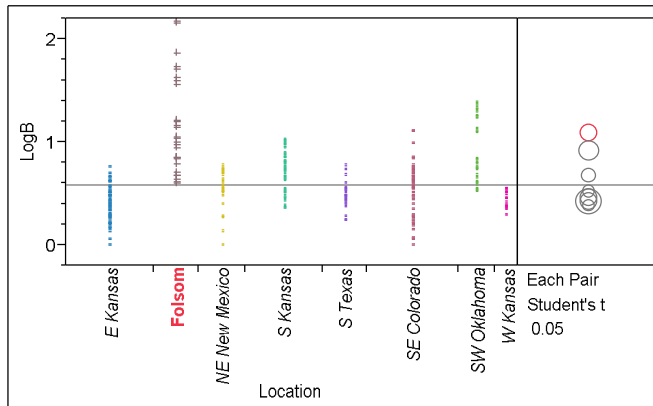


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogPb204 By Location

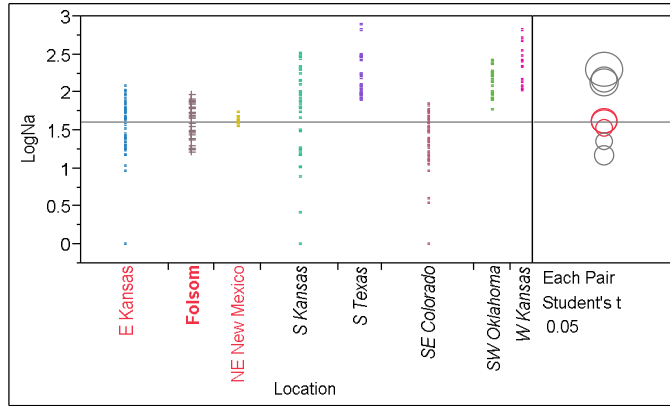


**FOLSOM T-TESTS
Oneway Analysis of LogB By Location**

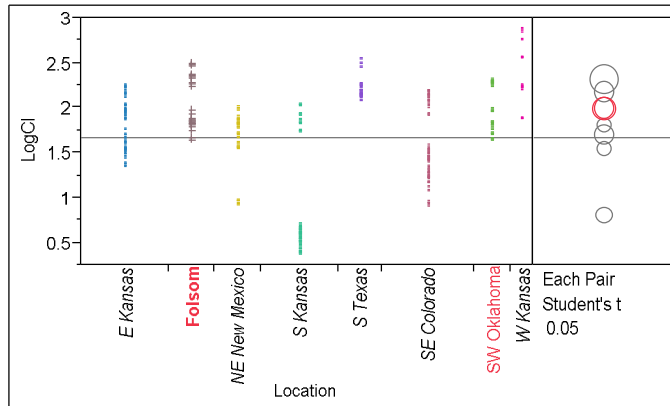


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogNa By Location

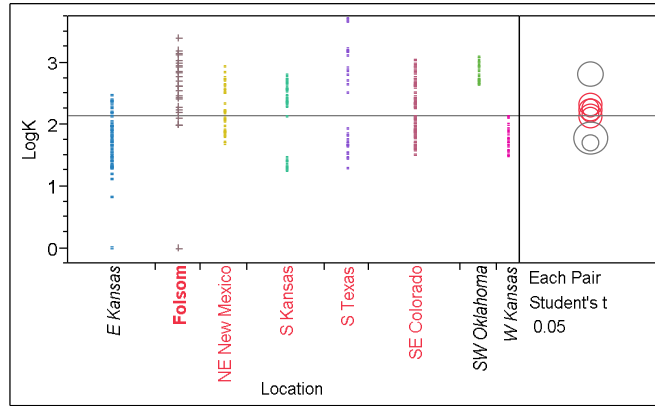


Oneway Analysis of LogCl By Location

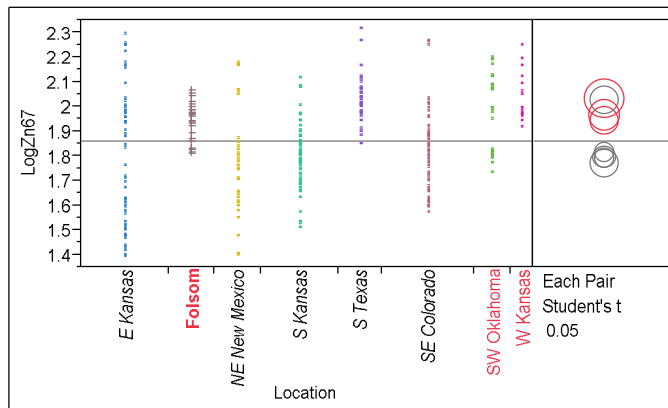


