IDEOLOGICAL AND VALUE CONFLICT IN UNIVERSITY SCIENTISTS AND TECHNICIANS CONTRACTED FOR WORK ON ENVIRONMENTAL IMPACT STATEMENTS

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1972

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
July, 1977

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PREFACE

This Thesis is concerned with a study of conflicting values and ideologies of university scientists and technicians contracted to research and/or write Environmental Impact Statements. The study was undertaken by an interdisciplinary research team funded by the Ethical and Human Values in Science and Technology (EHVIST) division of the National Science Foundation as a grant. I was employed by the team as a research assistant.

I would like to thank the EHVIST team, and especially Dr. Gordon Matzke, the Principal Investigator, for allowing me to use the data collected in this study for my thesis, and I would like to thank Dr. Matzke for being an exceptionally excellent employer. I would also like to thank Dr. Jack Bynum, both for recommending me to the research team, and assistance and support throughout my time at Oklahoma State University. Appreciation is expressed to Dr. Lawrence Hynson for concern and suggestions throughout the development of this thesis, as well as Dr. Edward Arquitt, who assisted greatly in theoretical refinements. I would also like to thank Dr. Ivan Chapman for encouraging a critical theoretical perspective and alerting me to the implications of ideology.

Great appreciation is expressed to Dr. Richard Dodder, who gave

so freely of his time, assistance, and suggestions on many stages of the research, and was so remarkably patient with his assistance in computer programming.

And, of course, many thanks to my husband Terry and son Jeremy, who made many sacrifices on my behalf for the months I was working on this thesis.

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CHAPTER I

INTRODUCTION

This thesis is a descriptive study of value and ideological conflicts of university scientists and technicians who have contracted to work on three different forms of Environmental Impact Surveys (EIS). While there is a considerable body of literature on the topic of value problems of scientists, there has been no research specifically on those scientists contracted to work on an EIS, which entails intensified problems and pressures. The significance of the study largely lies in the fact that Environmental Impact Surveys came about as an attempt to deal with the growing social problem of environmental degradation, and they have the potential of affecting thousands of lives and millions of dollars. As one of its functions is to serve as a full-disclosure document to the public, then, it is of social interest to attempt to discover the value conflicts of university scientists who have helped create the knowledge and predictiong these documents contain. Environmental professional Tyler (1975:74) has stated:

> In the face of our own individual shortcomings and imperfections, the challenge to live up to our code of ethics . . . and to perform our professional duties in a manner meriting implicit, as well as explicit, public trust in this profession is one to test the character, dedication, and intellectual competence of any person to be found on the earth.

There can be little doubt, then, that scientists engaged in EIS work are a focal point for ideological and value conflict.

The NEPA and the EIS

The National Environmental Policy Act (NEPA), effective January 1, 1970, created a new statement of federal policy vis-a-vis the environment, and created a new method of implementation. In Section 102, the NEPA requires all federal agencies to file an environmental impact statement (EIS) for all projects which significantly affect the human environment. (Cf. Matzke, 1976:1)

The EIS process required a new industry peopled by the staff of consulting firms, government agencies and universities. These scientists and technicians create documents which are the basis for major decisions and serve as public disclosure statements. (Cf. Tyler, 1975)

The EHVIST Project

This thesis draws upon data collected while the author was employed by a multidisciplinary research team funded by the Ethical and Human Values in Science and Technology program of the National Science Foundation. The Principal Investigator of the team, Dr. Gordon Matzke, created the research design, selected the sample, supervised team meetings, arranged the interviews, and indirectly supervised all research itself. Dr. Richard Dodder supervised directly the training of interviewers, the formulation of the

questionnaire and all data analysis and computer programming. This supervision continued throughout the study.

EHVIST Purpose

The EHVIST purpose as a team was to examine all moral dilemnas and compromises, ethical conflicts and conflicts of interest in all university scientists and technicians contracted to prepare an EIS. The goal of the study was "to bridge a significant gap that exists between scientists and humanists." (Matzke, 1976:4)

EHVIST Research Design

The sample selected by the Principal Investigator consisted of all university staff involved in preparation of the EIS for three selected cases, which will be discussed in a forthcoming section. University personnel were selected because they would have greater autonomy to speak freely, they were accessible, and they were unlikely to be highly sanctioned by their colleagues for their participation on an EIS. (Cf. Matzke, 1976:1)

The three case studies were qualitatively evaluated by members of the EHVIST team for problem areas. Following these studies, items for inclusion in a structured interview were suggested. The questionnaire was created and pretested by four pre-trained supervised graduate assistant interviewers. All interviews were tape recorded. The interview was found to require approximately forty-five minutes.

Interviewers were sent to several states to interview university professors and graduate assistants who had worked on the three projects. Graduate assistants who had had no real input in the research design of the case studies (e.g., laboratory slide preparers) were eliminated, as were those assistants who had left the North American continent. Final sample size was thirty-nine subjects.

Data was coded, key-punched, and programmed. Frequencies, means, and standard deviations were found for items. A factor analysis was also done, and indices constructed. Once the data was collected and analyzed, interviewers were dismissed. Interpretation of the data is to be made by senior EHVIST team members.

The Purpose of this Thesis

The scope of this study is somewhat different from that of the larger EHVIST project. The purpose of this thesis is to describe: 1) some problems of the scientific production of knowledge; 2) the differing ideologies involved in the EIS process; 3) a measure of subjects' agreement with the three ideologies; 4) a comparison of different groups' scores on the scales of ideologies and 5) some suggestions of the differences between expressed values and actions of the scientists and technicians of the sample.

CHAPTER II

LITERATURE REVIEW

Science and the Production of Knowledge

It is worthwhile to consider anew the purpose of an EIS. According to Tyler (1975), it is firstly, part of the planning process, secondly, a full-disclosure document and a decision-making tool, and finally, an environmental management tool. The focus of this paper will be on the second function: that the purpose of an EIS is to serve as a full-disclosure document to the public, which Tyler (1975) states was the intention of the legislators of NEPA.

Bureaucratization of the Scientist

University scientists and technicians involved in the preparation of an EIS may be seen as "hired hands" in the production of knowledge. This role has been of interest to many sociologists. Whyte (1956), for example, rails against the "bureaucratization" of the scientist in the continuing trend towards applied or directed research rather than fundamental research, as well as criticizing the committee system of expertise. Whyte (1956:235,239) suggests that in a committee which must "produce" something, there is a strong impulse toward consensus, but "if that something is to be a map of the unknown country, there

can hardly be consensus on anything except the most obvious." He continues that the "moral responsibility one feels to his colleagues becomes a downright hindrance, in that a committee member may wish to fight to support an idea but will not do so because of good will." (Whyte,1956:246) He will compromise out of respect for his colleagues. Whyte is suggesting, then, that the research design concept will bind the hands of free scientific inquiry. What is of secondary scientific importance may well be the primary consideration to the administrator. (Whyte,1956:239,246-248) Finally, Whyte (1956) notes a strain towards downgrading the value of individualism in the search for scientific knowledge, making a strong case that there is an ideological bias against the individual scientist, and in favor of the team effort. This bias also includes the notion that there are no new discoveries to be made, only amalgamation and new applications of existing knowledge, best performed by teams. (Whyte,1956)

Thus, there are value conflicts intrinsically involved in team science vs. individual research, applied science as opposed to pure research.

Pure Science versus Industrialized Science

The adulteration of "pure science" by the social world and politics is critiqued at length and intricately by Ravetz. (1971) Of special interest is his critique of the fact that, in a sense, scientific research is often subsidized by the government, and therefore must justify its products to the general public. Although he feels that the layman must simply trust scientific findings (as the layman could not grasp the scientists' methods), by later exposition

and critique of the growing trend of "industrialized science" and "capital intensive labor", he demonstrates amply why the public should not blindly trust science. (Ravetz, 1971) For instance, Ravetz traces the ideology of science as a search for truth to its early days when science was seeking to establish itself and its validity in the ideological warfare with metaphysics and dogma. Now, however, the scientific ideology of its truth as superior to all others is a convenient way of arguing for public support for expensive resarch. (Cf. Ravetz, 1971:20) Secondly, the production of knowledge as a commodity is quite a different thing from "worthwhile scientific knowledge". (Cf. Ravetz, 1971:20) While Ravetz (1971) insists that minimum standards of accuracy and reliability for "real" scientific knowledge are high, it has no automatic, external tests of quality, nor gauges to check specification, nor market mechanism for public rejection of inferior products. For really valid scientific knowledge to be created, there must be two factors: 1) a community of scholars with shared knowledge of quality and committment to enforce standards by informal sanctions, and 2) individuals whose personal integrity is at least as high as their larger scientific communities'. If either of these two factors is lacking, "bad science" will result. (Cf. Ravetz, 1971:19-22) In short, then, the scientific ideology demands the rather rareified atmosphere of a mature science and certainly a fair degree of organization and solidarity in each particular field, in order for good scientific results to be produced. Otherwise, industrialized science and technology suffer corruption. Ravetz (1971:28) is concerned particularly with environmental science

for maintenance of high scientific standards. This code of ethics, adapted in 1975 at the Second Annual Conference and Membership Meeting of Environmental Professionals, demonstrates a recognition of potential conflicts of values and ethical dilemnas and attempts to prescribe formally their solutions. (Appendix A) However, the creation and adaptation of this code of ethics was somewhat tardy, as NEPA became law in 1970, and many fast-talking charlatans had already been plying their trade as so-called environmental impact specialists with no real qualifications for years. (Tyler, 1975:70)

Environmental Assessment as a Unique Science

Aside from the fact that it was a field created by legislation, another aspect of environmental assessment that makes it unique in science is that it insists on the holistic view of nature, and rather explicitly critiques other established branches of science for their atomistic natures. (Cf. Tyler, 1975) The atomistic nature of science is of course necessitated by the norm of specificity. But unlike other branches, environmental sciences have prescribed a holistic, interdisciplinary view of reality. Thirdly, while environmentalists as represented by Tyler (1975:70-73) hold highest the value of "unvarnished facts", they have a prescribed philosophy of value hierarchies perhaps unique to science, as presented by the NEPA. (Appendix B) There is a good deal of discussion by Tyler (1975) about this underlying philosophy of frank admission of pitfalls intrinsic to environmental impact assessment. For example, he states the environmental professional must

when he worries that, if science becomes identified with "dirty work", only inferior scientists who are willing to act as mere "man-power units" will eventually end in working on such projects as an EIS. Such scientists will be required to bite the hand that feeds them upon occasion, and he implies that scientists who enter the field as willing agents for "dirty work" will never do so. The fact, then, that industrialized science and those who participate in it, frequently are looked down upon both by the public and loftier colleagues, may well result in such low morale that "hired hand" scientists will only consist of those willing to prostitute themselves to industrial and governmental goals. Clearly, Ravetz (1971:19-29) is arguing here a self-fulfilling prophecy. The validity of the claim that morale tends to be low among hired scientists and that they are looked down upon by their peers may be touched upon in this study.

Environmental Professionals' Values

There is little question that some of the foregoing conflicts have been perceived by environmental professionals. Tyler (1975) clearly acknowledges these problems, even when he calls his field an embryonic and rapidly changing science. They, too, acknowledge that the environmental impact assessment is only as good as those who perform it, thus affirming Ravetz's (1971) two conditions for valid scientific knowledge. Tyler (1975) has also printed the code of ethics adapted for "Environmental Professionals". Ravetz (1971) would argue that such scientific associations and codes are necessary

sometimes sacrifice his own financial well-being to insist on emphasis on the economic well-being of the larger society. Also, the environmentalist is told that he must take a much longer-range view of costs and benefits than conventional business and economics may. But in addition he is told that he must not yield to short-sighted pleas of preservationists who may not grasp the socio-economic costs involved. In short, Tyler (1975:70-73) espouses an environmental assessment ideology that must: 1) Forecast environmental impact holistically, that is, across time, throughout natural systems, and throughout socio-economic impacts, 2) be totally disinterested and objective and not an advocate of any cause in particular except "unvarnished facts", 3) present totally objective facts in forecasting the environmental impacts to the public in all its ramifications.

