

ENVIRONMENTAL DEGRADATION AND
DISRUPTED SOCIAL FABRIC IN THE
TAR CREEK BASIN

By

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CHAPTER I

INTRODUCTION

Oklahoma's Tar Creek Basin is located in the far northeastern corner of the state immediately adjacent to the Kansas and Missouri borders. In the early 20th century, the area gained prominence for its abundance of lead and zinc mining. By the early 1980's however, the area had also acquired notoriety for being heavily contaminated with multiple environmental hazards associated with the lead and zinc mining industry. Mountains of mining residue, known locally as "chat," litter the Tar Creek Basin landscape. These mountains contain lead, zinc, cadmium, arsenic, magnesium and other heavy metal residues. In addition to the mountains composed of chat, there have been concerns for the orange, rusty discharge emanating from the abandoned mines and vent shafts. In 1983 the federal government formally sanctioned Tar Creek's environmental problems by placing the site on the EPA Superfund list. Over the past twenty-five years the chat piles, contaminants, and remediation efforts at the site have caused dissension and community factionalism.

This research addresses community conflict over contamination and explores the related claims of contested illness. Specifically, I address several broad questions. How do residents living with the same objective environmental conditions differ in their interpretation of environmental hazards, risks and illness claims? What are the most salient dimensions of these conflicting interpretations? What role has the U.S.

Government played in facilitating residents' interpretations of environmental risks? How have environmental hazards in Tar Creek impacted community relations? Finally, how does this case fit within the parameters of existing literature on contaminated communities and contested illness?

For several decades the residents of Picher were unaware of the hazards and risks associated with the byproducts of the mining industry. The situation changed when the Environmental Protection Agency (EPA) officially registered the Tar Creek Basin area on its National Priority List (NPL), more commonly referred to as the Superfund. When some residents perceived that Environmental Protection Agency (EPA) plans for the area were merely cosmetic attempts to alleviate the problems, several proposals for alternative solutions were suggested by residents living in the area. Among those alternative plans were proposals for relocating the entire community *en masse* or perhaps a buyout funded by the government. The proposal for relocation/buyout brought about deep resentment from many area residents and the once close knit community became deeply divided over the best course of action. Many residents argued the contaminants posed serious health threats such as education problems for area children. Others downplayed the environmental crisis and argued their neighbors were exaggerating the threats.

This study addresses the broad community impacts in the Tar Creek Basin associated with the environmental contamination and resultant conflict over the future of the community. This is not a typical case of environmental contamination where the community has been ignored by state or federal agencies. As mentioned, the area has been an Environmental Protection Agency Superfund site since the first National Priority List (NPL) came out in 1983 and the environmental contamination has been well

documented. Increased environmental awareness in the 1970's led to legislation regarding sites which had been abused and neglected by corporate industrialists. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as Superfund, was enacted by Congress on December 11, 1980 to deal with these neglected and sometimes abandoned sites. When the Environmental Protection Agency compiled its first CERCLA or Superfund list, Tar Creek, the area encompassing Picher, was number one on the list.

But, despite being on the EPA's Superfund NPL for the past twenty-five years, the site remains heavily contaminated and environmental illness claims continue to be contested. The case appears to be, as one resident summarized, a "successful failure" based on the number of federal cleanup dollars that have poured into the site. To date, the federal government has spent more than \$120 million dollars in an effort to improve living conditions in the area. Yet, residents continue to live on contaminated property and children continue to suffer from elevated blood lead levels and other maladies. The contestation of illness claims and the conflicting perceptions of environmental hazards have divided residents and created animosity toward the governmental regulating agencies.

The environmental contamination and danger in Tar Creek is not limited to the lead and zinc dust, the heavy metal discharge from the mine shafts into Tar Creek, or the tailing ponds. Another source of environmental concern is the threat of subsidence, or cave-in. Large sinkholes have devoured property, sections of highway, and buildings. The communities in the Tar Creek Basin mining district are at risk of being enveloped in a sinkhole. During the eighty years lead and zinc were being mined in the Tri-State area,

the entire area was undermined to depths as deep as four hundred feet. The room and pillar method was utilized whereby large rooms were carved out below ground. Pillars were intentionally mined around so they might support and stabilize the overhead. As mining operations wound down, the pillars were “high graded” to remove the last remaining ore bearing materials thereby removing the supports. Today open caverns exist under communities, public highways, schools, and playgrounds. The caverns have filled with water over the years since mining ceased and there is some cause for concern that the bedrock is becoming unstable and increasingly susceptible to give way.

As a result of the continued contamination and the threat for subsidence, some area residents have mobilized for a complete buyout of the area. Others want to remediate the environmental conditions so they can remain in the area. Earlier research examined environmental activism regarding the environmental controversy in America’s number one Environmental Protection Agency Superfund site (Kennedy 2002). This project expands upon that research by examining current claims of contested illness and the ongoing factors contributing to corrosive community relations.

This brief introduction sheds light on some of the difficult social and economic conditions of the area. Tar Creek Basin residents have a rich community history intertwined with the mining operations that *created* the contamination. Community residents also have a long tradition of economic struggle and survival related to the closing of the mining operations and the resulting plummeting property prices. Local residents have adapted to changing conditions in the past, but recent social and political intervention based on environmental issues has created heated and hostile divisions within the Tar Creek Basin. In the next section, I review the relevant literature that will

guide my analysis, focusing primarily on the community impacts of environmental hazards and contested environmental illness. I then discuss the research methods employed in this study before turning to my analysis of the Tar Creek case.

CHAPTER II

REVIEW OF LITERATURE

I begin by drawing from literature that addresses the differences in therapeutic and corrosive communities followed by literature relevant to community conflict. In particular, I focus on research related to the emergence of competing factions, the ambiguity of harm, economic concerns and community attachment. Those sections will be followed by an examination of relevant literature contributing to contested environmental illness.

COMMUNITY IMPACTS OF ENVIRONMENTAL HAZARDS

For the past several years, researchers have debated the impacts associated with environmental disasters and other environmentally related problems. In this section the major themes that emerge from these debates will be outlined. First, there will be a brief overview of the therapeutic community followed by corrosive community impacts. In addition to briefly discussing some classic works relative to disaster research, I bring in contemporary perspectives from environmental sociology. Finally, I offer an overview of work emphasizing the corrosive impacts associated with environmental problems.

Research on disasters has identified two differing types of community responses that can emerge as a result of a disastrous event: therapeutic and corrosive. Community impacts are based, in part, on the origins of the event. Disaster events associated with

“acts of God,” or natural recurrences, are generally associated with “therapeutic” community impacts (Fritz 1961; Barton 1970; Quarantelli and Dynes 1977). Disaster events that are associated with human-made interventions are generally thought to be associated with “corrosive” impacts (Freudenburg and Jones 1991; Shriver and Kennedy 2005). Despite their differences in origin, an important characteristic shared by both natural and technological disasters is the disruption of traditional social organization (Fritz 1961; Barton 1970; Dynes 1970; Kreps 1985A; Kreps 1985b).

Natural disaster researchers have noted that disasters of this type usually have some sense of immediacy attached to their aftermath. The arrival of personnel ready to administer humane and selfless, or altruistic, acts and ready to assist victims in the aftermath of the disaster have led some theorists to label the responses as being demonstrated within the frame of a therapeutic community (Fritz 1961; Barton 1970; Freudenburg and Jones 1991). At the local level, a therapeutic community is likely to emerge whereby citizens and their organizations expand their ordinary roles within the community to meet the immediate needs of the injured, the homeless, and the grief-stricken (Fritz 1961:484). Significantly, the therapeutic community exemplifies reestablishment and reorganization of the social fabric that existed prior to, and begins immediately following the event.

In contrast to scholars emphasizing the therapeutic community thesis, many scholars over the past two decades have highlighted the negative, or corrosive community impacts associated with environmental hazards. Early explorations into community response(s) concerning chronic technical disasters (CTDs) focused almost exclusively on separating the hazard agent(s) associated with technological disasters versus those

characteristics assumed to be associated with natural disasters (Couch and Kroll-Smith 1985). At the time of the initial CTD studies, research into disaster impacts were based largely on research in communities afflicted by natural disasters such as hurricanes and tornadoes (Couch and Kroll-Smith 1985). However, there was burgeoning evidence that formerly acquiescent populations were becoming increasingly concerned with the proposition that an environmental disaster may exist in their midst (Couch and Kroll-Smith 1985). Edelstein (1993) notes that if it is “a human-caused phenomenon, contamination from hazardous materials inherently forces the victims to seek an explanation for what has occurred” (Edelstein 1993: 78).

Building on earlier disaster research, theorists developed ideas about catastrophes determined to be environmental in nature. Their research brought about perspectives in environmental sociology and subsequent studies regarding vulnerability. Couch and Kroll-Smith (1985) enhanced a more in-depth possibility with their conceptualization of CTD's. The introduction of CTD's reflects the importance of the dichotomous relationship between the empirical reality of the disaster and the community's perception of the disaster (Zavetoski, et al. 2002).

Research has shown that community residents experience a variety of emotional distress when confronted with issues that are socially constructed to be human-made or technological catastrophes (Couch and Kroll-Smith 1985; Freudenburg and Jones 1991). Although some ambiguity may be involved, the distinction between human-made catastrophes and “natural” catastrophes is somewhat crucial because, as noted earlier, each type elicits a different social response (Freudenburg 1997). According to Freudenburg (1997), “...recent research has indicated that the consequences of

technological contamination incidents and disasters are a different matter entirely” (Freudenburg 1997:21). “Dioxin and Radon contamination, toxic chemical leachates and underground mine fires are disaster agents quite unlike hurricanes, floods or tornadoes which strike quickly and disappear leaving visible evidence of their destruction” (Couch and Kroll-Smith 1985:565). And, quite unlike the usual sudden onslaught found in natural disasters, manmade disasters often lie undetected for years or decades without a warning or visible sign regarding their imminent danger (Couch and Kroll-Smith 1985).

Although it is often difficult to pinpoint the blame in the aftermath of natural catastrophes, technological catastrophes are human-made and there is always a responsible party, such as an individual, a corporation, or the government. Catastrophic incidents at locations such as Love Canal or Times Beach, and multiple deaths attributed to toxic chemical releases in Bhopal, India put citizens on notice to the dangers to which they could have been exposed: to both themselves and their environment (Markowitz and Rosner 2002). Catalysts just such as these were responsible for a shift from “passively held beliefs to active involvement” (Szasz 1994:88).

Victims of technological disruptions often experience ambiguity and fear which, when combined with other vested social actors, tend to amplify the incidents impact (Freudenburg 1997). Rather than exhibit therapeutic community characteristics, research conducted on environmental hazards illustrates what Freudenburg and Jones (1991) have referred to as “corrosive communities.” Rather than exhibit the altruistic characteristics noted in therapeutic communities (see Barton 1970), corrosive community residents engage in heated, and sometimes hostile, debates in their attempt to assign blame or point the finger (see Albrecht et al. 1996). “As they ponder why the disaster was

made to or allowed to happen, they question whether the government, industry, or other had the ability to cause or prevent the exposure, and whether they attempted to do so” (Edelstein 1993:78). Zavetoski et al. (2002) note,

“...part of the disruption that communities experience in the face of chronic technical disasters involves the violation of the assumption that government officials will take responsibility for returning the community to the state of health it previously enjoyed. Government officials can uphold this assumption by taking quick action, keeping the public abreast of all the steps that are being taken, and involving the public in decisions about how to manage the risks. Or they can *create the impression* that they are doing these things” (Zavetoski et al. 2002: 390).

Having briefly introduced the literature relevant to community responses and disasters, I now shift my focus to the community impacts associated with chronic technical disasters. In particular, I will focus on the emergence of competing factions, the ambiguity of harm, economic impacts and the importance of community attachment. For a summary of major research findings on corrosive community impacts please see Table 1.

The Emergence of Competing Factions

Several important characteristics associated with contaminated communities emerge from the literature (Freudenburg and Jones 1991; Erikson 1994; Shriver and Kennedy 2005). One common attribute noted in contaminated communities is the emergence of competing factions that create corrosive relations (Couch and Kroll-Smith

1985; Freudenburg and Jones 1991; Shriver and Kennedy 2005). This corrosiveness tends to destroy social cohesion rather than build relationships that are therapeutic in nature that tend to rebuild or reinforce the social fabric (Couch and Kroll-Smith 1985). Studies have noted that technological hazard cases typically document multiple groups emerging within the community to promote a set of claims regarding environmental risks (Taylor 2000). When community opinion is divided, opposition groups may form to oppose corporations, local elites, and local groups that support them (Taylor 2000; Bailey et al. 1992). It has also been noted that community groups are sometimes pitted against one another (Shriver and Peaden 2008).

While any disruption to the regular social order is upsetting, existing literature reflects that community conflicts may be particularly intense and may become hostile in communities where a buyout and or relocation is being considered as a possible terminal solution. One of the early cases involving the discovery of environmental contamination that subsequently culminated with a federal buyout is Love Canal (Cable and Cable 1995; Freudenburg and Steinsapir 1992; Fowlkes and Miller 1987; Levine 1982). Illegally discarded chemical contaminants began to surface in the community alarming some residents. This, in turn, led them to complain of such oddities as black gooey substances migrating into their cellars and basements and incidents such as exploding rocks on the playground. However, the most serious concern was the persistence of unexplained health issues among the community's children (Fowlkes and Miller 1987). A grassroots environmental campaign led by Lois Gibbs brought the problems to the front pages of America's newspapers and the awareness of the American people (Freudenburg and Steinsapir 1992). Her grassroots campaign was successful in winning a federal buyout of

Love Canal's residential homes. However, the buyout came at a cost by splintering the community over differential and conflicting perceptions regarding risk and the environmental harm associated with the chemical contamination (Freudenburg and Steinsapir 1992).

Love Canal does not stand alone as a contaminated community. In another study conducted in a small community in Missouri, residents were also confronted with a buyout controversy after it was discovered that chemical waste residues and byproducts had been spread on their dirt roads. The contamination, much of which had been spread to tame the dust, was dispersed throughout the area by record flooding, which floated the chemicals off the roadways and spread them into the residential areas. Parents began to notice unusual illnesses among their children and eventually linked those illnesses to the trucking company that had spread the chemicals on the roads. It was also discovered that this company had been involved in the death of several horses when it had spread the same chemicals around the horse barns to tame dust. Once residents learned that their homes were no longer safe, they mobilized for a federal buyout that was granted in 1985 (Freudenburg and Jones 1991; Freudenburg 1997).

In other cases involving potential buyouts or relocation, the sources of environmental harm can be even more confusing. As a result, threats to the community's social fabric can become extremely contentious to the point of becoming hostile. Community conflict was found in the African-American community of Jacksonville, Arkansas, over the differing interpretations related to local dioxin contamination. City officials, concerned with the impacts associated with negative publicity, attempted to minimize the pollution and the potential health effects while local residents demanded an

immediate and full remediation of the site (Capek 1993). In yet another case, a heated and prolonged battle between several competing residential groups within the community arose with the discovery of an underground mine fire in Centralia, Pennsylvania (Couch and Kroll-Smith 1985; Kroll-Smith and Couch 1990; Couch and Kroll-Smith 1994). Researchers noted that the competing community groups in the Centralia community were divided over their respective perceptions regarding environmental and health risks, as well as over the most steps to be taken to resolve the problem (Kroll-Smith and Couch 1990).

The Ambiguity of Harm in Environmental Hazards Cases

Social constructivist approaches to understanding the problems can expand our knowledge and understanding of local actors' responses to contaminated communities reflected in their claims making activities (Aronoff and Gunter 1992). Ambiguity related to contamination risks as well as concerns for the health and well-being of residents and their local environment fosters conflict as groups differ in their interpretations (Aronoff and Gunter 1992). Despite being confronted with similar environmental conditions, residents often construct different assessments of the environmental harms with which they are confronted. Conditions are further complicated by the "invisibility" of environmental hazards, which often render them impossible to detect through the human senses (Beck 1992; Erikson 1994; Vyner 1988). Local, state and company officials, along with regulatory agents, often exacerbate the ambiguity by either withholding information, sending contradictory messages, or even offering fictitious information (Levine 1982). These same officials utilize standardized language, control of information, claims to expertise, ambiguous promises, buck-passing, and stalling tactics

all aimed to thwart concerns voiced by community groups (Levine 1982). As a result, these communities are often characterized by stress and anxiety caused by ambiguity (Freudenburg and Jones 1991).

Conflict among community residents may not always correspond directly with the seriousness of the environmental threats posed by environmental hazards. In the Times Beach case, Freudenburg (1997) notes a greater degree in animosity among residents with lower levels of dioxin contamination than in neighborhoods where dioxin levels were several times higher and more dangerous to humans. The important difference was that the contamination was officially recognized in the neighborhood with higher dioxin levels, but not in the less contaminated areas (Freudenburg 1997). Another factor in the hostility may also have been that those individuals with lower contamination levels realized their property values were tied to and identified with the contamination. When residents demand immediate action regarding information and solutions, economic impacts become a concern (Bryant 1995). Not only do prospective new residents refrain from moving into the area, current residents often find it difficult to sell their homes for any tangible value (Bryant 1995).

Economic Factors in Environmental Cases

It has been noted that environmental contamination cases involve community responses are influenced by multiple economic concerns. In contaminated communities, the source of environmental harm is often complicated through the articulation of environmental grievances. The source of contamination may be locally based (i.e. Love Canal) or may have been transported (i.e. Times Beach) to the contamination point. Problems often emerge over the prospective economic impacts facing the community

such as the potential loss of jobs (i.e. Oak Ridge), as well as broader economic impacts on the community. As a result, local city officials and business leaders are often pitted against other citizen groups (Bailey et al. 1992; Alario and Freudenburg 2003). One community, Jacksonville, Arkansas, experienced conflict after a group of local business and chamber of commerce representatives attempted to protect the city's image from environmental hazards (Capek 1993). In another case in Bogalusa, Louisiana, citizen groups clashed over economic concerns after an explosion at a local chemical plant (Roberts 1997). In this particular case, a group of residents argued the economic importance to the community should outweigh the negative environmental impacts. However, other groups contested these claims, arguing in support of the plant's past safety record and emphasizing the subsequent problems associated with the environmental backlash (Roberts 1997).

Additionally, residents in environmental hazards cases also engage in conflicts over property values. In these cases, residents on either side of an environmental dispute may cite property values as a basis for their respective positions. In Love Canal, area residents wanting to remain in the community framed their grievances around economic losses and lowered property values (Levine 1982). Those grievances centered on citizen arguments that their homes were lifetime investments and claims of environmental degradation would diminish those investments. Younger residents promoting relocation argued that they were trapped in what Edelstein (1988:61) refers to as the "inversion of home," in which residents having found their homes no longer to be safe havens cannot afford to move. The depressed property values related to environmental threats precludes selling their homes for sufficient amounts to relocate and start anew. These are real

concerns as real estate and home investments are the largest investments many residents will make in their lifetimes and they do not wish to jeopardize a lifetime investment.

Community Attachment in Environmental Hazards Cases

Researchers have found that community attachment can play a prominent role in influencing residents' interpretation of environmental hazards. Attachment is affected by several factors including familial considerations, length of residency, and the perception of environmental stigma. Community residents may vary in the degree to which they express attachment to their individual homes, neighbors, and the broader community. Some analysts argue that rural community residents are influenced by community identity, which tend to be linked to the sense of place, relationships to the symbolic landscape and to broader attachment to the local environment (Wulfhorst 2000). Additional research links community attachment to length of residence, arguing for example that long-term residents generally express less concern over environmental hazards because they are far more attached to their local communities (see Fowlkes and Miller 1982; Edelstein 1988; Kroll-Smith et al. 2002).

Attachment to community has been linked to the potential for the development of environmental stigmas. Edelstein (1993) noted environmental hazards can create a stigma that becomes attached not only to the community, but also to the residents (Edelstein 1993). As a result of such concerns, it is perhaps inevitable that some residents engage in efforts to minimize the stigma associated with environmental hazards in their communities, whereas other residents attempt to draw attention to the hazards as part of their broader campaign for acknowledgement. In some environmental hazards cases, residents' efforts to raise awareness to the environmental hazards has inadvertently

depressed property values further by contributing to environmental stigmas in the community. In these cases, community relations are particularly strained as neighbors engage in competing campaigns to protect their economic investments.

As Stedman (2003) notes, a socially constructed sense of place is vital to the development or construction of self by providing parameters within which individuals develop and mature. Primary attachments are formulated with primary caregivers, but these attachments are made within a contextual location; an environment that becomes familiar and friendly. These perceptions are formed within a larger environmental context, whatever that environment may have been, such that place attachment is a positive emotional bond that is formed and developed between individuals to their physical environment through an abundance of interactional processes (Stedman 2003; Milligan 1998). Individuals develop into social beings beginning with their family or primary group in the group home and such development evolves within larger environments or structures that could include neighborhoods, schools, city, state, and nation.

Attachment to place has long been of interest to sociologists and other behavioral scientists, particularly those whose interests concern ethnicity. Belief in a common or shared historical past is indicative of phenomena conducive to attachment, whether it is shared family ties (attachment to family) or attachment to place. It is seemingly simpler to associate with one's historical area than to a specific extended family. A principal cultural focus is community or home. In the past "home" has been utilized to refer to a land of origin; a more common meaning refers to community of residence or even the residence itself (Erikson 1994). Attachment researchers have hypothesized that changes

in living conditions can lead to changes in familiar patterns of interaction and consequently in attachment security (Thompson 2000). Thus, when community cohesion is threatened with change a predictable response is that some residents will resist in their attempts to maintain community equilibrium.

CONESTED ENVIRONMENTAL ILLNESS AND COMMUNITY CONFLICT

A central feature of community conflict in environmental controversies centers on the contested nature of illness claims. Several important themes emerge from the literature regarding contested environmental illness. As illnesses attributable to environmental conditions become more prominent, there is a correlation between prominence and the need for society to comprehend that these illnesses exist (Brown, Zavetoski, Mayer, McCormick and Webster 2002). The medical establishment's inability to assess various health discrepancies involved in contested environmental illness cases render them to be embedded with ambiguity. This ambiguity involves several differing issues such as the bounds of scientific or medical knowledge and organizational responses which sometimes tend to exacerbate the ambiguity (Gibson, Elms, and Ruding 2003). Pressure from different sources has been applied to governmental bureaucracies and corporations to contain and manage the impacts associated with environmental degradation. This pressure is often countered with delaying tactics intended to impede corporate or governmental oversight or responsibility regarding remediation of affected areas. The ultimate ambiguity may involve the standards established in substantiating that health issues are the result of environmental hazards (Shriver, Webb, and Adams 2002; Landrigan 1990).

“Environmental illness is contested illness because it is ultimately linked to consumer society’s addiction to production and consumption practices,” the challenge of which challenges the existing distribution of power in society (Cable 2003:78-79). There is neither a general, nor a specific, consensus regarding exposure(s) and illness based on the ambiguity involved with the nature of the subject (Kroll-Smith and Ladd 1993; Kroll-Smith and Floyd 1997). Subsequently, substantiating environmental causation is difficult because exposures are often not controlled or easily measured in either quantity or location (Brown, Zavetoski, Mayer, McCormick and Webster 2002:177). In recent times, humans are exposed to hundreds, if not thousands, of different contaminants and the number is increasing annually rather than decreasing (Fiedler and Kipen 1997). Exposures to chemicals and other products once thought to be safe and even “pleasant” have been cause for “unusual sensitivity and illness” (Fiedler and Kipen 1997:409). Beck (1992) characterizes his “risk society” as derived from the inability to comprehend the negative consequences of surviving everyday life (Buell 1998:642). As environmentally induced diseases increase “there is a corresponding need to understand” how to deal with these diseases (Brown, et al. 2002: 176). Examples of contested illness include “...cancers and reproductive, immunological, and neurological disorders stemming from toxic waste sites; diseases resulting from nuclear power and weapons, asthma and pulmonary diseases resulting from air pollution; and diseases resulting from military exposure to toxic substances” (Brown, et al. 2004: 41-42). Pinderhughes (1996) adds that “Cancer, heart disease, diseases of the pulmonary system, neurological damage, birth defects and genetic mutations, miscarriage, lowered sperm

count, and sterility are some of the adverse health effects associated with exposure to environmental hazards” (Pinderhughes 1996:232).

The circumstances surrounding cases thought to be environmentally induced often find residents at odds with government regulating agencies, established science, and the corporate industries responsible for the contamination itself (Shriver, White, and Kebede 1998). In an effort to silence any claims making by citizens or groups, corporate lawyers utilize every imaginable effort, including practices deemed unethical or even illegal, to frustrate the attempts of concerned citizens making those claims (Rosner and Markowitz 2000). The corporate power brokers consistently and repeatedly impede the due processes established under the democratic form of government.