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogK By Location

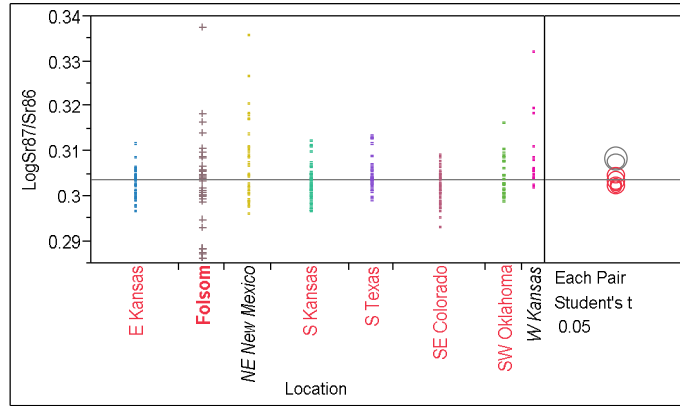


Oneway Analysis of LogZn67 By Location

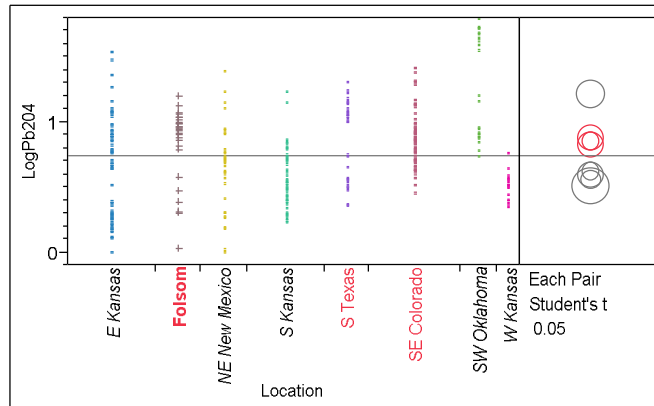


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogSr87/Sr86 By Location

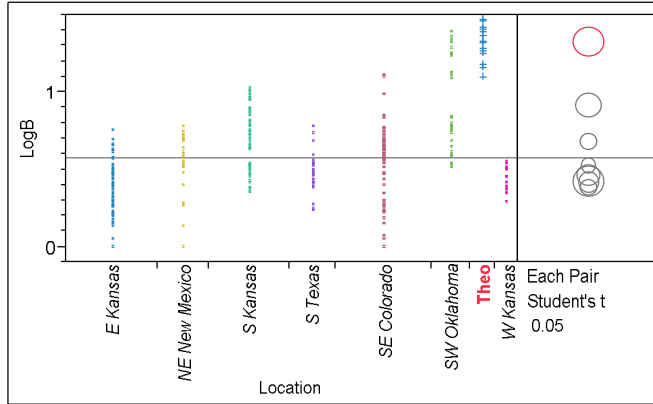


Oneway Analysis of LogPb204 By Location

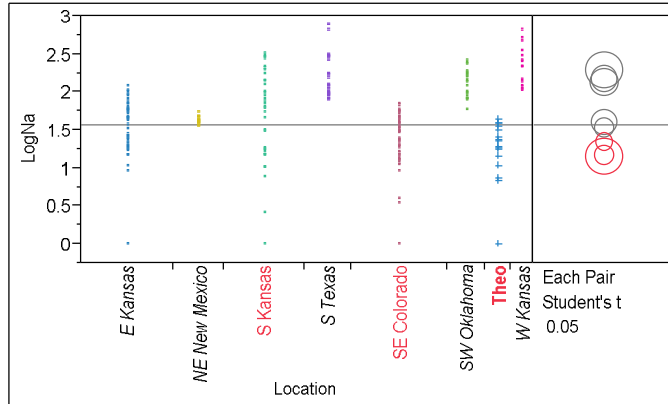


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

THEO T-TESTS
