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**Perspectives on Public Participation at a Department of  
Energy Nuclear Weapons Facility**

**Case Study:  
Addressing public health risks from radiological  
contamination released by the Fernald Nuclear Weapons  
Facility (Ohio)**

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**October, 2003  
SERI Report #93-003**

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## Overview of Research Project

This paper reports on the results from one case study that was performed as part of a larger research project whose goal was to advance knowledge of how best to involve members of the public in decision-making about contentious environmental and public health issues. The project began with the assumption that members of the public, stakeholder interest groups, and professional experts should be involved in decision-making about environmental and risk policies that are contentious. Hence, our focus is on *how* people should be involved, not *if* they should be involved.

The project was designed to shed light on four main questions.

1. Are there views of what is the most appropriate type of public participation process that are similar regardless of the topic being discussed?
1. How do preferences for different types of outcomes affect people's perceptions of what would be the most appropriate form of public participation?
3. How do elements of the context in which a decision-making process is situated affect people's perceptions of what would be the most appropriate form of public participation?
4. Are individuals' ideas of what is the most appropriate decision-making process shaped by their personal experience, their interest group affiliation, or their motivation to participate in the process?

There is an important need to know more about how best to involve interested and affected parties in environmental decision-making. It is true that the field of public participation is well known for its experienced practitioners and excellent handbooks. It is also true that recently the scholarship on theory of public participation has grown. Theories on public participation have emerged out of management sciences, decision theory, political science, philosophy, communication studies, and small group psychology. A recent National Research Council committee report on risk characterization advanced the idea of conceptualizing public participation processes as an iterative, non-linear combination of analysis and deliberation (National Research Council 1996).

Despite these theoretical developments and wise practitioner reflections there is little systematic research on public participation processes for environmental decision-making. There is no theory of public participation that adequately explains how context matters. Certain handbooks for public participation practitioners do give hints as to what context features planners should pay attention to, but the theory of why and how these features matter is undeveloped. While we know that the same participation model may not yield the exact same outcomes in two different social settings, we do not know why.

To address the four questions guiding this research project we conducted a systematic case comparison of public participation processes in three different policy venues: forest management, watershed planning, and radiological contamination clean-up and health effects protection. For each venue we conducted three case studies to inquire into participants' ideas of what matters in a public participation process. A tenth case study was conducted of a National Park Service planning process. In each case study, we asked about a dozen carefully-chosen individuals to express their viewpoints about what would be the best public participation process features for a particular context. To make sense of their different points of view, we used Q methodology. Q methodology is a way of finding commonalities among many independent and different perspectives on a topic. For each case study Q analysis identified three to five perspectives of what would be the most appropriate public participation process in that case.

In addition, we collected three other kinds of data from each person in the case studies. First, we had them order their preferences for twenty possible outcomes of the participation process. This allowed us to examine the possibility that people prefer different process features for strategic reasons: they think the process will produce the kinds of outcomes they like. Second, we used a survey to collect each individual's assessment of the contextual features of the decision-making process. We presume that these may influence an individual's idea of what is the best public participation process. For example, we asked people to assess the level of trust between the relevant regulatory agency and the stakeholder groups. The survey asked about contextual features that we had identified from other literature and studies as being important. Third, we used another survey instrument to inquire about the respondent's affiliation with interest groups, their motivation for participating, and their experience with public participation processes. Our overarching goal has been to investigate whether any of these factors determined how people think about public participation process.

### *Goals of this Research Project*

This research was funded by the National Science Foundation for the purpose of improving theoretical knowledge about public participation in environmental and risk decision-making. Better understandings of what different people want and expect from public participation processes will be beneficial to both activists and regulatory agencies. One of the key assumptions of this research has been that we must tap the knowledge of people who actually take part in public participation processes as well as tapping the theoretical knowledge. There was no intention that this research serve either "side" of a policy conflict more than the other. Instead, we believe that everyone wins when the participatory process is designed to meet the needs of all parties and is made flexible to deal with emergent changes in context and purpose. Revealing different visions for what is a good participation process enables those involved to talk about these differences and to attempt to find common ground and compromise on what kind of process to conduct. Our goal has not been to minimize or eliminate conflict *per se*. Instead, we seek, broadly, to improve democracy. We feel this will happen by constructing better processes where parties with different needs and concerns and objectives can come together and engage in reasoned discussion and careful analysis.

### *Purpose of this Report*

This case report and the other nine just like it describes the case study, reviews the methodologies used to collect data, reports on the data gathered, and summarizes the findings from our analyses of these data. Other publications will be prepared that address the cross case comparisons and the summary findings from the project as a whole.

### *Disclaimer*

This material is in part based on work supported by the National Science Foundation under grant number 0114784. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect those of the National Science Foundation.

### *Acknowledgments*

We thank the people who agreed to participate in our case study, generously contributing their time to interviews and the Q sort exercise. We would also like to thank Dr. Steve Depoe, of the University of Cincinnati, for his help in understanding the Fernald Health Effects Subcommittee process and identifying people to participate in our study. We greatly appreciate advice on Q methodology provided by Dr. Will Focht of Oklahoma State University.