Clearly, those who would participate in an EIS have prescribed for them a large ideology espousing some attitudes and values unique to its field, some in common with scientific ideology, and others demanding an unprecedented degree of objectivity and high-mindedness. This ideal is bound to be difficult to approximate. Obviously the ideology of science has been carried to an extreme, such that the prescription purports a god-like, objective, and accurate portrayal of "The Truth" to the public so that they put complete trust in this profession more than any other. Tyler (1975) states such high standards are necessary because the responsibility is so great. But, in actual practice, the preparer of an EIS is involved in collaboration with colleagues in other sciences, governmental bodies, private

clients, and the public, all perhaps with different perspectives, values, goals, and interests. One cannot ignore the fact that all these forces as well as purely personal ideological conflicts will cause considerable difficulty if the scientist attempts to divorce himself from it all and rise above it to discover and display "unvarnished facts". With differing pressures and tension, he is not likely to know if they are facts.

Objectivity of the Scientist: Summary

Mannheim (1936) dealt with the problem of objectivity and related epistemological problems. As Martindale (1960:415) interprets him, Mannheim felt that "there is one type of theoretical knowledge which rests on the criteria of science, and hence has nothing to do with class perspective."

However, Ravetz (1971) shows that what constitutes scientific fact is determined by a social process limited in membership to scientific colleagues which winnows out what the status quo determines to be chaff. Whyte (1956) insisted that scientific knowledge could and would be adulterated by bureaucratization and team mentalities.

In summary, then, a good deal has been written about scientists and technicians as producers of knowledge or facts, and the processes have been both described and prescribed. It is not the aim of this paper to settle the question of whether or not science can or should be value-free, or to settle the question as to the nature of reality. Rather, this paper is concerned with the kinds of value and ideological conflicts and ethical problems experienced in the highly charged process of preparation of an EIS. In this section, problems of scientific

knowledge production likely to apply to the participants on an EIS study have been explored. It remains to explore other ideologies in the following section.

NEPA and the Environmental Ethic Versus Business and Science

The value system of the NEPA itself is quite explicit, as set forth in Section 101.a.. (Appendix B) Section 101.b. states:

> . . . to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --
> (1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
> (2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
> (3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
> (4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
> (5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
> (6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Environmental Ethic Versus Business

As a normative statement, NEPA is very clear as to the values to be held paramount. As policy, it answers to some degree Blackstone (1974:33) and his call for expression of the right of man to a livable environment to be expressed in a legal form. Blackstone (1974:31,36) also called for government intervention to prevent industrial pollution

and waste of resources, and insisted that such intervention would be utilitarian, in that such a law must regulate man's freedom to manipulate his environment in order to protect the interests of overall human welfare, rights, and freedoms.

NEPA does have ecological values at base. Blackstone (1974:36) pointed out the way in which the environmental attitude (or ideology) is antithetical to economic values, and pointed out that it was necessary to qualify economic or private property rights in the interest of the public good. He stated that this curtailment of economic rights is due to the different goals of business, primarily that of profit. (Blackstone, 1974:36) Obviously the goal of profit precludes concern of business with long-range effects of their operations on society and future generations, and their accounting measures would not consider costs of their business operations to environmental quality or society as a whole. (Cf. Blackstone, 1974:36) Secondly, the competitive system of business is antithetical to voluntary curtailment of environmental degradation; such a concern would add to the cost of the product and reduce profit. (Cf. Blackstone, 1974:36) Thirdly, the response of free enterprise to economic problems is greater growth of the Gross National Product, which is equivelant to a bettwe quality of life in business ideology, although such is not at all likely to be the case. (Cf. Blackstone, 1974:37) Thus free enterprise as part of capitalist ideology is somewhat in conflict with ecological ideology.

If, then, ideology is defined as a set of beliefs and values which color ideas and direct actions and thoughts towards a certain

set of explicit goals, certainly there is a free enterprise ideology extant in our society. One may outline this ideology in the following manner: 1) The principal goal of industry is to produce a profit. Profit is, then, the highest-level value of business. 2) Profits are increased in competition. Free enterprise is an expressed value of business. 3) Concern for environmental degradation is expensive and lowers profit. Thus, the environmental quality is a low-level value for business. 4) Economic growth is a high-level value for industry. But, as Blackstone (1974:37) states, a stationary economy is much more beneficial to the environment. Thus, the value of economic growth is held much higher by capitalism than by environmental ideology. 5) Private property rights are basic to business and capitalism. But Blackstone (1974:37) points out that in the interests of justice, no one should be allowed to degrade or pollute the environment to the detriment of the public right. Private ownership of land, he states, can no longer constitute a right to use it in any way the owner sees fit. (Cf. Blackstone, 1974:37) The value of private property rights, then, is very low-level to the ecological ideology, but high-level to capitalism or business. 6) Since capitalism assesses costs and benefits in dollar terms, such values as aesthetics, justice, etc., are not included in the capitalistic marketplace ideology. Thus, human welfare cannot be understood accurately in the profit system of accounting, and the "public good" is not likely to be a high-level value. (Cf. Blackstone, 1974:40) What's good for General Motors is not necessarily good for the country.

According, then, to this set of value conflicts implied and expressed by Blackstone (1974:40) a number of values held high by laissez-faire capitalism are intrinsically in conflict with the values of the "ecological attitude" or ecological ideology.

Science Versus the Environmental Ideology

The role of technology vis-a-vis the environment is also discussed. Blackstone (1974:40) expressed the belief that technology must incorporate ecological values to correct the environmental damage that he considers it has produced. It is common in environmental literature of a philosophical sort to cast science and technology in the role of villain, sharing the honors with capitalism. But science is additionally frequently seen as the handmaiden of industry in capital-intensive research, counter to the scientific ethic and values, as explicated by Ravetz. (1971)

Such an attack on science and technology by environmental ideology is also contained in Marine's (1971) "The Engineering Mentality". His thesis is that any issue which arises is attacked by scientists and technologists calling for applications of techniques regardless of side effects. This tendency is implicitly recognized in NEPA, and Tyler (1975) also deals with this problem. Marine (1971:212) holds that the engineering mentality does not concern itself with side effects or responsibility, since that is not the engineer's job as he perceives it. Certainly, in interview after interview, when the author asked scientists about perceived responsibility or their concerns about side effects of the proposed project, the response was "That's not my job," or "That's someone else's responsibility, not mine." To many of the

scientists contracted for an EIS, they were simply to supply their data as an answer to a problem, and did not concern themselves with any wider implications of values, ethics, or responsibilities.

Scientific Ideology

The foregoing critique of science at its shallowest leads to an explanation of the scientific ideology. Although this ideology is well understood, it is difficult to locate specifically. However, Babbie (1976:14-20) gives as succint an outline as any: Science is based on meticulous and deliberate measurement and observation, science treads a fine line between generalization and observation, science is progressive and cumulative in knowledge, always searching for better answers, scientists test and re-test hypotheses and alter them, science is logical, scientists will admit error when they discover them, science is based on a belief in an explanation for everything which is rational and may be ultimately discovered by man, scientific findings must be subjected to the scrutiny of colleagues, science is value-free and objective. Ethical questions in scientific literature generally seem to revolve around science as a value-free pursuit, science as objective, and science as rational. If one adds this summary to Ravetz's (1971), one should have the complete ideology.

Summary

It should be evident, then, from the review of literature that scientists contracted to work on environmental impact statements will very necessarily be at the focal point of value conflicts and ethical

and ideological dilemnas. (Cf. Matzke, 1976) There has been no study done specifically upon the perceived conflicts of those scientists themselves.

In sum, then, these scientists and technicians will have the difficulties pointed out by Whyte (1956) intrinsic to team or committee scientific endeavor, as teamwork is the norm of EIS work. (Cf. Tyler, 1975) Secondly, the "engineering mentality" will work upon them, in conflict with NEPA. (Cf. Marine, 1971) In addition, they may suffer from the erosion of the scientific ethic described by Ravetz (1971) as "hired science". The scope of this thesis will be primarily to see to what degree university scientists and technicians will agree with differing factors composed of these ideologies (environmental, scientific, and business) as well as how they will agree with a set of trade-offs of values contained in a fourth factor. Findings will be discussed in that chapter.

CHAPTER III

METHODOLOGY

Research Design

The Sample

Three environmental impact surveys or statements were chosen for the study. The Arcadia Dam Project, proposed by the Corps of Engineers, was originally researched for environmental impacts by Oklahoma State University scientists and technicians, working as consultants in a multi-disciplinary team effort. The Sooner Coal-Powered Plant power station project employed a more scattered pattern of consultants than the Arcadia project, and was produced by the Oklahoma Gas and Electric Company, a private corporation, to satisfy environmental legal requirements to obtain a permit. The third study was undertaken by the Bureau of Land Management and involved a decision as to whether to lift a moratorium on leasing of public lands to potash mining companies. It was felt that each would involve sufficiently different issues to be representative of EIS work.

Arcadia Project. The Arcadia project involved the Corps of Engineers. The project proposed creation of a lake, for a three-fold stated purpose (Army, 1975): 1) The dam was to provide increased municipal water supply for the predicted and long-hoped for growing

Oklahoma City; 2) to provide recreation for that population, and 3) to control downstream flooding. Environmental impacts of a creation of a lake are manifold and inundation of populated farmland especially involves careful weighing of values in addition to the standard cost/benefit analyses. The final number of subjects interviewed was 17.

The Sooner Power Plant Project. The Sooner Power Plant Environmental Assessment Report (Benham Blair & Affiliates, Incorporated, 1976) was reluctantly undertaken by Oklahoma Gas and Electric Company as required by law. Not only did the project involve a lake to be created as a cooling pond, involving water rights issues, but as it was to be a high-sulphur coal burning plant, issues of air pollution were also involved. Values involving land use, water use, and depletion of non-renewable resources, as well as increased power production versus inevitable air pollution were involved. An especially interesting fact in this project is that several professors contracted to work on the assessment were living within the airshed of the project, and possibly subject to special dilemnas. (Cf. Matzke, 1976) Final number of subjects interviewed was 15.

The New Mexico Project. The New Mexico impact study involved as mentioned lifting the moratorium imposed for environmental study reasons by the Bureau of Land Management of public lands to private mining interests. As the document (B.L.M., 1976) states, this particular region produces the vast majority of potash for the United States, used primarily in producing fertilizer. Thus, not only was the potential loss of an important natural resource concerned, but it also happened that the nearby town of Carlsbad was quite dependent on the

potash mining industry for jobs. There was an additional unique factor added as it was found that the area which continued mining considerably disrupt, although uninhabited, was very rich in archeological sites. Thus, cultural losses as well as economic losses were involved. The final factor of the New Mexico project involved the use of an additional irreplaceable natural resource, the limited supply of underground water. Mining required vast amounts of water processing potash, and rendered it unfit for further use. There were many other issues involved, but these were of major consideration.

Differences Between the Projects. The three project studies were undertaken at different times. Arcadia was a very early EIS, undertaken in 1970 originally, after the Corps had already completed planning. The Arcadia EIS was somewhat experimental in design and also followed decision making. In other words, the Corps was very committed to the project before undertaking the EIS. Similarly, the Sooner Power Plant study had been undertaken very hurriedly, as the EHVIST team discovered, to complete legal requirements before a stricter air pollution law was passed and to take advantage of legal loopholes since closed. (These statements were gathered informally by members of the EHVIST team and reported in a team meeting; no documentation is available.) Scientists contracted to work on this assessment report also stated in interviews that construction had already begun on the plant, and therefore, they felt they had neither sufficient time nor an undisturbed environment to evaluate. The New Mexico project employed only seven university-affiliated staff, and of few different disciplines, unlike the other projects.