Oneway Analysis of LogB By Location

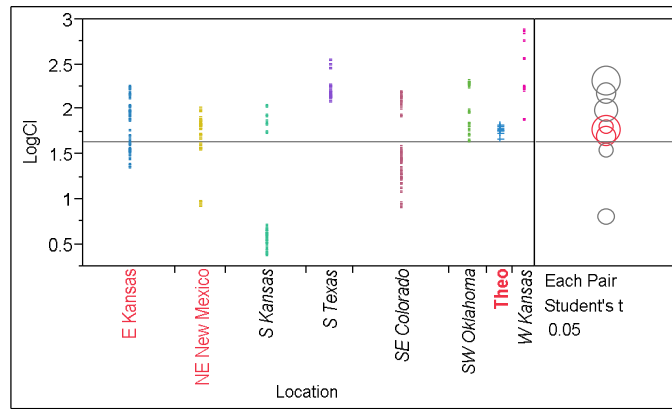


Oneway Analysis of LogNa By Location

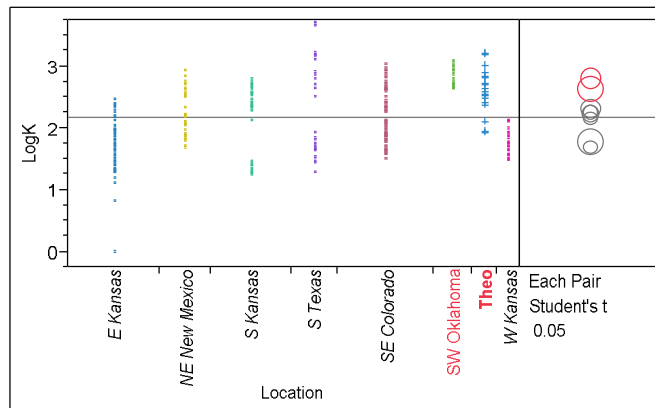


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogCI By Location

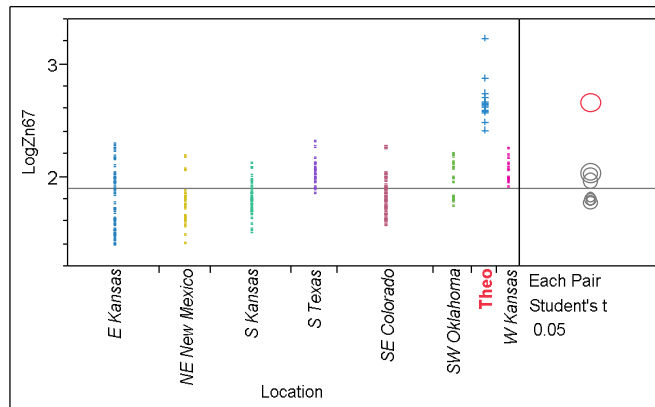


Oneway Analysis of LogK By Location

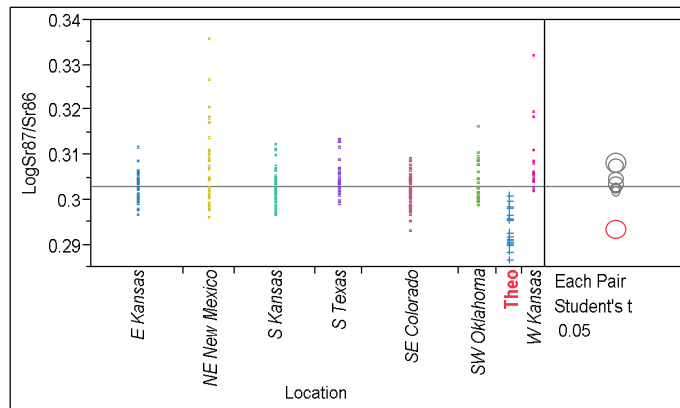


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogZn67 By Location

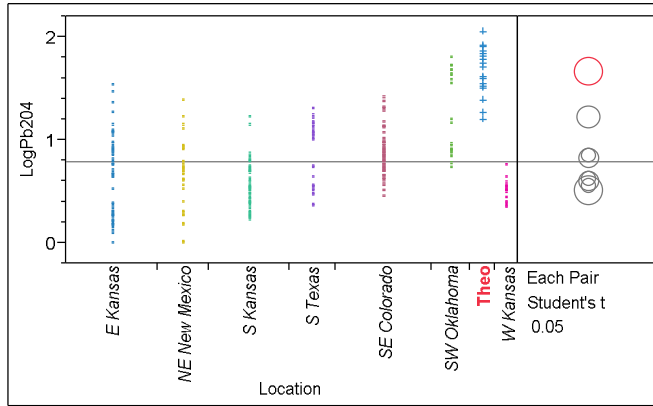