Ambiguity is abundant when hazards in the environment are considered as culpable agents for illnesses by claims makers for several reasons. Some authors note that the hazards are largely invisible such as in cases of radiation exposure at Oak Ridge in Tennessee, or chemical and biological weapons exposures in the first Gulf War (Beck 1992; Erikson 1991; Vyner 1988). Other incidents include scenarios which reflect the hazard was not so much invisible as it was ignored as in the Agent Orange exposures in Vietnam or the process of using mercury to extract gold from stream beds and melting the resultant ore to separate the metals. While the effects of exposures to Agent Orange are still being acknowledged some forty years later, it has been noted that breathing the fumes during the separation process caused mercury poisoning and many miners were affected by the negative consequences involved (Geise 1940).

Contested environmental illnesses are also categorized as ambiguous because they have not been officially recognized as fitting within the parameters of existing medical

knowledge (Shriver et al. 1998). The ambiguity permits the medical establishment leeway in acknowledging a malady which, in turn, also allows for a non-diagnosis. Although some medical practitioners specializing in environmental medicine have a systematic approach for working with contested illnesses, “there is no accepted treatment across medical disciplines” (Gibson et al. 2003:1498). Thus, people affected by contested illnesses are forced into ordeals of perseverance to receive a diagnosis for their crisis (Barrett and Gots 1998).

Brown et al. (2000; 2002) divide the disease categories between known and presumptive issues. Those diseases listed or categorized as known diseases are recognized by the established medical institution although recognition of a particular disease may be debatable in any case. Some known diseases that have emerged in environmental cases are low birth weights, breast cancer, and asthma although they may not have been initially linked to environmental exposures. Known diseases are associated with established treatments and medications.

Presumptive diseases are distinguished by the difficulty in establishing that a disease exists and can be illustrated by the case of Gulf War illness (Shriver 2001). Despite health related issues and complaints by nearly a quarter of a million veterans and their families, the government refused to acknowledge any single disease (Shriver 2001; Brown et al. 2001). Veterans of the 1991 Gulf War filed complaints with the VA listing a variety of ailments which included the inability to sleep, memory loss, chronic fatigue, blurred vision, rashes, headaches, and several other maladies; all of which were refuted by the government doctors (Shriver 2001). The military establishment had little or no difficulty in declaring the affected veterans to be outside military protocol despite

exemplary military service records (Shriver 2001). This systematic denial has been utilized with veterans of other eras such as the early entrants to Hiroshima and Nagasaki in Japan or atomic veterans (Smith 1983; Vynner 1988) and Vietnam veterans contaminated with the defoliant Agent Orange (Scott 1988, 2004; Kramarova et al. 1998).

Known diseases are those diseases with which the medical community is familiar and appears to come to consensus regarding cause and treatment. This consensual agreement paves the way for a standardized diagnosis followed by a designated method for dealing with the malady. Uncontested cases involving breast cancer, asthma, kidney disease, or other serious diseases are treated in the prescribed manner with little or no intimation regarding a possible environmental connection to the disease. Presumptive cases, on the other hand, reflect that both the environmental cause, as well as the disease itself, is a matter of concern. In denying a disease extant, the medical community establishes that regulatory action is not required for the protection of the people; hence, there is no need for a public alert. However, if an illness were determined to be associated with environmental degradation and a general consensus is built around that determination, the regulatory bodies would be required to act.

Additional ambiguity compounds environmental illness cases when, as Kroll-Smith, Couch, and Levine (2002) note, the power interests employ delaying tactics in attempts to curb and frustrate the public. In such cases, “they place the well-being of the organization before the well-being of employees and citizens” (Brown, Kroll-Smith, and Gunter 2000:12).

In communities where environmental hazards are acknowledged, the debate shifts to the extent of exposure and the related health impacts, or to the enviro-health linkages. In environmental hazards cases where there are established linkages, as in the case of lead exposure, there are also multiple sources of ambiguity and uncertainty, including the lack of information regarding extent of exposure, the relationship between dose and response, especially in cases where exposure is prolonged, the synergistic effects, etiological uncertainty, and diagnostic uncertainty (Brown, Kroll-Smith, and Gunter 2000: 11). These factors create a high degree of ambiguous uncertainty among regulatory officials, medical professionals, and at-risk populations.

In the Tar Creek area, a significant part of the controversy centers around perceptions of risks associated with environmental health impacts. Detrimental or adverse health issues are nearly always contentious in environmental controversies based largely on possible liability issues and subsequent limitations placed by the scientific community concerning the burden of proof (Shriver et al. 2002). It has been noted that the demand for consensus from the scientific community is merely a delaying tactic (Pellow 2000). However, the case of the Tar Creek area does not presently pit local environmental activists against an industrial polluter. Instead, it is the internal conflict amongst residents that appears to be most contentious (Kennedy 2002). While economic concerns are an integral part of this conflict, the community is divided over issues related to contested illness further exacerbated by community attachment, property rights, and justice.

Past studies reflect that in cases of community conflict surrounding environmental hazards, contentious claims often emerge, dividing residents and causing deep-seated

community schisms (Capek 1993; Fowlkes and Miller 1987; Levine 1982). Residents not only target the polluting industries, regulatory officials, and local governments, but community groups also attempt to stigmatize and discredit each other. Freudenburg and Gramling (1994) describe this process as “diversionary reframing,” whereby groups focus on discrediting both the views and credibility of competing community groups (see also Krogman 1996). Divisions amongst residents of small communities are often more pronounced than relationships between residents in larger communities.

CHAPTER CONCLUSION

Several themes emerge from the literature on contaminated communities. Research indicates that environmental hazards cases are nearly always characterized by ambiguity. This ambiguity impacts not only the general interpretation of environmental risks and hazards, but also residents' perspectives on environmental health impacts. These differences in interpretations contribute to the corrosive community impacts which are so often found in environmental hazard cases. Drawing from these key areas of research, I examine the community impacts associated with environmental hazards in Tar Creek.

I examine how residents living with the same objective environmental conditions interpret the threats and dangers in contradictory ways. Throughout my analysis I draw from the ecological-symbolic perspective which acknowledges the material basis of environmental problems, but highlights the importance of interpretive processes. As Couch and Kroll-Smith (1994, p. 28) explain, “The ecological-symbolic perspective joins environmental sociology’s assumption that biospheres and social structures are

interdependent with a key assumption of symbolic interaction that people act on the basis of the meanings they attribute to events and conditions.” The ecological-symbolic perspective provides an important analytical tool for understanding the broader community impacts associated with environmental hazards.

CHAPTER III

METHODOLOGY

In this chapter I outline the methodology employed for this longitudinal project. Data was collected over a seven year period between 2001 and 2008. During the data collection period I followed events in the community as they unfolded. This approach was particularly fruitful in this case because events in the Tar Creek Basin have been constantly changing. I briefly mention some of the strengths of qualitative research and then expand on the specific data collection techniques utilized in this project.

Employing qualitative techniques requires that the researcher delineates the study's focus and the goals expected to be achieved with the culmination of the project (Ambert et. al. 1995). Rather than use the quantitative method and make inferential assumptions about the larger population utilizing large sample sizes and statistical manipulation, qualitative research attempts to draw in-depth information from smaller groups (Ambert et al. 1995). Since its inception, qualitative research has been shadowed by a "*metaphysics of presence*" (Derrida 1972, p. 250), which stresses that real, concrete respondents live lives utilizing constructed meanings and the meanings are concrete for these individuals (cited in Denzin1989:2). Basically, qualitative researchers seek to preserve the form and content of human behavior and to analyze those qualities, rather

than rely on mathematical, statistical, or other formal transformations for an interpretation of those behaviors (Lindlof 1995). Based on its exploratory nature, this project employed multiple qualitative or field research methods. Qualitative research adopts assumptions about social life, objectives for research, and ways to deal with data (Neuman 1997). Primary among the field research methods utilized for this study was in-depth interviews. Subsequent and supportive methods included document analysis, historical analysis, and observation. Field research afforded an opportunity not only to ask questions but also allowed for a first hand observation of the citizens living in and around the contamination found surrounding the Tar Creek superfund site. Below I discuss each method that was utilized for this project.

IN-DEPTH INTERVIEWS

In-depth interviews were a primary data source for this research study. I first outline some of the strengths of in-depth interviewing in general. Next, I expand on the approach taken for this research. Prior research has borne out several advantages in employing in-depth interview techniques. One distinct advantage is embedded in the person to person contact necessary to conduct an interview. Another advantage is that the interviewer is afforded the opportunity to ask questions which relate directly to the project. Rubin and Rubin (1995:43) state that “qualitative interviewing design is flexible and continuous rather than prepared in advance and locked into stone.” In-depth interviewing allows the researcher flexibility to probe respondents further on specific issues rather than be tied to a formatted questionnaire (Denzin 1989; Babbie 1998; Rubin and Rubin 1995). Thus, probing allows the researcher to flesh out greater in-depth details

contained in those responses which are valid to the research project. Probing also provides follow up questions to responses that may be somewhat vague to the researcher's grasp of the situation (Denzin and Lincoln 1994). Another advantage of qualitative in-depth interviewing is the respondents are able to answer questions in their own words precluding the respondent from feeling that the researcher is directing the answers (Ambert, Adler, Adler, and Detzner 1995).

The in-depth interviews for this project were conducted in two waves. The first wave of interviews took place in 2002 and included in-depth interviews with twenty respondents. The second wave of interviews took place in 2007 and 2008 and included in-depth interviews with thirty respondents not included in the first wave. Thus, the research findings reported in this project come from in-depth interviews with a total of fifty respondents.

The initial interview contacts for the first wave of interviews were established through numerous research trips to the area in 2001 and 2002 and through newspaper coverage of the environmental controversy. I attended several community meetings and through networking I met several of the key figures in the Tar Creek Basin. I spoke to dozens of community residents and eventually conducted formal interviews with key leaders on each side of the environmental dispute. I then employed a snowball sampling technique to identify additional respondents supporting the respective sides of the debate. The twenty in-depth interviews conducted during the first wave included activists from both sides of the environmental controversy.

In terms of the demographics for the first wave of respondents, sixteen were males while the remaining four were females. In terms of marital status, eighteen

reported themselves as being married, one was single, and one was a widower. As far as employment was concerned, five were retired, three were disabled due to health problems, two were homemakers, two were truck drivers, three worked for some form of governmental agency (state or local), and five worked in retail. Two of the respondents had moved out of the area for part of their adult working life, but had returned to Tar Creek in retirement. The ages of the respondents ranged from thirty-eight to eighty-one. Three respondents had graduated from college, fourteen graduated from high school, and three dropped out of school prior to finishing the eighth grade. In terms of race, eighteen respondents were white while those remaining two were Native American.

The second wave of interviews was conducted in 2007 and 2008 and included 30 additional respondents. Having closely followed the environmental controversy since 2001, I had maintained a log of key figures involved in the case. In addition, through an extensive review of newspaper coverage of the environmental dispute, I was able to identify additional persons involved in the dispute. Starting in 2007 I made formal research contacts with several new residents in the area. Following the same approach used during the first wave of interviews, I began by conducting preliminary interviews with residents actively involved in the Tar Creek case. I then employed a snowball sampling approach to identify additional respondents. In-depth interviews were conducted with a total of thirty respondents during the second wave of data collection.

In terms of the demographic characteristics for the second wave of respondents, 22 were males and 8 were females. In terms of marital status, 21 reported that they were married, while 9 were divorced, single, or widowed. An examination of employment status revealed that 11 were retired, 19 were actively working of which 5 specifically

identified themselves as homemakers. In terms of education, 11 had graduated from college, 12 had high school degrees, and 7 had not finished high school. Finally, in terms of race, 20 respondents were white and 10 were Native American.

Table One provides a summary of characteristics for all respondents from both waves one and two. As indicated in the table, three-fourths of the respondents were male (76 percent). Eighty percent of the respondents were white, while twenty percent were Native American. In terms of length of residents, seventy-six percent indicated that they were "lifelong" Tar Creek residents. An examination of occupational status indicates that nearly half (48 percent) were retired or disabled. Twenty percent of the sample were laborers, while ten percent indicated homemaker as their occupation. Four percent were teachers and sixteen percent worked in professional occupations and/or managerial positions. Just over 40 percent (42 percent) believe that there are serious health and illness impacts associated with environmental hazards in Tar Creek, compared to nearly sixty percent (58 percent) that believe that illness has been exaggerated.

Table 1: Characteristics of Respondents

Characteristics	Respondents*	
	Number (#)	Percentage (%)
Gender:		
Female	12	24
Male	38	76
Race:		
White	40	80
Native American	10	20
Other	0	0
Tar Creek residence:		
Lifelong	38	76
Since childhood	7	14
Adult only	0	0
Briefly as child or adult	2	4
Never	3	6
Unable to determine	0	0
Occupational status:		
Professional	3	6

Management/administration	5	10
Technical	0	0
Teacher	2	4
Farmer	1	2
Retired/Disabled	24	48
Labor	10	20
Homemaker	5	10
Illness claim:		
No	29	58
Yes	21	42

*N=50

A basic interview guide was utilized for all in-depth interviews. Respondents were asked a series of open-ended questions related to their perceptions, experiences, and activities surrounding environmental hazards in the Tar Creek Basin. Additional questions addressed respondents' general perceptions of the community and their level of community attachment. In addition, respondents were asked questions concerning their perceptions concerning the governmental cleanup effort and their designation as an EPA Superfund site. Respondents were also asked about the future of the community and about their preferences for relocation. Finally, respondents were asked a series of questions about their backgrounds in the community, their views on the environmental impacts and the related health concerns. The questions were open-ended and designed to provide respondents with adequate room to fully describe their experiences and beliefs about the environmental controversy.

The interviews ranged from 1.5-4 hours and were audio-recorded on a digital recorder. In addition, copious field notes were taken during interviews and other site visits. After the interviews were completed, the data was then transcribed from notes and recordings. I used a coding process that identified key themes that emerged in the data. I began with a line-by-line coding of key words and phrases. This resulted in a list of

several key concepts that were grouped into major thematic themes (i.e., health concerns, community attachment, economic concerns, etc). The transcripts were supplemented with hand written notes made during the interviews.

OBSERVATION

In addition to in-depth interviews, I also conducted non-participant observation in the communities impacted by environmental hazards. During the course of data collection, I made numerous research trips to the area and spent several days in Tar Creek Basin communities including Picher, Cardin, Commerce, and Quapaw to get a better understanding of the locale's history, its citizens, and the area's environmental problems. These observations of local residents in their natural settings provided me keen insight into the processes shaping divergent interpretations of environmental hazards (Lofland and Lofland 1984). It also afforded me a great understanding of the emergence and continuation of community factionalism, which continues to plague these communities.

The non-participant observation method afforded me the opportunity to attend community meetings, frequent several Monday night music jams in the pool hall, and spend numerous hours in coffee shops and other gathering places talking informally to local residents about environmental hazards and the future prospects of the community. A central goal of qualitative research is to understand people in their real life, or naturalistic, setting (Lincoln and Guba 1985). Non-participant observation thus proved to be an ideal method for studying the attitudes and behaviors of residents living in the Tar Creek Basin.

DOCUMENT ANALYSIS

Due to the exploratory nature of the project, document analysis proved to be an invaluable source of information. I reviewed countless government documents on the case, including annual and five-year reviews by the Environmental Protection Agency. In addition, I reviewed research studies on the environmental health impacts associated with environmental hazards. Importantly, I reviewed over 300 newspaper articles from the *Tulsa World* written over a 15 year period. This information was critical in providing the historical context for the case and for developing a timeline of events (see Appendix for a timeline). In addition, data from documents proved to be invaluable in supplementing data from in-depth interviews and non-participant observation.

CHAPTER CONCLUSION

As indicated in this chapter, I utilized several qualitative techniques to gather data on the Tar Creek environmental controversy. Data collection spanned several years and included in-depth interviews, non-participant observation and document analysis. The primary data reported in this dissertation come from in-depth interviews with 50 respondents conducted during two different waves. This data was supplemented with numerous research visits conducted over several years and from analysis of relevant documents, particularly newspaper coverage of the case. This longitudinal approach allowed me to track the changes in the community as they occurred between 2001 and 2008.

CHAPTER IV

COMMUNITY CONTEXT:

ENVIRONMENTAL LEGACIES IN THE TAR CREEK BASIN

In this chapter I provide a brief overview of the Tar Creek Basin. I discuss the historical and economic importance of mining for the area's history. I then discuss some of some of the most critical environmental hazards and health complains that have been raised over the years. For a detailed chronology of the environmental history of the Tar Creek Basin please see Appendix One. Finally, I discuss some of the basic demographic characteristics of the Tar Creek Basin.

THE IMPORTANCE OF MINING IN THE TAR CREEK BASIN

Commercial mining for lead and zinc began in northeastern Oklahoma in 1891, although mining operations in the region date back even further. Mining operations in the Tri-State mining district (Kansas, Oklahoma, and Missouri) actually date back to the early Spaniard exploiters of minerals in the New World. The earliest lead deposits in the area were mined in the Missouri part of the Tri-state district because those deposits were closer to the surface than those found in Oklahoma. As a result, commercial mining began in Missouri in the mid-1850s with Joplin, Missouri serving as the hub of mining operations during that time period. In approximately 1891, mining operations began moving into Oklahoma (Gibson 1982).

By the mid-1890s, mining camp operations were established throughout the northeastern corner of Oklahoma. Lead was first discovered in the area now known as Picher, Oklahoma in 1914 and a thriving community soon emerged around the newly discovered mining activity. Picher quickly became a hub of mining activity not only because of the abundance of lead ore, but also because of its geographical location relative to the other surrounding mines in the area. In addition to the actual mines, Picher became a central location for housing mills for milling the mining ore from the surrounding sites (Gibson 1982; Kennedy 2002).

While a variety of mining techniques were utilized during operations, the primary method of mining used in the region was referred to as the “room-and-pillar method.” In this mining process, miners would sink shafts straight down into the ground to begin blasting with dynamite. The ore loosened by the blast was then raised by large buckets to the surface and hauled to the mill. As the loose ore was removed, “rooms” gradually began to emerge in the lead and ore formations below. These rooms eventually turned into huge caverns that were several hundred feet in depth and continued for miles. During the mining operations, miners would intentionally blast and dig around certain areas leaving large support pillars, or piers, in the caverns simply by removing the ore from around them. Often the pillars rose over 300 feet to the ceiling as the miners continued to enlarge the caverns and dig around the pillars. A long-time resident from the Tar Creek basin commented on the extent of the underground mines, “They say you could walk from Picher to Joplin underground before the shafts flooded.” These “rooms” and “pillars” play an important role in the complex environmental issues concerning Picher today (Kennedy 2002).

Mining operations continued in Picher and the surrounding region for nearly eighty years before mining operations ceased altogether in 1970. During those eight decades of commercial mining, hundreds of companies conducted mining operations in the region, making northeastern Oklahoma one of the largest producers of lead in the United States (Gibson 1982). The economic benefits of mining operations in the region made Picher, the epicenter of the region, a "boomtown." During the peak of operations, the population of Picher ranged from 25,000 to 40,000 people. Long time residents in the region and third generation "Picherites" described how the downtown area was full of shops and restaurants.

By the mid-1950s, mining operations were beginning to decline in the region as prices for imported lead and zinc were undercutting American production prices. Most notably, the largest mining company operating in the region, Eagle-Picher, shifted most of their operations out of the area (Gibson 1982). As a consequence of the declining mining operations, many jobs started to be lost in the area. While some miners followed the mining companies to other regions to continue working in the industry, many others stayed in northeastern Oklahoma and sought alternative employment. Many former miners went to work at the Goodyear Tire plant located in Miami, Oklahoma and Eagle-Picher continued to operate a mill for other mining companies until 1970. In addition to the closure of all mining activities in 1970s, the Goodyear Tire plant also closed in the mid-1980s (Kennedy 2002). The region has never recovered economically from the loss of mining operations.

HEALTH AND ENVIRONMENTAL LEGACIES

The eighty years of mining operations in the Tar Creek Basin left behind a legacy of environmental hazards for the region. The most obvious signs of environmental degradation are the huge mountains of mining waste, commonly referred to as "chat." There is an estimated 75,000,000 tons of mining waste, or chat, piled up within the Tar Creek Basin. These chat piles are saturated with lead and other heavy metals, as the dust from these waste piles continuously spreads throughout the surrounding communities. In addition to the spreading of contamination through wind and natural processes, the chat has been further spread through its use in the asphalt. Furthermore, many residents have used the chat for local driveways and other local construction projects around their homes for decades (Shriver and Kennedy 2005).

In addition to the lead and zinc dust, the heavy metal discharge from the mine shafts contaminated many tailing ponds, as well as the Tar Creek. Moreover, there are serious environmental concerns related to subsidence, or cave-ins. During the eighty years that lead and zinc were being mined in the Tri-State area, the entire area was undermined to depths as deep as four hundred feet. The room and pillar method was utilized whereby large rooms were carved out below ground. Pillars were intentionally mined around so they might support and stabilize the overhead. As mining operations wound down, the pillars were "high graded," removed as the last remaining ore bearing materials thereby removing the supports. Today open caverns exist under communities, public highways, schools, and playgrounds. The caverns have filled with water over the years since mining ceased and there is some cause for concern that the bedrock is becoming unstable and increasingly susceptible to give way.

These environmental hazards have been linked to environmental health concerns. While concerns over health received public attention during the past two decades, there has actually been a long history of health concerns related to mining operations. Ottawa County, which houses the Tar Creek Basin, long had the highest rate of tuberculosis mortality rate in the United States (Nieberding 1983). In fact, concerns over miners' health date back to at least 1923, when a clinic was opened for miners to receive annual physical exams. During these early days of mining, health nurses went into homes to check miners' health and they tracked the health conditions of children in area schools (Nieberding 1983).

The seriousness of environmental hazards in Tar Creek have been formally acknowledged by the U.S. Government. In 1983, the area was placed on the Environmental Protection Agency's (EPA) Superfund list, officially marking it as one of the country's most contaminated sites. Over \$120 million has been spent on environmental cleanup around Picher, but environmental contamination problems continue to plague the community. Some of the chat piles have been removed, but most still remain in the area. The EPA has spent millions of dollars remediating residential yards, only to find them re-contaminated from airborne particles within a few months. There are ongoing efforts to recoup some of the costs of cleanup from several of the largest companies that formerly mined the area, but most these businesses are either bankrupt or have been closed for many years. The Environmental Protection Agency is covering the vast majority of the cleanup costs (Shriver and Kennedy 2005).

While the Tar Creek Basin was placed on the Environmental Protection Agency's Superfund list in 1983, serious concerns over health did not emerge until much later.

Most of the concerns have centered on the health impacts on smaller children and high blood lead levels have been particularly acute for this population. In 1988, the EPA reported that the percentage of children with elevated blood lead levels in the area was the highest among all of the Superfund sites (Schafer 2002a, p. A1).

Since 1994 several research studies have validated health concerns among the public and environmental health professionals. For example, a 1994 health study of children participating in the Department of Agriculture's Women, Infants, and Children Program found that 34 percent of 192 Native American children tested in the Tar Creek Superfund site had BLLs in excess of ATSDR's recommended standard. In 1994, EPA sampled residential properties and high access areas frequented by children – such as day-care centers, playgrounds, and schoolyards. Their findings indicated that 97 percent of Picher homes contained lead, the majority exceeding by a factor of ten the limit recommended by the Department of Housing and Urban Development. As a result, the EPA declared soil lead contamination as a significant risk to human health (Shriver et al. 2008).

In 1995 the Cherokee Volunteer Society Members instituted a high school service learning program that engaged students in community work to inform residents of the dangers of lead exposures and initiated Toxic Tours. They produced a study finding elevated BLLs among 32 percent of area children (Schafer 2003a, p. A1). A 1996 study by Tribal Efforts Against Lead (TEAL) found elevated BLLs among 43 percent of area children (Pearson 2003a, p. G5). A 1998 ATSDR study found that 24 percent of the children in Picher, Cardin, and Hockerville had elevated BLLs, the highest percentage among all Superfund sites (Pearson 2003a, p. G5; Schafer 2002a, p. A1). EPA initiated a

new public education campaign on the dangers of lead exposure to children and targeted an additional 1,300 homes for soil removal (Shriver et al. 2008).