The Procedure

Following the qualitative analysis of the three cases, the EHVIST team hired four graduate students to collect the data and perform the data analysis. The assistants, including the author, sat in on final planning and discussion meetings to become familiar with the issues and projects involved. The team attempted to locate every university affiliated person who had been hired to work on the three studies. This sample included undergraduate and graduate research assistants, professors, and other university employees who had gathered data, planned the research, or assisted in analyzing the data. The method of identifying those not listed in the documents themselves consisted in asking each subject for all the names of participants they knew. In this manner, all researchers were located and interviewed. The exceptions to this search were: 1) students who had since left the North American continent and 2) students who had done only totally supervised data gathering or manual labor and had thus had no input in the research design or interpretation of data. Interviewers were sent all over the country to contact subjects in an interview.

The Interviews. Interviewing training and techniques were done by a supervisor, as previously mentioned, who also audited taped interviews and consistently oversaw interviewing methods. Potential subjects were, for the most part, contacted by the Principal Investigator and were not told the specific topic of the study. Appointments also were made by the Principal Investigator, for the most part.

The interviews were, as mentioned, all tape-recorded, and as per instructions of the National Science Foundation, interviews were coded rather than labelled by name, and kept secure for reasons of confidentiality. As it was recognized that the tape recorder is an obtrusive measure, interviewers were instructed to place it out of the line of sight of the interviewee and, after initially casually asking where it could be plugged in (a question devised to inform interviewees that they were being taped), interviewers did not call attention to the tape recorder again. Subjects were assured of the measures taken to insure confidentiality, although they were told that they might be quoted in the write-up of the project. The tapes were found to last roughly forty-five minutes.

The Questionnaire. The questionnaire (or structured interview format) was created by the EHVIST research team, with members collaborating as to the type of value conflicts and ethical issues they thought intrinsic both to the EIS process as a whole and specific to each case. (Appendix C) Subsequent smaller meetings were held, and the final instrument was created with the benefit of the supervisor's expertise on questionnaire construction. Pretests were conducted by interviewing scientists not in the sample frame. Tapes of these interviews were audited and suggestions sought from interviewers. The questionnaire was then altered to its present state. The first section of the questionnaire involved demographic variables it was thought would be valuable. The second section was constructed to discover some of the values held by the interviewees. Answers were to be given on a 1-7 continuum, with 1=Strongly Disagree, 7=Strongly

Agree and 4=Neutral or No Opinion. Interviewers gave a card of this continuum and requested subjects to give their answers in this code.

Section III involved discovering the scientists' thoughts and attitudes before he signed a contract. These questions were close-ended up to question eight, in the interests of obtaining quantifiable data. Categories of responses were decided in team meetings as likely areas of conflict, bias, etc.. The questionnaire attempted to find, in this section, the scientists' motives for EIS work, pressures which may have affected his work, and whether his values concerning prestige, ambition, and money had an effect upon his decision to participate.

Section IV was designed to probe for scientists' values and ethics involved in the actual research. It was felt it would be of interest to see if his values were congruent with environmental values or ethics as well as scientific ones, as perceived by the EHVIST team. Also, as study of the documents had revealed significant alterations, omissions and elisions of the data originally compiled by university personnel, it was of great interest to discover if they felt any uneasiness about this possibility, and if so, whether or not they would be concerned enough about the fate of their work to pursue its course to the final documents. Also, in study of the documents, the EHVIST team members arrived at conclusions based on the data regarding the legality and undesirable effects of the proposed projects, and there was a desire to see if any of the participants had perceived these problems also. The research team also wanted to discover if the scientists were in any way using their positions as advocates for the proposed project,

for, as Tyler (1975) points out, when one is employed by a company or agency which has considerable time and money invested in a project, the tendency is to become supportive of the project. It was felt that this tendency would be an especially crucial element in the Arcadia and Sooner projects, the latter of which had already begun construction. Subjects were also questioned as to their sense of the importance of their findings as influencing the final decision.

Section V was an additional plumbing of interviewees' values of the scientific ethic and also an attempt to discover their preferences as to actual trade-offs of values intrinsic to the three projects.

Finally, section VI was intended as somewhat educational for the subjects, as it was felt that they could not have been aware of the eventual fate of their data. Also, final documents were extremely difficult to obtain and there seemed little indication that many of the researchers had ever seen it. It was the conclusion of the EHVIST research team after weeks of comparing original documents with final documents that, especially in the case of Arcadia, there had been such a change both in content and tone that scientists had been somewhat misrepresented. The team wanted to know if any of the scientists felt this, and if so, what they would do about it.

The last statements at the end of the questionnaire were intended to gather additional data not included in the questionnaire, and frequently lengthy statements were made.

Aside from responses to actual items on the questionnaire, there were many comments, speculations, and complaints collected. As soon as possible after the interview, interviewers were instructed to take

field notes of their impressions and comments of the subject, and record additional remarks the subject may have made. Tapes were a great assistance to this process.

Operational Definitions

Responses were coded, and some open-ended categories collapsed when all interviews were completed (N=39), for the purpose of quantification, when it could be done without sacrificing accuracy. Number codes were key-punched on data cards, and Statistical Analysis programs were written recording 1) Frequencies of all items except attitudinal items. Since the items were difficult to interpret singly, a factor analysis was done on the attitudinal items, with no particularly interesting results. At this point, working from a theoretical base, the author and the supervisor collaborated on pinpointing specific items thought to be connected with specific ideological values. Analysis results will be found in the following section.

Factor Identification

Environmental Values. Environmental values were determined by selecting, based on the literature already discussed, items which involved environmental ideology. For instance, item 14, "Each person has a right to use all of the energy (such as natural gas or electricity) that he/she can afford to pay for," should be disagreed with if the scientists have what Blackstone (1974) called the environmental ethic, on the grounds that private rights cannot be elevated above the public rights or justice. Loadings for this environmental factor were such that the lowest loading on a single dimension was -.53531 for item

22 ("All humans have an equal right to an environment suitable to meet their biological needs,"). Items 15 ("Our moral obligations are the same toward all persons everywhere,"), 16 ("We have duties to preserve presently existing non-human species,"), 22 and 23 ("In evaluating environmental impact, strong consideration needs to be given to esthetic values (such as 'broad open spaces' or 'free flowing streams',") were negatively correlated with items 10 ("The environmental problems emerging in our time are temporary because they will be solved by technological innovations,") and 14. All items referred to ethical or value statements to be found explicitly or implicitly in environmental literature. Factor loadings are found in Table I.

TABLE I

FACTOR LOADINGS OF ENVIRONMENTAL ITEMS

Factor I

Item	Unrotated Loading	Rotated Loading	Variance
10	.66079	None	.4457
14	.60972		
15	-.61528		
16	-.83325		
22	-.53531		
23	-.70755		

Business Values. Values towards business were chosen based on ideology concerning expansion, growth and economics. Items 17 ("We have the same duties to future human generations as we do to those presently alive,") and 18 ("In order to protect certain human values, some economically promising developments should be foregone,") were negatively correlated with items 11 ("Continually increasing the level of industrial production is essential to human well being,"), 12 ("Our grandchildren and great grandchildren will enjoy as high a standard of living as we do now,"), 13 ("The natural resources we are now running low on will be replaced by plentiful resources of types we are not aware of now,"), 19 ("The elimination of some specie of plant or animal is an acceptable price to pay for increased electrical power generating capacity,"), 20 (" . . . an acceptable price to pay for increased recreational facilities,"), and 21 (" . . . an acceptable price to pay for increased fertilizer production,"). (Appendix D) On the unrotated factor matrix, only item 13 loaded at .3976. However, on the rotated factor matrix, items 12 and 13 loaded at -.797 and -.845 respectively on the second dimension of the factor. These two items deal with specific statements about the future and imply optimism about future generation. Item 18 alone loads on the third dimension, and deals with the question of values versus economics. However, the unrotated factor matrix first sub-factor still has a cumulative eigenvalue of 43.195%. Factor loadings seem, then, to justify treating these items as representative of business ideology. These loadings may be found on Table II.

TABLE II

FACTOR LOADINGS OF BUSINESS ITEMS

Factor II

Item	Unrotated			Rotated		
11	.65084	-.12826	.30061	.54684	-.48102	-.00175
12	.56527	-.65954	.02054	.13747	-.79610	-.31981
13	.39760	-.67441	.32638	.06731	-.84532	.01861
17	-.60403	-.13913	.46717	-.45342	-.02952	.62928
18	-.42738	.32539	.70985	-.01196	.20465	.86625
19	.78325	.33009	.28465	.88454	-.14415	.01709
20	.81528	.28590	-.06034	.80306	-.07507	-.31546
21	.85365	.33717	.08758	.89739	-.09899	-.18696
	I	II	III	I	II	III
Var:	.43195			Var: 47.57%	28.58%	23.84%

Scientific Items. The factor identified with scientific ideology also loaded on more than one dimension. On the unrotated factor matrix, item 24 ("Scientists should have an important voice in interpreting their research,") loaded at .41, with the other six items loading higher. On the rotated factor matrix, items 24, 26 ("Scientists should not participate in research which must agree with externally imposed conclusions,") and 99 ("A scientist should be informed of the interpretations other parties place on the data he/she gathered,") loaded on the second dimension rather than the first. These three items deal with gray areas of scientific responsibility which are directly concerned with involvement in EIS work, while the items still loading

highest in the first dimension are more standard to the scientific ideology in general. (Appendix D) However, the first dimension alone of the unrotated matrix accounts for 34% of the variance, and on the rotated matrix, 51.03%. These loadings, on Table III, would justify calling this factor a potential index of ideology of science.

TABLE III

FACTOR LOADINGS OF SCIENCE ITEMS

Factor III

Item	Unrotated		Rotated	
24	.41100	-.67023	-.15698	-.77038
25	.48729	.32761	.57975	-.09309
26	.62450	-.25575	.28193	-.61313
28	.51112	.46009	.68758	-.01252
31	.48153	.42401	.64133	-.01869
99	.71583	.46285	.20736	-.82683
100	.76037	.22033	.70614	-.35787
	I	II	I	II
eigenvalue:	.34001		Var: 51.03	48.97

Trade-Off Items. The final factor was a compilation of specific trade-offs necessitated by the three proposed projects. Agreement with these items implied agreement with proponents of building Arcadia dam, Sooner Power Plant, and recommending potash mining. All trade-offs were weighing of values. Items 103, 104, 105, 106, 107, 108, 110, and 111

on the unrotated factor matrix loaded at .551 or higher, and the first dimension of the factor accounted for 48.5% of variance. On the rotated factor matrix, items 104 ("It is more important to control flooding in rural regions than it is to preserve family farms and homesteads,") and 105 ("It is more important to increase recreational facilities than it is to preserve the cultural integrity of rural communities,") loaded at .891 and .832 respectively on the second dimension. These two items referred specifically to the Arcadia dam and constituted a more difficult value decision than the others. (Appendix D) Loadings for this trade-off factor are found on Table IV.

TABLE IV

FACTOR LOADINGS OF TRADE-OFF ITEMS

Factor IV

Item				
103	.71547	-.03158	.54670	.46261
104	.60826	.65141	.00425	.89124
105	.64599	.53651	.10997	.83249
106	.74880	.20655	.40949	.66007
107	.75138	-.06087	.59295	.46549
108	.55110	-.63896	.83843	-.09490
110	.76859	-.12557	.64952	.42968
111	.74938	-.50776	.89492	.13605
	I	II	I	II
eigenvalue:	.48506		Var: 51.79	48.21

Summary. The four factors were analyzed for means scores and standard deviation for the group as a whole, as well. T-tests were made on index scores for the four factors, based on different breakdowns of the sample which will be discussed in the results. Frequencies were also tabulated and collapsed, as will be discussed in the results. The factors for environmental items, business items, and science items will henceforth be treated as indices for ideological commitment to the three respective sets of values. The factor of trade-off items will be treated as an index of agreement with the trade-offs of values entailed by completion of proposed projects.