Oneway Analysis of LogSr87/Sr86 By Location

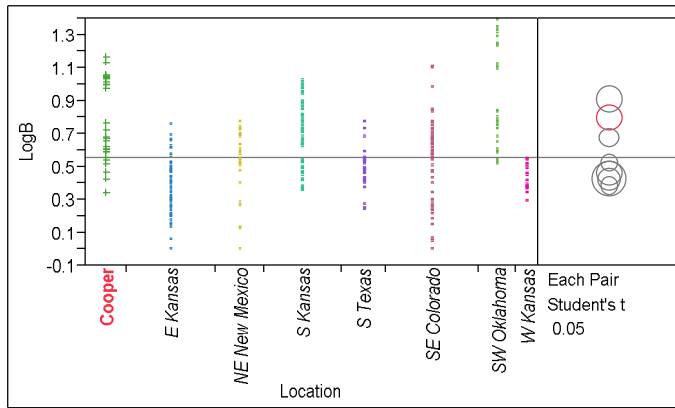


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogPb204 By Location

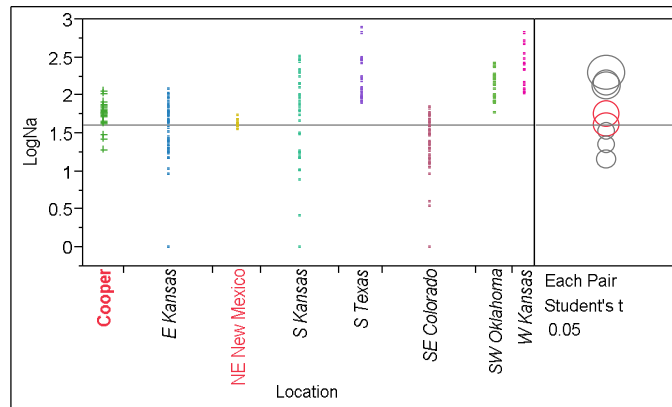


COOPER LOWER T-TESTS Oneway Analysis of LogB By Location

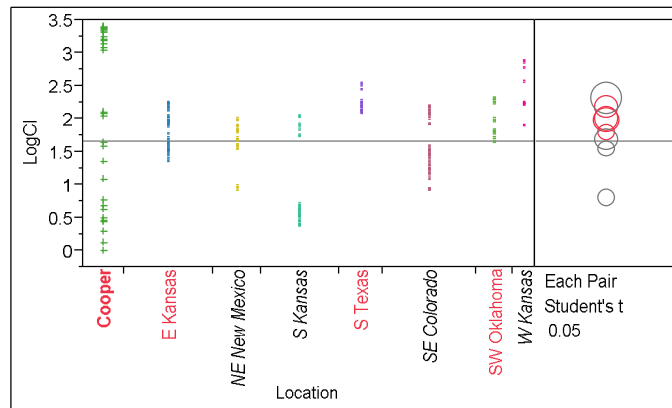


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogNa By Location

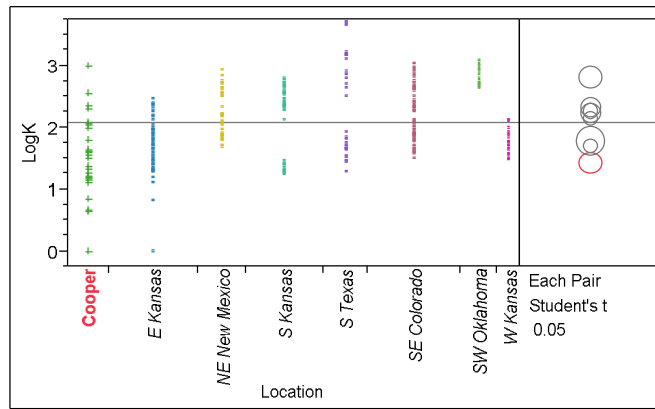


Oneway Analysis of LogCl By Location