# Assessing Public Health Risks of Historical Releases of Radionuclides from Fernald

## Introduction

This paper reports on the results from one case study that was performed as part of a larger research project whose goal was to advance knowledge of how best to involve members of the public in decision-making about contentious environmental and public health issues. The project began with the assumption that members of the public, stakeholder interest groups, and professional experts should be involved in decision-making about environmental and risk policies that are contentious. Hence, our focus is on *how* people should be involved, not *if* they should be involved.

We addressed four questions in this case study research. First, we inquired into the variety of perspectives held among participants for a process by asking about their preferences for different process features. Second, we asked how important a variety of potential outcomes were to the participants. Third, we asked how perceptions of the context influenced participants' beliefs about what is a good public participation process. Fourth, we gathered information about each of the people participating in the case study to assess how factors, such as interest group affiliation and years of involvement with the issue, influenced perspectives about process. In this report we present findings from our study of the Fernald Health Effects Subcommittee and its efforts to assess and respond to public health risks from historical releases of contaminants from Fernald. This case study is one of 10 that we completed as part of the full project (see Appendix A for a list of the case studies).

## Background

The Fernald Environmental Management Project (FEMP) is a former nuclear production facility located in a rural, residential area 18 miles northwest of Cincinnati, Ohio. The Fernald site is located in two Townships: Ross and Crosby. A third township, Morgan Township, has also been involved in clean-up related decision-making. The site operated from 1951 until production was suspended in 1988. The main activity of the facility was to produce highly purified uranium metal products (“feed materials”) for US defense programs. In December 1989 the site was added to the U.S. EPA National Priorities List. In 1991 DOE officially ended production and the site was renamed the Fernald Environmental Management Project, or FEMP. It is now one of many sites that is being “cleaned” as part of the DOE’s Environmental Management Program.

Soils, debris, ground water, and surface water in the Fernald vicinity are contaminated with uranium, radon and other radioactive materials. In 1984 the site contractor announced that an accident released uranium dust.<sup>1</sup> At first they denied that any contamination occurred off-site. Subsequent investigations showed that was untrue. This was the first time that the community received such news and the response was anger, disbelief, and a sense of betrayal. Trust and credibility of DOE, Ohio state agencies, and site management were severely eroded. These

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<sup>1</sup> There have been three site contractors: National Lead of Ohio (1951-1986), Westinghouse (1986 - 1992), and Flour Daniels (1992 – present).

feelings were exacerbated when news was released that the wells of several abutters were contaminated – and that the site had been testing the wells secretly for several years prior to the residents’ being informed. The response was a lawsuit brought by local residents against Fernald and the DOE (settled in 1989).

#### *Public health studies at Fernald*

The Centers for Disease Control and Prevention’s National Center for Environmental Health was asked by Congress in 1988 to consider conducting an epidemiologic study of the community surrounding Fernald. The CDC felt that an epidemiologic study would not be possible without first developing information about radiation doses to residents in the surrounding area. In addition to the need for reliable estimates of off-site exposures, the CDC and community also considered whether there were adequate data about plausible health outcomes and availability of demographic and health outcome information.

Subsequently, the Fernald Dosimetry Reconstruction Project was begun in 1990 to estimate off-site radiation exposures during 1951-1988. The NCEH Radiation Studies Branch worked with its contractor, Radiological Assessments Corporation (RAC), to complete the project in 1996 (RAC 1998). Scientific and public reviews were conducted for another two years and the final report was released in Sept. 1998.

The study’s results indicate that most of the estimated dose to the public came from inhalation of radon and radon decay products. These exposures came mainly from the wastes in the K-65 silos. The highest exposures occurred in the 1950 – 1970s. Structural modifications to the silos in 1979 substantially reduced releases of radon and its decay products from the K-65 silos. The primary risk from radon exposure is lung cancer. Other isotopes of uranium and thorium contributed to the exposure of other organs, such as the kidney, bone marrow, bone surfaces, and liver.

There were multiple opportunities for the public to learn about and participate in discussions about the potential of an epidemiologic study to find positive relationships between exposure and outcomes. For example, preliminary estimates were made available – and discussed in a public workshop – by 1993. Even before the study was completed the CDC engaged independent experts and members of the community in discussions about the most appropriate means for following-up public health concerns with further epidemiologic studies.

To further understandings of the public health legacy of contamination from the Fernald facility, the CDC conducted a two-phased Risk Assessment Project. The Risk Assessment Project was intended to provide further information to inform a decision about the feasibility of conducting an epidemiologic study of the community. It was also initiated to help respond to the concerns of residents about their potential health risks from radioactive releases from the FMPC. Phase 1 focused on lung cancer risks from radon and radon daughter exposures (CDC 1998). Phase 2 focused on risk estimates for kidney cancer, female breast cancer, bone cancer, and leukemia (CDC 2000). Risks were estimated for exposures during the operation of the facility to residents living within a 10 km (6.2 miles) radius from the facility during 1951-1988. Risks from exposures after site closure were not estimated in these studies; the Agency for Toxic

Substances and Disease Registry conducted a study of exposures finding that no significant risks to the off-site community were occurring from remaining contamination (ATSDR 2000).