Other Definitions

For item 9 (Appendix D), the criterion for urban versus rural was the population figure 2,500. Categories for item 6, that of academic discipline, were later collapsed into three of interest as decided at team meeting for purposes of data analysis. Biology, zoology, animal behavior ecology, icthyology, agronomy, botany, and wildlife ecology were collapsed into one category called natural sciences. Administrative sciences, geography, agricultural economy, and anthropology were called social sciences. Civil engineers comprised thr third category. No consensus could be made for the categories geology, meteorology, and business, and these three disciplines were eliminated for that sole breakdown of data.

No hypotheses are proposed, as this thesis is intended to be descriptive.

CHAPTER IV

FINDINGS

This chapter will outline certain patterns to findings related to frequency tabulations and t-tests for factor means, and will suggest hypotheses for some of these results.

Frequencies of Responses

Some general remarks would be worthwhile about selected tabulations. Table V lists collapsed categories of responses of "Agree", "Disagree", and "Neutral or No Response", as well as the individual item means and standard deviations for value and attitudinal items not included in the four factors.

It is worth noting that the highest consensus on these items is for item 101. 92.31% agree that "The collection and interpretation of data so as to predict specific environmental impacts is within the scope of scientific work." It is only natural that they should agree with this statement, or they would not be engaged in such data collection. However, often in interview and specifically in answer to item 67, seven, or 17.95% said that the data only allowed short-term assessment, and five, or 12.82% said that long-term prediction was too difficult or uncertain. Thus, while agreeing that prediction was scientific, a total of twelve, or 30.77% thought long-term prediction to

be somewhat impossible. Only nine, or 23.08%, in response to item 66, placed more emphasis on long-term consequences (future generations). This discrepancy is of interest in light of NEPA concern with future generations. (Appendix A) The second highest consensus on these items was on item 102, in which twenty-seven, or 69.23% agreed that "The evaluation of the desirability of specific environmental impacts is within the scope of scientific work." Not only does this contradict the fact that many said in interview that they did not feel it their responsibility to decide the desirability of predicted impacts, but that it was someone else's responsibility, but most seemed to have at least a personal opinion as to the desirability of a proposed project not necessarily based on their data. It seems that the decision should be more socially than scientifically determined, in light of the fact that science really knows relatively little about the effect of certain impacts. One scientist was quite outraged that a group of citizens against a project had filed suit to stop it on the basis that their school districts would have to be re-formed, and that this cost had not been evaluated in the EIS. While this scientist thought the costs were acceptable and outweighed by the benefits, certainly the local citizens who would be most affected obviously did not share his views of the desirability of the project. One can see that this item becomes more questionable the more one considers it. The final frequencies of special interest are those for item 30. Twenty-three, or 58.97% agreed that "The standards for acceptable EIS work are lower than for most other scientific work." Ten, or 25.64% disagreed, with six, or

15.38% neutral on the question. This frequency becomes even more surprising in light of the fact that thirty-six, or 92.31% said that they "Would participate on an EIS again" (item 116), only two would not, and one was uncertain. Thirty-five, or 89.74% said they would contract with the same contractor again, two would not, and two were not certain. (Item 117) It is possible that the scientists stating that the standards were lower mentally excepted themselves from the agreement response. Even so, it is inconsistent with the high frequencies and means of items dealing with the scientific ethic.

TABLE V

FREQUENCIES AND MEANS OF NON-FACTOR ITEMS

Item	Means	Standard Dev.	Agree	Disagree	Neutral
27	4.59	1.84	25 (64.10)*	9 (23.08)	5 (7.8)
29	4.72	2.08	24 (61.54)	12 (30.77)	3 (7.7)
30	4.67	1.74	23 (58.97)	10 (25.64)	6 (15.4)
101	6.18	1.07	36 (92.31)	1 (2.56)	2 (5.13)
102	4.95	1.75	27 (69.23)	6 (15.38)	6 (15.4)
109	3.77	1.53	12 (30.77)	15 (38.46)	12 (30.77)

*Number in parentheses is percentage

Tables VI, VII, VIII, and IX contain the frequencies, means, standard deviations, and percentages for each item of the factors. Table VI contains factor items comprising Factor I, or those items dealing with environmental values.

TABLE VI

FREQUENCIES, MEANS, STANDARD DEVIATIONS
FOR ENVIRONMENTAL VALUES

Item	Means	S.D.	Agree	Disagree	Neutral
10	2.62	1.58	7 (17.95)*	29 (74.36)	3
14	1.82	1.25	2 (5.13)	35 (89.74)	2
15	5.13	1.87	28 (71.79)	9 (23.08)	2
16	6.15	1.18	37 (94.87)	1 (2.56)	1
22	5.95	1.17	34 (87.18)	2 (5.13)	3
23	5.74	1.37	33 (84.62)	4 (10.26)	2

*Numbers in parentheses are percentages

TABLE VII

FREQUENCIES, MEANS, STANDARD DEVIATIONS
FOR BUSINESS VALUES

Item	Means	S.D.	Agree	Disagree	Neutral
11	2.74	1.70	8 (20.51)*	24 (61.54)	7
12	3.64	1.88	14 (35.90)	18 (46.15)	7
13	3.23	1.72	11 (28.21)	21 (53.85)	7
19	3.05	1.73	8 (20.51)	23 (58.97)	8
20	2.41	1.50	4 (10.26)	29 (74.36)	6
21	2.49	1.68	7 (17.95)	29 (74.36)	3
17	6.05	1.21	35 (89.74)	3 (7.69)	1
18	6.46	1.39	29 (74.36)	4 (10.26)	6

*Numbers in parentheses are percentages

TABLE VIII

FREQUENCIES, MEANS, STANDARD DEVIATIONS
FOR SCIENCE VALUES

Item	Means	S.D.	Agree	Disagree	Neutral
24	6.21	.98	36 (92.32)*	0	3 (7.69)
25	5.92	1.56	35 (89.74)	4 (10.26)	0
26	5.97	1.69	33 (84.62)	4 (10.26)	2 (5.13)
28	4.82	1.34	23 (58.97)	6 (15.38)	10 (25.64)
31	6.31	1.10	36 (92.31)	2 (5.13)	1 (2.56)
99	6.05	1.17	35 (89.74)	1 (2.56)	3 (7.69)
100	6.39	.85	38 (97.44)	0	1 (2.56)

*Numbers in parentheses are percentages

TABLE IX

FREQUENCIES, MEANS, STANDARD DEVIATIONS
FOR TRADE-OFF VALUES

Item	Means	S.D.	Agree	Disagree	Neutral
103	2.41	1.27	3 (7.69)*	30 (76.92)	6 (15.38)
104	3.00	1.52	4 (10.26)	24 (61.54)	11 (28.21)
105	2.54	1.21	1 (2.56)	28 (71.79)	10 (25.64)
106	2.56	1.65	1 (2.56)	29 (74.36)	9 (23.08)
107	2.67	1.54	4 (10.26)	25 (64.10)	10 (25.64)
108	3.26	1.62	10 (25.64)	22 (56.41)	7 (17.95)
110	2.31	1.08	12 (30.77)	15 (38.46)	12 (30.77)
111	1.85	1.09	1 (2.56)	34 (87.18)	4 (10.26)

*Numbers in parentheses are percentages

Tables VI, VII, VIII, and IX are primarily presented for informational purposes, as items will be discussed primarily in terms of the factors. However, it should be noted that, on Table VI, that environmental items 10 and 14 are negatively correlated with items 15, 16, 22 and 23. This is the only factor in which the lower the score, the more pro-factor concept the score. In other words, the lower the score, the more agreement with the ideology the factor represents.

On Table VII, business items 17 and 18 are negatively correlated with business items 11, 12, 13, 19, 20, and 21. The higher the score on this index, the higher the agreement with business and economic capitalism items.

On Table VIII, all items, expressing in part the scientific ethic ideology, are positive, that is, the higher the score, the more pro-scientific ethic the score.

On Table IX, all trade-off items are positively correlated, and the higher the score, the more agreement with the trade-offs of values entailed by the proposed projects.

The Factor Means and T-Scores

Table X sets out results of tabulation of scores on each factor for the sample overall. Tables XI, XII, XIII are factor scores by different disciplines. Overall patterns suggest less controversy over indices of environmental and scientific values, as their standard deviations are smaller. (Table X)

TABLE X

FACTOR MEANS, STANDARD DEVIATIONS,
POSSIBLE RANGE, ACTUAL RANGE

Index	Means	S.D.	P.R.	A.R.
Environmental	13.46	5.57	6-42	6-29
Scientific	41.67	4.99	8-56	26-49
Business	22.05	8.31	7-49	10-40
Trade-Offs	20.59	7.22	8-56	8-38

TABLE XI

ENVIRONMENTAL, SCIENTIFIC, BUSINESS, TRADE-OFFS
INDEX MEANS, STANDARD DEVIATIONS FOR ARCADIA

Index	N	Means	S.D.
Environmental	17	16.00	5.82
Scientific	17	40.47	6.21
Business	17	25.06	8.92
Trade-Offs	17	24.12	7.36

TABLE XII

ENVIRONMENTAL, SCIENTIFIC, BUSINESS, TRADE-OFF INDEX MEANS, STANDARD DEVIATIONS FOR SOONER

Index	N	Means	S.D.
Environmental	15	10.33	4.19
Scientific	15	43.27	3.65
Business	15	17.07	5.57
Trade-Offs	15	16.80	6.47

TABLE XIII

ENVIRONMENTAL, SCIENTIFIC, BUSINESS, TRADE-OFF INDEX MEANS, STANDARD DEVIATIONS FOR NEW MEXICO

Index	N	Means	S.D.
Environmental	7	14.00	4.73
Scientific	7	41.14	3.58
Business	7	25.43	7.19
Trade-Offs	7	20.14	4.06

Tables XI, XII, and XIII suggest less consensus among scientists on the Arcadia project than the others, as evidenced by the larger standard deviations for all four factors. On all three projects, there was less consensus on business than the other three indices, except in the case of Sooner scientists, there was the least consensus on the trade-offs. It should be noted also that Arcadia scientists appear to be the most pro-trade-offs. These suggestions of these means was definitely born out in interviews as to favorability of attitudes towards the proposed projects. The Sooner scientists appear the least pro-business and have the highest means on science index scores. Gross findings were subjected to a t-test. T-test scores for the projects will be found in Tables XIV, XV, and XVI.

TABLE XIV

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: ARCADIA VERSUS SOONER

Index	T-Scores	D.F.	* Sig. Level
Environmental	3.12	30	.05, .01
Scientific	1.57	15	not
Business	3.08	15	.05, .01
Trade-Offs	2.97	30	.05, .01

*Two-tailed

TABLE XV

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: ARCADIA VERSUS
NEW MEXICO

Index	T-Scores	D.F.	*Sig. Level
Environmental	.80	22	not
Scientific	.27	22	not
Business	.10	22	not
Trade-Offs	1.34	22	not

*Two-tailed

TABLE XVI

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: SOONER VERSUS
NEW MEXICO

Index	T-Scores	D.F.	*Sig. Level
Environmental	1.84	20	not
Scientific	.08	20	not
Business	2.99	20	.05, .01
Trade-Offs	1.25	20	not

*Two-tailed

Tables XIV, XV, and XVI suggest that the scientists on the Sooner project were the only ones who scored significantly differently on the four indices. Sooner scientists scored more pro-environmental, and less pro-business than Arcadia scientists, and were also significantly less pro-trade-offs than Arcadia scientists. There were no significant differences in scores made by New Mexico scientists and Arcadia scientists, and Sooner scientists were significantly less pro-business values than New Mexico scientists.