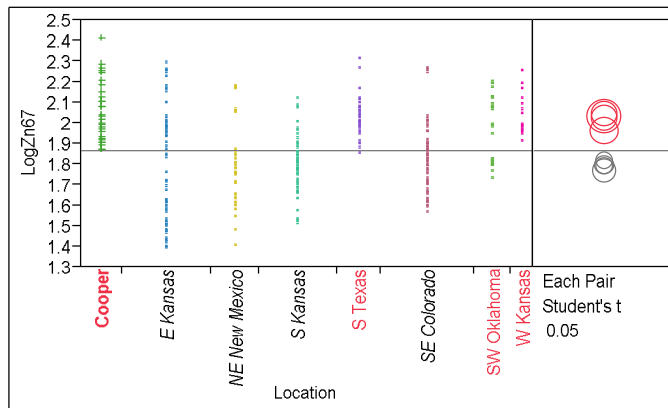


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogK By Location

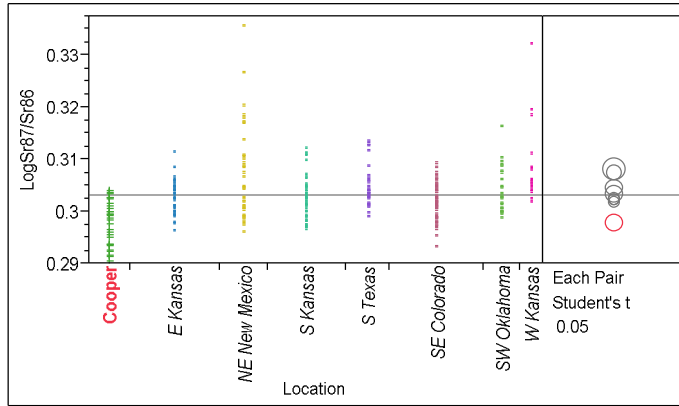


Oneway Analysis of LogZn67 By Location

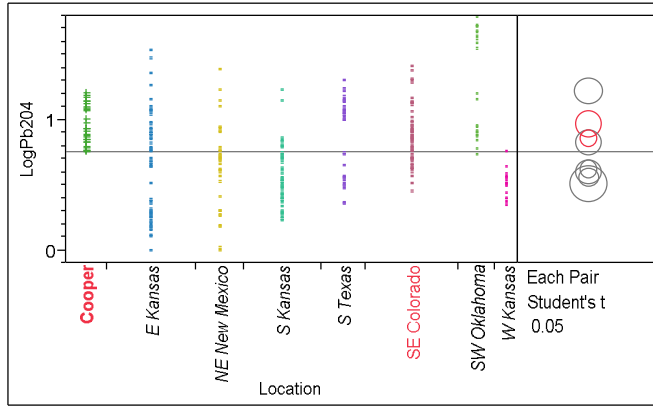


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogSr87/Sr86 By Location

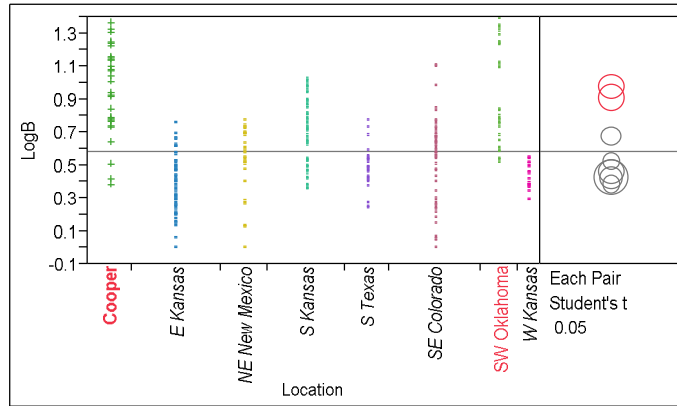


Oneway Analysis of LogPb204 By Location

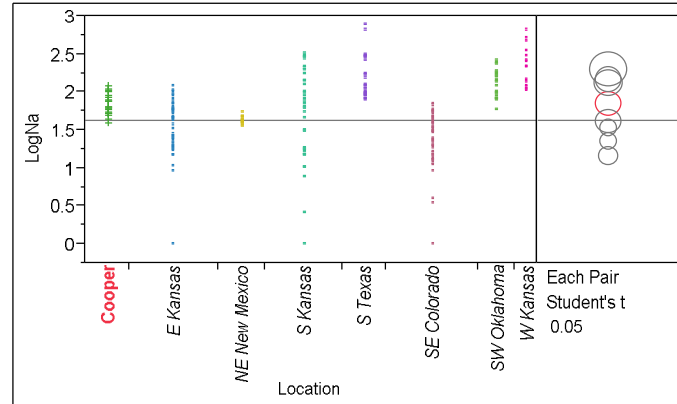