In 2001, then Governor Frank Keating proposed a federally funded buyout and relocation of Picher-Cardin residents and conversion of the area to a wetland (Myers 2001). He asked the EPA to conduct a feasibility study of the plan that potentially affected about 1,800 people, 800 homes, and 50 businesses and churches. In 2002, Governor Keating took preliminary steps to file suit against the US government for financial damages and assistance to families volunteering to relocate. The EPA's 2003 technical feasibility report, however, only supported a portion of the former governor's proposal, advocating only a *voluntary* relocation of Picher and Cardin residents. The report cited the US Army Corp of Engineers' estimate that the voluntary buyout and relocation of Picher and Cardin residents would cost about \$43 million, compared to \$118 million for the governor's proposal. A poll by the *Tulsa World* newspaper found that 85 percent of Picher/Cardin residents preferred the voluntary buyout/relocation plan over seemingly endless remediation as a remedy for avoiding further health risks (Schafer 2003c; Shriver et al. 2008). A local pediatrician and toxicologist stated: "They need to figure out what to do over the long term regarding the environmental issues, but for now, I say get the people out" (Pearson 2003a p. G5). A detailed chronology of environmental hazards is listed in Appendix One.

COMMUNITY DEMOGRAPHICS

Although the Tri-State mining region includes portions of Kansas, Missouri, and Oklahoma, the forty square mile Tar Creek Superfund site is located primarily in Ottawa

County. The Superfund site is in the northeastern corner of the county. Ottawa County is one of seventy counties in Oklahoma. The population of Ottawa County of 33,026 is relatively poor: 17.8 percent of the population lives below the poverty line, compared to the 14.5 percent state average. The county has higher unemployment rates, higher child poverty rates, more single female-headed families living in poverty, more individuals aged 65 and older, and more disabled than state averages. The population is mostly white, but 17 percent claim Native American heritage, compared to 8 percent across the state (www.quickfacts.census.gov/qfd/states/40/40115.html). Table 2 shows the demographic information for Ottawa County compared to the state of Oklahoma

Table 2. Population Overview Ottawa County Compared to Oklahoma

	Ottawa County	Oklahoma
Population Overview		
Population, 2006	33,026	3,579,212
Percentage Change in Population, 2000-2006	-0.5%	3.7%
Persons under 5 years old, 2006	6.2%	7.1%
Persons under 18 years old, 2006	24.4%	25.0%
Persons 65 years old and over, 2006	16.5%	13.2%
Female Persons, 2006	51.3%	50.7%
White Persons, 2006	74.4%	78.3%
Black Persons, 2006	1.0%	7.8%
American Indian, 2006	16.4%	8.0%
High School Graduates, percent of persons age 25+, 2006	75.7%	80.6%
Bachelor's Degree or Higher, percent of persons 25+, 2006	12.2%	20.3%

Source: U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Non-employer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report. Last Revised: Wednesday, 02-Jan-2008 15:10:24 EST (retrieved May 6, 2008)

A brief demographic overview of Ottawa County indicates that the socioeconomic background of the area is considerably lower than the rest of the state. Many residents in Ottawa County live below the poverty line and their education levels fall below Oklahoma state averages. In addition, the proportion of older residents (age 65 and

older) is considerably higher than the rest of the state. Importantly, while the state of Oklahoma has experienced modest population increases over the past several years (3.7 percent), Ottawa County has experienced population decline (-0.5 percent). The changes in population are likely linked to the environmental hazards and the attempts by many residents to relocate outside the area.

CHAPTER CONCLUSION

This brief overview of the Tar Creek Basin illustrates the economic and historical importance of mining to the region. In addition, it profiles many of the ongoing environmental problems associated with this mining legacy. While the Tar Creek Basin was placed on the Environmental Protection Agency's Superfund list in 1983, health concerns did not emerge until much later. Since 1994 residents and health professionals have been documenting the health impacts associated with environmental exposures, especially those related to lead contamination. Finally, I provided a brief overview of community demographics, focusing on Ottawa County, which houses the Tar Creek Basin.

CHAPTER V

ANALYSIS

In this chapter, I analyze data gathered over a six year period, including government and historical documents, in-depth interviews and observation. I begin the chapter with an overview of residents' general perceptions of environmental hazards in Tar Creek. Next, I examine contested environmental illness in the community focusing on lead exposures, official accounts of environmental harm and residents' conflicting interpretations of health impacts. Finally, I outline the corrosive community impacts associated with environmental hazards in Tar Creek, focusing on community dissension and factionalism, emotional distress, economic impacts and the loss of community.

Throughout my analysis I draw insights from the ecological-symbolic perspective, which acknowledges the objective reality of environmental problems while emphasizing the interpretative processes associated with such conditions. The ecological-symbolic perspective provides an analytic framework for studying various community responses to environmental hazards within communities (Couch and Kroll-Smith 1994; Kroll-Smith and Couch 1993; Gunter and Kroll-Smith 2007). Drawing from the ecological symbolic perspective, I identify and explain numerous factors that contribute to the emergence of community dissension in Tar Creek, including competing interpretations of environmental hazards, the ambiguity of harm, scientific uncertainty, contested illness claims and contradictory sources of information.

PERCEPTIONS OF ENVIRONMENTAL HAZARDS IN TAR CREEK

I begin my analysis with a brief overview of residents' perceptions of environmental hazards in Tar Creek. As described in Chapter 4, there is a substantial amount of information regarding environmental hazards in the area. Documented evidence of environmental hazards dates back to 1979 when water discharging from the abandoned mineshafts began migrating into Tar Creek, literally turning the creek *orange* from contamination. The US Government officially acknowledges that the Tar Creek site is one of the most contaminated sites in the country, having placed it on the EPA Superfund list since 1983. Furthermore, the area was previously listed as the EPA's number one Superfund site. Despite these seemingly objective indicators of environmental contamination, not all residents agree that living in Tar Creek poses a serious threat to the community or to human health. I examine concerned residents' accounts of environmental hazards, as well as the counter-claims made by a group of unconcerned Tar Creek Basin residents.

The majority of Tar Creek residents expressed concerns over environmental hazards in their community. Most residents in Tar Creek have lived in the area for years and were thus accustomed to the large chat piles that litter the surrounding area. As a result, most were shocked to learn that their "Picher Mountains" could also be the source of contamination. A long-term resident explained, "No, initially there wasn't concern about the chat piles." As a result, many residents continued to use the chat piles for recreational purposes. A resident explained how he took an Atlanta based doctor on a tour of the chat piles to verify some residents' continued use of chat piles for recreational purposes,

... I took him on a tour one weekend when we had about four thousand dune buggy and motorcycle riders on the chat piles. That happened every weekend. People would camp and ride the dune buggies and everything. Those people were stirring up the dust. They went over the country. You couldn't keep a fence up. They would carry cutters right with them and when they ran into a fence they would just cut it and go in. The Sheriff wouldn't do anything about it and finally we got a new sheriff and he put his foot down and started arresting people.

Over time, however, increasing numbers of residents became concerned about contamination from the chat piles. In addition to dust blowing directly from the piles of waste, residents believe that they are being contaminated from the "remediated" materials that have not been handled properly. According to a 2003 *Tulsa World* article, "In an area called the repository, just south of Cardin in extreme northeastern Oklahoma, dump trucks have unloaded acres of former lawns and gardens. The soil is laced with the poisonous heavy metals that pollute much of the area. Area residents say the remains of the old lawns, left out in the open, dry each spring and blow back toward the towns of Cardin and Picher in the center of the site in northern Ottawa County." (Schaefer 2003c, p. A1). Thus, concerned residents believe that the failed remediation efforts are exacerbating the toxic conditions in which they live.

As additional information became available, many residents became concerned about their own health and the health of their children and other family members. Residents expressed the greatest concern over children's health and the possible learning disabilities. A school administrator described the impacts on children,

...after the water changed, I saw what was a change. It was harder for the kids to learn. Their demeanor changed and I kept wondering why. I was the counselor at Miami for twenty five years and I saw the children change virtually before my eyes. When you have been at one school and have seen and worked with the children there and how they interact and behave and learn then it becomes apparent when you go to another school and there are tremendous differences in the demeanor of the two groups.”

Another resident added this statement on the children,

Of course, my focus and concern has been the kids. And if you look at some of the characteristics or the symptoms of lead contamination I came to the conclusion once this started being released back in the late 90’s that when you look at some of our students and the amount of repetitions they require to comprehend things, certainly lead contamination cannot be dismissed as a possible contributor to their condition.

A special education teacher reflected, “My first realization that something was wrong was when I came back as a special ed teacher for...I was the director for three schools Picher, Commerce, and Quapaw. I have spent years in this school district and when everything I learned at the undergraduate level didn’t stick or, so I guess is the best way to put it, I didn’t have a clue and obviously I wasn’t bright enough to figure it out. I just thought there must be something wrong. There must be something the matter and I just don’t have a clue what it is.”

Concerns about environmental hazards in the Tar Creek Basin are not limited solely to concerns for children residing in the area. One respondent attempted to expand

the scope of concern about environmental degradation by stating, “Well, you know my concern was from the fact that my mother passed away from unusual circumstances. Uh, she had been in excellent health all of her life and all of a sudden developed a very strange kidney disease. And that eventually led to all kinds of problems. Grant you she was elderly, but she was in excellent condition.”

Concerned residents initially developed concerns associated with contamination from the chat piles. These issues were later translated into broader concerns over health and health-related impacts, particularly as they affected area children (See Gillham 2004b). Most recently, concerned residents have expanded their issues to include broader quality of life issues associated with environmental hazards in Tar Creek. This perspective is reflected in this recent illustrative quote from a concerned resident living in Picher,

I’ll just be honest, my main priority is the people and families that are living here whether they’re Indian or not, it’s irrelevant to me. I just want those people who are trying to raise a family have the opportunity to do so in an environmentally safe place. Once these people are gone, what’s done with the land that remains here is another thing to be decided.

Despite the concerns raised by many Tar Creek residents over the six-years of data collection, a substantial minority of residents believe that environmental hazards have been exaggerated in the Tar Creek basin. As evidence of this perspective, some respondents referred to healthy older residents living in the community. For example, an unconcerned respondent recently suggested, "I sure don’t believe the area is harmful. I am going to be honest with you. I really don’t. And, it goes to show you that when

you've got seventy to eighty year old people living around here. And if it was going to be bad, why wasn't it bad when the mining was going on?" Other unconcerned residents cited their own good health. A respondent noted, "Well, myself. I'm not. I grew up here and I've never had any real health problems. And, like I say, I raised all four of my children here and they've not had any health problems. I've not really seen any health problems because of the lead." Another respondent noted with a hint of sarcasm,

I'm not a bit concerned with the environment here. What's done is done. I've already been eaten up with the lead. Look at me, don't I look like I've been affected. We use to play on the chat piles when we were kids. Hell. We might go up there and play tonight. How come nobody wanted to move until the money issue came up? Before that nobody wanted to move. The dollar sign makes the world go around.

Another older respondent cited his own health and recalled his work in the mines,

I used to swim in the fine ponds. All of the kids did. And I worked in the mill where the dust was heavy and I worked forty five years for Eagle Picher and I didn't have any problem. Still don't have any problems. But you know, every time somebody dies they blame it on that. I haven't seen any kids that are retarded. You can go to any town and find three or four kids that are slow learners. And that is what it amounted to there. We didn't have maybe two or three that was slow learners. They would have been slow learners wherever they went to school. It wasn't any affect of the lead. You talk to anybody that lived there as long as we did and they will give you the same story.

Residents in the Tar Creek basin have conflicting interpretations of what have been seemingly objective environmental conditions. The majority of residents expressed serious concerns over environmental contamination and most believe they are living in a "toxic community"(see Gillham 2004c). However, a substantial minority of residents continue to believe that environmental hazards are being exaggerated. While there is general disagreement within the community over the general interpretation of environmental contamination, the most serious conflicts center on the environmental health impacts. In the next section, I address contested environmental illness claims in the Tar Creek basin.

CONTESTED ENVIRONMENTAL ILLNESS IN TAR CREEK

Given the documented evidence of environmental hazards in Tar Creek, many residents have questioned the linkages between environmental exposures and health impacts. As described in the literature review [Chapter Two], contested environmental illness often takes two different forms: presumptive versus known diseases (Brown et al 2001; Brown et al 2002). In cases of presumptive disease, the condition itself is contested. An example is Gulf War illness, where the government and the medical establishment have refused to diagnose or even acknowledge the disease or condition exists. Known diseases, in contrast, are those that are accepted by the medical establishment and other governing bodies. Such is the case with lead exposures. There is substantial scientific and medical literature documenting the links between lead exposure and health problems (Schaidler et al., 2007; *Health and Medicine Week*, 2004).

I first examine the known health effects of lead exposure. I then examine how, despite this evidence, claims of illness have been contested by residents and government regulatory agencies in Tar Creek. Finally, I outline conflicting resident accounts of health and illness problems associated with lead and other contaminants.

Lead Exposure and Health

Lead mining has been the source of extensive environmental damage and health hazards. Mines closed by abandonment pose particular hazards, including acid mine drainage, as well as the physical dangers of open mine shafts, drilling holes, and subsidence. The known health affects associated with lead exposure are extensive. Lead contamination has been associated with impaired memory, hypertension, hearing problems and weakened immune systems (Shriver, Cable, and Kennedy 2008). Lead contamination is particularly harmful for fetuses and young children. It has been associated with premature births, lowered birth weights and permanent neurological damages which include learning disabilities, decreased mental function, and lowered growth and development (Environmental Protection Agency 1995).

Lead was mined in the Tar Creek Basin over a period covering roughly three quarters of a century. A large portion of the ore mined throughout the mining district was transported to the Picher/Cardin area because that is where many mills were centrally located. When mining operations ceased in 1970, the mills were loaded and transported to New Mexico for mining uranium. Subsequently, the landscape in and around Picher/Cardin was left with the toxic remains of mountainous ore waste piles. The chat piles are laced with lead and other heavy metal residues that have continued to blow

indiscriminately with the prevailing winds and mix with rainwater to filter down through the piles themselves creating an acid water discharge.

For decades, the residents in the Picher/Cardin communities were unaware of the dangers posed by the piles of waste which they affectionately referred to as the "Picher Mountains." They used the mining waste for paving their driveways, alleys, city streets, country roads and even used some of the waste as sand box material for local children. In addition, area residents also used the Picher Mountains as a source of entertainment and recreation, hosting cookouts and family gatherings near the peaks of the waste. In addition to the actual chat piles, floatation ponds that had once provided water for washing the ore during the milling process were utilized by the residents as wading and swimming pools. The combination of contamination from the chat piles and the floatation ponds exposed local residents to multiple environmental hazards.

Interestingly, the EPA's decision to designate the Tar Creek Basin as the nation's number one Superfund site was not based on lead exposures. In 1979, after being neglected for years, the mineshafts began to discharge rust colored acid mine water into Tar Creek, which ultimately connected into the Spring River and eventually to the Grand Lake of the Cherokees. This same acid water contaminated the Boone Aquifer and threatened to contaminate the underlying Roubidoux Aquifer which supplies the entire area with drinking water. In 1980, Oklahoma governor George Nigh appointed a task force to investigate Tar Creek's acid mine discharge and that body issued its report to the EPA Regional Office. In 1983, the EPA designated an entire 40 square mile area as the agency's first Superfund site, identifying threats from: widespread water and soil contamination; physical hazards associated with mine shafts and drill holes that

threatened subsidence; and alteration of the watershed that contributed to drainage problems and frequent flooding (Pearson 2001) The agency's report listed lead, cadmium and zinc as the principal pollutants and lead-contaminated soils and chat piles as the major exposure sources (Shriver et al 2008).

Infants and children are particularly vulnerable to lead toxicity. Children absorb lead more readily and they are far more likely to inhale lead on the ground and floor. Lead contamination for children continues to be a serious concern throughout the United States. For example, lead toxicity affects an estimated 890,000 preschoolers and low-income families are particularly affected by such exposures. Children from poor families are eight times more likely to be poisoned by lead than children from higher-income families (www.atsdr.cdc.gov/toxprofiles/phs13.html; Shriver, et al. 2008).

The Tar Creek Basin had been a Superfund site a full ten years before serious concerns over elevated blood lead levels were initiated in 1993. The Indian Health Service, a branch of the US Public Health Service, conducted blood lead studies on children in the Picher School district. This study found that nearly forty percent of the children attending Picher School had blood lead levels far higher than the EPA allowable threshold. In a letter dated January 21, 1994 the Field Sanitarian for the Indian Health Service notified the EPA Remedial Project Manager for Oklahoma and Texas that:

Approximately 34% (66 of the total 192) of the people tested for blood lead have had a 10 ug/dl or higher blood lead level. Of these 66 children 4% are above 20 ug/dl. Most of the individuals tested are participants of the WIC program (EPA 1994 Appendix F).

The IHS notification prompted the EPA District 6, which includes Oklahoma but not Kansas (EPA District 7), to begin testing residential yards for lead contamination.

But, the EPA five-year report of 1994 states,

Additional information on mining wastes on the land surface has been provided by EPA Region 7. Investigations of the Cherokee County Superfund Site, which represents the Kansas portion of the Tri-State mining district, indicate that mining wastes in Kansas contain elevated levels of lead and cadmium as high as 13,000 ppm and 540 ppm, respectively. These types of wastes were not significantly investigated during the Tar Creek Remedial Investigation, as the focus at that time was on water quality.

The U.S. Public Health Service's Indian Health Service has recently informed EPA that 34% of 192 Native American children tested had blood lead levels in excess of the 10 g/dl standard. An investigation should be conducted to evaluate the impact of mining wastes, i.e., chat piles and floatation ponds, on human health and the environment and whether additional remedial action is needed (EPA 1994 p. v).

After extensive research, it was *initially* determined that 300 residential yards in the Tar Creek Basin would require complete remediation, which entailed digging down 12-18 inches into the residential top soils and removing those soils to a holding area south of Cardin. The yards were then filled in with 8-14 inches of clay which was then topped with 4 inches of top soil. It was later determined additional residential yards were in need of remediation. In the end, approximately 2200 residential yards were remediated in the Tar Creek Basin. Despite the remediation efforts by the EPA and their subcontractors, many residents were angered with the conditions of their remediated properties. As a result, the EPA's actions served to further disenfranchise area residents. In the next section I discuss agency reports and ambiguous health issues encountered in Tar Creek. I then address resident's competing/conflicting accounts of health and illness.

Agency Reports, Official Information and Ambiguity over Health

The initial studies on lead contamination in Tar Creek shocked many local residents, who had previously been unaware of the direct health impacts associated with the environmental hazards in the area. While some residents have remained unconcerned over the health impacts, a substantial proportion of the community continue to express concern and even anger over the potential health threats. Thus, there continues to be conflicting interpretations of health impacts. My findings suggest that these differences are grounded, at least in part, in the ambiguity and uncertainty being fostered by official government accounts and news sources on contamination.

Residents have been bombarded with mixed messages regarding remediation efforts and health impacts associated with contamination. While health studies by agencies such as the Indian Health Studies and CDC indicate serious links between hazards and environmental health, various official government reports continue to indicate progress and improvement at the Superfund site. The Environmental Protection Agency, for example, continues to suggest steady progress in the clean up efforts.

Various government documents and reports also indicate positive improvements. For example, a five-year report from the EPA in 2000 noted, "A review of the residential remedial action currently in progress led to the following conclusions:

1. The EPA's current remediation of the residential areas of OU [Operational Unit] 2 which started as a removal action and which continues as a remedial action is eliminating the risks associated with exposure to mining-waste-contaminated soil.

2. Risks are also being addressed through supplemental health education efforts." (EPA 2000 p. 36)

Similarly, the summary report from next EPA five-year review in 2005 stated, "The remedies implemented for the Tar Creek site are protective of human health and the environment in the short term. The Operable Unit (OU) 1 remedy addressed the primary route of potential human exposure by protecting the Roubidoux Aquifer, and, in this way preventing the possibility that hazardous substances would be ingested in drinking water. Although acid mine water continues to discharge into Tar Creek, the remedial actions performed appear to be functioning as designed, and the site has been maintained appropriately. No deficiencies were noted that currently impact the protectiveness of the remedy, although several issues were identified that require further action to ensure the continued protectiveness of the remedy." (EPA 2005 p. 60).

The third five-year review also reported favorably on Operable Unit OU2 which addressed remediation of residential yards in the Tar Creek Superfund site. "In the remediated areas, the remedy being implemented for OU2 is protective of human health and the environment. A total of 2,072 [properties] have been remediated. Additional properties continue to be identified and remediated. Human health and the environment are being protected by the remedy for OU2" (EPA 2005 p. 60).

Furthermore, public comments by EPA representatives offer reassurances to community residents and foster greater ambiguity over the cleanup effort and the potential for exposures. For example, there have been extensive concerns raised over the handling of contaminated soils. Some of the contaminated soils that were removed from residential yards were moved to the outskirts of the Tar Creek site for disposal.

However, residents argue that these contaminated materials have remained uncovered for years and have effectively recontaminated the area. In response, the EPA project manager for yard remediation stated in the *Tulsa World*, "No, it's not a threat to blow. Much of the questioned repository has been capped, preventing dust contamination." He went on to explain how natural processes are protecting the community from additional contamination, "Grass started growing atop the repository to help bond the tainted soil and keep it from blowing back into the communities...At the end of the project, we will be putting a permanent cap on it" (Schaefer 2003c, p. A1).

Thus, despite alarming health studies by the Indian Health Services and other independent agencies and the growing concerns over environmental hazards and health impacts, the Environmental Protection Agency has continued to emphasize the progress being made in the cleanup efforts. The official documents of these federal agencies continually reassure that health problems are being held in check. My findings indicated that these *mixed messages* have contributed to conflicting interpretations of environmental harms in the community.

Competing/Conflicting Residents Accounts for Health & Illness

In this section I highlight how confusion and ambiguity over health impacts has been expressed by community residents. As previously indicated, most residents continue to express concern over health consequences. Many residents emphasized the health of young children, but some recognized the links between exposures and adult health as well. Referring to various health reports she has read about exposures in Tar Creek, a resident described her concerns over young children, "I'm sure that during your research you've heard age 0-6 or from the womb to age 6 is so critical for the cognitive

development. If there's some hand to mouth action where the lead is actually ingested it could be devastating to that development during those critical years. Here recently, in recent years there's been some concern about breathing in the lead dust and stuff. I think there are a lot of things not known about the contaminants." While the respondent remained most concerned about the health of young children based on the reports she has read, she also noted the possible negative effects on adults, "It wouldn't surprise me if some of these contaminants affect adults as well. I mean I don't think you are out of the woods just because you turned seven years old."

Other residents concurred with these concerns with younger and older populations within the community. A respondent offered this lay assessment of the health impacts and noted that the older generations are largely being ignored by the official agencies involved in the remediation efforts,

It's unsubstantiated but let me put this too you. We have a fairly high Native American population up here but not real high. Nine different tribes up here. This is kind of a melting pot up here. But Miami sustains two [three] kidney dialysis centers, for kidney disease. Joplin, Missouri has only one for which is a town of 70,000. Why do we have such high incidents of kidney disease here? People with kidney disease who don't have diabetes. Speaking of people who've died of lung cancer and never smoked. My good friend here, [name], she was old 77 years old when she passed away, but bless her heart she never smoked a day in her life. But, she did live next to a chat pile all of her life here in Picher. Born here,

grew up here and lived all of her life here. There's a health issue here that officials with elderly people are not even looking at.

Several residents noted how the Environmental Protection Agency failed to identify critical health impacts associated with lead and other contaminants at the Superfund site. For example, a concerned resident described how health concerns were initiated by the Indian Health Service, *rather* than the EPA which was the official agency in charge of the remediation of the Superfund site. "In 1993, that was the beginning...It began with some people at the Indian Health Service who were just talking one day and all thought that the blood level testing would be a good idea since there was so much degradation in the area. It's not just the chat piles in Picher; it is Tar Creek pouring out tainted water. It is the wind blowing the heavy metal contaminated dust off the chat piles to the four directions of the wind." Many residents now believe that a larger geographical region is being negatively affected by the toxins. A resident explained,

"What is safe? My message is that the larger area is in danger, not just Picher and Cardin....This is not just a Superfund site-it is people's lives and their health and welfare that we are talking about."

Many residents scoffed at the official reports indicating "progress" in the cleanup efforts and statistics suggesting "improved" lead levels. Furthermore, they question the veracity of such claims. A respondent stated, "This place is gone! It's unhealthy! ...They've got to deal with the issue of the children out here at this school. When they say, and they lied about this, in 1997, when they done it, it was probably the truth. Twenty-four percent of the children had high excessive high lead level. They come back in 2000 and retested people. And they're not testing the same kids. They test *other*

kids." The respondent then described how additional community populations were added to the "official data" to "water down" the results,

They add Miami. They add Quapaw. They add Commerce. And they add Wyandotte in there. Now, these places don't have near the problems we got. So now it waters us down and brings us down to 12%. Even if that was a true figure 12% is still higher than the national average. It's *not* a true figure! They didn't just give the Picher-Cardin area. They put all these other towns in with it.