The Phase 1 report, *Estimation of the Impact of the Former Feed Material Production Center (FMPC) in Lung Cancer Mortality in the Surrounding the Community* (CDC 1998) estimated mortality risks for the community and for specific sub-groups (e.g., smokers vs. non-smokers, sex, age). Overall, a median estimate of 85 deaths was calculated, with a 90% confidence range of 25 to 309 lung cancer deaths. The percentage increase in the number of lung cancer deaths over background rates due to FMPC-related exposures were 1-12% with a median value of 3%. The size of the community residing in the study area around FMPC during 1951-1988 was 40,000 to 53,000 people.

The Phase 2 report *Screening Level Estimates of the Lifetime Risk of Developing Kidney Cancer, Female Breast Cancer, Bone Cancer, and Leukemia Resulting from the Maximum Estimated Exposure to Radioactive Materials Released from the Former Feed Materials Production Center (FMPC)* was completed in March, 2000 (CDC 2000). The calculated risks are lifetime risks for hypothetical exposures during the years of FMPC operation. Many conservative assumptions were made to calculate maximum doses, including lifespans of 100 years, all local food products were contaminated (e.g., eggs, milk, vegetables), and all irrigation water and air was contaminated: “it is important to remember when evaluating these estimates that they are based on the unrealistic assumption that everyone who ever resided within an area of the assessment domain received the estimated maximum dose associated with that area” (CDC 2000, pg. 16).

The risk estimates were called “screening levels” because the estimated increase in lifetime cancer risks to the target organs were calculated to a) provide members of the community with a reference point for evaluating their own potential risks associated with FMPC radiation exposure and b) guide further discussions of public health activities, including epidemiological studies, for the community. Based on the results, the CDC did not recommend a more detailed analysis of the cancers studied in the Phase 2 assessment.

#### *The Fernald Health Effects Subcommittee*

At the same time the dose reconstruction study was being completed and reviewed, the CDC’s National Center for Environmental Health set-up the the Fernald Health Effects Subcommittee (FHES) in 1996. The FHES was established as a committee under the Federal Advisory Committee Act. It held 18 meetings between June 1996 and August 2001, when it was formally dissolved. It had work groups with special emphasis on three topics: medical/educational, position papers, and community outreach. In August 2001 the CDC formerly ended the activities of the advisory board, saying that its work was completed. This is a position that was contrary to the views of most community members and advisory board members and was a cause of ill-feelings within the community toward the NCEH. In part this was a result of the lack of clarity about the purposes of the committee.

The FHES played a significant role in the continuing consideration of whether an epidemiological study would be conducted in the community. Based on the findings from the dose reconstruction study and the Phase 1 and Phase 2 risk assessments, the FHES recommended

that the CDC *not* conduct an epidemiological study of lung cancer in the Fernald community. FHES members agreed with CDC staff that the power of the study would be too low to identify effects. When the FHES finally did recommend that such a study *not* be done, it was a position that was very different than the one advocated by many members of the FHES in the beginning who wanted a study to be completed. It is worth noting, however, that the FHES recommendation was not as determinant as might be supposed. According to our interviews with CDC staff they would have opposed the study even if it had been supported by the FHES.

The Subcommittee included 14 members representing a variety of groups, including:

- residents of the nearby communities, including members of the group Fernald Residents for Environment, Safety, and Health;
- current and former workers;
- scientists, including individuals playing key roles in the Fernald Medical Monitoring Program;
- Township Trustees;
- members of the medical community;
- liaisons from the Ohio EPA, Ohio Department of Health, and the county health district,
- staff from the federal health agencies, including the CDC NCEH Radiation Studies Branch, ATSDR, and NIOSH. Several staff usually attended meetings to give presentations and respond to questions from subcommittee members. A Designated Federal Official was from CDC NCEH Radiation Studies Branch (12 meetings from June 1996 – March 1999 and then again after March 2000) and from the National Institute of Occupational Safety and Health (three meetings, March 1999-2000).

While the importance of the FHES was understood by many, its purposes were often a subject of dispute. The lack of clarity had implications for how well its risk communication activities were viewed and caused friction between members of the FHES and agency staff. Agency staff defined its primary purpose narrowly as providing “consensus advice to the agencies on research and public health activities at [Fernald]” (COSMOS 2001b, pg. 2-5). On the other hand, FHES members identified other purposes. As part of an evaluation project conducted by a contractor (COSMOS 2001b, pg. 2-4)<sup>2</sup>, a variety of purposes were expressed by participants:

- identifying, learning, and characterizing health concerns in the community,
- learning about health effects in the community,
- providing advice on research and public health activities,
- representing the public,
- providing outreach and education,
- increasing government credibility,
- advocating for dose reconstruction,
- improving community health,

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<sup>2</sup> In 2001 the Radiation Studies Branch of NCEH received a completed evaluation of Health Effects Subcommittees from a contractor (COSMOS 2001a, 2001b, 2001c). The evaluation of the FHES was based on seven interviews with Fernald community members, an unspecified number of interviews with NCEH, NIOSH, and ATSDR staff, and 10 completed surveys (COSMOS 2001b; the contractor reported 11 returned surveys, but one was returned uncompleted).

- advocating for health monitoring,
- providing agencies with information about the concerns of the community,
- sharing information from the agencies with the workers and from the workers with the agencies, and
- serving as a watchdog for the community against the site and monitor what happens.