Interpretation of Project Comparisons

There could be a number of reasons for these results. The Sooner Power Plant project became widely publicized after the assessment and was a factor inssetting a state-wide air pollution standard lower than many people desired. Secondly, Oklahoma Gas and Electric Company had, as previously mentioned, already begun construction on the plant before completing the environmental impact study. This fact angered several of the scientists. Thus, it is quite possible that subsequent publicity and the essentially negative experience of working on this project may well have influenced values. There is also the fact that some scientists lived within the airshed of the project and were likely to be personally affected by it. It would have been of interest to pursue in interview what degree of environmental impacts might be personally experienced by contracted scientists. For the most part, neither the scientists contracted to work for the Arcadia project nor the New Mexico project were personally susceptible to suffering from the completion of the project,

and there were, as stated, no significant differences in their scores. There was another factor unique to the Sooner project in that it was the only survey undertaken by a private agency, as opposed to the other two. This too may have affected the scientists' values.

Index Means by Academic Discipline

Index means were also separated by discipline as defined in the Operational Definitions section. These t-tests will be found in Tables XVII, XVIII, and XIX.

TABLE XVII

INDEX MEANS FOR THE FOUR FACTORS, T-SCORES: NATURAL SCIENTISTS VERSUS SOCIAL SCIENTISTS

Index	T-Scores	D.F.	* Sig. Level
Environmental	.89	27	not
Scientific	.81	27	not
Business	2.63	27	.05
Trade-Offs	.86	27	not

*Two-tailed

TABLE XVIII

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: NATURAL SCIENTISTS
VERSUS CIVIL ENGINEERS

Index	T-Scores	D.F.	*Sig. Level
Environmental	2.47	24	.05
Scientific	1.31	12	not
Business	3.81	24	.05, .01
Trade-Offs	3.62	24	.05, .01

*Two-tailed

TABLE XIX

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: CIVIL ENGINEERS
VERSUS SOCIAL SCIENTISTS

Index	T-Scores	D.F.	*Sig. Level
Environmental	1.56	13	not
Scientific	.93	13	not
Business	1.22	13	not
Trade-Offs	2.99	13	.05, .02

*Two-tailed

On Tables XVII, XVIII, and XIX, it should be noted that there are only two cross-discipline significant index score differences. Natural scientists are less pro-business ideology than other disciplines and civil engineers are more pro-trade-offs. There are no significant differences for scientific index scores. Environmental scores differ significantly between only natural scientists and civil engineers, with the former more pro-environmental. This result is not unexpected, however, one would expect social scientists to be more pro-environmental than civil engineers, which does not appear in this data.

Index Means by Background of Subject

T-scores were also compiled comparing those with rural background to those with urban background. Results are on Table XX.

TABLE XX

INDEX MEANS FOR THE FOUR FACTORS,
T-SCORES: RURAL VERSUS URBAN

Index	T-Scores	D.F.	*Sig. Level
Environmental	.37	37	not
Scientific	.42	37	not
Business	.38	37	not
Trade-Offs	2.49	37	.05, .02

*Two-tailed

The fact that the only significant difference in means in Table XX lies in the index involving trade-offs, with rural background subjects being less pro-trade-offs, might indicate several things. On the whole, the values involved in the trade-offs (Appendix D) are composed of intangibles connected with not completing a project as opposed to tangible, economic benefits connected with completing a project. To be pro-trade-off is to be pro-building. Table XX suggests that those scientists having a rural background are less willing to trade-off their values in favor of what might be called "progress".

Index Means Compared by Other Variables

Separating means also on the basis of the response to the question as to the main reason for participating in an EIS was money as opposed to other reasons, those who cited money (N=12) scored means on the four indices not significantly different from those who cited other reasons. (N=26) These t-tests were not tabulated. Those who cited money as the principal reason seemed to be graduate and undergraduate students for the most part, and possibly they did not value money more than anyone else, but they did seem to have less of it. Graduate student (N=13) scores were compared to professor scores (N=15) and did not differ significantly. These t-tests were not tabulated.

Additional negative results were found in comparing scores of those who interpreted their data (N=19) versus those who did not (N=15). Also, those scientists who participated in the research design (N=23) did not differ significantly in scores from the scientists who did not

participate in the research design (N=14). These foregoing negative results were not tabulated.

Some Conflicting Data

Table XXI presents some selected frequencies of responses somewhat at odds with each other and indices scores.

TABLE XXI

FREQUENCIES OF SELECTED ITEMS

Item	Yes	No	No Reply Unsure
96	13	21	1
97	22	3	9
98	13	24	1
63	25	13	1
70	28	11	0
112	25	10	2
117	35	2	2
116	36	2	1

It should be noted (Appendix D) that while the above items are very much at odds with expressed agreement with scientific values, note that still, in item 116, 92.31% of respondents said they would work on an EIS again, and, in item 117, 89.64% would work for the same contractor again. Also, item 112, which asks whether the pro-project tone expressed

in the final document agree with their research, shows 64.10% thought that it did, although on item 89, only eleven, or 29.73% said that they wanted the project to be completed, eighteen, or 46.15% said they didn't care, and eight, or 20.51% did not want the project completed. The fact that so many said they didn't care if the project was completed versus the 64.10% who thought their research lent itself to pro-project tones, as opposed to the very low index scores for the trade-off scores of the entire project is certainly a conflict. Items 96, 97, and 98 all deal with questions of good scientific procedure, and answers are clearly at odds with high-consensus agreement responses to scientific values items.

CHAPTER V

SUMMARY AND CONCLUSIONS

In conclusion, it seems that a case might be made for applications of Mannheim's (1936:85-86 criterion for false consciousness:

> As examples of 'false consciousness' taking the form of an incorrect interpretation of one's own self and one's role, we may cite those cases in which persons try to cover up their 'real' relations to themselves and to the world, and falsify to themselves the elementary facts of human existence by deifying, romanticizing, or idealizing themselves and the world, and thereby conjuring up false interpretations of existence. We have a case for ideological distortion, therefore, when we try to resolve conflicts and anxieties by having recourse to absolutes, according to which it is no longer possible to live. This is the case when we create 'myths' . . . avow allegiance to 'ideals', while in our actual conduct we are following other interests which we try to mask by simulating an unconscious righteousness, which is only too easily transparent.

In environmental impact assessment there seems to be a need for a different set of ethics. There is clearly a conflict in the science ideology and environmental assessment needs. As previously discussed, there is a considerable gap between expressed agreement with scientific ideology and reported actions on EIS work. Mannheim (1936:86) stated that " . . . knowledge is distorted and ideological when it fails to take account of the new realities applying to a situation." Certainly this is the relationship between conflicting environmental ideology and business ideology, and between the old scientific ideology and environmental science. Environmental values also demand a stable

economy, as opposed to economic and business values. (Cf. Tyler, 1975) These, as mentioned, are value conflicts intrinsic to all environmental impact study. However, there is also some evidence that there is a conflict between expressed scientific ideals and statements of scientists indicating that they have not stringently applied these values through their work. The aim of the foregoing statement is not to accuse these scientists of hypocrisy; rather, the conflict suggests that environmental scientific assessment demands a more realistic set of guiding ideals. One scientist stated in interview that working on an EIS, a scientist is generally not subjected to review of his work by his colleagues in his field, which puts an extra strain on his personal integrity to uphold the scientific ethic. The pitfalls of industrialized science and team science have already been discussed. On the whole, it is not surprising that scientists should not easily perceive the growing distance between ideals and action. One can only hope that study of the problem will be an aid in future actions.

Secondly, a finding which is not very apparent from the questionnaire or frequency counts is that very few of the scientists had any idea of the purpose of an environmental study. For instance, 27, or 69.23% felt they had no responsibility to those who might be helped by the project, and 19, or 48.72% felt they had no responsibility to those who might be harmed by the project. In fact, their responsibility was an "unbiased presentation of all findings," which only five scientists, or 12.82%, gave as their perceived responsibility. Many stated in interview that they had no idea of the overall research design for the

project, or of other findings than those of their own study. The result of this ignorance is that one scientist was somewhat favorable towards the Arcadia project because the lake would trap effluents and result in a cleaner downstream. However, he completely overlooked the fact that the lake was supposed to be municipal drinking water and quite unsuited for that purpose. Also, on the same project, an engineer stated that he was in favor of the dam, and when asked why, he said that he liked dams. The tendency of those in each discipline to develop tunnel views was very obvious in interviews. A biologist said he felt no responsibility to people in his work, because his field was biology. (However outside of his role as a scientist, he had strong ideas about his duty as a citizen, but segmented his values as to roles completely.) An archeologist was not concerned about unemployment because he was only interested in whether he could preserve archeological sites. The engineer knew or cared nothing about inundating farmland's costs to local farmers, because he liked dams. A business professor drew up projections for growth in Oklahoma City by a method dictated by the Corps of Engineers for the cost/benefit analysis for Arcadia, and approved of the project, but he neither knew nor cared if the water would be fit to drink. He said that it looked dirty to him, but that he was no scientist. An overall impression gained from interviews was that very often, scientists judged the favorability of projects based upon their career-long assimilated discipline-based values. Their judgments were very narrowly based in that sense. This impression, of course, is very much counter to Tyler's (1975) explication of the prescribed

view of an environmental professional. (Appendix B)

A final finding reflected in the data, but more obvious in interview, was that while only one person disagreed and three were neutral that (item 99) "A scientist should be informed of the interpretations other parties place on the data he/she gathered," and only one person disagreed that "A scientist should have the opportunity to correct possible misinterpretations placed on the data he/she gathered," only 13, or 34.21% of the entire sample had seen the final document (item 98). One did not know if he had or not, and 24, or 63.16%, had never seen the final document. Not only does this point up a discrepancy between ideals and action, but also points out that the majority of scientists had no way of knowing if their data had been distorted or altered. Therefore, while 37, or 94.87% said they would protest if they found out their research had been misrepresented, it is difficult to know how they would ever discover it. This lack of concern is especially difficult to grasp when (item 113) 17, or 43.59%, thought the research had any bearing on the contractor's decision to go ahead with the project, and (item 112) ten, or 25.64% said that the favorable conclusion of the final project was <u>not</u> compatible with the research. It is, in fact, quite difficult to obtain a copy of these documents, although some scientists seemed to recall vaguely that it had crossed their desks. Thus, impressions of scientists' values derived solely from their scores on the four indices are somewhat at odds with other responses.

Major Limitations of the Study

This study is limited due to a basic difficulty long-recognized in sociology, which is that statements about attitudes and beliefs do not necessarily dictate actions. Also, reports about actions as recollected are not necessarily accurate. However, it should be noted that the sample was an unusual one, consisting of highly educated scientists and technicians who would not be likely to purposely misrepresent themselves. The fact that the research project was funded by a National Science Foundation grant would seem to encourage careful answers and responses also, at least from scientists. As an aside, scientists in interview did reveal some unflattering things about themselves. But a further limitation of the study, in noting the distance between expressed ideals and reported actions, is that the strain towards conventionalization of responses may be more pronounced, especially on items about the scientific ethic. This trend could only be enforced by the fact that interviewers were graduate students and possible to being cast in the role of students to whom the subject was obliged to lecture. One safeguard against this contingency was that it was made clear to subjects that graduate students were only interviewers, not independent investigators. But the tendency toward conventionalization of replies is still quite present. This problem is a frequent one with the methodology of interviewing.

Another limitation is the fact that the sample was not overly large. However, the types of items asked do not lend themselves well to a self-administered questionnaire. Even with a well-educated sample,

it was often necessary to explain in standardized re-wordings what a question meant. In terms of funds, then, it would be impractical to have a larger sample. In addition, considerable analysis of the three documents by the research team preceded the actual questionnaire construction and interviewing. It would be a horrendous job to analyze many cases. The chief advantage of a larger sample really would only be to facilitate use of other statistical techniques.

There is another small methodological problem in that many do not consider scores on attitude or opinion indices to be interval data, and therefore would not consider t-tests a suitable statistical technique. In addition, the sample could not accurately be called a probability sample. However, sample size was limited, and use of the t-test may be defended on the basis of its rigor.