Another common narrative regarding health impacts among concerned residents was the fact that environmental conditions were continually worsening in the community. A long-time resident described his own background in the community and then explained how environmental conditions were deteriorating for the younger population today,

My main concern, priority wise, is the health of these children having high blood-lead levels. Now everybody asks the questions. "Well, I grew up here and all this." Me personally, I was the valedictorian of my high school class was a national science foundation scholarship winner. Went to summer school on an advanced math and science deal. Went to one of the most prestigious metallurgist schools in the United States. Got my bachelor's degree. Went to Vietnam, got shot at, came back and got my master's degree. People ask about a lot of us older people, "Why aren't you affected?" Well, the reason we're not affected is the lead and so forth is not in the same state as it was back in those days. It's a lot more easily

airborne, it's a...a major portion of it is water soluble now. And it'll just blow like flour now. The situation is different now.

While there are numerous factors involved in residents' health and pollution concerns, the most salient issue clearly surrounds children's lead contamination. During a 2003 town meeting with Senator Don Nickles, residents on both sides of the debate expressed their concerns with the situation in Tar Creek. Concerned residents explained that some of their children tested positive for lead contamination despite the parents following the EPA guidelines for cleanliness. A Picher elementary school principal argued that it has become increasingly difficult to teach young children to read. As a result, she argued that the school systems had been forced to develop innovative ways to teach basic reading and memory skills. She explained that while the typical child requires up to 25 repetitions to learn a reading lesson, nearly half of her children in Picher require 75-100 repetitions to learn the same lesson. According to the elementary school teaching, by age 12 many of the children in the school system "Hit a wall." She later added that this lead-induced damage causes many Picher children to "miss out on the American dream" (Pearson 2003, p. G6).

Despite the serious concerns raised by many residents, not everyone living around the Superfund site shared the health concerns associated with environmental hazards. While there are many reasons for these conflicting perceptions of environmental harms, at least part of variation can be explained through different interpretations of official reports and public information about the remediation efforts and the alleged health impacts. These residents tended to emphasize the ambiguous and often contradictory

reports coming out on health impacts in the community. For example, a resident explained,

There was just a recent study conducted by the CDC. There's a unit of CDC called ATSDR, which is an acronym for something which studies environmental health effects. And they just completed a study for Ottawa County in which they looked at other things, diabetes, cancer rates, and other diseases. And basically they found that there isn't [a problem]. The death rate was substantially higher but disease rates weren't. And specific diseases that weren't consistent with the rest of Oklahoma.

Thus, for this resident, the ATSDR report confirmed that health and illness rates were relatively "normal" for the area. Despite this view, the resident did acknowledge the criticism from concerned residents, "However, the argument is that they took Ottawa County as a whole rather than looking at Picher and Cardin which is what they are thinking about doing now."

While some residents such as the one just quoted offered tempered skepticism toward any negative health impacts, other residents were far more deliberate in their rejection of health and illness problems in the area. Many residents acknowledged the source of pollution (e.g., chat piles), but refused to acknowledge any negative health impacts or learning disabilities associated with exposures. For example, an outspoken resident argued,

Yes, I'm sure there's lead and stuff around. Where I live there's a chat pile 200 foot from my house. My son graduated from high school as an honor student. My daughter graduated as an all "A" valedictorian. Never

made anything under an A during her whole school. She is a member of the national honor society and she's in her third year of college. My son has graduated and he was on the honor roll in college too.

The respondent then stated succinctly, "I can say that lead hasn't affected us!" The respondent was not opposed the removal of the chat, as he thought it would improve the community's appeal, but he was adamant that lead exposures had not negatively impacted himself or his family.

Since one of the most salient concerns regarding contamination and lead exposures in Tar Creek involves the impairment of cognitive development, many unconcerned residents offered narratives dispelling these problems in the community. Many residents, such as the respondent quoted above, cited their own children as examples of the positive learning environment in the Tar Creek area. Some unconcerned residents cited other bright and educated students to illustrate exaggerated claims of illness in the community. For example, a respondent explained,

But, like I say, we never had any dumb kids in Picher. That one boy that graduated a year or two ago, he was one of two in the state with the highest possible thing that you could get. I can't remember what it was. They won some kind of award for being so smart. Apparently it didn't affect him.

The respondent then used himself as an example of how lead contamination claims have been blown out of proportion, "When I was a young boy growing up I swam in Tar Creek. I swam in all of the mill ponds. I played on all of the chat piles playing forts and stuff you know. And, just all over the place and the lead never bothered me. I came in

fourth in my class in my senior year and I didn't try at all. I could have been valedictorian. All of my sisters were valedictorians....We didn't have any dumb kids on account of lead is what I'm trying to say. You know." The respondent later cited recent reports that indicate that there are no serious problems with lead exposures, "And uh...the levels weren't excessive when they did test them...it wouldn't damage anyone's brain or anything like that. So the lead problems were supposed to be taken care of when they did the yards.

The narratives regarding a highly educated population came up repeatedly among unconcerned residents during the six years of fieldwork for this study. In an interview conducted in early 2008 a long-time Picher resident explained, "Listen, our high school has turned out more doctors and lawyers and professional people than any other school in this whole area. I can't remember one idiot that ever graduated from Picher High School." The respondent later noted, somewhat paradoxically, "Of course, there's a few of us that's kinda slow. I quit school in the eighth grade and went to work [in the mines] in the summer of 1941, before WWII. I enlisted in the Navy in 1943. I got out in '44... I finished high school in eighteen months and I just hated to walk in that door when I was just a kid." The resident then argued that the environmental hazards were largely a "political" issue in the area, "I think it's all political. It has been for years. Over around Miami, they tried to kill Picher 'cause we're getting all of that Indian money for our school system. [Name] was superintendent for years and he got all that Indian money. We never had to vote a bond until just a few years ago we built a gym. Well, you know when they was trying to shut the school down and we had a surplus of over \$350,000 last

year. We've still got one of the best school systems around. Everyone was after the money that we have."

Beyond the direct links to human health effects, many residents cited official agency reports and argued that the yard remediation project was having positive outcomes for the community. This position was summarized by this illustrative quote by a resident, "Yes I do believe yard remediation improved lives. There are people in Picher who will say that it did not and that the tests were skewed or somehow the tests were rigged, but cleaning the yards had a positive outcome as far as blood lead levels are concerned."

My findings indicate that claims of environmental illness are contested in the Tar Creek basin. Prior to the 1993 study by the Indian Health Services, residents were only concerned about the general environmental problems in their community. However, after the initial lead study came out many residents became concerned about their own health and the health of their children. While residents draw from a variety of information sources, including their own personal experiences, the conflicting reports from the media and official government sources contributed to ambiguity and confusion among residents concerning health impacts in Tar Creek. As a result, residents remain divided over their level of health concerns. A group of residents remains extremely concerned about the health and development of area children. A substantial minority of residents, however, cite their own educational success, as well as that of their children, as illustrations of a safe and healthy environment. Tar Creek residents clearly differ over their interpretations of environmental harms and health impacts. In the next section I more fully explore the corrosive elements of these environmental hazards case.

CORROSIVE COMMUNITY IMPACTS IN TAR CREEK

The presence of environmental hazards has been validated by numerous government agencies and there is substantial evidence for residents to be concerned about environmental health impacts. As discussed in the previous sections, residents vary in their interpretations of environmental exposures and health. In this section I discuss the broader community impacts associated with environmental hazards. As stated in the literature review, environmental hazards cases are often accompanied by corrosive elements (Freudenburg and Jones 1991). I discuss several of these corrosive elements, including: community factionalism and dissension, debates over the attribution of responsibility, emotional stress and anxiety, economic impacts and the general loss of community.

Community Dissension/Factionalism

Given the discrepancy in how community residents in Tar Creek perceive environmental hazards and environmental health impacts, it is not surprising that conflict and dissension has emerged in Tar Creek. Contentious conflict first emerged in 2000, after residents became aware of the seriousness of the environmental hazards and the extent of potential environmental hazards. Many residents were particularly upset that millions of dollars were being spent on what they believed to be a futile remediation effort. I discuss this early dissension and then examine the community schism that resulted.

Early Dissension over Relocation

The 1994 study on elevated blood lead levels in children living in the area signaled a turning point in the Tar Creek case. Following these test results, the EPA initiated a massive effort to remediate residential yards. The remediation efforts involved replacing the contaminated top soil with clay and new top soil. Many residents became angry with these remediation efforts, arguing that their yards had been turned into mosquito infested swamps due to water standing on the clay and topsoil mixture. Furthermore, many residents argued that the money being spent on failed remediation efforts was a waste of taxpayer dollars. As a result, a group of residents began calling for more drastic actions.

Based on the growing frustrations among many Tar Creek residents, Governor Keating initiated a Tar Creek Task Force on January 16, 2000 to study various health and environmental issues encountered in the Tar Creek Basin. In their final report to the Governor, dated October 1, 2000, the Task Force recommended the establishment "...of a world-class wetlands area and wildlife refuge within the boundaries of the Tar Creek Superfund Site that will serve as an ecological solution to the majority of the most pressing health, safety, environmental, and aesthetic concerns" (ODEQ Task Force Report to Governor Keating dated October 1, 2000 p. 2). The recommendation for the establishment of a world-class wetlands, and by extension, for a federal buyout of the area, sparked heated controversy within the community. A member of the original Task Force recalled the group's mandate,

I actually sat on the Steering Committee, at least initially. Officially, I guess I'm still on it...The original mission of the steering committee,

because I helped draw that up, was we wanted to be an agency that could disseminate information to the community because people here are not very well equipped to get information on their own. The buyout that was something that was really originally proposed by Governor Keating back in 2000. I think he released the Tar Creek Basin Report or whatever it was officially called and part of that called for this area to become a wetlands. For that to happen, people were going to have to be relocated. And, uh, one of the particular options for that was to buy people out.

The respondent then explained that his central role on the committee was to ensure that residents had some feasible options. According to the respondent, "My purpose or objective was to get information out. I was certainly in favor of some options. My whole deal with this whole mess was that people will be afforded some options to look at, some fair options for the people. Relocating the entire community never did really have a legitimate chance for whatever reason."

Following the official recommendations by Governor Keating's Task Force community dissension continued to escalate. Many residents immediately supported the wetlands options and saw it as an opportunity to receive federal assistance for relocation away from the environmental hazards. Other residents perceived these recommendations as a threat to their homes and their community.

Community Schism and the Wetlands Debate

Eventually, the community became divided into two competing camps. Residents supporting the federal buyout and wetlands option emerged from the original Tar Creek Task Force initiated by Governor Keating which had called for the world-class

wetlands. While the original intent had been to form a Steering Committee with wide "representation" from the entire community, it quickly evolved into a local citizens group actively supporting a federal buyout of the community. The Steering Committee included a core group of approximately 20 members, but the group claimed to represent the "vast majority" of the local population.

While the Steering Committee stated publicly that it was open to "all residents," including those residents that opposed an organized relocation campaign, the residents interviewed for this research understood that the Steering Committee's central mission was to promote relocation at all costs. The Steering Committee generally represented working age residents in the community, including many residents with small children. The position of the Steering Committee was best illustrated by one its founding members, who explained,

They had already spent over one hundred million dollars on this place and hadn't accomplished a thing that they set out to do. They could have bought us out and been done with it. If there weren't any people living here, it would not be disastrous to human health, pure and simple!

While the Steering Committee's primary objective was to support and promote relocation, a second group of residents coalesced around the effort to keep the community of Picher in its current location. This group of citizens operated under the moniker of "Speak Out," and included a core membership of approximately 15 citizens. Residents formed Speak Out in August, 2001 as a direct response to the Steering Committee's campaign for relocation. The founder and leader of Speak Out is a fourth generation "Picherite," who has close family and friendship ties to the area. Another leader of Speak

Out explained that they needed a competing citizen's organization because the Steering Committee was leading residents, "in the wrong direction." While the Steering Committee was generally made up of working-age residents, Speak Out was made up predominantly of older residents, many of whom are second and third generation residents in the area.

While the most salient issue of contention between competing resident groups has always centered on federal buyout/relocation, the initial conflicts between citizens were filtered through Keating's proposal to turn the area into a world-class wetlands. Citizens promoting relocation argued that the final solution to their environmental and health problems was going to involve a two-step process. The first step involved moving the residents out of the area, either through a federal buyout or relocation. The second step involved creating a world-class wetlands. A resident explained that he wanted to be, "Bought out completely! Put the gravel back in the holes and let it go back to the wild."

Tar Creek residents supporting for a federal buyout/relocation program strategically linked their campaign to Governor Keating's original call for a wetlands. They touted this plan as an effort to turn the area into a *hunter's paradise* and a tourist recreation site. For these citizens, the wetlands provided a final solution to the ongoing community controversy. As one concerned resident explained,

The wetlands is the only proposal I have seen since 1983 for a terminal end solution to the problems up here.

Another concerned resident explained, "I think the wetlands is the best idea that they have come up with. Because I think if they flatten all of this here and made a wetlands it would be better for the wildlife, and you wouldn't have this dust blowing around in the

air. And if they make a wildlife area out of it, it would bring more people and money into Miami, and Commerce, and surrounding towns. Tourists coming in to hunt and fish and whatever. If it caves in then what would it matter? It's full of water." Finally, a concerned resident offered this candid assessment on the local environment,

I can see why it would be a good thing. I mean, it's about the only thing they can really do with this place. It's already nearly a swamp anyway.

That's about the only thing you can do with it. It's damn sure not safe for human habitation. I can tell you that.

In contrast to the concerned residents supporting the Steering Committee's call for a world-class wetlands, residents opposed to relocation criticized the proposal as unrealistic and unfair to the broader community. Residents supporting Speak Out used their criticism of the wetlands proposal as a central platform in their campaign to oppose relocation. Paradoxically, residents opposing relocation and the wetlands proposal used a series of environmental arguments to critique the proposal for world-class wetlands.

For example, many residents argued that the existing contamination would surely cause problems for a wetlands area. An outspoken resident argued,

They want to move the town so they won't have to move the chat piles because, 'That's too expensive,' they say. If they leave the chat piles here, and they flood it, what are they gonna have? You are gonna have a big wetlands full of polluted water!

Another resident argued that a wetlands would simply create a "mosquito spawning ground" and added, "That's just swapping one problem for another." Another

unconcerned resident commented on the wetlands proposal and the call for a "hunters paradise" sarcastically, "I think it would be a fine deal if I was a duck hunter."

The Tar Creek site was placed on the EPA Superfund list in 1983 and during the first seventeen years community relations were largely kept in check. However, throughout the 1990s residents became increasingly concerned about the linkages between environmental exposures and health impacts. This mounting tension became institutionalized shortly after Governor Keating's Tar Creek Task Force recommended turning the area into a world-class wetlands in 2000. While the wetlands proposal itself caused some dissension, the larger debate centered around the future of the Tar Creek Basin. Concerned residents coalesced around the Steering Committee which called for a federal buyout/relocation program. Unconcerned residents opposed such drastic proposals, arguing that the community should remain intact. Furthermore, they argued that the environmental hazards were being grossly exaggerated.

These divisions set the tone for community relations for the next several years. In the following sections, I analyze how community relations continued to be marred by controversy and heated disagreements over the attribution of responsibility, economic impacts and the general loss of community.

Attribution of Responsibility

In environmental hazards cases, residents often seek a responsible party for their problems. For example, in their research on Native Americans in Ponca City, Shriver and Webb (2008) found that residents identified three responsible parties: the polluting facility, the Oklahoma Department of Environmental Quality and the local medical establishment. Freudenburg (1997, p.33) coined the term recreancy to refer to the

"failure of an expert, or for that matter a specialized organization, to do the job that is required" (see also Freudenburg 1993)

In Tar Creek, there have been a host of parties identified as responsible for the prolonged remediation effort and the inordinate amount of money being spent on what many perceive to be a "failed" effort. Specifically, residents identified the federal government as primarily responsible because they allowed the mining companies to dispose of the mining waste within the city limits. Residents have also identified the mining companies as responsible parties because they failed to adequately dispose of mining wastes; either prior to, or after they shut down operations in the early 1970's. Residents have also voiced their frustrations with the EPA and ODEQ for failing to provide appropriate oversight for the many operations that have taken place in the decades since the Tar Creek Basin was listed on the initial Superfund list. In the following sections, I outline the central organizations and institutions for which residents in Tar Creek attribute responsibility for the current environmental situation. Importantly, differences in the attribution of responsibility both "reflect" and "contribute" to the corrosive nature of this environmental hazards case.

Residents differ in their interpretations of the United States Government's handling of the Tar Creek remediation efforts and these differences contribute to the corrosive elements of the environmental hazards case. At a general level, charges have been levied against regulatory conflicts of interests. For example, in 2002, an assistant administrator for the U.S. Environmental Protection Agency responsible for the Superfund program recused herself as a "precaution" because her previous consulting firm had ties to ASARCO, one of the Tar Creek mining companies responsible for waste in Tar Creek.

In addition, another official who headed the White House's Council on Environmental Quality previously worked for a law firm also representing ASARCO. Commenting on such conflicts of interests, then-U.S. Representative Brad Carson was quoted in the *Tulsa World* as stating, "The revolving door of life in Washington, D.C., is one in which you are the regulator, the next day the regulated and then again in charge of regulation." Carson later explained, "This type of sickening pattern is exactly why issues such as Tar Creek haven't been solved in 25 years." (Myers 2003, p. A1).

These conflicts of interests have negatively impacted many residents trust in government. Commenting on the EPA's use of resources and their failed progress in the remediation efforts, then-Chairman of the Tar Creek Basin Steering Committee explained, "You know what this project is? It's a successful failure." Referring to EPA's accounting exercises, he then commented, "A lot of money is going into somebody's pocket." (Schafer 2003g, p. A1).

Residents and political leaders in Oklahoma argue that part of the problem in Tar Creek is the lack of a clear mandate on the cleanup efforts. U.S. Senator Jim Inhoff argued that competition between federal agencies has prolonged the cleanup effort (Schafer 2003b, p. A10). Furthermore, other politicians and residents argued that a consensus was needed within the community in order to move forward with a reasonable solution to the environmental disaster. Former U.S. Representative Brad Carson argued that without a clear consensus within the community, "we could spend another \$100 million and another 25 years and not get anything done." (Schafer 2003b, p. A10).

In addition to general concerns raised over conflicts of interests and the EPA's "waste" of taxpayers dollars, residents have been staunch critics of the EPA's yard

remediation project. Yard remediation began in summer 1996 and has continued until recently. In fact, the majority of the EPA's total budget has been spent on yard remediation efforts. Between June 1996 and June 2003 the EPA spent nearly \$100 million dollars (\$95.6 million) remediating residential yards in approximately 1,900 locations in the Tar Creek Basin. During a 15 month period in 2002 and 2003 the remediation of residential yards averaged over \$71,000 per yard (Schafer 2003h, p. A1). Paradoxically, the costs of residential remediation far exceeds the value of properties being remediated. According to Ottawa County assessor records, the average value of local homes in the Tar Creek Basin is \$15,200 to \$26,155 (Schafer 2003h, p. A1).

The EPA has targeted residential yard remediation because it is believed to be the most prudent means of reducing blood-lead levels in area children. But residents think these expenses are a complete waste of time, energy and valuable resources that could be used relocating the population. In addition to the inordinate expenses incurred in remediation of residential yards, residents are also critical of the "re-contamination" from the existing pollution sources. Concerned residents argue that it doesn't make sense to spend \$20,000 or more remediating a yard that continues to sit beside a chat pile. A concerned resident argued, "They're remediating yards on homes that are right next to a chat pile. You tell me how that's going to keep from getting recontaminated."

Residents shared numerous stories of yard remediation. A resident explained that he was initially optimistic the EPA repairing his yard, "Really, when I first become concerned with it was when they came back in here in 1997 to cleanup stuff. You know, a person thought they was going to do a good job and have nice yards and all that." He expressed his frustration at the poor effort and explained, "Even If you had to live here at

least they would have cleaned the environment up. You'd thought they'd done it right. Even if they *wasted* millions and millions of dollars they would have at least done that right."

This was a common sentiment shared by numerous respondents. Another angry respondent described his frustration after his yard was "remediated,"

Morrison-Knudsen [contractor for the EPA] were the first ones that came in and tore all of these yards up. They messed up the people's yards big time. They messed up my yard and I fought with them forever over it and it is still messed up...They put so much clay here that the grass won't even grow. I have nothing but weeds growing in the back yard. We tried to put a sprinkler system in our yard and couldn't even get it to go in. I had to go out there with an iron bar and gouge the ground with the iron bar to drive a sprinkler in the ground.

Many residents remain baffled at the use of clay in the remediation of yards. Another respondent explained,

I had the richest yard around here and I'm not bragging. I had a real pretty yard. They dug that yard up and filled it back in with clay. They really ruined every yard here in town. They kept putting clay in the yard and I told them they didn't get clay out of it and I didn't want clay back in it. And when it rains it runs under my house. They was supposed to bring in a carpenter and fix it up 'cause it rotted out a couple of floors. They kept telling people...they dug mine up three times. I made 'em dig it up three times. But they caught me gone to work one day and filled it in. Most

people didn't care what kind of job they done. Mine's just like a washboard and unlevel. As far as I'm concerned they didn't care what kind of a job they done here because they didn't live here. That was the beginning of ruining everything.

Some concerned residents argued that the EPA's yard remediation campaign is simply fraudulent. One angry concerned resident captured this sentiment, stating, "Greed and corruption! Now the bunch that was in here before got \$50 million. Fraud! I think the attempt to clean up is just people sticking money in their pocket. I think its a scam, all the way to the top, payoffs and stuff." Thus, concerned residents attribution of blame was largely targeted to the United States Government and in particular to the EPA. While some residents expressed general frustration with the failed remediation efforts, other residents took their criticisms further, arguing that the EPA and its contractors were engaging in fraudulent activities.

Concerned residents were the most outspoken critics of the EPA's remediation efforts. In contrast, unconcerned residents tended to be far less critical of the EPA. Some even argued that the EPA was doing a "good job." In contrast to the criticisms of their neighbors, unconcerned residents tended to focus on the "progress" being made by the EPA and many argued that the community would eventually be completely "safe" from past pollution problems. An unconcerned resident argued, "Well, this problem didn't happen overnight. It's taken years for this problem to happen. You're going to have to deal with it in the same fashion..."

These differing interpretations of cleanup efforts further exacerbated the existing cleavages within the community. While concerned residents spoke candidly and publicly

about their concerns with the EPA's remediation efforts, unconcerned residents tended to downplay these criticisms, in some cases actually praising the EPA for their efforts.

Economic Impacts in Tar Creek

In addition to the literature on emotional distress, residents also face serious economic problems. As explained earlier, many residents in the Tar Creek basin have lower socioeconomic backgrounds. Many residents are struggling to make ends meet and this controversy over environmental hazards has exacerbated these difficulties. I examine some of the issues surrounding economic concerns and hardships.

In many environmental hazard cases, residents experience what Edelstein (1988) has referred to the "inversion of home," or an economic catch-22 in which residents can't afford to sell their properties and relocate because of the depressed real estate values associated with environmental contamination. My findings indicate that the inversion of home is a central concern among many area residents. This sentiment was captured in a editorial/opinion piece in the Tulsa World, titled "While Politicians Debate, Tar Creek Citizens Struggle,"

Nickles said that if he lived here and thought his children were in danger, he would leave immediately. Except – and this is a big except – most of the people still here can't leave without losing everything. If, for example, a family has payments to make every month on a house loan, they can't pick up and buy another house in another city and pay on two houses. And, make no mistake, most of the people own their houses. The U.S. Corp of Engineers, in assessing the possibility of a buyout, reported that of 679 houses, there were only 184 renters." (Neal 2003, p. G6).

A local resident explained,

Oh they got us! They came in there and said they needed to clean the yards up. Too much lead in the yard. And they checked the yards. And they told us if we didn't let them redo the yards, then you would never be able to sell your house. They would hold that over our heads because it was exposed to lead and it would be too dangerous for people to live there. So people [residents] let them do it. And I did too.

Over the years, residents have shared numerous accounts of their economic hardships associated with property ownership and life in a contaminated community. For example, a concerned resident explained, "Property values are zero." Another resident explained, "No one will buy here and no banker will lend on the land." Another resident explained, "I spent \$30,000 for this house. Now, it's worthless. Somebody owes us." (Schaefer 2002c, p. A1). The uncertainty surrounding the community's future has left residents in a particularly vulnerable economic situation. A concerned resident argued,

People don't know what to do when something goes wrong. If you need to fix the plumbing or repair the heater, you are suddenly at a crossroads of whether to stick another \$2,000 into it. (Schaefer 2002c, p. A1).