## Research Methods

We selected individuals to participate in our study who:

- have been actively involved in the participatory process and
- represented different points of view regarding the participation *process*.

We did not consider -- nor did we care about -- their views on the substantive nature of the policy issue. To help us identify people for our case study research we obtained input from Dr. Steve Depoe who has observed, participated in, and conducted research on issues related to risk management at Fernald (Depoe 1997). He is a Professor of Communication at the University of Cincinnati.

The identified individuals were approached via telephone and introduced to the project and told how they were selected. We described our data collection procedures and what we wanted them to do. We told people we would visit them at a time and place convenient to them and that the entire process would take about one and one-half hours. In this case 10 people participated in our case study research. The list of participants in this case is shown in Table 1.

**Table 1. Participants in the Fernald Case Study.**

- Lisa Crawford (member of FRESH)
- Owen Devine (Radiation Studies Branch, CDC)
- James Farrell (local resident and chair of FHES)
- Robert Hanavan (local resident and member of FHES)
- Keith Nelson (Fernald worker and member of FHES)
- Tom Ontko (Office of Federal Facilities Oversight, Ohio EPA)
- Susan Pinney (Professor of Epidemiology and member of FHES)
- Judith Qualters (Radiation Studies Branch, CDC)
- Susan Verkamp (local resident and chair of FHES)
- Edwa Yocum (member of FRESH and of FHES)

Data were gathered from each person during January – May 2002. We asked each participant to do four tasks:

- 1) complete an exercise to reveal their preferences about process features,
- 1) express their preferences for 20 different statements describing potential outcomes from a process,
- 1) complete a survey in which they assessed the context in which the process was occurring, and
- 1) complete a short survey about their interest group affiliation, motivation for participating, and experience with similar processes.

We asked them to do these tasks as if they were responsible for designing a new process that would start immediately. We did not ask people to evaluate the process that had occurred, although we expected, of course, that their experiences would inform their ideas for a new process. In the following sections we discuss each of these tasks and our findings.

### **Preferences for Process Features**

Our primary interest in this research was to identify the variety of perspectives about what constitutes good process among participants involved in environmental and risk decision-making. To identify and clarify these perspectives we used Q methodology. Q method has a growing history of application in the political and social sciences, and its use in environmental studies is expanding.<sup>3</sup> This method, analysis, and findings are discussed in this section.

#### *Q Method*

In Q methodology, the researchers gain access to various perspectives on a subject – what Q practitioners often call “social discourses” – by having a small number of people with different, but well-formed opinions sort a group of statements according to their personal opinions.

Participants in our case study were handed a set of small cards (about the size of a normal business card). Each card had a statement printed upon it that described a single feature that might be included in the design of a public participation process. The full list of “Q statements” is given in Table 2. We asked the participant to imagine the process was going to start over tomorrow and to sort the cards according to how much importance he or she would give to that statement relative to all the others in the design of the new process.

The statements sorted by the participants were chosen by the research team to represent the fullest possible extent of content relative to the topic.<sup>4</sup> It was essential that these statements apply to each of the ten case studies in the larger research project. For each case, several of the statements were adapted so that references to the relevant decision-making body were

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<sup>3</sup> Key resources on Q methodology include Brown 1980, 1986, 1996; McKeown and Thomas 1988; Stephenson 1953. Excellent resources that document the application of the method include: Dryzek 1996; Focht 1995; Kalof 1998, 2000; McGinnis and Woolley 2000; Normand and Salazar 1998; Pelletier, et al. 1999; Woolley and McGinnis 2000; Woolley, McGinnis, and Herms 1998.

<sup>4</sup> It is important to note that in a Q study the sample is *not* the people who sort the statements; rather, the sample in a Q study is the set of Q statements, the population is the “concourse” of utterances that have been made on the topic, and the completed Q sorts are the variables. This is just the opposite of standard survey techniques.

appropriate to each case. For example, a reference to the US Forest Service in one case was changed to the US Department of Energy in another case.