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

COOPER MIDDLE T-TESTS
Oneway Analysis of LogB By Location

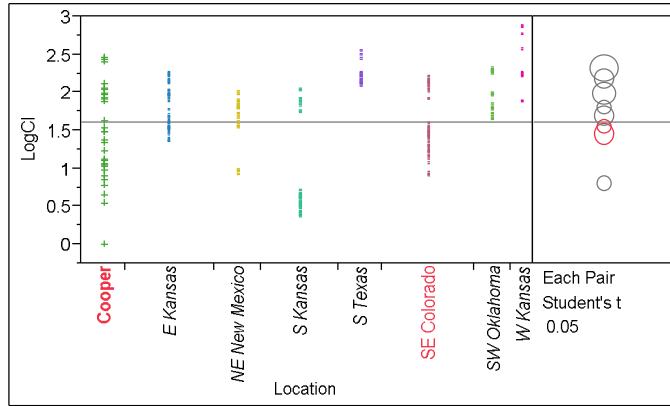


Oneway Analysis of LogNa By Location

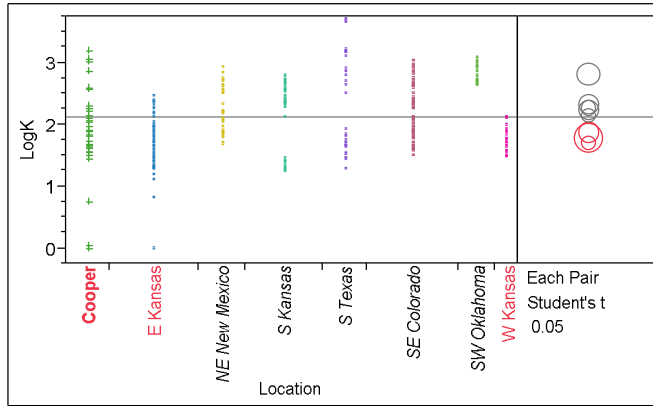


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogCI By Location

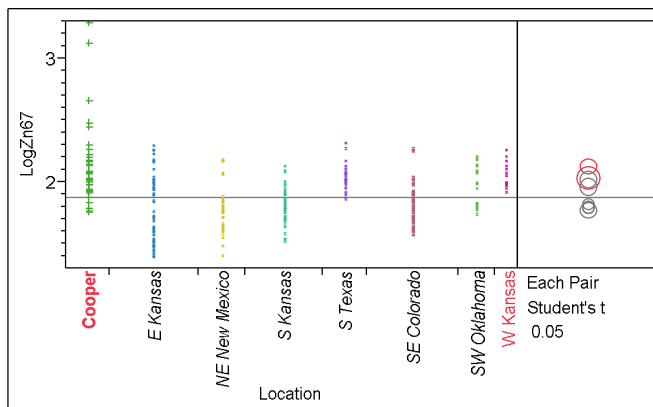


Oneway Analysis of LogK By Location

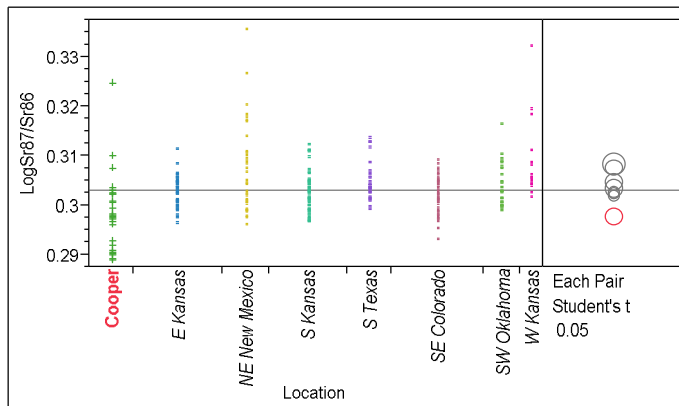


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogZn67 By Location