Many low-income families living in the Tar Creek region struggle to survive economically. For example, a Picher resident explained how she attempted to take a mortgage loan from the bank to pay off medical bills incurred when her husband became seriously ill. Unfortunately for the resident, the local banks refused to get her a loan against her home. The resident explained, "The property values here have gone to nothing. Your house sits on land here and it is not worth diddly squat" (Schafer 2002b, p.

A1). Commenting on the economic situation in Tar Creek, the Chairman of the Steering Committee explained to the Tulsa World, "Being identified as a Superfund site has been a death blow to the communities." (Schafer 2002b, p. A1).

However, negative economic impacts associated with the buyout and the concept of inversion of home was captured succinctly with the statement of one resident who told me,

Yes. I turned down my offer for my house. I live in a three bedroom, bath and a half brick home and just three years ago I put new double hung vinyl windows in and I have hardwood flooring throughout. I have a large walk in pantry and a screened in back porch all on three quarters of an acre of land. The back yard is completely fenced and they offered me fifty four thousand dollars. There is no way I can replace my home for fifty four thousand dollars. So I...The only way I would move is if I were to move into something I would like better. If I took the buyout I would have to take something less. And I am not going to do that.

Like many other contaminated communities, the Tar Creek Basin has been stigmatized by the environmental pollution. In these cases, stigma can be attached not only to the broader community but also to the residents themselves (Edelstein 1993). Ironically, as concerned residents raise awareness to their environmental problems and seek acknowledgement and responsibility, their communities tend to be further stigmatized as a consequence. Thus, publicizing environmental hazards fostered the creation of a stigma that further threatens property values and exacerbates existing dissension between residents who differ in their interpretations of environmental harms.

The Corrosive Elements of the "Voluntary Buyout"

Fieldwork for this project spans from 2001 to 2008. This longitudinal approach has allowed me the opportunity to follow many of the changes experienced by community residents over those years. One of the most salient issues is that of the voluntary buyouts. The first phase of the buyout began in 2004 with Oklahoma governor Brad Henry petitioning the state legislature for a buyout of families with children six years of age and under because it has been determined that this group is most susceptible to harm from a chronic exposure to lead. Phases two and three began after an eighteen month, two million dollar subsidence study determined that area residents were living in areas vulnerable to cave-ins. In the following section I examine some of the conflicting responses by residents to the buyouts.

Some area residents have been pleased by the voluntary buyout program, arguing that it is the only reasonable option for them to relocate. This perspective is illustrated by the following respondent,

The people living in Picher are for the large part of the lower socio-economic strata...For the buyout, I think it is a pretty good deal for the people. Most of them want to get out and this is an opportunity for them. It's a shame that it took so long. They've had to suffer for a long time. If this works out like they say its going to it will be a good deal.

Another resident added,

The buyout is the *savior*...Like over in Picher, you can't get money to buy a home and, unless somebody came up with the cash, you couldn't sell it. You'd get a little of nothing for it. My house is three years old. I owned

the land it is built on and I put the land up as a down payment. And then all of this stuff broke loose.

Despite a few positive responses to the voluntary buyout program, most respondents in this study expressed frustration and anger over the entire process. As a result, there has been considerable dissension generated within the community over the voluntary buyout program. I argue that this has further contributed to the corrosive elements of the environmental hazards by dividing residents and creating distrust toward the buyout process.

The controversy surrounding the voluntary buyout program centers around two key issues. First, residents are frustrated and even angered at the money they are being offered for their properties. This has sparked additional dissension within the community as residents debate the relative values of their own properties against their neighbors. Furthermore, residents have been angered at the appraisal process. Second, some residents have refused to accept buyout offers because of broader issues of community attachment. These residents worry that the community will dissolve around them even if they refuse the voluntary buyout offers.

There has been a contentious issue over property values throughout the buyout process. For example, a frustrated resident summarized what he believed to be the general community sentiment on the buyout,

They're on the tail end of the buyout crap that they started and that's going on. But, I haven't heard anyone that's real pleased with what's going on. Everyone figured they was going to come out with enough money to buy a new place some where's else and that's just not going to work that way.

Another added,

A lot of people will not accept the offers they have been receiving. The buyout by the state and Governor Henry's program offered more money than what is currently being offered. This is funded by the federal government and the offers are lower. I wish they were allowing the state to oversee the process but they aren't.

Several respondents identified problems with the appraisal process and many compared their own assessed values with those of their neighbors. A respondent compared his property value with others in the community, "People living on Indian land are getting more for their appraisals than the people with deeded land. Yeah, I know so! Yeah, some of the people on Indian land living in a dumpy old trailer getting' fifty or sixty thousand for their homes and people like me with deeded land getting thirty thousand. I and my neighbor both got the same thing!" He then added, "Some people came out good and some of them didn't." Other frustrated residents agreed with these assessments:

No. I didn't take the offer for my house. I really don't know. I turned the offer down and my sister turned her offer down. I know there will be 8 or 9 or 10 of us that don't take the offer but there are several that didn't apply so they will be here too.

Many residents simply felt that they were not getting enough money for their current properties. As a result, they worried that they wouldn't be able to purchase comparable homes for the money they were being awarded. A respondent described this situation for himself and his older neighbors, "My neighbors didn't get much for their house. I was concerned about them. They are retirees and on a fixed income. They only

got \$31,000 for their home. I got a little more than they did, but they are retired and already had their home paid for and you know now they have to go out and buy a home for thirty thousand dollars. You can't buy a home in Miami or anywhere else for thirty thousand dollars. I got thirty eight thousand for mine. You can't buy a home for that!"

While many homeowners expressed frustration and anger at the low property values they are being offered, the voluntary buyout program has also been extremely problematic for renters living in the area. Many residents in this situation have limited resources and are being forced to relocate on relatively short notice. For example, a resident explained, "Real estate has tripled in their prices. People that are renting have had their rents jacked up because these people know these people need a place to live. It's just doubling up on us. And, again like myself, I've got to be out of here in three months and it's just a burden on you."

Some angry residents targeted the appraisal process itself as being problematic. A respondent explained, "This was a money-making racket...The surveyors got rich!" Some even hinted at the possible misuse of funds, as indicated by this respondent, "Now, where did all of that money go? Look at all of the money that has been run through over here and tell me where the money went. These guys didn't get very much money for homes." Another added, "Oh, yeah I'm unhappy with the appraisal process. The way they done the whole thing was a big farce. They appraised several single wide trailer houses with old corrugated tin skirting on one lot for more than my house and you saw my house. It is a brick home. Those that got their trailer houses appraised for that was related to the people on the trust." Another resident added,

Well, you have all of the people on the committee that's making money off of it. You have all of these people that came out and surveyed and all of that stuff. They are all making more money off of it than I did with my little old two bedroom house.

A resident described how the money you received for your property was largely based on the luck of the draw, depending on which phase of the buyout you happened to fit into,

They are doing the third phase now and I'm in the third phase. The first phase made good money, but they are not offering the kind of money now that they offered back in the first phase. And it may be that the first phase was state operated and these other phases are federal.

In addition to concerns about property values and the appraisal process itself, other residents were angered by the buyout process because it signals the end of their community. Beyond issues of community attachment, which I describe in the next section, residents also face the practical economic issues associated with trying to sustain a dying community. Many residents expressed anxiety at having to leave the community where they spent much of their lives, as indicated by this illustrative statement, "...they grew up there all of their life and what are they gonna do? That's the only life they know and I'm sure its not gonna be easy to pick up and move."

Other respondents focused on the practical considerations of living in a desolate community. For example, a resident explained, "If you want to shop for groceries you'll have to go to Miami or Baxter, Kansas before you'll ever be able to buy anything."

Beyond the daily essentials, residents also worry about how the town's infrastructure will

continue to sustain such a small and shrinking population. A respondent described how he was forced to accept the voluntary buyout because of the inevitable consequences,

I took it [the voluntary buyout] because I didn't have any choice. If I stayed there my house was worth nothing, and there may be only 20 percent of the people left. You couldn't afford to keep the town going and water and stuff.

Another added, "They will just have a home. It will just be a place to live. There won't be any businesses. The utilities will be so high. Gas and electric will. It will be so high they won't be able to pay it. Another angry resident described the situation for most residents, even those that insisted on remaining in the community,

It was the hometown people that got all of this started in the first place...about the ground being unsafe. They got all this ruckus started about the ground is going to fall in. And his dad worked in the ground right with my dad for years and years. No. They've, just got our town ruined. I can't see a reason to stay here...Sitting down at the little café I hear a lot of 'em talking about how they ain't going to leave. And a lot of these people are on fixed income. Their little old house, it may not be much but these people just can't go out and buy a new house and go into debt.

While many residents have been campaigning for a federal buyout/relocation package for several years, the practical issues associated with such a program have proved to be quite divisive for the community. Some residents accuse their neighbors of trying to exploit the situation for economic gain, while others believe they have been

essentially cheated out of the true value of their properties. Other residents simply acknowledge that they will never be able to purchase homes for the amount of money they received for their contaminated properties. This issue has been particularly problematic for retired residents living on fixed incomes who no longer had mortgages for their homes. Finally, some residents have reluctantly accepted the voluntary buyout because they see the inevitable end of their community. However, they expressed fear and anxiety at the prospect of giving up their homes. In the remaining section I discuss issues associated with the general loss of community.

Environmental Hazards and the Loss of Community

The communities in the Tar Creek Basin have been under stress for several years. They have experienced conflicting reports of health impacts, as well as contradictory news on the US Government's various remediation efforts. This has contributed to emotional distress and community factionalism. But perhaps the most "corrosive" element has been the inevitable loss of community permeated by either relocation or a buy out of the entire community. I examine several related aspects of the loss of community.

Attachment to Place

Despite the "objective" indicators of environmental hazards that have plagued the Tar Creek Basin for several decades and the more recent revelations of health impacts, many residents remain attached to the community. I describe some of the salient issues associated with this community attachment and the struggles faced by many residents being forced to reconcile their desire to stay with the practical considerations of remaining in a dying community.

During the initial data collection for this project some concerned residents believed that the sense of "community" could remain intact despite the geographical relocation of the population. More recently, however, as a result of community dissension and the practical implications of relocation, residents have accepted the fact that their communities will cease to exist. This realization was captured in a *Tulsa World* editorial,

Some people understandably don't want to leave their beloved communities, including residents whose families have lived in the area for generations. But the sad truth is the towns were [are] dying a slow, agonizing death anyway. Thanks to the enlightened leadership of several courageous officeholders, helped along by a cadre of tireless and knowledgeable advocates, these Oklahomans now have a chance for a brighter future (*World* Editorial Writers June 9, 2006, p. A-11).

While concerned residents, especially those that supported the Tar Creek Steering Committee that has been campaigning for a relocation/buyout for several years, have willingly accepted the "loss" of community in return for a safer and cleaner environment, unconcerned residents continue to struggle with the idea of being forced from their homes. This sentiment was poignantly captured by several long-time residents of the area,

It's sad. It's really sad. It's a sad situation. My wife and I have been married sixty two years and we lived in that same house fifty seven years. [We] raised all of our kids there. It's kind of hard to pull up and get out.

You feel like you've been mistreated a little bit. But, it was millions of dollars wasted by the government and they are still pouring it in.

Another added,

You just hate to give up your home and go somewhere else, especially at my age. I just love my neighbors. If anything was wrong they was checking on you and if strangers were around they were looking out for you. I know this neighborhood is fantastic people. If I needed anything they'd help out. They would come over and mow my lawn and things like that.

Residents lamented on the practical reality of forced relocation, as illustrated by this respondent,

I wouldn't leave if everyone else wasn't going to leave. I've lived here all of my life. I don't want to live here by myself. And we don't know about services that will be offered after the buyout. Where will we get our water if the town [city of Picher] doesn't provide it? Commerce isn't going to run water lines out here. So, you see, I don't want to be here by myself.

Several residents remain unconcerned about the environmental problems in the community. They believe they are being forced out of their communities for unsubstantiated reasons. Many argued that they would still prefer to remain in the community despite claims of environmental problems. A respondent stated,

If they hadn't tore our town up, I'd just as soon stay right here. I always thought I would die here in this little town. Since they've got it all tore up,

we have nothing here anymore. If they walk up and offer me mine I'm going to get out of here.

Educational Resources and the Loss of Community

Despite conflicting interpretations of environmental hazards in the Tar Creek Basin, objective pollution problems persist in the community. To date, the buyout program has been voluntary. As a result, residents wanting to remain in the community have been allowed to stay. However, there are increasing problems associated with out-migration. Specifically, the controversy over environmental hazards and the subsequent relocation efforts are impacting local education. Beyond the important curriculum needs, Oklahoma's rural schools are important sources of community *pride* as well as an integral party of the community's *identity*. Rural community schools provide sporting events for the larger community. As Tramel (2006, p. B1) notes, "Small Oklahoma communities take pride in- and get a sense of identity from- high school sports teams. Picher loves its Gorillas. On the water tower are the words, "Picher Gorillas since 1918." Due to the loss of students and resources during the 2006/2007 academic year, the Picher-Cardin school district was forced to eliminate junior high and high school athletics. A respondent explained,

Well, Picher was a big sports town, big athletic town. They no longer have competitive sports. And some of the old timers perhaps that thought well, if we lose our school we are going to lose our town.

Beyond high school athletics, the education system continues to face extreme cuts in resources that are negatively impacting curriculum needs. As a result, the relocation

program associated with environmental hazards is having an immediate negative impact on the local education system. An administrator explained,

There has been a per student expenditure model and we lost eighteen teachers and a principal when the state's buyout occurred for families with children under six years of age. Of course some of those families had children older than six and they got to move with the family. With that first buyout we lost about sixty five students. But with the buyout came the legislation that we would be fully funded. With this latest buyout, we lost two hundred kids, and none of those kids had been bought out yet. They were just positioning themselves into stable districts. Of course, with the loss of so many students, it limited what we're able to offer curriculum wise and at the beginning of this year we had to do away with sports, band, and art. We now have one hundred and forty students k-12. That's roughly 10 students per class.

Given the drastic reduction in students enrolled, the administrator then stated, "You have to ask yourself how few a number of students will be it take to remain viable." The school administrator elaborated further on the challenges being faced by dwindling enrollment and the likely closure of the school district in the near future,

I just had to recommend [to the school board] that we put the situation to a vote of the people and see if they want to ask Commerce and Quapaw if they want to absorb our students. It will be between those two schools to absorb our assets. Many of our students already attend those schools. My son played football for Commerce this year and we did very well, making

it to the semi finals. By the beginning of the school year next year this buyout will be half complete. So say we will lose half of our students. If that should not pass, then we will have school next year. I would anticipate that even though we would lose all of those students, we would need to employ more faculty and offer more courses than we offer this year and I gotta tell you that we are not an attractive employer at this time due to the environmental stigma associated with this place.

Despite the objective loss of resources, the decline in student enrollment and the inevitable closure of the school system, many residents remain confused and frustrated with the situation (See Gillham 2007, p. A1). Many residents explained that they have received conflicting reports about the closure of the school district, and others are frustrated by what they perceive to be contradictory messages regarding the environmental threats around the local schools. A respondent described the conflicting information reports received about the schools and explained his frustration, "You know, what I don't understand, they all say our school is on dangerous ground and it could fall in at any time and they haven't been in no hurry to get the kids out of there. If the ground is as dangerous as they say, I would have already moved them out." The respondent further elaborated on the confusion,

Really, I don't understand. In fact, my grandson lives with us and we moved him out. We put him in another school because they said it wasn't safe. Here they built that new playground for the elementary kids and they came in and condemned that land right after they built it and they're still letting kids go over and play tennis. They let kids go in the gym and

lift weights. It seems to me that if it was that dangerous they would have moved the kids out of there first. But, we've had school there the last two years and they said it's going to fall in anytime.

Loss of Family and Friendship Ties

In addition to the other community impacts, residents lamented the loss of family and friendship ties. Community relations have been strained by conflicting interpretations over environmental hazards, as well as the issues associated with relocation. While the corrosive elements of this environmental hazards case have been discussed throughout the analysis, here I elaborate more specifically on the loss of family and friendship ties and community memories.

Several respondents lamented the loss of the memories and family histories. A respondent described his family ties to the area within the context of some residents refusing to relocate,

There are some people here that don't want to move and they aren't taking the bid and they are staying. Some of them I really don't blame. I really didn't want to move either. My dad grew up here, I grew up here. My brothers grew up here until they were sixteen. My dad was a miner. He worked in all of the mines. He started working in the mines when he was fifteen or sixteen years old...He worked all of these mines here in town.

Other residents explained how the strong sense of community and the neighborly behavior could never be re-created, as indicated in this illustrative quote, "You know, we were just one big family over there. If somebody got sick everybody was in there to help

them. If somebody was out of work, everybody took them food and tried to help. And now we are just scattered. It's just tearing everybody up."

Other residents described how the relocation project and the loss of community is having corrosive impacts on former friends and neighbors. For example, a resident explained,

Well, they just made a lot of people mad at each other. It's just this little old town was just one big family at one time before this all started. Our nursing home has closed down and they've closed one convenience store down. The funeral home, the Gorilla Cage, and the pharmacy are about all that's left now. They raised the ton limit on the road from 25 to 30 tons.

That helped a little bit. It's just a waiting game now.

Another resident described their new location after accepting the relocation offer, "We moved over here about six months ago. We got a better house, but it's not *home*. You know, you live there that long, its not home.

Loss of Community and Emotional Distress

In addition to the loss of family and friendship ties associated with environmental hazards and relocation, many respondents also expressed emotional distress and anxiety. This theme was particularly salient among older residents who had lived in the area for decades. Residents expressed concerns for their older neighbors. For example, a respondent noted,

I have never seen such a change in people's cultural life, their social life, and their moods....And people, older people are just having an awful time. It's hurt some of the people who have lived here really all of their life,

mentally and so on. These little old ladies like me that had a comfortable little place. I've lived in this house thirty five years and another one here in town for eighteen. We've been married fifty five years. We've lived here all of our lives.

Another respondent described the grieving process,

We have a lady in Cardin that is in a nursing home now and she just grieves and grieves and grieves and other people are doing the same thing. There other people that have moved that are just unhappy and there is nothing you can do to help them. They have lived here so long and they were happy...You either had to move or die, so its just sad, very, very sad.

Another resident described he and his wife's mental anguish over the loss of their community and discussed how the couple would soon only have memories of the community they loved,

My wife and I are just sick about it. She boxed up a bunch of stuff that we'd had for fifty seven years. You know how much junk you gather up, and she won't even go out and open up any of those boxes. That's how she feels. I mean, it's just made her sick. I'm just going to buy another shed and put all of them in it because that's how she feels. I can't get her to go through them. It just disturbs her every time I try to get her to do it.

The respondent then explained how other older residents have suffered over the loss of their community,

And I know two or three old people that died over this. They were broken hearted. Tearing our churches up, that's what hurts. I preached at the

Baptist church in Cardin until I retired and I have been helping out at the church in Hockerville until they bought them out. I preached the last service there three weeks ago and everyone left there crying because they had to shut it down. It's not a very good picture, I'll tell you. I really didn't think it would ever happen.

Finally, the respondent lamented, "How could a government be that stupid to ruin a beautiful town?"

Several residents described their grieving process. Many explained that they preferred to do their grieving in private, as indicated by this respondent,

Everybody has to deal with this loss and grieving process the way they do it. I'm a pretty private person and I have never really shown myself, but I can. And in a big way.

Describing the suffering by older residents, a respondent added, "And it's kind of sad. And I know other people are going to be going through the same thing. Some of these older people that have already moved out, I know its tearing them apart."

Given the emotional distress and the frustration experienced by many residents, some continue to explain that they prefer to stay in the community despite the obstacles of living in an isolated environment. For example, a respondent explained,

They also see that if everybody leaves there won't be anything left. They're still saying I'd like to stay here but there won't be any services, water or sewer. Some are saying I don't care if I have to drill a well and put in a septic tank, I'm staying right here. And you know if you're

seventy-five years old and lived in Picher or Cardin all of your life and its home to you. It's *stressful*.

The respondent then noted the relative health implications of potential environmental hazards and subsidence for many older residents, "And you know, unless you're right over a place that is really one of the real possibilities of caving in the health effects are probably not going to be a factor in this stage of your life."

Many residents expressed emotional distress over relocation, even ones that were generally pleased with the financial offers they received for their homes. These respondents emphasized the loss of "home" and the inability to recreate lifelong friendship and family ties. For example, a respondent noted,

We were happy right there and we planned on finishing life out right there because we were around people if you needed them they would be there in just a minute. They are all good people here in Quapaw, I'm not knocking that, but it just isn't the same. I have good neighbors but they aren't the people I was raised with. I don't know of anyone that you could talk to that would tell you they are tickled to death that they are being bought out.

Another concurred, downplaying the importance of money, "Money don't mean that much to me, it's where you live, you know?" A life-long resident of the Tar Creek Basin captured this sentiment by stating, "They gave me a fair price for my house, I'm not knocking that. Sentimental price, they couldn't have paid enough!"

CHAPTER CONCLUSION

Residents in the Tar Creek Basin have faced extensive environmental hazards for

several decades. Despite the seemingly objective environmental problems, my analysis emphasizes the importance of interpretative processes. Tar Creek residents were subjected to conflicting information over the years regarding the extent of environmental damage, the degree of environmental exposures and, importantly, the seriousness of environmental health impacts. My analysis highlighted the complex nature of contested environmental illness claims and emphasized the corrosive community impacts associated with environmental hazards. For several years, community relations were strained over differing interpretations of environmental hazards. More recently, animosity has centered on the voluntary buyout process and its consequences, particularly economic impacts and the loss of community.

CHAPTER VI

CONCLUSIONS

In this chapter I summarize the major findings of my project and discuss the contributions to the literature on contaminated communities and contested environmental illness cases. In addition, I highlight some of the limitations related to my research on Tar Creek. Finally, based on my findings I suggest future research for the Tar Creek Basin and for environmental hazards cases in general.

SUMMARY OF MAJOR FINDINGS

This research focused on community impacts associated with environmental hazards in Tar Creek. For nearly eight years the area was well known throughout the country for its prominent lead and zinc mining operations. During those eight decades of active mining, mountains of mining waste, or chat, were created throughout the Tar Creek area. These piles of chat literally became "mountains of waste," as they contained lead, zinc, cadmium, arsenic and other heavy metal residues. In addition to the chat piles, contaminated water discharge from the abandoned mines ran into Tar Creek and ultimately into Grand Lake. Finally, the open mine shafts underground have created serious problems with subsidence, or cave-ins for area residents.

This plethora of environmental problems has been acknowledged by the Environmental Protection Agency and, in 1983, the site was listed as the EPA's number

one Superfund site. This officially marked the site as the one of the most, if not "the" most, contaminated sites in the country. The site's placement on the EPA Superfund list initiated a set of remediation activities that have continued for the past twenty-five years. During that time, the U.S. Government has spent over \$120 million dollars on cleanup efforts.

Given the documented environmental problems and the site's official placement on the EPA Superfund list, it seems straightforward that there are "objective" environmental problems in the area. This research sought to address an overriding research question: How do residents living with the same objective environmental conditions differ in their interpretation of environmental hazards, risks and illness claims? In addition, I wanted to identify the most salient dimensions of these conflicting interpretations, including the perceptions of the U.S. Government cleanup efforts. Below I offer a summary of my major findings.

My analysis began with an overview of conflicting perceptions of environmental hazards and risks in the Tar Creek basin. Drawing from the ecological-symbolic perspective, I argued that residents developed different interpretations of the environmental hazards. The majority of respondents were long-time residents of the area, so their interpretations of the chat piles, or "Picher Mountains," differed from the average visitor to the area. However, based on the amount of evidence in recent years, the majority of residents in Tar Creek expressed concern with both the environmental hazards and with the environmental health impacts. They cited the health studies that have been conducted in recent years and expressed the greatest concern for area children, who are likely to be the most negatively impacted from the environmental exposures.

Despite these expressed environmental concerns, not all residents agreed with this perception of environmental hazards. A significant minority of vocal residents downplayed the environmental hazards and argued that the concerns were being exaggerated by their neighbors. They were much more supportive of the U.S. Government's remediation efforts and many were committed to remaining in the area, despite the concerns raised by their fellow residents.

Residents' conflicting claims of environmental illness formed a central thrust of my analysis of the Tar Creek Superfund site. Again, drawing from the ecological-symbolic perspective, I highlight the ways that residents differed in their interpretation not only of the hazards themselves, but also of the illness claims. I situate these conflicting interpretations within the broader context of ambiguity and conflicting sources of information. Specifically, residents were bombarded with technical information and contradictory messages regarding the nature of the exposures and the potential impacts on health. I argue that the official government reports further exacerbated confusion and ambiguity among area residents. I use residents' own narratives to highlight how they differed in their interpretations of environmental harms.