**Table 2. List of 56 statements used in the Q sort.**

1. Set up a situation that encourages all participants to listen to what others say and to consider it carefully.
1. Use the best available science in the analysis.
1. Establish relationships that promote constructive collaboration among participants.
1. Acknowledge and explore uncertainties.
1. Develop a common language and understanding among participants.
1. Reach out in a number of different ways through different mechanisms to different communities on different issue points, throughout the process.
1. Work to build trust among the different participants during the process.
1. Hold meetings at different times and places so no one is excluded from participating.
1. Participants should be courteous and respectful to one another.
1. Provide financial resources that enable people to participate effectively (e.g., travel, hire experts).
1. Participants should see beyond their individual interests to what is good for the larger community.
1. The process cannot be open to just anyone who wants to participate, participation has to be restricted in some way.
1. Participants should be accountable for what they say, sincere in their promises, and reliable in carrying them out.
1. The process gives recommendations to the CDC who then make the final decisions.
1. Participants should have reasonable expectations about what the CDC are able to do.
1. All important decisions are made according to consensus (including the agenda).
1. Participants should attend meetings regularly and see tasks through to completion.
1. It is clear under what conditions the process will end.
1. Participants should be able to deal with complex technical issues.
1. Every recommendation is justified with evidence.
1. Participants should feel comfortable and safe at the meetings.
1. Consensus is used to decide what rule is used to make decisions (simple majority vote, 2/3 majority vote, etc.)
1. There are clear ground rules that govern how people should interact.
1. The CDC respond in a timely way to all questions, comments, and requests.
1. Pay attention to the physical arrangement of tables and chairs at the meetings.
1. Opportunity can't be an empty shell; there need not only be opportunities to be heard but there also has to be some way for the public to see that the decision makers are listening.
1. Discuss the values underlying people's opinions about the issues.
1. There are mechanisms for communicating to the broader public about what decisions are being considered and made.
1. Validate all information to make certain it is correct.
1. Participants who represent groups check in with their memberships regularly to ensure that they represent their views accurately.
1. Everyone has an equal chance to put their concerns on the agenda.
1. The process improves the participants' skills to participate effectively in processes like this (e.g., problems solving, conflict resolution, communication)
1. The process has to be able to limit topics of discussion in order to avoid quagmires.
1. The process improves participants' understandings.
1. The process requires unbiased and independent facilitation.
1. The process ends up enhancing the trust between the community and CDC.

**Table 2, continued.**

1. The purposes and goals of the process are clear to all involved.
1. The process does not make any pre-existing conflicts worse.
1. All participants have equal access to information.
1. All important stakeholders are taking part in the process.
1. There is full disclosure of information at all times.
1. At the end of the process there is a clear plan for how to implement the final decision.
1. The staff involved is receptive to questions or requests for information from the public.
1. The process makes progress on solving the right problem.
1. Get the right information.
1. The process produces outcomes that are acceptable to me or my organization.
1. The process taps the knowledge and experiences of local people.
1. The process produces outcomes that are acceptable to the CDC.
1. The process needs an effective leader.
1. One outcome of the process is a plan to ensure that the promises made are actually followed through, that organizations are accountable for their promises.
1. There is adequate administrative support (e.g., funding, staffing) for the life of the process.
1. The process is well-timed to the CDC's window of opportunity to act.
1. There is adequate notification of meetings, comment periods, etc.
1. Allow time to re-visit issues and decisions, even if it means extending the timetable.
1. Participants are involved in deciding *what* studies ought to be done.
1. Participants are involved in deciding *how* studies ought to be done.

At the start of the Q sort exercise, the researcher read a “condition of instruction.” This specified the context under which the participant should interpret and react to the Q statements. In this case the condition of instruction was:

*Imagine that a process assessing health effects at the Fernald site is going to begin again. Sort the statements according to what you believe should be the most important to least important ideas guiding the design of the process.*

This condition of instruction was designed to focus the participant's thinking on the topic of public health risk assessment and management specifically. We wanted to draw on the participant's experience with the decision-making and public participation processes to-date and at the same time get his or her ideas of what would be the best way to design a process right now. We wanted to tap into people's present experience and understandings, as opposed to asking people to think about what would have been the best process some years ago.

This is how the Q sort happened. We asked each participant to read all the statements through once or twice. Then we asked them to sort the statements into three piles, the left-hand pile being the less important ideas, the right-most pile being the most important ideas, and the middle pile being in between. The Q sort was further constrained by forcing participants to sort

the cards into a specific pattern. This pattern is shown in Figure 1.<sup>5</sup> Three cards could be placed in the two left-most columns, four in the third column, and so on. The scale was relative, not absolute. In other words, a certain participant may have felt that *all* the statements were important, but he or she still had to differentiate between the *most* and *least* important. Thus, it is important to note that, while the right-most edge contains statements the participant thought were most important, and the left-most edge contained statements considered least important, the middle *does not* contain statements that are viewed as irrelevant or unimportant.

Participants reported the Q sort was innovative, fun, and that it stimulated their thinking. During the Q sort the researcher asked the participant to talk about the sorting and how he or she interpreted the statements. These comments were recorded and used to help interpret the results.

**Figure 1. Layout for Q sort cards.**

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| ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
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Least  
Important

Most  
important

<sup>5</sup> A question has arisen among researchers using Q methodology about whether the pattern into which people are required to sort the Q statements, such as the normal distribution shown in Figure 1, matters to the results that are obtained. The conclusion among researchers of Q is that the use of a normal distribution makes little or no difference to the results of a study. We elected to use the normal distribution because we find it helps people sort the cards and because it enables us to use software that we prefer.

### Q Method Data Analysis

Q sort data were entered into a computer program called MQMethod.<sup>6</sup> This program computes the statistical analysis.<sup>7</sup>

The analysis that is part of Q method reveals both the content of the social discourses present in the group of participants and the extent to which particular individuals believe or subscribe to the different discourses. The assumption is that these social discourses exist partially in the subjectivity of individuals, but they are also a product of social interaction. Rarely will one find an individual whose subjective beliefs completely match the social discourse. In addition, while perspectives are held subjectively, similarities among individual views make it possible to articulate a small number of social discourses on a topic.