Precautions were taken in training interviewers, however, only two of the four interviewers had previous experience. The tapes of interviews were audited by senior team members, and knowledge of this fact served to remind interviewers of their duties in not influencing the subjects, etcetera. But the element may be present in any interview situation. On the whole, though, this study probably suffers from relatively few limitations, as it was planned, supervised, and executed under the direction of experienced researchers, and was well-funded.

Suggestions for Future Research

This research project will be interpreted and widely disseminated by other members of the research team. The four factors uncovered

would be quite valuable in further exploration. It would be of great interest to administer the questionnaire to the staff of private consulting firms to see if their ethical standards were quite as high as university staff. Administering the questionnaire to more people who have become environmental professionals would also be of interest.

It would be well to pursue the question as to whether being personally subject to environmental impacts caused by a proposed project would influence responses, as it was suggested might be the case of the Sooner scientists.

It would also be of interest to have both sexes included in further study. In spite of the fact that virtually all who worked on the three projects were interviewed, only one was a woman. However pending social change, there is little that can be done about this for some time.

It would be worthwhile to ask specifically the age of respondents. While the question was asked in the pre-test, it was eliminated because it caused tension in the interview. It was thought that "years in profession" would serve the purpose, however, there was no actual correlation between this response and age.

Finally, it would be worthwhile to administer the items in the scientific index and similar questions as to actions of scientists employed by private industries in other kinds of research as well as scientists working independently on their own projects to discover if the distance between scientific ideals and actions is larger or smaller. Of interest also would be to query the same sample as to the Environmental Professionals' code of ethics versus items of the old scientific ethic.

Certainly, at least, development of a scale for testing environmental ideological values could prove quite useful for future research. When scientists are looked to for reliable information, it seems, the public cannot expect total objectivity; but it would be very worthwhile to know in which directions their biases lie. As creators of knowledge which serves as a basis for decisions that could affect many lives and the future, and as those theoretically least likely to distort that knowledge, scientists contracted to work on Environmental Impact Statements are an especially significant group for further study.

SELECTED BIBLIOGRAPHY

Babbie, Earl R.
1975 The Practice of Social Research. California: Wadsworth Publishing Company Incorporated.

Benham Blair and Affiliates Incorporated
1976 Sooner Power Plant Environmental Assessment Report. Unpublished.

Blackstone, William T.
1974 "Introduction." Pp. 1-9 in William T. Blackstone (ed.), Philosophy and Environmental Crisis. Georgia: University of Georgia Press.

1974 "Ethics and Ecology." Pp. 16-42 in William T. Blackstone (ed.), Philosophy and Environmental Crisis. Georgia: University of Georgia Press.

Blalock, Hubert M., Jr.
1972 Social Stastics. New York: McGraw-Hill Book Company.

Disch, Robert
1970 The Ecological Conscience: Values for Survival. Robert Disch (ed.), New Jersey: Prentice-Hall, Incorporated.

Mannheim, Karl
1936 Ideology and Utopia. New York: Harcourt, Brace and Company.

Marine, Gene
1971 "The Engineering Mentality." Pp. 205-219 in Playboy Press (ed.), Project Survival. Illinois: HMH Publishing Company Incorporated.

Martindale, Don
1960 The Nature and Types of Sociological Theory. Boston: Houghton, Mifflin and Company.

Matzke, Gordon E.
1976 Research Proposal Submitted to National Science Foundation, Ethical and Human Value Implications Program, Washington, D.C.. Unpublished.

Ravetz, Jerome R.
1971 Scientific Knowledge and Its Social Problems. New York: Oxford University Press.

Tyler, D.B.
1975 "Environmental Science Perspectives and Methods." in Ruthann Corwin, Patrick H. Heffernan, Robert A. Johnston, Michael Remy, James A. Roberts, and D.B. Tyler (eds.), Environmental Impact Assessment. California: Freeman, Cooper and Company.

United States Government
1974 The National Environmental Policy Act of 1969, Public Law 91-190, January 1, 1970 (42 U.S.C. 4321-4347). Pp. 11-13 in Peter E. Black and Lee P. Herrington (eds.), Readings in Environmental Impact. New York: MSS Information Corporation.

United States Department of the Army, Tulsa District Corps of Engineers
1975 Draft: Updated and Revised Environmental Statement, Arcadia Lake, Deep Fork River, Oklahoma. Unpublished.

United States Department of Interior, Bureau of Land Management, New Mexico
1976 Executive Summary and Supplement to Preliminary Potash EAR. Unpublished.

Whyte, William H., Jr.
1956 The Organization Man. New York: Doubleday and Company Incorporated.

APPENDIX A

THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
(Partially reproduced)

THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Public Law 91-190

January 1, 1970

(42 U.S.C. 4321-4347)

An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

BE IT ENACTED BY THE SENATE AND HOUSE OF REPRESENTATIVES OF THE UNITED STATES OF AMERICA IN CONGRESS ASSEMBLED, That this Act may be cited as the "National Environmental Policy Act of 1969."

PURPOSE

Sec. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

Sec. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may--

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Sec. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) Utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment;

(B) Identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) Include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) The environmental impact of the proposed action,

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) Alternatives to the proposed action,

(iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

(PARTIAL LAW ONLY: SOURCE: Black and Herrington, 1974:11-13)

APPENDIX B

CODE OF ETHICAL PRACTICE

CODE OF ETHICAL PRACTICE

PREPARATION AND PROCESSING OF ENVIRONMENTAL DOCUMENTS

Association of Environmental Professionals

1. Whereas, the goal of my endeavor is to provide a full-disclosure environmental document in which decision makers and public can place full confidence,

2. Therefore, I will subscribe to this Code of Ethical Practice:

3. I will examine all relationshipd or actions which could be legitemately interpreted as a conflict of interest by clients, officials, the public, or my peers; and I will fully disclose my financial or personal interests in the project and each alternative, including the no-build or null alternative.

4. I will encourage, by every reasonable means, that environmental planning begin in the earliest stages of project conceptualization.

5. I will refuse to create an environmental document as a justification of a project or as a platform for opposition or advocacy.

6. I will abstain from attempting to improperly delay the outcome of an action or project through the environmental document process.

7. I will produce an objective environmental document; . . .

8. If preparing a document pursuant to the environmental document process, I will:

9. define a level of investigation appropriate to the nature and scope of the proposed project or action, and its probable impacts;

10. select and use qualified persons of pertinent disciplines in the conduct of the study;

11. incorporate the best principles of the design and environmental planning arts in recommending measures for mitigation of environmental harm and enhancement of environmental quality;

12. rely upon the independent judgment of an interdisciplinary team to determine impacts, define and evaluate all reasonable alternatives to the proposed action, and assess short-term versus long-term productivity with and without the project or action;

13. encourage public participation from the beginning in an open, frank and productive atmosphere to stimulate democratic consensus;

14. write in a clear and accurate manner, to achieve objectivity and remove all possible bias;

15. list all study participants, their qualifications and affiliations;

16. cite all sources, written and oral;

17. strive to create a complete, scientifically accurate, objective environmental document that can be defended professionally.

18. <u>If reviewing an environmental document, I will</u>:

19. insist upon review of original technical reports or findings upon which conclusions or recommendations summarized in the environmental document are based, to ensure they are in conformity with applicable laws and guidelines;

20. assure that the assessment reflects my own best judgment where I am qualified to judge, and that of independent persons expert in areas beyond my capability to assess effects deemed "significant";

21. determine that the document is consistent with all pertinent laws, ordinances, guidelines, plans and policies to the best of my knowledge and ability;

22. certify acceptability of the environmental document only if I am satisfied that it has been prepared and reviewed in conformance with all of the above.

"This code appears as adopted by the Association of Environmental Professionals in plenary session at the second annual conference and membership meeting on the 29th of March, 1975, at Stanford."
(Cf. Tyler, 1975:75-77)

APPENDIX C

THE RESEARCH INSTRUMENT

I. Demographics

1. ___Arcadia; ___New Mexico; ___Sooner
2. Area of EIS you worked on? _____
3. What other professors and graduate students worked on this EIS?
4. Rank ___grad student; ___asst. prof; ___assoc.prof; ___prof.
5. Years in profession at the time? _____
6. Were you on ___release time or ___consulting?
7. Department/discipline _____
8. How many EIS's have you worked on? _____
9. Did you grow up in the state where you worked on the EIS? ___yes; ___no
10. Did you grow in an ___urban or a ___rural region (less than 2,500 people)?

II. Attitudes toward science and environmental matters

___ 1. The environmental problems emerging in our time are temporary because they will be solved by technological innovations.

___ 2. Continually increasing the level of industrial production is essential to human well being.

___ 3. Our grandchildren and great grandchildren will enjoy as high a standard of living as we do now.

___ 4. The natural resources we are now running low on will be replaced by plentiful resources of types we are not aware of now.

___ 5. Each person has a right to use all of the energy (such as natural gas or electricity) that he/she can afford to pay for.

___ 6. Our moral obligations are the same toward all persons everywhere.

___ 7. We have duties to preserve presently existing non-human species.

___ 8. We have the same duties to future human generations as we do to those presently alive.

___ 9. In order to protect certain human values, some economically promising developments should be foregone.

10. The elimination of some specie of plant or animal is an acceptable price to pay for:

____ a. increased electrical power generating capacity.

____ b. increased recreational facilities.

____ c. increased fertilizer production.

____ 11. All humans have an equal right to an environment suitable to meet their biological needs.

____ 12. In evaluating environmental impact, strong consideration needs to be given to aesthetic values (such as "broad open spaces" or "free flowing streams").

____ 13. Scientists should have an important voice in interpreting their research.

____ 14. Scientists have some moral responsibility for the use that is made of their research.

____ 15. Scientists should not participate in research which must agree with externally imposed conclusions.

____ 16. Science can define reasonable limits to growth and energy usage that are optimal for the quality of human life.

____ 17. Scientific research tneds to be focused atomistically rather than on the connections between diverse phenomena.

____ 18. My discipline places a high value on research involved in preparing an EIS.

____ 19. The standards for acceptable EIS work are lower than for most other scientific work.

____ 20. Sound scientific procedures must include the review of one's work by one's peers.

III. The scientist before signing the contract

1. Was this the first EIS you worked on? ___yes; ___no

2. Had you worked for this contractor before? ____yes; ____no

3. Why did you decide to participate in this EIS?

____yes ____no Money

____yes ____no Scientific Interest (worthwhile scientific project, research opportunity, securing data)

____yes ____no Interest in Contractor (wanted to find out about Army Corps, wanted to work for Army Corps)

____yes ____no Novel Experience (looking forward to a new experience as a "wonderland")

____yes ____no One's Own Future (contacts for future, advancement in university, data for publishing)

____yes ____no Involvement in the World (practical experience, improve the world)

Others:

4. (Of the reasons offered), which ones seemed most important at the time?

5. What kinds of pressures to participate did you feel?

Sources of Pressure			Kinds of Pressure		
____yes	____no	Departmental	____yes	____no	Financial
____yes	____no	University ,	____yes	____no	Professional Advancement, (tenure, promotion)
____yes	____no	Family			
____yes	____no	Colleagues	____yes	____no	Prestige (some colleagues had already done so or brought in outside money)
Others:					

Others:

6. How did your <u>department</u> regard your participation? (Departments/Universities vary in the ways they assess faculty time. And faculty vary in the ways they interpret the value placed on faculty activities. Thus, we want to find out how the department/university regarded participation in an EIS <u>compared</u> to other activities.)