I then focused extensively on the corrosive community impacts associated with environmental hazards in the Tar Creek Basin. I described how conflicting interpretations of risks and environmental health impacts have divided area residents into two distinct camps: concerned versus unconcerned residents. Community factionalism initially emerged over a 2000 proposal from Governor Keating and the Tar Creek Task Force to relocate the entire community of Picher and turn the area into a wetland. This

sparked heated divisions and lead to the institutionalization of community factions. This also set the tone for community tension that continues to plague the area today.

In addition to conflicting interpretations of environmental hazards and health impacts, residents also differed over the attribution of responsibility and the economic impacts of the hazards. Concerned residents expressed frustration with the EPA and their remediation efforts, which they argued were simply a waste of valuable taxpayer dollars. Residents were particularly frustrated and angered over the remediation of residential yards, where the EPA invested considerable resources. Unconcerned residents tended to be much less critical of the remediation efforts and some even praised the EPA's efforts. This was consistent with their more general platform for the successful remediation of the environmental problems and the continuation of the communities in the Tar Creek Basin.

My longitudinal approach allowed me to follow the controversies within the community as they unfolded. More recently, community animosity and tension centered on plans for the voluntary buyout programs. Within this context, many residents expressed anger at the U.S. Government for what they perceive to be the inconsistent and unfair handling of residential purchases. This created additional tension within the impacted communities as some residents accused their neighbors of receiving unfair treatment.

Finally, I documented many of issues associated with the loss of community, which is a central feature of this environmental hazards case. The controversies over environmental hazards and the conflicting claims of environmental health problems ultimately contributed to differences in attachment to community. Within this context, I highlight the importance of place attachment and document the emotional distress

experienced by many residents who are being forced to relocate. In addition, I document the importance of educational resources to the local community and highlight the central role that educational sporting events play in rural Oklahoma communities. Finally, I highlight the concerns raised over the loss of family and friendship ties.

IMPLICATIONS FOR LITERATURE

This research has important implications for the existing literature on contaminated communities and for contested environmental illness. Perhaps most importantly, this case validates the utility of the ecological-symbolic perspective for studying environmental hazard cases. While environmental hazards may appear to be "objective" from a scientific perspective, this case illustrates how residents, health professionals and government agencies differ in their interpretations of environmental threats and harms. This was clearly indicated by the EPA's handling of the environmental hazards in the Tar Creek Basin. As indicated, the EPA spent over \$120 million dollars remediating the area and repeatedly reported in its reviews that progress was being made at the site and that human health was being protected. At the same time, health professionals continued to caution the public about the dangerous health effects of living in the area. Prominent politicians also weighed in on the debate, but differed in their interpretations of the environmental harms and their proposals for a solution.

This study contributes to the existing literature by calling for greater attention to the interpretative processes involved in environmental hazards cases. At the same time, it reflects many of the existing features of contaminated community cases. It validates the importance of ambiguity, which is reflected both in the perception of environmental

hazards and in the perceptions of environmental health claims. This study also confirms the emergence of competing factions in technical hazard cases, which fostered community dissension and animosity. Finally, my findings suggest that community and place attachment are central features of environmental hazard cases. While community attachment has been discussed in past research, I suggest that these issues warrant greater attention.

LIMITATIONS AND FUTURE RESEARCH

This research project was a longitudinal, exploratory case study of the Tar Creek Basin. Data for the research was collected over a seven-year period between 2001 and 2008. This approach allowed me to collect relevant data on the environmental controversies as they unfolded. While this approach yielded a rich set of data on the environmental controversy, it also has some limitations. The biggest concern with a single case study approach is based on whether or not the results are generalizable to other similar cases. There are certainly unique features to the Tar Creek case that may not be applicable to other environmental hazard cases. For example, many communities struggle to seek validation from the U.S. Government. In the Tar Creek case, as mentioned, the EPA not only acknowledged the environmental hazards but listed it as the number one site on the Superfund list.

In addition, the nature of the environmental hazards is likely to vary from case to case. In Tar Creek, at least some of the environmental hazards are visible. For example, you can identify the piles of chat waste from miles away. This differs from many environmental hazards cases, where the suspected contaminant may be invisible to the

public eye. In addition, the environmental health problems in Tar Creek fall into the category of "known illness." In other words, the medical community has long acknowledged the negative effects of lead exposure. In other contested environmental illness cases, the suspected health impacts may be much more ambiguous and uncertain.

Despite these limitations, there is much to be learned from the Tar Creek case. For example, the case illustrates that even known illness (e.g., exposures to lead and learning disabilities) can be hotly contested, both between residents and between residents and governmental agencies. In Tar Creek, many residents suggested that lead exposures were more likely the result of exposures to lead paint, rather than exposures to lead emanating from the chat piles.

While this project has collected rich, qualitative data on the Tar Creek dispute, future research should seek to validate these concerns through survey research. This would allow researchers to gain a broader understanding of the extent of these respective positions. In addition, greater attention needs to focus on the government's remediation efforts. Many residents, health professionals and politicians questioned the investment of such extensive resources into the remediation efforts, especially given the problems associated with recontamination and the low property values of most residential homes in the area.

Finally, Picher, Oklahoma was recently hit with a massive tornado which destroyed much of the remaining community. This poses a whole new set of concerns and research questions for the Tar Creek Basin. Were the toxins in the area further dispersed into the surrounding area? How will the damages from this natural disaster impact future remediation efforts? What are the implications for voluntary buyout and

relocation? How does the combination of the natural disaster and the toxic hazards impact property values and residents' views on the future of the Tar Creek Basin?

REFERENCES

- Alario, Margarita and William Freudenburg. 2003. "The Paradoxes of Modernity: Scientific Advances, Environmental Problems and Risks to the Social Fabric?" *Sociological Forum* 18, 2, 193-214.
- Albrecht, Stan L., Robert G. Amey, and Sarit Amir. 1996. "The Sting of Radioactive Waste Facilities: What Are the Effects on Communities?" *Rural Sociology* 61, 4, 649-673
- Ambert, Anne-Marie, Patricia A. Adler, Peter Adler, and Daniel F. Detzner. 1995. "Understanding and Evaluating Qualitative Research." *Journal of Marriage and the Family* 57, 4, 879-893.
- Aronoff, Marilyn and Valerie Gunter. 1992. "Defining Disaster: Local Constructions for Recovery in the Aftermath of Chemical Contamination." *Social Problems* 39, 4, 345-365.
- Babbie, Earl 1998. *The Practice of Social Research*, (8th ed.) Belmont, California: Wadsworth Publishing Company.
- Bailey, Conner, Charles E. Faupel, and Susan F. Holland. 1992. "Hazardous Wastes and Differing Perceptions of Risk in Sumpter County, Alabama." *Society and Natural Resources* 5, 1, 21-36.
- Barrett, Stephen and Ronald E. Gots. 1998. *Chemical Sensitivity: The Truth about Environmental Illness*. Amherst, N.Y.: Prometheus Books.
- Barton, Allen H. 1969. *Communities in Disaster: A Sociological Analysis of Collective Stress Situations*. Garden City, New York: Doubleday Anchor
- Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. London: Sage
- Brown, Phil, Steve Kroll-Smith, and Valerie J. Gunter. 2000. "Knowledge, Citizens, and Organizations: An Overview of Environments, Diseases, and Social Conflict." pp 9-25 in *Illness and the Environment: A reader I Contested Medicine* edited by Steve Kroll-Smith, Phil Brown, and Valerie J Gunter. New York: New York University Press.

- Brown, Phil, Stephen Zavestoski, Meadow Linder, Sabrina McCormick, and Brian Mayer. 2003. "Chemicals and Casualties: The Search for Causes of Gulf War Illnesses." Pp. 213-236 in *Synthetic Planet: Chemical Politics and the Hazards of Modern Life*, edited by Monica Casper. New York: Routledge.
- Brown, Phil, Stephen Zavetoski, Brian Mayer, Susan McCormick, Pamela S. Webster. 2002. "Policy Issues in Environmental Health Disputes." *Annals of the American Academy of Political and Social Science* 584, 175-202.
- Brown, Phil, Stephen Zavestoski, Sabrina McCormick, Meadow Linder, Joshua Mandelbaum, and Theo Luebka. 2001. "A Gulf of Difference: Disputes Over Gulf War-Related Illnesses." *Journal of Health and Social Behavior* 42: 235-257.
- Buell, Lawrence. 1998. "Toxic Discourse." *Critical Inquiry* 24, 3, 639-665.
- Bryant, Bunyan. 1995. "Issues and Potential Policies and Solutions for Environmental Justice: an Overview" pp.8-34 in *Environmental Justice: Issues, Policies, and Solutions* edited by Bunyan Bryant. Washington, D.C.: Island Press
- Cable, Sherry and Cable, Charles. 1995. *Environmental Problems: Grassroots Solutions*. New York: St. Martin's Press.
- Cable, Sherry. 2003. "Review of Illness and the Environment: A Reader in Contested Medicine" edited by Steve Kroll-Smith; Phil Brown; Valerie J. Gunter. *Contemporary Sociology* 32, 1, 78-79.
- Capek, Stella M. 1993. "The "Environmental Justice" Frame: A Conceptual Discussion and an Application." *Social Problems* 40, 3-24.
- Couch, Stephen R. and Steve Kroll-Smith. 1985. "The Chronic Technical Disaster: Toward a Social Scientific Perspective." *Social Science Quarterly* 66, 564-575.
- Couch, Stephen, R. and Steve Kroll-Smith 1994. "Environmental Controversies, Interactional Resources, and Rural Communities: Siting Versus Exposure Disputes." *Rural Sociology* 59, 1, 25-44
- Cuba, Lee and David M. Hummon. 1993 "A Place to Call Home: Identification With Dwelling, Community, and Region." *The Sociological Quarterly* 34, 2, 111-131.
- Denzin, Norman K. 1989. *Interpretive Biography*. Newbury Park: Sage Publications.
- Denzin, Norman K. and Yvonne S. Lincoln. 1994. *Handbook of Qualitative Research*. Thousand Oaks, California: Sage Publications
- Dynes, Russell R. 1970. *Organized Behavior in Disaster*. Lexington, MA: Heath Lexington

- Edelstein, Michael R. 1988. *Contaminated Communities: The Social and Psychological Impacts of Residential Toxic Exposure*. Boulder, CO: Westview Press.
- Edelstein, Michael R. 1993. "When the Honeymoon is Over: Environmental Stigma and Distrust in the Siting of a Hazardous Waste Disposal Facility in Niagara Falls, New York." *Research in Social Problems and Public Policy* 5, 1, 75-95.
- Environmental Protection Agency. 1994. "Tar Creek Basin First Five-Year Report."
- Environmental Protection Agency. 2000. "Tar Creek Basin Second Five-Year Report."
- Environmental Protection Agency. 2005. "Tar Creek Basin Third Five-Year Report."
- Erikson 1989. "Review: Drawing Boundaries" *Contemporary Sociology* 18, 4, 511-513.
- Erikson, Kai. 1994. *A New Species of Trouble: Explorations in Disaster, Trauma, and Community*. New York: W.W. Norton and Company.
- Feldman, Roberta M. 1990. "Settlement-Identity: Psychological Bonds with Home Places in a Mobile Society." *Environment and Behavior* 22, 2, 183-229.
- Fiedler, Nancy and Howard Kipen. 1997. "Chemical Sensitivity: The Scientific Literature." *Environmental Health Perspectives* 105, 2, 409-415.
- Fowlkes, Martha R. and Patricia Y. Miller. 1987. "Chemicals and Community at Love Canal." Pp. 55-77 in *The Social and Cultural Construction of Risk*, edited by B.B. Johnson and V.T. Covello. Boston: D. Reidel Publishing Company.
- Freudenburg, Nicholas and Carol Steinsapir. 1992. "Not in Our Backyards: The Grassroots Environmental Movement." In *American Environmentalism: The U.S. Environmental Movement, 1970-1990*. Edited by Riley Dunlap and Angela Mertig, 27-37. Philadelphia: Taylor and Francis.
- Freudenburg, William R. 1993. "Risk and Recreancy: Weber, the Division of Labor, and the Rationality of Risk Perceptions." *Social Forces* 71, 4, 909-932.
- Freudenburg, William R. 1997. "Contamination, Corrosion, and the Social Order: An Overview." *Current Sociology* 45, 3, 19-39.
- Freudenburg, William R. and Robert Gramling. 1992. "Community Impacts of Technological Change: Toward a Longitudinal Perspective." *Social Forces* 70, 4, 937-955.

- Freudenburg, William and Timothy R. Jones 1991. "Attitudes and Stress in the Presence of a Technological Risk: A Test of the Supreme Court Hypothesis." *Social Forces* 69, 4, 1143-1168.
- Fritz, Charles E. 1961. "Disaster." in *Contemporary Social Problems: An Introduction to the Sociology of Deviant Behavior and Social Disorganization* edited by Robert K. Merton and Robert A. Nisbet. Harcourt, Brace and World: New York.
- Geise, Arthur C. 1940. "Mercury Poisoning." *Science* 91, 2368, 476-477.
- Gibson, Arrell M. 1982 *'Lead and Zinc,' Drill Bits, Picks and Shovels*. Norman, Oklahoma: University of Oklahoma Press.
- Gibson, Pamela Reed, Amy Nicole-Marie Elms, and Lisa Ann Ruding. 2003. "Perceived Treatment Efficacy for Conventional and Alternative Therapies Reported by People with Multiple Chemical Sensitivity." *Environmental Health Perspectives* 111, 12, 1498-1504.
- Gunter, Valerie and Steve Kroll-Smith. 2007. *Volatile Places: A Sociology of Communities and Environmental Controversies*. Thousand Oaks: Pine Forge Press.
- Kennedy, Dennis K. 2002. *Grassroots Environmental Activism in the Tar Creek Basin: The Case of Picher, Oklahoma*. Master's Thesis. Department of Sociology, Oklahoma State University, Stillwater
- Kramarova, Eva, Mandis Kogevinas, Cung Thuyet, Anh, Hoang Dinh Cau, Le Cao Dai, Steven D Stellman and D. Maxwell Parkin. 1998. "Exposure to Agent Orange and Occurrence of Soft-Tissue Sarcomas or Non-Hodgkin Lymphomas: An Ongoing Study." *Environmental Health Perspectives* 106, 2, 671-678.
- Kreps, Gary A. 1985a. "Disaster as Systematic Event and Social Catalyst: A Clarification of Subject Matter." *International Journal of Mass Emergencies and Disasters* 13, 3, 255-284.
- Kreps, Gary A. 1985b. "Disaster and the Social Order." *Sociological Theory* 3, 1, 49-64.
- Krogman, Naomi T. 1996. "Frame Disputes in Environmental Controversies: The Case of Wetland Regulations in Louisiana." *Sociological Spectrum* 16, 371-400.
- Kroll-Smith, Steve and Stephen R. Couch. 1990. *The Real Disaster is above Ground: A Mine Fire and Social Conflict*. Lexington: University of Kentucky Press
- Kroll-Smith, Steve, Stephen R. Couch and Adeline. G. Levine 2002. "Technological Hazards and Disasters" pp. 295-328 in *Handbook of Environmental Sociology*, edited by Riley E. Dunlap and W. Michelson. Westport, CT: Greenwood Press.

- Kroll-Smith, Steve and H. Hugh Floyd. 1997. *Bodies in Protest: Environmental Illness and the Struggle for Medical Knowledge*. New York: New York University Press.
- Kroll-Smith, Steve and Anthony E. Ladd. 1993. "Environmental Illness and Biomedicine: Anomalies, Exemplars, and the Politics of the Body." *Sociological Spectrum* 13: 7-33.
- Landrigan, Phillip J. 1990. "Prevention of Toxic Environmental Illness in the Twenty First Century." *Environmental Health Perspectives* 86, 2, 197-199.
- Levine, Adeline G. 1982. *Love Canal: Science, Politics, and People*. Lexington, MA: Lexington Books.
- Lincoln, Yvonne S. and Egon G. Guba. 1985. *Naturalistic Inquiry*. Newbury Park: Sage.
- Lindlof, Thomas R. 1995. *Qualitative Communication Research Methods*. Thousand Oaks: Sage.
- Lofland, John and Lyn H. Lofland. 1984. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Belmont, California: Wadsworth Publishing Co.
- Markowitz, Gerald and David Rosner. 2002. "Corporate Responsibility for Toxins." *Annals of the American Academy of Political and Social Science* 584, 159-174.
- Milligan, Melinda J. 1998. "Interactional Past and Potential: The Social Construction of Place Attachment." *Symbolic Interaction* 21, 1, 1-33.
- Neuman, W. Lawrence. 1997. *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: Allyn and Bacon.
- Nieberding, Velma. 1983 *The History of Ottawa County*. Marceline, Missouri: Wadsworth Publishing Co.
- Pellow, David N. 2000. "Environmental Inequality Formation: Toward a Theory of Environmental Injustice." *American Behavioral Scientist* 43, 4, 581-601.
- Pinderhughes, Raquel. 1996. "The Impact of Race on Environmental Quality: An Empirical and Theoretical Discussion." *Sociological Perspectives* 39, 2, 231-248.
- Quarantelli, E.L., and Russell R. Dynes. 1977. "Response to Social Crisis and Disaster." *Annual Review of Sociology* 3, 23-49.

- Roberts, J. Timmons. 1997. "Negotiating Both Sides of the Plant Gate: Gender, Hazardous Facility Workers and Community Responses to Technological Hazards." *Current Sociology* 45, 3, 157-177.
- Rosenthal, Uriel. 1998. "Future Disasters, Future Definitions." in *What is a Disaster?: Perspectives on the Question* edited by E. L. Quarantelli. London: Routledge.
- Rosner, David and Gerald E. Markowitz. 2000. "From Dust to Dust: The Birth and Re-Birth of National Concern for Silicosis" pp. 162-174 in *Illness and the Environment: A Reader in contested Medicine* edited by Steve Kroll-Smith, Phil Brown, and Valerie J. Gunter. New York: New York University Press.
- Rothera, Ellen. 1991. *Encyclopedia of Allergy and Environmental Illness: A Self-Help Approach*. Hong Kong: Typeset Publishing.
- Rubin, Herbert J. and Irene S Rubin. 1995. *Qualitative Interviewing: The Art of Hearing Data*. Thousand Oaks: Sage.
- Sampson, Robert J. 1988. "Local Friendship Ties and Community Attachment in Mass Society: A Multilevel and Systematic Model." *American Sociological Review* 53, 5, 766-779.
- Scott, Wilbur J. 1988. "Competing Paradigms in the Assessment of Latent Disorders: The Case of Agent Orange." *Social Problems* 35, 2, 145-161.
- Scott, Wilbur J. 2004. *Vietnam Veterans since the War: The Politics of PTSD, Agent Orange, and the National Memorial*. Norman: University of Oklahoma Press.
- Shriver, Thomas E. 2001. "Environmental Hazards and Veterans' Framing of Gulf War Illness." *Sociological Inquiry* 71,3, 403-420.
- Shriver, Thomas E., Deborah A. White, and Alem Seghed Kebede, 1998. "Power, Politics, and the Framing of Environmental Illness." *Sociological Inquiry* 68, 3, 458-475.
- Shriver, Thomas E. and Dennis K. Kennedy. 2005. "Contested Environmental Hazards and Community Conflict Over Relocation." *Rural Sociology* 70, 4, 491-513.
- Shriver, Thomas E. and Charles Peadar. 2008. "Frame Disputes in a Natural Resource Controversy: The Case of the Arbuckle Simpson Aquifer in South Central Oklahoma." Forthcoming in *Society and Natural Resources*.
- Shriver, Thomas E. and Gary A. Webb. 2008. "Perspectives on Environmental Health and Justice among Native Americans in a Rural Oklahoma Community." Unpublished Manuscript.

- Stedman, Richard C. 2003. "Is it Really Just a Social Construction? The Contribution of the Physical Environment to a Sense of Place." *Society and Natural Resources* 16, 8, 671-685.
- Szasz, Andrew. 1994. *Ecopolitism: Toxic Waste and the Movement for Environmental Justice*. Minneapolis: University of Minnesota Press
- Taylor, Dorceta E. 2000. "The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses." *American Behavioral Scientist* 43, 4, 508-580.
- Theodori, Gene L. and A. E. Luloff. 2000. "Urbanization and Community Attachment in Rural Areas." *Society and Natural Resources* 13, 399-420.
- Theodorson, George A. 1961. *Studies in Human Ecology*, edited by George A. Theodorson. Evanston: Harper and Row.
- Thompson, Ross A. 2000. "The Legacy of Early Attachment." *Child Development* 71, 1, 145-152.
- Vyner, Henry. M. 1988. *Invisible Trauma: The Psychosocial Effects of Invisible Environmental Contaminants*. Lexington, MA: Lexington Books.
- Wellman, Barry and Scot Wortley. 1990. "Different Strokes from Different Folks: Community Ties and Social Support." *American Journal of Sociology* 96, 3, 558-588.
- Wulfhorst, J.D. 2000. "Collective Identity and Hazardous Waste Management." *Rural Sociology* 65, 2, 275-294.
- Zavetoski, Stephen, Frank Mignano, Kate Agnello, Francine Darroch, and Katy Abrams. 2002. "Toxicity and Complicity: Explaining Consensual Community Response to a Chronic Technical Disaster." *The Sociological Quarterly* 43, 3, 385-406.

Newspaper and publication articles

- Averill, David. 2003. "Hellholes." *Tulsa World*, June 22, G5.
- Averill, David. "Tar Creek." *Tulsa World* March 12, A11.
- Berrey, John L. 2003. "Quapaw Tribe wants Tar Creek land restored." *Tulsa World* July 13 p. G4
- Blackshare, Derek. 2007. "Environmental rules effective but costly." *Tulsa World* April 26, 2007.

- Biotech week*. 2004. "U.S. National Institutes of Health; Children's Environmental Health Center will address Tar Creek exposures." *Biotech Week* July 28, P 606.
- Branstetter, Ziva. 2006. "Kansas cleanup doesn't include buyout." *Tulsa World* July 25, 2006.
- Branstetter, Ziva. 2006. "Tar Creek: Buyout: Residents informed." *Tulsa World* August 2, 2006.
- Branstetter, Ziva. 2006. "Tar Creek: Relocation: Henry names buyout panel." *Tulsa World* July 15, 2006.
- Caseload Data, July 2005. Available at: <http://www.teletrain.com/wic/mainpage.htm>. Accessed October 10, 2005.
- Chavez, Will. 2003. "Cherokee citizen advocates clean up of Tar Creek." *Cherokee Phoenix and Indian Advocate* 17, 7, 1
- Cooper, Jay. 2001. "Study: Picher Students' Learning Hurt by Lead." *Tulsa World*, July 26, A1.
- County Business Patterns: Oklahoma 2003, US Census Bureau, US Department of Commerce; Economics and Statistics Administration, September 2005. Available at: <http://www.census.gov/epcd/cbp/view/cbpview.html>. Accessed October 15, 2005.
- Delcour, Julie. 2003. "A Fish Story." *Tulsa World*, July 6, G1.
- Economic Research Service: County-level unemployment and median household income for Oklahoma, USDA. Available at: <http://www.ers.usda.gov/Data/Unemployment>. Accessed October 10, 2005.
- Environmental Health; "Report shows not enough data to measure health hazards at Tar Creek." (2004, May). *Health & Medicine Week*, 361.
- Editorial. 2003. "Mugwump, Jr." *Tulsa World* Editorial Staff July 8, A 12
- Editorial. 2008. "Tar Creek." *Tulsa World* Editorial Staff April 14, A 12
- Ervin, Chuck. 2002. "Keating Seeks Suit Against Federal Government." *Tulsa World*, May 4, A1.
- Gillham, Omer. 2004a. "Tar Creek: Grievances about cleanup voiced." *Tulsa World* April 23, A1.