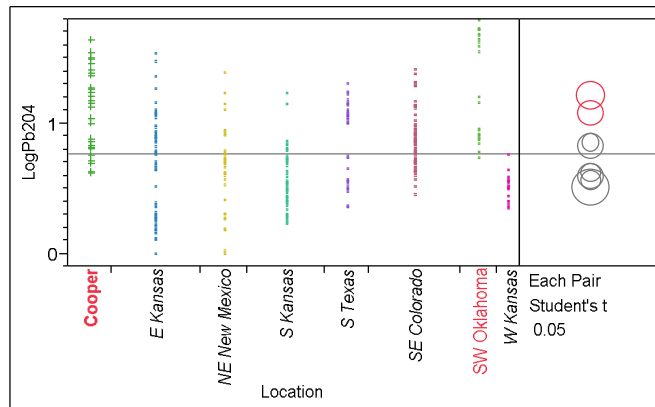


Oneway Analysis of LogSr87/Sr86 By Location

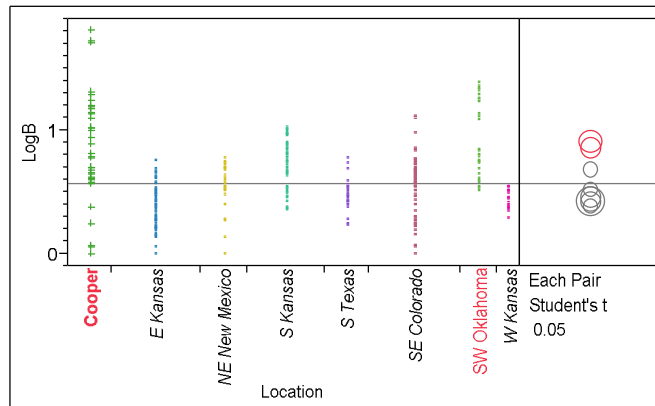


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogPb204 By Location

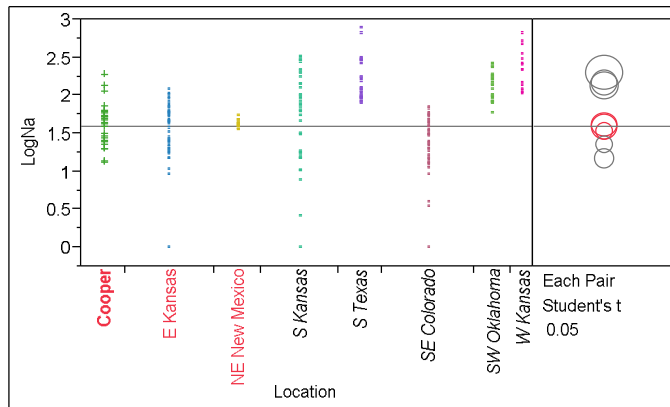


COOPER UPPER T-TESTS Oneway Analysis of LogB By Location

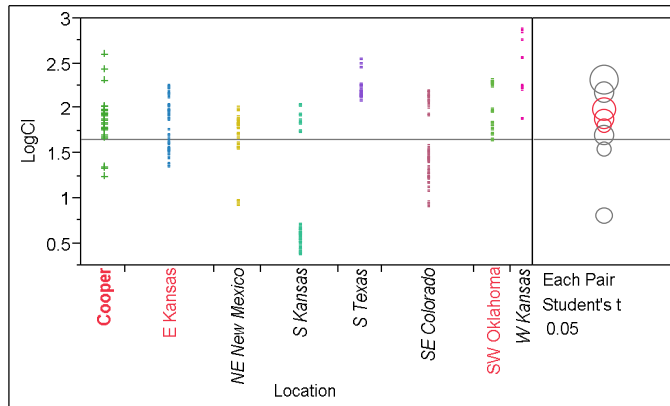


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogNa By Location