____yes ____equal ____no Teaching more important than EIS?

____yes ____equal ____no Other research more important than EIS?

____yes ____equal ____no Publishing more important than EIS?

____yes ____equal ____no Securing grants more important than EIS?

Other:

7. How did your university regard your participation?

____yes ____equal ____no Teaching more important than EIS?

____yes ____equal ____no Other research more important than EIS?

____yes ____equal ____no Publishing more important than EIS?

____yes ____equal ____no Securing grants more important than EIS?

Other:

8. How much information did you have about the research design before you agreed to participate in this EIS?

9. What features of this research design seemed wrong to you? (Follow up with: Why did they seem wrong?)

IV. **The scientist while doing research**

1. How did you decide (or whoever decided) which environmental impacts were important enough to investigate? (This question is in reference to the particular EIS interviewee participated in.)

2. As you assessed environmental impact, did you place more emphasis on ____short term consequences (5-20 years) or on ____long term consequences (future generations)? (Follow up with: Why?)

3. Did you feel responsible for predicting long-term consequences?

Here our interest is in how the scientist interpreted his own

responsibility. Specifically, did the scientist himself to the time frame specified in the contract? For example, if the contract called for an EIS of 20 years, did the scientist go beyond that time frame to predict consequences?

____went beyond ____did not go beyond

4. Did you foresee some "trade offs" (for example, clear air for industrial growth) which would result from the proposed project?
____yes ____no
(If yes, follow with: What trade offs did you foresee?)
(If yes, also follow with: How did this affect the research you did?)

5. What responsibility did you feel toward persons who might be helped or harmed by the proposed project?

6. Did you foresee desirable consequences following from the completion of the proposed project? ____yes ____? ____no
(If yes, follow with: Why did you think they were desirable?)

7. Did you foresee undesirable consequences following from the completion of the proposed project? ____yes ____? ____no
(If yes, follow with: Why did you think they were undesirable?)

8. How broad a vicinity should environmental impact research include?

____ immediate area of the project

____ rest of the state

____ neighboring states

____ the nation

____ the world

9. Would you be in favor of more of these same projects elsewhere (e.g., the same kind and size of power station with the same environmental impact)?
____yes ____? ____no
Had you considered this while you were doing the research?
____yes ____? ____no
Would you be in favor of more of these same projects in the same region?
____yes ____? ____no

10. Under what conditions would you have quit working on the EIS?
____yes ____? ____no If you thought the proposed project would harm more people than it would help?
____yes ____? ____no If you thought the proposed project would be generally beneficial but illegal?
____yes ____? ____no If you thought the proposed project would be generally harmful even though legally required.

Others:

11. What kinds of environmental impact would you regard as intrinsically wrong? (Intrinsically wrong is something wrong in and of itself, regardless of its consequences.) We want to find out if the scientist would regard certain kinds of environmental impact as intrinsically wrong (e.g., killing off a non-human species) even though the proposed project would have more favorable consequences overall (more jobs, more money in the area's economy, more electrical energy). ____yes ____no
(If yes, follow with: What are they?)

12. Did you intend through your research to increase (or decrease) the possibilities that the proposed project would be completed (build the dam, process the potash, or build the power generating station)?

That is, did you want the project to be completed?
____yes ____didn't care ____wanted project stopped

Did you think your participation would make the project more likely to be completed? ____yes ____no

13. How did you think your research would affect the final EIS?

____yes ____? ____no Did you think contractor would follow your recommendations?

____yes ____? ____no Did you think contractor would consider recommendations more from another area (say social impact or air quality)?

____yes ____? ____no Did you think contractor had intended to complete the project regardless of the research?

____yes ____? ____no Did you think contractor had intended to complete the project unless the research was quite negative?

____yes ____? ____no Did you think contractor would misrepresent your research?

14. Have you had the opportunity to check what happened to your research? ____yes ____no

____yes ____? ____no Were your conclusions adequately represented in the report sent in to the contractor?

____yes ____? ____no Have you seen the final document for the project (EIS by Army Corps for Arcadia; Executive Summary for New Mexico; Environmental Analysis Report for Sooner. Have the document with you.)

V. Post EIS reflection

____1. A scientist should be informed of the interpretations other parties place on the data he/she gathered.

____2. A scientist should have the opportunity to correct possible misinterpretations placed on the data he/she gathered.

____3. The collection and interpretation of data so as to predict specific environmental impacts is within the scope of scientific work.

____4. The evaluation of the desirability of specific environmental impacts is within the scope of scientific work.

____5. It is more important to increase employment in a given area than it is to conserve the natural resources of the area.

____6. It is more important to control flooding in rural regions than it is to conserve the natural resources of the area.

____7. It is more important to increase recreational facilities than it is to preserve the cultural integrity of rural communities.

____8. It is more important to provide significant economic benefits for new industries than it is to preserve the economic interests of existing residents.

____9. It is more important to increase the electrical power generating capacity in a given region than it is to retain land for food production.

____10. It is more important to maintain the present material standard of living in our country than it is to meet the biological needs of people in other countries.

____11. It is more important to utilize our own natural resources at a lower present cost than it is to meet the biological needs of people in other countries.

____12. It is more important to honor individual and corporate property rights than it is to minimize environmental damage.

____13. It is more important to maintain current U.S. living standards than to preserve non-renewable resources for future generations.

THE FINAL DOCUMENT STRONGLY SUPPORTED COMPLETING THE PROJECT (building the dam, processing the potash, or building the power station).

____yes ____? ____no 1. Is this conclusion compatible with your research? (Not necessarily just the individual's research, but others' too)

____yes ____? ____no 2. Do you think the research had any bearing on the contractor's decision to go ahead with the project?

____yes ____? ____no 3. Do you think the contractor selectively used the research to justify doing what he wanted to do?

____yes ____? ____no 4. Did the contractor make any efforts to get you to modify your findings?

____yes ____? ____no 5. Would you participate on an EIS again? (We are interested here in the effect of working on an EIS. Thus if interviewee could not participate because of the job he now has, put the question hypothetically.)

____yes ____? ____no 6. Would you contract with the same contractors again?

7. How effective do you think the EIS process is for environmental protection?

8. What would you do if you found out your research had been misrepresented? (If the final document took a position opposite to that indicated by the scientist, what would he do?)

____yes ____? ____no Protest

(If yes, in what way would scientist protest?)

Now, if there are issues on the scientist's mind that we did not cover in the interview, what are they? Or does scientist want to discuss his feelings about the questionnaire?

Thank you.

APPENDIX D

THE INSTRUMENT WITH CODED ITEM NUMBERS AND CODED RESPONSES TO OPEN-ENDED QUESTIONS

EHVIST QUESTIONNAIRE CODES

Item Number	Card Column	
		I. Demographics
I1	1	1 Arcadia; 2 New Mexico; 3 Sooner
I2	2-3	Area of EIS you worked on?

01	aquatic ecology	09	vegetation analysis
02	water quality	10	soil analysis
03	socio-economic	11	botany
04	hydrology	12	fish
05	agricultural econ.	13	aquatic plants
06	herpetal fauna	14	arch.-cultural
07	birds & mammals	15	principal inv.
08	air quality	16	economic

I3	4	Rank 1 grad student; 2 asst. prof.; 3 assoc. prof.; 4 prof.
I4	5-6	Years in profession at the time? 01-99
I5	7	Were you on 1 release time or 2 consulting?
I6	8-9	Department/discipline

01	biology	09	icthyology
02	zoology	10	agronomy
03	admin. sciences	11	meteorology
04	civil engineer	12	botany
05	geography	13	wildlife ecol.
06	geology	14	anthropology
07	ag. econ.	16	business
08	animal beh. ecol.		

I7	10	How many EIS's have you worked on? 1-9 or more
I8	11	Did you grow up in the state where you worked on the EIS? 1 yes; 2 no
I9	12	Did you grow up in an 1 urban or a 2 rural region (less than 2,500 people)?

II. Attitudes toward Science and Environmental Matters

(Codes range from 1-7 with 7 being most agreement)

I10	13	The environmental problems emerging in our time are temporary because they will be solved by technological innovations.

I11	14	Continually increasing the level of industrial production is essential to human well being.
I12	15	Our grandchildren and great grandchildren will enjoy as high a standard of living as we do now.
I13	16	The natural resources we are now running low on will be replaced by plentiful resources of types we are not aware of now.
I14	17	Each person has a right to use all of the energy (such as natural gas or electricity) that he/she can afford to pay for.
I15	18	Our moral obligations are the same toward all persons everywhere.
I16	19	We have duties to preserve presently existing non-human species.
I17	20	We have the same duties to future human generations as we do to those presently alive.
I18	21	In order to protect certain human values, some economically promising developments should be foregone.
I		The elimination of some specie of plant or animal is an acceptable price to pay for:
I19	22	a. increased electrical power generating capacity.
I20	23	b. increased recreational facilities.
I21	24	c. increased fertilizer production
I22	25	All humans have an equal right to an environment suitable to meet their biological needs.
I23	26	In evaluating environmental impact, strong consideration needs to be given to aesthetic values (such as "broad open spaces" or "free flowing streams").
I24	27	Scientists should have an important voice in interpreting their research.
I25	28	Scientists have some moral responsibility for the use that is made of their research.

I26 29 Scientists should not participate in research which must agree with externally imposed conclusions.

I27 30 Science can define reasonable limits to growth and energy usage that are optimal for the quality of human life.

I28 31 Scientific research tends to be focused atomistically rather than on the connections between diverse phenomena.

I29 32 My discipline places a high value on research involved in preparing an EIS.

I30 33 The standards for acceptable EIS work are lower than for most other scientific work.

I31 34 Sound scientific procedures must include the review of one's work by one's peers.

III. The Scientist Before Signing the Contract

I32 35 Was this the first EIS you worked on? 1 yes; 2 no

I33 36 Had you worked for this contractor before? 1 yes; 2 no

Why did you decide to participate in this EIS?

I34 37 1 yes 2 no Money

I35 38 1 yes 2 no Scientific Interest (worthwhile scientific project, research opportunity, securing data)

I36 39 1 yes 2 no Interest in Contractor (wanted to find about Army Corps, wanted to work for Army Corps)

I37 40 1 yes 2 no Novel Experience (looking forward to a new experience as a "wonderland")

I38 41 1 yes 2 no One's Own Future (contacts for future, advancement in university, data for publishing)

I39 42 1 yes 2 no Involvement in the World (practical experience, improve the world)

I40 43 Others: (if no "others" are listed, this item is left blank)

1 = assignment

2 = personal growth

[Note: "others" elicited in in one interview are not probed specifically in other interviews.]

(Of the reasons offered), which ones seemed most important at the time?

I41 44 The most important:

1 = money
2 = scientific interest
3 = interest in contractor
4 = novel experience
5 = one's own future
6 = involvement in the world
7 = other

I42 45 The second most important:

1 = money
2 = scientific interest
3 = interest in contractor
4 = novel experience
5 = one's own future
6 = involvement in the world
7 = other

What kinds of pressures to participate did you feel?

Sources of pressure

I43 46 _1_ yes _2_ no Departmental

I44 47 _1_ yes _2_ no University

I45 48 _1_ yes _2_ no Family

I46 49 _1_ yes _2_ no Colleagues

I47 50 Others: (if no others are mentioned, this item is left blank.)

1 = immediate supervisor

Kinds of pressure

I48 51 _1_ yes _2_ no Financial

I49 52 _1_ yes _2_ no Professional Advancement (tenure, promotion)

I50 53 _1_ yes _2_ no Prestige (some colleagues had already done so or brought in inside money)

I51 54 Others: (if no "others" are mentioned, this item is left blank)

1 = to keep job

2 = from general interest

How did your department regard your participation? (Departments/Universities vary in the ways they assess faculty time. And faculty vary in the ways they interpret the value placed on faculty activities. Thus, we want to find out how the department/university regarded participation in an EIS compared to other activities.)