- Gillham, Omer. 2004b. "Report: Tar Creek risks still unassessed." *Tulsa World* May 6, A 19.
- Gillham, Omer. 2004c. "Tar Creek: Residents attribute ailments to Tar Creek-area pollution." *Tulsa World* May 7, A 13.
- Gillham, Omer. 2007. "Picher School annexation rejected." *Tulsa World* February 14, A1.
- Low income Report for 2004-2005, Oklahoma State Department of Education, Child Nutrition Programs website. Available at: <http://cnp.sde.state.ok.us>. Accessed October 13, 2005.
- Luthy, Brenda. 2006a. "Sinkhole has town pondering its future." *Tulsa World* August 5, 2006.
- Luthy, Brenda. 2006b. "Tar Creek: Buyout: Applications flying out the door." *Tulsa World* August 8, 2006.
- Myers, Jim. 2001. "Keating Makes Case for Tar Creek." February 27, A9.
- Myers, Jim. 2003a. "Obstacles Seen in Tar Creek." *Tulsa World*, April 12, A15.
- Myers, Jim. 2003b. "Tar Creek Key Figures Withdraw." *Tulsa World*, April 30, A1.
- Myers, Jim. 2003c. "Tar Creek Report Stirs Carson Ire." *Tulsa World*, May 11, A27.
- Myers, Jim. 2003d. "Carson Wants Tar Creek Report Probe." *Tulsa World*, June 4, A1.
- Myers, Jim. 2003e. "Inhofe Wants to Put Chat to Use." *Tulsa World*, August 2, A1
- Myers, Jim and Shaun Schafer. 2003. "Solutions for Tar Creek Touted." May 2, A13.
- Neal, Ken. 2003. "While Politicians Debate, Tar Creek Citizens Struggle." *Tulsa World*, July 6, G6.
- Nees, Terry. 2003. "Ivory Tower Governing." Letter to the editor, *Tulsa World*, May 12, A11.
- Oklahoma Department of Human Services. Available at: <http://www.okdhs.org/ioppr/cp>. Accessed October 16, 2005.
- Oklahoma Quick Facts, US Census. Available at: <http://quickfacts.census.gov/qfd/states/40/40115.html>. Accessed October 17, 2005.

- Oklahoma State Department of Health, WIC data as of January 31, 2005. Available at: <http://www.health.state.ok.us/program/wicdata>. Accessed October 17, 2005.
- Oklahoma Department of Human Services, Office of Planning, Policy and Research; County Profiles, July 2005. Available at: <http://www.okdhs.org/ioppr/cp>. Accessed October 17, 2005.
- Oklahoma Department of Environmental Quality. 2003. Oklahoma Plan for Tar Creek.
- Pearson, Janet. 2003a. "Unacceptable Risks." *Tulsa World*, June 22, G3.
- Pearson, Janet. 2003b. "The American Dream." *Tulsa World*, July 6, G6.
- Planning for Healthy Communities, 2005 County Health Profile, Oklahoma State Department of Health; data obtained from "Population Indicators (1, 2, 3) US Census Bureau provided by the Oklahoma Department of Commerce.
- Profile of Selected Social Characteristics, American FactFinder, US Census 2000. Available at: <http://factfinder.census.gov/>. Accessed October 17, 2005.
- Profile of Selected Economic Characteristics, US Census, 2000.
- Robertson, Joe. 1998. "Getting the Lead out EPA Documents Warn of Urgent Health Risk from Mining Waste in Ottawa County Area." October 11, A13.
- Roosevelt, Margot. 2004. "The Tragedy of Tar Creek." *Time* 163, 17, 42-47.
- Schafer, Shaun. 2002a. "Tar Creek Projects Detailed by DEQ." *Tulsa World*, September 7, A16.
- Schafer, Shaun. 2002b. "Superfund Chief Delivers Dirt on Cleanup." *Tulsa World*, September 16, A1.
- Schafer, Shaun. 2002c. "Residents: EPA Short on Yards." *Tulsa World*, December 8, A1.
- Schafer, Shaun. 2002d. "Area Struggling 20 Years Later." *Tulsa World*, December 15, A1.
- Schafer, Shaun. 2002e. "Tar Creek's Legacy a Heavy Burden." *Tulsa World*, December 29, A1.
- Schafer, Shaun. 2003a. "Tar Creek Lead Study Results in." *Tulsa World*, March 18, A11.
- Schafer, Shaun. 2003b. "Carson asks for Input on Superfund Site." *Tulsa World*, April 23, A10.

- Schafer, Shaun. 2003c. "Toiling with Tainted Soil." *Tulsa World* April 26, A1.
- Schafer, Shaun. 2003d. "Ride to offer 'Toxic Tour.'" *Tulsa World*, May 1, A11.
- Schafer, Shaun. 2003e. "In Tar Creek, Danger Remains." *Tulsa World*, June 22, A1.
- Schafer, Shaun. 2003f. "Caution Urged in Eating Fish." *Tulsa World*, July 18, A1.
- Schafer, Shaun. 2003g. "Dirt-Cheap It's Not." *Tulsa World*, August 3, A1.
- Schafer, Shaun. 2003h. "Tar Creek Lot Work Stops." *Tulsa World*, August 8, A1.
- Schafer, Shaun. 2003i. "Heads of Tailings." *Tulsa World*, August 20, A11.
- Small Area Income & Poverty Estimates, US Census 2002 (released in December 2004),
Available at: <http://www.census.gov/cgi-bin/saipe/saipe.cgi>. Accessed October 17,
2005.
- Small Area Income & Poverty Estimates, US Census, 2002.
- Staff Reports. 2000. "Tar Creek Clean-up: Getting the Lead Out." *Tulsa World*, April 3,
A1.
- Staff Reports. 2003a. "The Key to Less War, Cheaper Fuel." *Tulsa World*, February 28,
A2.
- Staff Reports. 2003b. "Without Change, State is Doomed." *Tulsa World*, June 30, A2.
- Tramel, Jimmie. 2006. "Picher residents brace for quiet Friday nights." *Tulsa World*
July 3, 2006 B1.
- Walton, Rod. 2000. "Task Force Supports Wetlands Plan." *Tulsa World*, October 6, p.
A1.
- Walton, Rod. 2002. "Officials Chat about Chat: New Cleanup of Tar Creek
is Promised." *The Tulsa World* January 30, p. A11-13.
- Warford-Perry, Janet. 2000. "Mining Waste Cleanup Could Cost Billions." *Tulsa World*,
September, 19 A1.
- Warford-Perry, Janet. 2001 "Tar Creek Homes Subject to Study." *Tulsa World*, July 22,
A1.

APPENDICES

APPENDIX ONE

TAR CREEK CHRONOLOGY

- 1891 Picher Mining Field discovered. Mining of lead and zinc began in the Tar Creek Basin and continued to 1970. Most of the mines located on land owned by the Quapaw Tribe. Corporate mining leases were negotiated and approved by the federal government. Most mines had their own mill, and Oklahoma mills in many cases served as central mills for mines operating in Kansas and Missouri. Milling the lead and zinc ore resulted in a concentrate of the original mined material. The milling process, however also resulted in mine tailings that were originally considered an unmarketable waste product. The mine tailings were disposed of by collecting in piles or in flotation tailings ponds. Some piles are as high as 200 feet and contain elevated levels of lead and other heavy metals. Chat has been marketed and sold as a construction production like limestone gravel for many years. Chat piles are either owned privately or held in trust by the US DOI for members of the Quapaw Tribe (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality, p.4).
- 1920 Picher population peaked at 9,676 as largest city in Ottawa County; population declined ever after (Schafer 2003e, p. A1).
- 1934 Private lawsuit over polluted water – no resolution (Schafer 2003, p. A6)
- 1950s Subsidence gutted a four-block area in the middle of Picher; it remains abandoned and fenced off today (Averill 2003, p. G5).
- 1958 Depressed metal markets halted most major mining operations.
- 1967 Massive cave-in, or subsidence, in Picher swallowed three houses and left 18 people homeless (Averill 2003, p. G5).
- 1970 Picher and Cardin epicenter of a giant lead and zinc mining operation. Last mining operations stopped. Federal government released mining company bonds without requiring a cleanup (Berrey 2003, p. G4). 2000 census showed Picher = 1,640 residents; Cardin = 150 from high of 2,640. Left behind about 75 million tons as estimated by US Geological Survey and US Army Corps of Engineers (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality, p.4) of mining wastes, or tailings, of chert, limestone, lead, and other heavy metals (“chat”) left, scattered in mountains throughout community of Picher – “Picher

Mountains.” Some of the chat piles are over 150 feet tall. One respondent told me the tallest one was 300 feet, but I'm inclined to believe it is more like 200 feet. It is quite large. The base covers 5-10 acres. Mountains a source of recreation and entertainment, small kids played on the chat piles and teens organized cookouts on the mountains, skiing and sledding. Chat used as road-building material, foundations for buildings, filler for children’s sandboxes, playgrounds, and spread on base paths in ball fields. The mountains are taller than 11 pickup trucks. The fine chat settles into a pile and the surface becomes armored with hard gray and tan chat. “Chat rats.” Also left miles of underground tunnels, enormous underground caverns from open mine shafts, and drill holes. Also left contaminated flotation ponds, used in the mining process to separate the desired minerals from the tailings. Also left zinc, cadmium, manganese, and arsenic (Pearson 2003, p. G3).

- 1974 Family barely escaped from their home as it subsided into the ground (Averill 2003, p. G5).
- 1979 Mineshafts filled with water, minerals oxidized and created acid mine water that discharged into Tar Creek and contaminated ground and surface water – soda-pop orange. Contaminated mine water in surface streams.
- 1980 Oklahoma Governor George Nigh established the Tar Creek Task Force to investigate acid mine drainage into Tar Creek. Results shown to EPA.
- 1981 July: EPA proposed 40-square-mile site at Tar Creek as one of the first Superfund sites. Included towns of Picher, Cardin, Commerce, North Miami, and Quapaw. I believe it was designated the #1 site based on the immense area that is contaminated. The area encompasses more than 40 square miles. Of course the EPA denies it was ever designated #1, but it was listed at the top of the very first list.
- 1983 September 8: Site designated as EPA Superfund site. (Currently about 3,000 people in the five cities)(Pearson 2003, p. G3). The Tar Creek Superfund Site is part of the Tri-State Mining District which includes northeastern Oklahoma, southeastern Kansas, and southwestern Missouri. Specifically, the Site includes the Old Picher Field lead and zinc mining area in northeastern Ottawa County. Approximately 20,000 in surrounding area. Principal pollutants: lead, cadmium, and zinc. Health considerations: lead-contaminated soils and chat piles are a source of exposure to the population, especially to young children. Center for Disease Control sets blood lead level threshold level at 10 micrograms per deciliter: beyond that, adverse health effects have been shown to occur. Chronic exposure can deleteriously affect the immune system, blood system, nervous system, and kidneys. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and

reduced growth in young children. EPA began education effort to teach about negative impacts of lead exposures. The EPA did some work between '83 and '86 at which time they discontinued any work in the area. Sometime after '86 and prior to '95 LEAD (Local Environmental Action Demanded, activist group associated with local teacher Ms. Rebecca Jim and recipient of EPA's Technical Assistance Grant for the Tar Creek Area) and TEAL singularly or in tandem initiated a study for elevated blood levels in Native American children. That is where the Indian Health Service comes in. They could get this done for the Native American children through IHS.

- 1984 Operable Units are portions of a remedial response – cleanup of Superfund site can be divided into a number of OUs, organized by geographical portions of a site or specific site problems to be remediated (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality). Tar Creek has four OUs. Operable Unit 1 Record of Decision signed June 6. OU1 addressed (1) the surface water degradation by the discharge of acid mine water, and (2) the threat of contamination of the Roubidoux Aquifer, the regional water supply, by downward migration of acid mine water from the overlying Boone Aquifer through abandoned wells connecting the two. Recharge was to be prevented by utilizing diking and diversion of surface water of Tar Creek to keep it from entering the two collapsed mine shafts in Kansas, which were identified as the main inflow points, The remedy also called for preventing the downward migration of acid mine water into the Roubidoux Aquifer by plugging 66 abandoned wells. During remediation, an additional 17 wells were identified and addressed, bringing the total to 83 wells. Completed 1986.
- 1984 EPA settled with the mining companies for about \$1.4 million, which went toward the water diversion project. Eagle Picher, largest mining operation in area, declared bankruptcy; only some of its \$470,000 in assets went to EPA's cleanup costs. Remaining companies accounted for less than 10% of mining operations. US DOI chose not to participate in cleanup costs even though it managed much of the land belonging to the Quapaw Nation which was leased to the mining companies (Robertson 1998). EPA launched plan to plug wells and reroute Tar Creek around contaminated sites.
- 1986 OU1 construction activities concluded on December 22, \$10 million (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality). Project to reroute Tar Creek was completed but failed: EPA's five-year review reported that the rerouting project failed to clean water. Still streams running orange with acid mine water. No other cleanup attempts made until after early 1990s' discovery that as many as 40% of area residents had elevated blood lead levels.

- 1986 OK DEQ said mixed results: surface water quality was not significantly improved; diking and diversion remedial action was at best only partially effective; and insufficient data to evaluate effectiveness of well plugging operations. Concentrations of most constituents in the mine water discharges decreased; however, that may have occurred naturally, and the volume of the mine water discharged to Tar Creek was not significantly impacted by the remedial action (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality).
- 1989 OU3 designated in 1989 and ended in 1999. Pursuant to request of Quapaw Tribe, EPA investigated the abandoned Eagle Picher Industries mining laboratory in Cardin and disposed of 120 deteriorating containers of lead recovering chemicals at the lab. \$55K (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality).
- 1991 EPA began issuing Consent Decrees to 6 Primarily Responsible Parties (mining companies: Asarco Inc., Blue Tee Corp., Goldfields Mining Corp., NL Industries, Childress Royalty Co., and Doe run Resources Corp.) to assist in the cleanup; they refused.
- 1994 Study of lead exposure by the Indian Health Services and the State of Oklahoma reported findings of significant blood-lead levels in area children. Between 1994 and 1998, 1,000 children from Ottawa County were tested for blood lead levels; 11% in county tested positive; 33% of children in Picher community tested positive (Pearson 2003, p. G3). The IHS is a part of the Federal Government. Separate tribes usually have their own service-Pawnees treat Pawnees, Cherokees/Cherokees, etc. Although if someone is registered with one service and is in need of service in another area, they will treat the individual.
- 1995 Mining companies (the 6 Primarily Responsible Parties) offer to perform a Community Health Action Monitoring program to aid in cleanup; EPA accepted offer.
- 1995 Tribal Efforts Against Lead research found that lead levels among local children were four times higher than the national average. TEAL is the organization that got the ball rolling on the Picher Superfund site after the EPA had pulled out. With their study on elevated blood lead levels, large scale remediation of the area began. From April to July 1995, EPA took samples of outside air, drinking water, soil, inside dust, produce and paint at 100 randomly chosen homes in Picher (Warford-Perry 2000, p. A1). A total of 380 dust samples were collected from floor areas accessible to children. Guidelines from the Department of Housing and Urban Development deem a home unsafe for human habitation if it contains a lead level above 100 micrograms per square foot. Many homes exceeded those limits. The highest recorded lead levels measured were 207

micrograms per square foot in a family room, 280 in a child's room and 1,850 in the entry area of one home.” “The blood lead levels in area children continue to be four times greater than the national average, according to a study this year by the Tribal Efforts Against Lead organization.” (TEAL Study). (Warford-Perry 2001, p. A1). State of Oklahoma confirmed elevated blood lead levels in children. The 1996 study would be the TEAL study. EPA sampled 100 randomly chosen homes and found that the majority exceeded the federal government's lead threshold levels of 100 micrograms per square foot (estimated 97% of homes in the Tar Creek Basin contained lead). EPA began efforts to remediate the lead from public land (including 16 city parks) (Myers and Schafer 2003, p. A13) and residential yards – about \$100 million so far, focused on residential yards. But residents complained that their yards were continually recontaminated with lead from wind blowing across chat piles.

- 1995 Rebecca Jim formed the Cherokee Volunteer Society to rally citizens to the cause; CVS coordinated a study that found that 32% of children had elevated blood lead levels. Don Ackerman, master's student [IHS Field Sanitarian], sent results to EPA and EPA refocused on Tar Creek. Beginning of Toxic Tour by Rebecca Jim, guided tours of the contaminated areas (Schafer 2003d, P. A11). CVS started Learn and Serve Program – service learning for high school students.
- 1995 OU 2 designated in 1995 as a result of information obtained from the Indian Health Service about concentration levels of lead in blood of Indian children in area: about 35% of the Indian children tested showed concentrations of lead in their blood that exceeded CDCP level. Subsequent county-wide testing: more than 30% of children had elevated blood lead levels. EPA began sampling soils and began yard remediation activities from 1995-2003 (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality, 2003).
- 1996 TEAL study found that 43% of the children in the five-city Superfund site had elevated blood lead levels (Pearson 2003, p. G3).
- 1996 Yard remediation began in June 1996 (Schafer 2003h, p. A1). EPA response team had removed contaminated soil from 300 residences. Yard remediation = removal of lead-tainted soil from the site and replacement w/ “clean” dirt from outside the Superfund area; involves digging 18 inches of dirt around homes or in playground “hot spots” with high lead concentration (Schafer 2003c, p. A1).
- 1996 National Institute of Environmental Health Sciences awarded a CBPR (community-based participatory research) to University of Oklahoma College of Public Health to work with the Native-American community on

its environmental lead problem. Such grants are made to unite scientists and community members in research on the effects of environmental health hazards and to educate local residents on how to avoid or to mitigate their risk of exposure. The researchers and community members created TEAL – Tribal Efforts Against Lead – to develop and enact strategies for reaching out to the community. Used a lay health advisor model to build on existing social networks to prevent disease and promote health. Consists of five volunteers from each of the 8 tribes. Volunteers were trained for two days on lead poisoning and prevention. Then they spent the next two years passing the info on to the rest of the community via booths at county fairs, powwows, carnivals, and sidewalk sales; handout out pens, emery boards, and balloons imprinted with messages on how to reduce exposure in the home – wet mop regularly, wash children’s hands, eat foods high in calcium and iron, and avoid playing in the chat.

- 1997 August 27: Operable Unit 2 Record of Decision signed to address residential yard cleanups.
- 1997 Rebecca Jim helped form Local Environmental Action Demanded Agency to educate residents and conduct research on local health hazards.
- 1997 EPA report: area children with high BLLs decreased from 43% of children to 23% (state average = 3%; national average = 4%); lead found in homes decreased from 97% in 1996 to 51% in 1997 (Staff Reports 2000, p. A2) EPA site manager Noel Bennett ‘The problem is so large and widespread that it is not fixable from a practical standpoint,’ Bennett said. ‘We don’t have enough money to fix it all, so we give the greatest priority to human health issues.’” (Robertson 1998, p A13).
- 1998 Research by Tribal Efforts Against Lead found 24% of children in the Picher/Cardin/Hockerville area had elevated BLLs (Pearson 2003, p. G3). Study found 18.8% of children aged six and younger had elevated blood lead levels, nearly 4 times higher than national average and 5 times higher than state average (Schafer 2002c, p. A1).
- 1998 Excavation of contaminated soil began on 1,300 more homes. New public education program lead danger started. EPA found that Tar Creek Basin had highest percentage of children with elevated lead levels among all Superfund sites. Mining district moved to number one on the National Priority List for remediation; nation’s largest superfund site. EPA initiated new public education campaign on the dangers of lead exposure to children.
- 2000 TEAL study found 12% of children in Picher area with BLLs about 10 micrograms – the majority live in remediated households.

- 2000 September: Oklahoma State Secretary of Environment Brian Griffin headed task force: remediation = \$500 million to \$20 billion to: address health problems of adults and children; seal sink holes; seal mine shafts; eliminate 75 million tons of chat; repair mining-associated drainage and flooding problems; and rectify soil damage from contaminants (Warford-Perry 2000, p. A). The governor's task force made recommendations that included establishing guidelines for the "safe, economical and effective" use of chat, creating a local industrial authority to coordinate transportation and marketing of chat and developing a chat marketing program (Myers 2003e, p. A1). World-class wetlands area and wildlife refuge would be most affordable and effective way to financially deal with the seemingly endless environmental disaster in Ottawa County (Walton 2000 p. A1).
- 2001 Based on the task force report, Governor Frank Keating proposed relocating residents from the Picher community and adjacent Cardin community (17-acre epicenter of the Superfund site with population around 1,800, 800 homes, 50 businesses and churches) and turning the Superfund site into a 10,000 acre wetlands for waterfowl migration, tourism, and recreation (Myers 2001 p. A9). Relocation continued to be advocated briefly by next Governor Brad Henry.
- 2001 Quapaw Tribe filed lawsuit against US to attempt to hold the responsible federal authorities accountable for 100 years of mismanagement of its land and resources (Berrey 2003, p. G4). Bureau of Indian Affairs lifted a 4-year moratorium prohibiting the Quapaws from selling chat (Walton 2002, p. A11-A13).
- 2002 Gov. Keating requested a technical study and report from the EPA on his plan for voluntary relocation of Picher and Cardin residents and for transforming the Superfund site into a wetlands.
- 2002 May: Gov. Keating asked State Attorney General to file a lawsuit against federal government to force them to take action at Tar Creek. "It was the Department of the Interior that told everyone where to mine, how to mine and not to sell the chat," Keating said. The lawsuit should seek financial damages and assistance for families who volunteer to relocate their homes and businesses (Ervin 2002, p. A1).
- 2002 DOI Secretary Gale Norton recused herself from Tar Creek case 06/24/02 because NL Industries, one of Tar Creek mining companies, had been a Norton Client when she was in the private sector. Marianne Lamont Horniko, responsible for Superfund program as an asst. administrator for EPA, recused herself because her former consulting firm worked for a law firm that represented ASARCO, one of the mining companies. James Connaughton, head of White House's Council on Environmental Quality,

worked for a law firm that represented ASARCO (Myers 2003b, p. A1). No one agency has mandate or abilities to solve all Tar Creek's problems – would have to be a consensus (Schafer 2003b, p. A10). John Sparkman, chairman of Tar Creek Basin Steering Committee (a semi-activist group organized by Sparkman at Governor Frank Keating's suggestion to form a committee including the mayors of Picher, Cardin, Commerce, Quapaw, delegates of the Quapaw Tribe and others; represents itself as the group that Govs. Nigh and Keating backed; (I initially found that the committee was organized for a federal buyout, not a community relocation), Picher Housing Authority director, and school board president for the Picher-Cardin school system: "You know what this project is? It's a successful failure" (Schafer 2003g, p. A1). Frank Wood, long-time resident and head of Picher Mining Field Museum: "Hundreds of studies and remediation efforts have amounted to little. The people here are sick of being lab rats" (Delcour 2003, p. G1)

- 2002 August: unauthorized release of report contracted by the federal government via EPA with a Virginia firm that endorses most of a 2001 proposal by former Gov. Frank Keating to relocate residents (voluntary location) of the contaminated Tar Creek area and turn the Superfund site into a 10,000 acre wetlands (Myers 2003c, p. A1; Myers 2003d p. A1; Nees 2003, p. A11).

- 2002 August, completion of remediation of 8 schools in Miami and Picher, removal of chat piles.

- 2002 State of Oklahoma Department of Environmental Quality signed contract with Gateway Economic Development Association, the area substate planning district, for several projects: assist with the marketing of chat, educate area families on the hazards of lead contamination; \$600K in state funds for rail spur construction, lead-based paint cleanup and remediation coordination. Rail spur to expand options for economically marketing chat. \$260K to test homes for lead-based paint. \$60K for education (Schafer 2002g, p. A1).

- 2003 January: Senator Jim Inhofe became chairman of US Senate Committee on Environment and Public Works. He opposed relocation; proposed to spend \$45 million on cleaning up unpopulated areas and consolidate the waste at one central site (Pearson 2003, p. G6). Inhofe instrumental in granting \$45 million to University of Oklahoma to study Tar Creek (*Tulsa World* editorial 2003, p. A12). Residents divided over voluntary buyout: those who stay would have to pay for municipal services etc.

- 2003 Toxic Tour featured junior high students riding bikes through 19 miles of contaminated areas (Schafer 2003d, p. A11). Picher resident Dwight Pettitt: "The EPA is a joke – everybody will tell you that. They don't know what

they are doing” (Schafer 2002c, p. A1). Multi-billion dollar class-action lawsuit by Quapaw Tribe against mining companies for compensation for tribal members and for health monitoring and additional cleanup work; attorneys for mining companies have said that the companies operated the lead and zinc mines by state-of-the-art standards of the day and that they were unaware of the potential long-range dangers to the environment (“The Results of Mining at Tar Creek,” http://www.umich.edu/~snre492/cases_03-04/TarCreek/TarCreek_case_study.htm). Class-action lawsuit by residents of Picher-Cardin area, city of Picher, and the Picher School District against various mining companies and the federal government (Schafer 2003i, p. A11).