We arrive at the meaning of each of the social discourses that emerges from the analysis by using three approaches. First of all, we relied on the statistical analysis achieved by the MQMethod program. This is explained in detail below. Second, we ran an audiotape during the Q sort exercise and recorded the conversation we had with the participant during the sort. We asked the participant to interpret their sort and to explain how he or she interpreted specific Q statements. We had these tapes transcribed and used them to help interpret the statistical output when composing the perspective narratives. Third, we mailed a narrative description of each social discourse to a participant whose sort was most strongly correlated with it. That is, we endeavored to find the participant who was most representative of the perspective represented by the social discourse and then asked him or her to verify its clarity, content, and emphasis.

MQMethod is basically a factor analysis program. A factor analysis is a way of identifying a handful of underlying variables that account for changes among a much larger group of measured variables. In this instance, the 10 Q sorts are the measured variables and the factor analysis reduced them to four variables, which are called “factors.” The program produces factors that are represented as a specific Q sort. The factors identified in the analysis represent “ideal types.” Typically, the analysis reveals that each individual’s beliefs strongly shares features represented in one factor (which represents a social discourse), and has only moderate to little agreement with the others. In some cases, however, an individual’s beliefs may share features of multiple perspectives. The degree to which an individual’s beliefs share features with an “ideal” discourse is represented by a score derived as part of the factor analysis. These scores are called “factor loading scores” and a +1.00 would indicate that participant’s sort exactly matched the factor, a 0 would mean there were no similarities at all, and a –1.00 would indicate that participant’s sort was the exact opposite of the factor sort.

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<sup>6</sup> This freeware program is available through <http://www.qmethod.org>. Readers interested in learning more about Q method will find this website informative.

<sup>7</sup> MQMethod computes a correlation matrix among the Q sorts and performs a factor analysis on the correlation matrix. Any statistical factor analysis requires a certain amount of judgment in determining the factors. We started every analysis using Principle Components Analysis followed by the varimax solution. Theoretically this solution accounts for the most variance in the data. Frequently, we were satisfied with the varimax solution. However, theorists in Q methodology argue that the varimax solution is not necessarily theoretically relevant and that judgmental hand rotation is sometimes needed to find the most appropriate solution. Judgmental hand rotation is extremely time consuming. We employed it only when we felt that the varimax solution missed an important perspective. When we did use judgmental hand rotation, we selected our factors based on three criteria. First, the solution should account for over 50% of the total variance in the data. Second, each factor solution had to account for at least 10% of the total variance. Third, the factor had to be meaningful and theoretically important.

### *Q Method Results*

Four distinct and coherent factors — or what we will continue to call perspectives on public participation process — emerged from the analysis.<sup>8</sup> Each is characterized by a particular rank ordering of the Q statements into the eleven categories from “least important” (–5) to “most important” (+5), as shown in Figure 1, above. A statement ranking +5 strongly defines that perspective while a statement ranking –5 is much less associated with the meaning of that perspective. In other words, the perspectives are defined by the rankings of all the statements relative to each other. Table 3 presents the statement rankings for each of the four perspectives. The end product of the Q study is a set of narrative descriptions of each perspective, which are discussed below.

Table 4 presents the re-ordered factor matrix showing the loading scores on each perspective for each participant who completed the Q sort. The individuals participating in our research have been given aliases to maintain confidentiality. A loading score greater than 0.4165 is statistically significant at the 0.05 level. This means that there is at most a 5% chance of the person loading on that factor being the result of a random event.

Table 4 shows that there are four different perspectives on what would be the appropriate public participation process.<sup>9</sup> Table 5, which presents the correlation coefficients among the factors, indicates that these four perspectives are largely independent. The closest correlation is between perspectives A and D, which are 37% alike.

What is particularly important is that all but one person loaded significantly on only one perspective. The exception is Sasha<sup>10</sup>, who loaded significantly on the first three perspectives. This result suggests that this person has a point of view that is highly unique and it is not captured by any of the four “ideal types” emerging from this solution. It suggests there is another factor solution that might be appropriate.<sup>11</sup> However, when we investigated this possibility, through additional judgmental hand rotation of factors and inclusion of additional factors, we discovered all new solutions that were produced had many more participants confounded on more than one factor, higher inter-factor correlations, and/or less variance explained. Thus, these alternative solutions were not as informative about the differences in preferences among the participants in our study.

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<sup>8</sup> It is important to note that we cannot claim that these are the only perspectives that exist – there may be perspectives that we did not capture because they were not represented by the people we studied. We sought to overcome this potential problem by selecting a diverse group of people to complete the Q sorts, as described above. In addition, we cannot make any claims about the frequency of the perspectives in the larger population of people involved with this case study; this is an inherent limitation of Q methodology.

<sup>9</sup> Recall that the condition of instruction was: *Imagine that a process assessing health effects at the Fernald site is going to begin again. Sort the statements according to what you believe should be the most important to least important ideas guiding the design of the process.* In other words, we are gathering peoples’ ideas of what would be the most appropriate process right now.

<sup>10</sup> To maintain confidentiality we have used aliases for each of the people who participated in our study.

<sup>11</sup> There are, in principle, an infinite number of possible factor solutions. None is “more right” than another in any objective sense. Researchers justify their solution on various grounds. One solution, called the “varimax” solution, is popular. It is the solution that maximizes the variance explained. In other words, it explains more of the variation in the data than does any other solution.