I52	55	1 yes 2 equal 3 no	Teaching more important than EIS?
I53	56	1 yes 2 equal 3 no	Other research more important than EIS?
I54	57	1 yes 2 equal 3 no	Publishing more important than EIS?
I55	58	1 yes 2 equal 3 no	Securing grants more important than EIS?
I56	59	Others: 1 = indifferent toward working on EIS 2 = Consulting is at least as important as working on EIS (as well as teaching, research, publishing, and grant-getting) 3 = EIS is important as it gets money for students and equipment 4 = EIS is important as it brings in outside money 5 = work on EIS is OK if it doesn't interfere with teaching, etc. 6 = discourages working on EIS	

How did your university regard your participation?

I57	60	1 yes 2 equal 3 no	Teaching more important than EIS?
I58	61	1 yes 2 equal 3 no	Other research more important than EIS?
I59	62	1 yes 2 equal 3 no	Publishing more important than EIS?
I60	63	1 yes 2 equal 3 no	Securing grants more important than EIS?

I61 64 Others: 1 = indifferent toward working on EIS
2 = Consulting is at least as important as working on EIS
3 = EIS is important as it's part of community service
4 = University doesn't like multi-dept. projects
5 = University is most concerned with bureaucratic operations

62 65 How much information did you have about the research design before you agreed to participate in this EIS?

01 none
02 basic design only
03 a little
04 general design
05 moderate amount
06 majority of it
07 all of it

I63 67-68 What features of this research design seemed wrong to you?

01 nothing
02 predetermined result [needed a favorable report, project had begun before EIS]
03 sloppy science, technical methods, untested theories [different creeks treated as the same, inadequate sampling, left out important features]
04 too little time/money
05 didn't know the design
06 the fact that a graduate student was in charge
07 too limited in scope

I64 69 Why did these features of the research design seem wrong to you?

1 nothing seemed wrong
2 results cannot be predetermined
3 science must not be sloppy
4 must put in sufficient time and money
5 didn't know design
6 scope should have been broader

IV. The Scientist While Doing Research

I65 70-71 How did you decide (or whoever decided) which environmental impacts were important enough to investigate? (this question is in reference to the particular EIS interviewee participated in)

01 someone else decided (contractor/supervisor)
02 own professional judgment and experience
03 consulted with others
04 all that was possible with limited time/ money
05 used other statements as model

I66 72 As you assessed environmental impact, did you place more emphasis on 1 short term consequences (5-20 years) or on 2 long term consequences (future generations)? 3 equal emphasis

I67 73-74 (Follow up with: Why?)

01 others (contractor/supervisor) decided
02 contractor only interested in short term
03 data only allowed short term assessment
04 short term is the norm
05 short term is more important
06 these projects will have long term effects
07 long term too difficult/uncertain
08 short term not as significant as long term
09 my field concerned with long term [Note: Arcadia EIS called for a 100-year assessment]
10 both equally important

I68 75 Did you feel responsible for predicting long term consequences?

Here our interest is in how the scientist interpreted his own responsibility. Specifically, did the scientist limit himself to the time frame specified in the contract? For example, if the contract called for an EIS of 20 years, did the scientist go beyond that time frame to predict consequences?

1 went beyone 2 did not go beyond

76 The numberal 1 is punched in every card to identify data card #1

77-79 Subject Identification number (001-999) 001-030 Anne
031-060 Robert
061-090 Robin
091-120 Val

I69 80 1 yes 2 no to I68 above

This next set of data will be data deck #2

I70 1 Did you foresee some "trade offs" (for example, clear air for industrial growth) which would result from the proposed project?
1 yes 2 no

I71 2-3 (if yes, follow with, What trade offs did you foresee?)

01 dirty lake for clear downstream
02 clean air for electrical power
03 land for flood control
04 land for recreation
05 land for lake (fish)
06 terrestrial habitat for aquatic habitats
07 habitats for economic & electrical power
08 land for mining
09 land for pristine areas
10 stream for lake
11 jobs for clean air
12 land for municipal & industrial water supply
13 land for economic development
14 land for electrical power

[Note: Land = archeological sites or cultural heritage, as private property, & for economic profit]

I72 4 (If yes, also follow with: How did this affect the research you did?)

1 = made research more subjective
2 = no effect
3 = made research more thorough

I73 5-6 What responsibility did you feel toward persons who might be helped by the proposed project?

01 no responsibility
02 duty to help more people than harm
03 unbiased presentation of all findings
04 find out what those effected want
05 to preserve things most worthwhile

I74 7-8 What responsibility did you feel toward persons who might be harmed by the proposed project?

01 no responsibility
02 duty to help more people than harm
03 unbiased presentation of all findings
04 find out what those effected want
05 to preserve things most worthwhile

I75 9 Did you foresee <u>desirable</u> consequences following from the completion of the proposed project?
<u>1</u> yes <u>2</u> ? <u>3</u> no

I76 10-11 (If yes, follow with: Why did you think they were desirable?)

01 downstream cleaner, less flooding
02 economic growth
03 cleaner environment
04 recreation
05 increase fish
06 increased power
07 more water
08 preserve heritage indirectly
09 local government said so

12 ∅

I77 13 Did you foresee <u>undesirable</u> consequences following from the completion of the proposed project? <u>1</u> yes <u>2</u> ? <u>3</u> no

I78 14-15 (If yes, follow with: Why did you think they were undesirable?)

01 heated water undesirable
02 eutrophication of the lake
03 accumulation of waste materials
04 inadequate water supply
05 inundate land
06 potential for racial clash
07 create unpotable water
08 costs greater than benefits
09 loss of terrestrial habitat
10 loss of private property
11 unneeded growth
12 air pollution
13 loss of jobs
14 not good for public health and lessen quality of life
15 pollution of the water
16 lost archeological sites
17 land subsidence and erosion
18 relocation of people
19 potential for racial clash at lake
20 loss of unique aesthetically valuable scenery

I79 16 How broad a vicinity should environmental impact research include?

1 immediate area of the project

2 rest of the state

3 neighboring states

4 the nation

5 the world

6 depends on the project

I80 17 Would you be in favor of more of these same projects elsewhere (e.g., the same kind and size of power station with the same environmental impact)? 1 yes; 2 ?; 3 no

I81 18 Had you considered this while you were doing the research? 1 yes 2 ? 3 no

Under what conditions would you have quit working on the EIS?

I83 20 1 yes 2 ? 3 no — If you thought the proposed project would harm more prople than it would help

I84 21 1 yes 2 ? 3 no — If you thought the proposed project would be generally beneficial but illegal

I85 22 1 yes 2 ? 3 no — If you thought the proposed project would be generally harmful even though legally required

I86 23 Others: (blank if no "others" were mentioned)

1 payments stopped
2 none
3 personality conflicts
4 boredom
5 if contractors misrepresented or falsified reports
6 if contractor pressured me to do bad science
7 did quit

7 did quit
8 pressure to compromise professional judgment
9 if integrity was doubted

I87 24 What kinds of environmental impact would you regard as intrinsically wrong? 1 yes 2 no

I88 25-26 (If yes, follow with: What are they?)

01 if the only function of project is economic growth
02 if a biologically worse situation results from the project (long range)
03 the accumulation of more garbage than nature could absorb
04 the loss of human life
05 if there are adverse effects to the human quality of life (health)
06 if damages exceed benefits
07 major long term irreversible consequences
08 radioactive pollution
09 experimental pollution
10 continued pollution where it could be controlled by existing technology
11 kills off a non-human species
12 total environmental destruction
13 where a small minority benefit and the majority pay the cost
14 aesthetic destruction of a fragile area
15 total destruction of irreplaceable resources
16 total destruction of the land so it would be useless afterward
17 eliminating a very unique natural or physical place or living thing

Did you intend through your research to increase (or decrease) the possibilities that the proposed project would be completed (build the dam, process the potash, or build the power generating station)?

I89 27 That is, did you want the project to be completed? 1 yes 2 didn't care 3 wanted project stopped

I90 28 Did you think your participation would make the project more likely to be completed? 1 yes 2 no

I91 29 How did you think your research would affect the final EIS?

1 yes 2 ? 3 no 4 did not make recommendations.

Did you think contractor would follow your recommendations?

I92 30 1 yes 2 ? 3 no 4 did not make recommendations.

Did you think contractor would consider recommendations more from another area (say social impact or air quality)?

I93 31 1 yes 2 ? 3 no

Did you think contractor had intended to complete the project regardless of the research?

I94 32 1 yes 2 ? 3 no

Did you think contractor had intended to complete the project unless the research was quite negative?

I96 34 Have you had the opportunity to check what happened to your research? 1 yes 2 no

I95 33 1 yes 2 ? 3 no

Did you think contractor would misrepresent your research?

I97 35 1 yes 2 ? 3 no 4 no conclusions

Were your conclusions adequately represented in the report sent in to the contractor?

I98 36 1 yes 2 ? 3 no 4 no conclusions

Have you seen the final document for the project (EIS by Army Corps for Arcadia; Executive Summary, New Mexico; Environmental Analysis Report for Sooner Have the document with you.)

V. Post EIS Reflection

(Codes range from 1-7 with 7 being the most agreement)

I99	37	A scientist should be informed of the interpretations other parties place on the data he/she gathered.
I100	38	A scientist should have the opportunity to correct possible misinterpretations placed on the data he/she gathered.
I101	39	The collection and interpretation of data so as to predict specific environmental impacts is within the scope of scientific work.
I102	40	The evaluation of the desirability of specific environmental impacts is within the scope of scientific work.
I103	41	It is more important to increase employment in a given area than it is to conserve the natural resources of the area.
I104	42	It is more important to control flooding in rural regions than it is to preserve family farms and homesteads.
I105	43	It is more important to increase recreational facilities than it is to preserve the cultural integrity of rural communities.
I106	44	It is more important to provide significant economic benefits for new industries than it is to preserve the economic interests of existing residents.
I107	45	It is more important to increase the electrical power generating capacity in a given region than it is to retain land for food production.
I108	46	It is more important to maintain the present material standard of living in our country than it is to meet the biological needs of people in other countries.

I109 47 It is more important to utilize our own natural resources at a lower present cost than it is to utilize the natural resources of other countries at a higher present cost.

I110 48 It is more important to honor individual and corporate property rights than it is to minimize environmental damage.

I111 49 It is more important to maintain current U.S. living standards than to preserve non-renewable resources for future generations.

THE FINAL DOCUMENT STRONGLY SUPPORTED COMPLETING THE PROJECT (building the dam, processing the potash, or building the power station).

I112 50 1 yes 2 ? 3 no 1. Is this conclusion compatible with your research? (Not necessarily just the individual's research but others too)

I113 51 1 yes 2 ? 3 no 2. Do you think the research had any bearing on the contractor's decision to go ahead with the project?

I114 52 1 yes 2 ? 3 no 3. Do you think the contractor selectively used the research to justify doing what he wanted to do?

I115 53 1 yes 2 ? 3 no 4. Did the contractor make any efforts to get you to modify your findings?

I116 54 1 yes 2 ? 3 no 5. Would you participate on an EIS again? (We are interested here in the effect of working on an EIS. Thus if interviewee could not participate because of the job he now has, put the question hypothetically.)

I117 55 1 yes 2 ? 3 no 6. Would you contract with the same contractor again?

I118 56-57 How effective do you think the EIS process is for environmental protection?

01 completely ineffective
02 hardly effective at all
03 not very
04 undecided
05 somewhat effective
06 rather effective
07 completely effective

What would you do if you found out your research had been misrepresented? (If the final document took a position opposite to that indicated by the scientist, what would he do?)

I119 58 _1_ yes _2_ ? _3_ no Protest?

I120 59 (If yes, in what way would scientist protest?)

01 action without a specific plan
02 through professional organizations
03 directly to the public (press, TV)
04 through channels (go to contractor, court, Congress, CEQ)
05 nothing myself

I121 61 Did the interviewee interpret the data? _1_ yes _2_ no

I122 62 Did the subject participate in designing the research and deciding what data to gather (vs. having someone else tell him what data to gather)? _1_ yes _2_ no

76 The numberal 2 is punched in every card to identify card #2

77-79 Subject I.D. number (001-999)

VITA 2

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