- 2003 May 1: Coordinated by Inhofe (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality – 2003, part of OU4), the agencies wrote a Memorandum of Understanding about their roles on Tar Creek – EPA, DOI, and US Army Corps of Engineers (Myers 2003, p. A 15). The MOU gives the federal agencies the opportunity to coordinate with the affected Indian tribes, the State of Oklahoma, local communities, and other stakeholders in determining the most effective manner for resolving the issues at this site.
- 2003 April: federal report on buyout and relocation issued. Report done by a technical team from a Virginia firm, contracted with the EPA. A draft of the report dated August 2002 leaked to the *Tulsa World* shows a stronger endorsement of Keating’s relocation and wetlands plan than the April 2003 final draft. Controversy over whether an earlier version of the report endorsed a voluntary relocation of residents of Picher and Cardin and whether the final version was watered down – overruled – by EPA or other government officials to derail such talk. Heated debate between US Rep (D) Brad Carson and Inhofe. Inhofe favors sticking to a plan based on current cleanup efforts. Member of technical team said he never saw the final report. Some changes: “Even so, the team favors a voluntary relocation for a number of reasons” changed to “Even so, if the goal is to create a resource area, the team favors a voluntary relocation for a number of reasons;” “Chat piles continued risk to community health” changed to “Chat piles pose potential risk to community health.” US Army Corp of Engineers: relocation would cost between \$43.2 million for voluntary acquisitions and relocation to a high of \$118.4 million for acquisition and relocation of all affected land (Pearson 2003, p. G6).
- 2003 June: opinion piece in *Tulsa World* compares money spent on war to that spent on US citizens: “Our government has spent billions rebuilding Afghanistan and will do the same for Iraq. We throw billions more on other, foreign countries, but we can’t take care of our own” (Staff Reports 2003, p. A 2).

2003 July: Gov. Brad Henry backed out on State's lawsuit against federal government to force action on Tar Creek. OK DEQ issued warning on eating whole fish based on draft report of metals in fish from Tar Creek. Lead and cadmium above safe levels for consumption (Schafer 2003f, p. A1). Oklahoma Dept. of Environmental Quality warned against eating fish because of lead and cadmium above safe levels for consumption in bottom feeding species like carp, buffalo and catfish when fish flesh and bones were blended together. "Preparing fish whole is particularly common among tribal members in the area" said John Berrey, chairman of the Quapaw Tribe (Schafer 2003f, p. A1).

2003 By 2003, over 1900 residential yards had been remediated in a process that involves replacing the contaminated soil with clean soil and clay. By June 2003, \$95.6 million spent on yard remediation; \$107.5 million since 1980 spent on the Superfund site (Schafer 2003h, p. A1). EPA contracted with several private companies for remediation. Average cost is over \$20,000 per yard, high end \$71,000; average cost per location was as much as four times the value of many of the structures on those properties (Schafer 2003g, p. A1). EPA claimed success of remediation project. University of Oklahoma Health Sciences Center study found that lead dust could re-contaminate a house within nine months (Schafer 2003a, p. A11, Schafer 2003c, p. A1). Research by Tribal Efforts Against Lead found some area homes re-contaminated in 11 days (Schafer 2003c, p. A1). 36 of 45 homes studied were re-contaminated beyond acceptable levels in an average of 160 days (Schafer 2003a, p. A11). South of Cardin is the repository, where dumptrucks have unloaded acres of former lawns and gardens. Residents say that the soil is left out in the open and dries each spring to blow back toward Cardin and Picher. EPA project manager for the yard remediation, Mike McAteer, disagreed – not a threat because in 2002 workers spread residential sludge wastes from Picher on the repository, grass started growing and bonded the tainted soil to keep it from blowing back. At the end of the project, they'll put on a permanent cap (Schafer 2003c, p. A1).

2003 July 8, 2003 town meeting with Nickles (US Senator Don Nickles, senior Senator from Oklahoma until about 2004 when he retired – Inhofe is now the senior Senator) in which a Picher elementary school principal spoke about reading disabilities: about half the students required 75-100 repetitions to learn a reading lesson (average = 25 repetitions). Learning disabilities contribute to high dropout rate. Local school superintendent reported 2001 study of 28 students in K-3 whose parents gave permission for release of their child's blood-lead levels: those with elevated blood lead levels were more than nine months behind the normal expectations for their age cohort (Schafer 2002e, p. A1; Cooper 2001, p. A1). Of those 28 students, 14 had BLL of 7 micrograms per deciliter or greater, and 14

had a level of 6 micrograms or under (Cooper 2001, p. A1). Several residents argued that they and their children grew up in the area and showed no ill effects. But another woman said she worked hard to keep her home spotless, a recommendation the EPA said would minimize lead exposure, and yet one of her children still tested high for lead exposure. Nickles said that, if he feared his children were in danger, he would simply move them. A female resident responded “I can’t eat my house!” Nickles also asked: “Why do you think the government owes you a town?” (Pearson 2003, p. G6).

- 2003 December 9 OU4 designated: EPA Administrative Order on Consent signed for the OU4 Remedial Investigation/Feasibility Study (OU4 = Operable Unit 4: Chat Piles and Mill Ponds). Purpose to negotiate a legal consent order and statement of work concerning the remedial investigation and feasibility study with DOI, Blue Tee Mining Company, and gold Fields Mining Company = 3 of the potentially responsible parties involved in the Tar Creek site (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality – date ? prior to 2003, as part of OU4). Respondents to the negotiated consent decree = EPA, Oklahoma Department of Environmental quality, the Quapaw Tribe, Bureau of Indian Affairs, Bureau of Land Management, US Geological Survey, US Fish and Wildlife Service, US Army Corps of Engineers (US EPA Fact Sheet, Tar Creek Superfund Site Update, March 25, 2004).
- 2004 February 10: meeting of Respondents to discuss and seek resolution on the comments to the draft Scoping Phase Work Plan (US EPA Fact Sheet, Tar Creek Superfund Site Update, March 25, 2004). After the meeting, Richard Greene (US EPA Regional Administrator) wrote a guest commentary for the Joplin Globe published on March 31, complaining that news coverage emphasized comments by the critics at the meeting (a minority).
- 2004 August: two open mine shafts closed. US Army Corps of Engineers initiated work in August on the Tar Creek and Spring River Watershed Management Plan to evaluate short and long-term solutions to reduce flooding and improve ecosystems (Oklahoma Plan for Tar Creek, Oklahoma Department of Environmental Quality, 2003, part of OU4).
- 2004 October: Report to Congress by the Agency for Toxic Substances and Disease Registry showed that children between the ages of 1 and 5 living at the Tar Creek site who had a blood lead level in excess of the 10ug/dL level decreased from 31.2% in 1996 to 2.8% in 2003. The 2.8% level is only slightly higher than the findings of the National Health and Nutrition Examination Surveys for children living in the US as a whole, which stands at 2.2% for children between the ages of 1 and 5 during the years 1999-2000 (May 1 EPA update from EPA Region 6, p1).

- 2004 November: EPA began closing of over 30 open mine shafts on both private and Bureau of Indian Affairs-managed properties.
- 2005 EPA reported that the blood lead levels of Tar Creek children aged 1-5 had been reduced to close to the national average.
- Residents continue to seek government sponsored relocation and buyout program. Inhofe's plan is to consolidate chat and market it for commercial use as roadbed stock. Resistance from residents and critics who argue that plan would take five years and would further contaminate the area with lead dust. Study showed 80% of 556 Picher and Cardin community residents support relocation. The support for relocation was information that was disseminated by the Tar Creek Basin Steering Committee. I was actually present at the meeting where some of the opposition were deriding the Steering Committee leadership for putting out that information knowing it was false.
- 2006 May 1 EPA update from EPA Region 6.
- >Operable Unit 1 = Surface water/Groundwater (rerouting streams): EPA is funding Oklahoma Department of Environmental Quality to monitor ground water in the Roubidoux aquifer. Abandoned well plugging has reduced the potential for contaminants in the shallow Boone Aquifer to migrate to the Roubidoux drinking water aquifer.
 - >Operable Unit 2 = Residential Properties: as of January 5, 2,179 residential yards and public areas remediated since the inception of cleanup in Quapaw, Cardin, Picher, Commerce, and North Miami. Work on the final 100 properties began in December 2005 and is expected to be completed by the end of 2006. EPA funding ATSDR and Ottawa County Health Department to provide community education and blood lead screening. OCHD also works with local health professionals including Indian Health Service physicians to provide education to the medical community.
 - >Operable Unit 4 = Chat Piles, Mine and Mill Waste, Smelter Waste, and Flotation Ponds: Proposed Plan outlining EPA's preferred alternative from the Feasibility Study is projected to be released in May 2006. Ongoing monthly and quarterly Memorandum of Understanding meetings, hosted by US Army Corps of Engineers. Purpose: to share information and keep parties abreast of pilots and studies that are being pursued in and around the site.
 - >Operable Unit 5 = Sediment and Surface Water: EPA Region 6 and EPA Region 7 working together as part of multi-state effort to characterize sediment and surface water throughout the Spring and Neosho River basins. Initial sampling planned for Spring 2006.
- 2006 Governor Brad Henry has been successful in buying out residents of Picher with children six years of age and under.

APPENDIX TWO

PLEASE CONSULT THE IRB APPLICATION GUIDE BEFORE COMPLETING THIS APPLICATION.

<http://compliance.vpr.okstate.edu/hsp/forms.htm>

Application for Review of Human Subjects Research Submitted to the Oklahoma State University Institutional Review Board Pursuant to 45 CFR 46		IRB Number FOR OFFICE USE ONLY
Title of Project: Environmental Degradation and Disintegrating Social Fabric in the Tar Creek Basin.		
Is the Project externally funded? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, complete the following: <input type="checkbox"/> Private <input type="checkbox"/> State <input type="checkbox"/> Federal		
Agency:	Grant No:	OSU Routing No:
Type of Review Requested: <input type="checkbox"/> Exempt <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Expedited Special Population <input type="checkbox"/> Full Board		
Principal Investigator(s): <i>I acknowledge that this represents an accurate and complete description of my research. If there are additional PIs, provide information on a separate sheet.</i>		
Dennis K. Kennedy <hr/> Name of Primary PI (typed)	<hr/> Signature of PI	<hr/> 01/27/06 Date
Sociology <hr/> Department	Arts and Sciences <hr/> College	
200 W. Mulberry Fairfax, OK 74637 <hr/> PI's Address (Street, City, State, Zip)	(918) 642-5656 <hr/> Phone	dennis.kennedy@okstate.edu <hr/> E-Mail
<hr/> Name of Co-PI (typed)	<hr/> Signature of Co-PI	<hr/> Date
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/> E-Mail
Adviser (complete if PI is a student): <i>I agree to provide the proper surveillance of this project to ensure that the rights and welfare of the human subjects are properly protected.</i>		
Dr. Thomas E. Shriver <hr/> Adviser's Name (typed)	<hr/> Signature of Adviser	<hr/> 01/27/06 Date
Sociology <hr/> Department	A&S <hr/> College	
006 CLB <hr/> Adviser's Address	744-6121 <hr/> Phone	tshrivr@okstate.edu <hr/> E-Mail

NOTE: If sufficient space is not provided below for a complete answer in sufficient detail for the reviewer to fully understand what is being proposed, please use additional pages as necessary.

1. Describe the purpose and the research problem in the proposed study.

The purpose of this project is to conduct an in-depth qualitative research study utilizing an open-ended question format in order to obtain a better understanding of environmental justice and contribute to the literature. This unfunded study will examine problems encountered by area concerned citizens in relation to lead mining residue contamination (i.e., blood lead levels, etc.), mobilization processes (LEAD and TEAL), and various interactions with governmental agencies (BIA and EPA). How have respondents constructed their coping strategies and mobilized in response to the environmental degradation encountered in the largest Superfund site in America?

1. (a) Describe the subjects of this study:

- 1) Describe the sampling population: My sampling population will be concerned citizens of Picher, Oklahoma and the surrounding communities in that area who have experienced the environmental degradation and hazardous waste remediation relative to that area. Area activists construct an argument that minorities have been treated differently by government agencies and I want to research the respective construction of the coping strategies involved in the situation.
- 2) Describe the subject selection methodology (i.e. random, snowball, etc): During interviews with initial contacts, respondents will be asked for the names of participants willing to participate in this project. Thus, snowball sampling will be employed. The names of initial individuals willing to participate have been published over the internet on the Tar Creek Environmental page.
- 3) Describe the procedures to be used to recruit subjects. Include copies of scripts, flyers, advertisements, posters or letters to be used: The names and phone numbers of concerned individuals within organizations have been posted on the internet. I will contact them and ask if they are willing to participate in this project. I will further ask if they would be able to supply me with names of individuals who may also be willing to participate in this study.
- 4) Number of subjects expected to participate: I expect to interview fifty respondents.
- 5) How long will the subjects be involved: In-depth interviews will involve approximately 1-2 hours of the respondent's time. There are no rewards, punishments, or unnecessary risks associated with this study.
- 6) Describe the calendar time frame for gathering the data using human subjects: The researcher will begin gathering data upon IRB approval and finalize the interviews and continue until 12/31/06.
- 7) Describe any follow-up procedures planned: There are no follow-up procedures planned.

(b) Are any of the subjects under 18 years of age? Yes XNo

If Yes, you must comply with special regulations for using children as subjects. Please refer to IRB Guide.

3. Describe each proposed condition, intervention, or manipulation of human subjects or their environments. Include a copy of any questionnaires, tests, or other written instruments, instructions, scripts, etc., to be used.

The names of leaders of Picher's local grassroots organizations have been posted on the Internet.

I called the phone numbers provided by those leaders and asked them if they would be willing to participate in a research project centered on their situation involving environmental justice. I also asked if they would be able to furnish me names of other respective respondents should I pursue this project. Respondents will be interviewed face to face unless this method proves to be a hardship to the respondent. I will then conduct the interview via telephone. In the event a telephone interview is conducted, a consent form will be mailed to the respondent, signed and returned before the interview is conducted. Respondents will be informed that the interviews are being audio taped. Interviews will be recorded on audio tape and I will transcribe them. The data will appropriately coded according to topic and relevance, and utilizing the cut and paste method, the data will be analyzed and reported in my dissertation. There will be no manipulation or intervention employed in this study. The researcher will simply ask questions relating to the life situations encountered by respondents.

4. Will the subjects encounter the possibility of stress or psychological, social, physical, or legal risks that are greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests? Yes No

If Yes, please justify your position:

5. Will medical clearance be necessary for subjects to participate because of tissue or blood sampling, administration of substances such as food or drugs, or physical exercise conditioning? Yes No

If Yes, please explain how the clearance will be obtained:

6. Will the subjects be deceived or misled in any way? Yes No

If Yes, please explain:

7. Will information be requested that subjects might consider to be personal or sensitive? Yes No

If Yes, please explain:

8. Will the subjects be presented with materials that might be considered to be offensive, threatening, or degrading? Yes No

If Yes, please explain, including measures planned for intervention if problems occur.

9. Will any inducements be offered to the subjects for their participation? Yes No

If Yes, please explain:

NOTE: If extra course credit is offered, describe the alternative means for obtaining additional credit available to those students who do not wish to participate in the research project.

10. Will a written consent form (and assent form for minors) be used? Yes No

If Yes, please include the form(s). Elements of informed consent can be found in 45 CFR 46, Section 116. Also see the IRB Guide.

If No, a waiver of written consent must be obtained from the IRB. Explain in detail why a written consent form will not be used and how voluntary participation will be obtained. Include any related material, such as a copy of a public notice, script, etc., that you will use to inform subjects of all the elements that are required in a written consent. Refer to IRB Guide.

11. Will the data be a part of a record that can be identified with the subject? Yes No

If Yes, please explain:

12. Describe the steps you are taking to protect the confidentiality of the subjects and how you are going to advise subjects of these protections in the consent process.

Respondents will be assigned numbers. Respondents will not be asked to identify themselves during the interview process. Consent forms, audio tapes, and interview documents will be stored separately under lock and key at **200 W. Mulberry, Fairfax, OK 74637. Audio tapes will be retained for a period of one year after transcription.** The researcher will control the keys and access to all consent forms and audio data.

13. Will the subject=s participation in a specific experiment or study be made a part of any record available to his or her supervisor, teacher, or employer? Yes No

If Yes, please describe:

14. Describe the benefits that might accrue to either the subjects or society. *Note that 45 CFR 46, Section 46.111(a)(2) requires that the risks to subjects be reasonable in relation to the anticipated benefits. The investigator should specifically state the importance of the knowledge that reasonably may be expected to result from this research.*

This study will lead to an enhanced understanding of the dynamics involved in identifying, evaluating, and assessing coping strategies in the midst of perceived environmental racism/justice. The results from sociological study will contribute to the study of sociology, scholarly literature in general and assist in disseminating information involving minority and poor populations regarding contested illness, corrosive communities and environmental justice.

Concurrence:			
Dr. Patricia A. Bell		01/27/06	Sociology
Department Head (typed)	Signature	Date	Department
Dr. Peter Sherwood		01/27/06	Arts and Sciences
College Dean or Research Director (typed)	Signature	Date	College

Checklist for application submission:

- X Research plan*
- X Informed consent/assent forms
- X Outline or script to be provided prior to subjects= agreement to participate
- X Instrument(s) [questionnaire, survey, testing]
- X Bio, resume or vitae for all PIs (student or faculty) and advisor
- X Department/college/division signatures
- X Grant Proposal

Number of copies to be submitted (based on type of review required):

Exempt	2
Expedited	3
Expedited Special Population	5
Full board	17

NOTE:

1. Any changes in the project after approval by the IRB must be resubmitted as a modification for review by the IRB before approval is granted. Modifications do not change the period of initial approval.

2. Approval is granted for one year maximum. Annual requests must be made to the IRB for continuation, as long as the research continues. Forms for continuation and modification are available on the web at <http://compliance.vpr.okstate.edu/hsp/forms.htm>

APPENDIX THREE

Oklahoma State University Institutional Review Board

Date: Thursday, April 20, 2006
IRB Application AS0662
Proposal Title: Environmental Degradation and Disrupted Social Fabric in the Tar Creek Basin

Reviewed and Processed as: Expedited

Status Recommended by Reviewer(s): Approved Protocol Expires: 4/19/2007

Principal Investigator(s):

Dennis Kennedy 200 W. Mulberry Fairfax, OK 74637	Thomas E. Shriver 006 CLB Stillwater, OK 74078
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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, It is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sue C. Jacobs, Chair
Institutional Review Board

APPENDIX FOUR

Informed Consent to Participate in Study

**Dennis Kennedy, M.S.
Oklahoma State University
Department of Sociology
(405) 744-9425**

You have been asked to participate in a research project conducted by Dennis Kennedy of the Department of Sociology at Oklahoma State University. The purpose of the study is to gain a better understanding of environmental concerns in northeastern Oklahoma. As a participant in this research program, you will be asked to respond to in-depth interview questions either in person or via the telephone. You have been advised and understand that there are no risks associated with your participation in this study greater than those ordinarily encountered in daily life.

You understand that no one will be able to connect your name or any other type of personal identification with the information you provide during the interview. The information that you furnish will remain confidential. YOU have been advised that a tape recorder may be utilized during this interview for the purpose of aiding the researcher with field notes. These tapes will be stored under lock and key at 200 W. Mulberry Fairfax, Oklahoma. The OSU IRB has the authority to inspect consent records and data files to assure compliance with approved procedures.

You understand that participation is voluntary, that there are no penalties for refusing to participate, and that you are free to withdraw your consent and participation at any time by notifying Dennis Kennedy at (918) 642-5656 or Thomas Shriver, Ph.D. at (405) 744-6121. If you have questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater OK 74078 405-744-1676 or irb@okstate.edu.

You have read and fully understand this consent form. You are currently eighteen years or older. You understand that this signed consent form will be filed separately from any and all interview correspondence and this is the only place your name will ever appear. You sign your name freely and acknowledge that a copy of this consent form has been afforded to you.

Name (printed) _____

Signature: _____

I certify that I have personally explained all elements of this form to the subject or his/her representative before requesting the subject to sign it.

Signed: _____ Principal Investigator

APPENDIX FIVE

Interview Guide-Environmental Degradation

I. Basic Information

1. Are you currently a resident in the Picher/Cardin/Quapaw area?
2. How long have you been a resident?
3. Do you own land in the area?
4. Do you have children? What are their ages?

II. Environmental Concerns

1. Can you describe your concerns for the environment in the area?
2. When did you become concerned?
3. What have been your experiences with contamination? (i.e. lawns, chat piles, etc)
4. Can you tell me about how you found out about the potential risks posed by mining residues?

III. Health Concerns (Illness)

1. Do you believe environmental conditions are affecting residents' health? Explain.
2. Do you think your health has been affected?
3. Do you think the health of anyone in your family has been affected?
4. How serious do you think the health and environmental issues are in this area?
5. Can you describe any stress you have experienced relative to the environmental conditions encountered in the area?

IV. Cleanup Efforts (Gov't mistrust)

1. Describe the cleanup efforts in the area. Have they been successful?
2. Do you believe cleanup efforts have been fairly administered? How so?
3. What are your thoughts on the Environmental Protection Agency? Superfund? Corps of Engineers? Effective?
4. Can you describe for me your impressions regarding the BIA in dealing with Native Americans and hazardous waste in this area?

V. Community Perceptions (Framing the Issues)

1. Who do you think is responsible for the current situation in the area? Explain.
2. What do you think should be done about the situation? Explain.
3. Do you believe Native Americans have been treated equally when compared to other area residents? Explain in detail, please?

VI. Social Movement Activity

1. Can you describe your involvement with any citizen group representing Native Americans in their concerns or disputes in the area? (i.e. LEAD or TEAL)
2. Describe for me your thoughts or impressions of the group's ultimate goals. In what ways have those efforts been effective or ineffective?
3. Are there other organizations in and around Picher that have aided in the Native American cause? In what ways? Explain in detail.
4. Has the Environmental Protection Agency been receptive of Native American complaints and issues? In what ways?
5. Has the BIA been receptive of Native American complaints and issues? In what ways?

VII. Justice

1. Can you describe for me how the mining companies gained access to restricted Native American properties?
2. Describe for me how the overall cleanup processes have differed for white and non-white landowners in the area?
3. Describe for me any complaints that you have regarding the treatment of Native Americans in the area in relation to the treatment of other people. Please explain in detail.
4. Have Native Americans been a party to the state's voluntary buyout of homes? What about homes on restricted land or the land itself? Explain.

VII. General Background Information

1. Age?
2. Sex?
3. Race?
4. Highest level of education?
5. Marital status?
6. Children? How many?
7. Current occupation?
8. Annual income? (Not necessary to answer in uncomfortable in doing so).

A: less than 15,000

B: 15,000-29,999

C: 30,000-49,999

D: 50,000-74,999

E: 75,000 and above

VITA

Dennis K. Kennedy

Candidate for the Degree of

Doctor of Philosophy

Thesis: ENVIRONMENTAL DEGRADATION AND DISRUPTED SOCIAL FABRIC
IN THE TAR CREEK BASIN

Major Field: Sociology

Biographical:

Personal Data: Born at Shepherd Air Force Base in Wichita Falls, Texas on May 21, 1952, the son of Clarence E and Irvaline Kennedy. Married to Marville A. McKinney, December 30, 1978. Father of Chantry, Caitlin, Caleb, Jacqueline, and Gilbert III. Grandfather of Ben, Kenna Dee, Zachary, Dennis Keith II, Julius (Chiefy), Scott Marvin, Derrick, Joby, Jake, Michelle, and Jonathon

Education: Attended Ralston Public Schools and graduated in 1970; received a Bachelor of Arts Degree in Sociology from Oklahoma State University, Stillwater, Oklahoma in May 1999. Received a Master of Science Degree in Sociology from Oklahoma State University, Stillwater, Oklahoma in August 2002. Completed the requirements for the Doctor of Philosophy or Education in Sociology at Oklahoma State University, Stillwater, Oklahoma in July, 2008.

Experience: Raised in rural Oklahoma; seven years military experience USMC; twenty years oilfield and petroleum related hazardous waste remediation; employed by Oklahoma State University, Department of Sociology as a graduate teaching and research assistant

Professional Memberships: American Sociological Association, Midwest Sociological Association, Mid South Sociological Society, Alpha Kappa Delta

Name: Dennis K. Kennedy

Date of Degree: July, 2008

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: ENVIRONMENTAL DEGRADATION AND DISRUPTED SOCIAL
FABRIC IN THE TAR CREEK BASIN

Pages in Study: 143

Candidate for the Degree of Doctor of Philosophy

Major Field: Sociology

Scope and Method of Study: This longitudinal qualitative research project examined residents' conflicting interpretations of environmental harm and health impacts in the Tar Creek Superfund site. Data collection spanned several years and included in-depth interviews with 50 respondents conducted in two waves, non-participant observation and document analysis.

Findings and Conclusions: Research findings indicate that residents living with the same objective environmental conditions can differ in their interpretation of environmental threats and health impacts. In the Tar Creek Basin residents were subjected to conflicting information regarding the extent of environmental damage, the degree of environmental exposures and the seriousness of environmental health impacts. Findings highlight the complex nature of contested environmental illness claims and point to a number of salient issues around which residents disagree. During the initial phase of data collection, community relations were heavily strained over conflicting interpretations of environmental risks and a proposal for a complete buyout of the area. In more recent years, animosity within the community centered on the voluntary buyout program, the loss of community and the economic implications associated with relocation.

ADVISER'S APPROVAL: Thomas E. Shriver