**Table 3.**  
**Ranking of each statement for each perspective.**

| No. | Statement   | Perspective |    |    |    |
|-----|---|-------------|----|----|----|
|     |   | A           | B  | C  | D  |
| 1   | Set up a situation that encourages all participants to listen to what others say and to consider it carefully.  | 1           | 0  | 0  | 2  |
| 2   | Use the best available science in the analysis.   | 2           | 3  | -2 | 2  |
| 3   | Establish relationships that promote constructive collaboration among participants.   | 2           | -3 | -1 | -2 |
| 4   | Acknowledge and explore uncertainties.  | 1           | -1 | 0  | 4  |
| 5   | Develop a common language and understanding among participants.   | 0           | -3 | 2  | -1 |
| 6   | Reach out in a number of different ways through different mechanisms to different communities on different issue points, throughout the process.                                      | 0           | 1  | -5 | 0  |
| 7   | Work to build trust among the different participants during the process.  | 2           | -3 | 2  | -1 |
| 8   | Hold meetings at different times and places so no one is excluded from participating.   | -2          | -2 | -5 | -3 |
| 9   | Participants should be courteous and respectful to one another.   | 3           | -5 | 0  | 0  |
| 10  | Provide financial resources that enable people to participate effectively (e.g., travel, hire experts).   | -1          | 2  | 4  | 1  |
| 11  | Participants should see beyond their individual interests to what is good for the larger community.   | 2           | 1  | 1  | -1 |
| 12  | The process cannot be open to just anyone who wants to participate, participation has to be restricted in some way.   | -3          | -2 | -4 | -5 |
| 13  | Participants should be accountable for what they say, sincere in their promises, and reliable in carrying them out.   | 0           | 5  | -1 | -3 |
| 14  | The process gives recommendations to the CDC who then make the final decisions.   | 5           | -4 | 3  | 1  |
| 15  | Participants should have reasonable expectations about what the CDC are able to do.   | 4           | -2 | 0  | 3  |
| 16  | All important decisions are made according to consensus (including the agenda).   | -4          | -1 | 0  | 5  |
| 17  | Participants should attend meetings regularly and see tasks through to completion.  | 1           | 1  | -2 | 2  |
| 18  | It is clear under what conditions the process will end.   | 5           | -1 | 1  | 1  |
| 19  | Participants should be able to deal with complex technical issues.  | -5          | -5 | -5 | -2 |
| 20  | Every recommendation is justified with evidence.  | -3          | 0  | 2  | 0  |
| 21  | Participants should feel comfortable and safe at the meetings.  | 0           | -2 | 1  | 5  |
| 22  | Consensus is used to decide what rule is used to make decisions (simple majority vote, 2/3 majority vote, etc.)   | 0           | -1 | 5  | 5  |
| 23  | There are clear ground rules that govern how people should interact.  | 3           | 0  | 1  | 1  |
| 24  | The CDC respond in a timely way to all questions, comments, and requests.   | 2           | 4  | 2  | 0  |
| 25  | Pay attention to the physical arrangement of tables and chairs at the meetings.   | -3          | -5 | -3 | -4 |
| 26  | Opportunity can't be an empty shell; there need not only be opportunities to be heard but there also has to be some way for the public to see that the decision makers are listening. | 0           | -1 | 1  | -2 |
| 27  | Discuss the values underlying people's opinions about the issues.   | -5          | -3 | 2  | -4 |
| 28  | There are mechanisms for communicating to the broader public about what decisions are being considered and made.  | 1           | 0  | -2 | -2 |
| 29  | Validate all information to make certain it is correct.   | -2          | 2  | -1 | -1 |
| 30  | Participants who represent groups check in with their memberships regularly to ensure that they represent their views accurately.   | 0           | 0  | -1 | -1 |
| 31  | Everyone has an equal chance to put their concerns on the agenda.   | -2          | 0  | 1  | 2  |
| 32  | The process improves the participants' skills to participate effectively in processes like this (e.g., problems solving, conflict resolution, communication)                          | -4          | 0  | 0  | -2 |
| 33  | The process has to be able to limit topics of discussion in order to avoid quagmires.   | 0           | -2 | -3 | 4  |
| 34  | The process improves participants' understandings.  | 1           | 0  | -1 | -3 |
| 35  | The process requires unbiased and independent facilitation.   | -1          | 0  | -2 | 1  |
| 36  | The process ends up enhancing the trust between the community and CDC.  | -1          | 0  | 5  | 0  |
| 37  | The purposes and goals of the process are clear to all involved.  | 5           | 3  | 5  | 1  |
| 38  | The process does not make any pre-existing conflicts worse.   | -2          | -2 | -4 | -1 |
| 39  | All participants have equal access to information.  | -2          | 1  | 0  | 3  |
| 40  | All important stakeholders are taking part in the process.  | 3           | 1  | -3 | 0  |
| 41  | There is full disclosure of information at all times.   | -5          | 5  | 0  | 0  |

Table 3, continued.