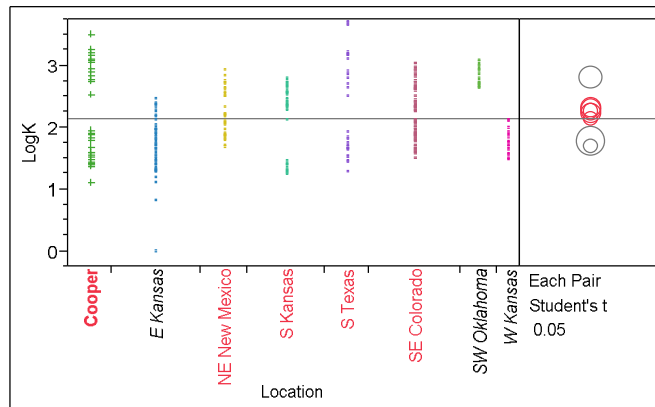


Oneway Analysis of LogCl By Location

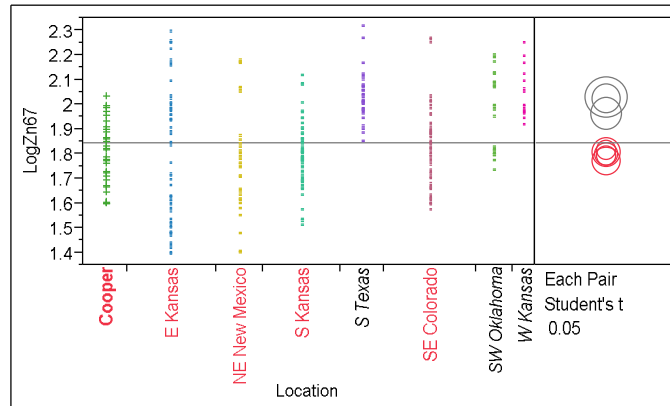


Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogK By Location

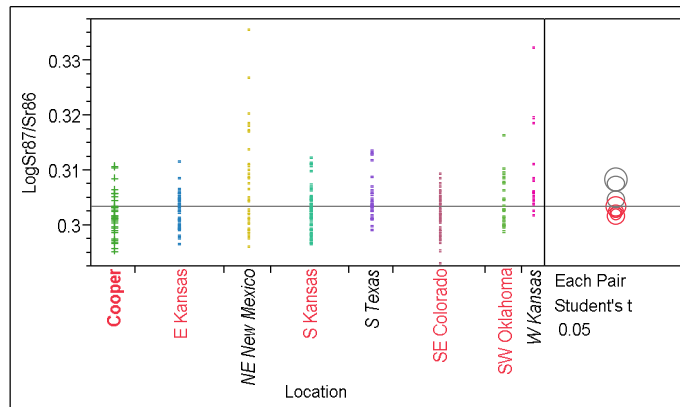


Oneway Analysis of LogZn67 By Location



Appendix B. T-tests of prehistoric and modern tooth samples using the elements selected for this study.

Oneway Analysis of LogSr87/Sr86 By Location



Oneway Analysis of LogPb204 By Location