| No. | Statement   | Perspective |    |    |    |
|-----|---|-------------|----|----|----|
|     |   | A           | B  | C  | D  |
| 42  | At the end of the process there is a clear plan for how to implement the final decision.  | 2           | 4  | 0  | 2  |
| 43  | The staff involved is receptive to questions or requests for information from the public.   | 0           | 2  | 2  | 2  |
| 44  | The process makes progress on solving the right problem.  | 1           | 1  | 1  | 0  |
| 45  | Get the right information.  | -1          | 2  | -2 | 3  |
| 46  | The process produces outcomes that are acceptable to me or my organization.   | -3          | -1 | -4 | -5 |
| 47  | The process taps the knowledge and experiences of local people.   | 4           | 3  | -2 | 0  |
| 48  | The process produces outcomes that are acceptable to the CDC.   | -1          | -4 | 3  | -5 |
| 49  | The process needs an effective leader.  | 4           | 2  | 4  | 4  |
| 50  | One outcome of the process is a plan to ensure that the promises made are actually followed through, that organizations are accountable for their promises. | 3           | 4  | -1 | -1 |
| 51  | There is adequate administrative support (e.g., funding, staffing) for the life of the process.   | 1           | 5  | 4  | 0  |
| 52  | The process is well-timed to the CDC's window of opportunity to act.  | -1          | -4 | -3 | 3  |
| 53  | There is adequate notification of meetings, comment periods, etc.   | 0           | 1  | 0  | 1  |
| 54  | Allow time to re-visit issues and decisions, even if it means extending the timetable.  | -2          | -1 | -1 | -4 |
| 55  | Participants are involved in deciding <i>what</i> studies ought to be done.   | -1          | 3  | 3  | -2 |
| 56  | Participants are involved in deciding <i>how</i> studies ought to be done.  | -4          | 2  | 3  | -3 |

Table 4 reveals that the first perspective is strongly held by six of the people in our study. Perspective A accounts for 29% of all the variance; this is the highest of all factors, which means among our small group of participants it is the most widely held view.

Perspective B in Table 4 is shared by three individuals (in addition to Sasha, mentioned above), both with very high loading scores. Sasha loaded more highly on Perspective A, which is why she is listed with that Perspective in Table 4. Michaela and Kai also come close to loading significantly on this factor (0.41 n.s. and 0.34 n.s., respectively),<sup>12</sup> suggesting agreement with some aspects. Sam has a negative loading score (-0.19, n.s.) on this factor, suggesting disagreement with some portions of it.

Perspective C is defined by two individuals, Sarena and Sasha. Sasha loaded more highly on Perspective A, which is why she is listed with that Perspective in Table 4. Josiah and Etta also come close to loading significantly on this factor (0.28 n.s. and 0.32 n.s., respectively), suggesting agreement with some aspects. Kai has a negative loading score (-0.36, n.s.) on this factor, suggesting disagreement with some portions of it.

Perspective D is defined by only one participant (Alice). The fact that some of these perspectives are unique or based on one or two participants is not unexpected, since we intentionally selected people who would have very different points of view. Kai and Etta also helped to define these factors, with positive loadings scores that suggest some agreement with aspects of it (0.34, n.s. and 0.28 n.s., respectively).

<sup>12</sup> n.s. means "not statistically significant at the 0.05 level or better."

**Table 4.**  
**Re-ordered factor matrix of loading scores for participants (aliases used).**

|                      | Loading scores on perspectives |             |             |             |
|----------------------|--------------------------------|-------------|-------------|-------------|
|                      | A                              | B           | C           | D           |
| <i>Perspective A</i> |                                |             |             |             |
| Sam                  | <b>0.79</b>                    | -0.19       | 0.09        | 0.13        |
| Josiah               | <b>0.74</b>                    | -0.03       | 0.28        | 0.21        |
| Michaela             | <b>0.72</b>                    | 0.41        | 0.15        | -0.14       |
| Elle                 | <b>0.73</b>                    | 0.12        | 0.06        | 0.16        |
| Kai                  | <b>0.61</b>                    | 0.34        | -0.36       | 0.34        |
| Sasha                | <b>0.46</b>                    | <b>0.45</b> | <b>0.44</b> | -0.05       |
| <i>Perspective B</i> |                                |             |             |             |
| Kobi                 | 0.06                           | <b>0.87</b> | -0.07       | -0.05       |
| Etta                 | -0.04                          | <b>0.78</b> | 0.32        | 0.28        |
| <i>Perspective C</i> |                                |             |             |             |
| Sarena               | 0.18                           | 0.10        | <b>0.82</b> | 0.15        |
| <i>Perspective D</i> |                                |             |             |             |
| Alice                | 0.23                           | 0.07        | 0.14        | <b>0.89</b> |
| Variance explained   | 29%                            | 19%         | 12%         | 11%         |

**Table 5.**  
**Correlations Between Perspectives.**

| Perspective | A   | B    | C    | D    |
|-------------|-----|------|------|------|
| <b>A</b>    | 1.0 | 0.18 | 0.30 | 0.37 |
| <b>B</b>    |     | 1.0  | 0.21 | 0.14 |
| <b>C</b>    |     |      | 1.0  | 0.22 |
| <b>D</b>    |     |      |      | 1.0  |

In each of the following sections we present the perspective narratives. These describe views the participants in our study have about the most appropriate process they would create if they were responsible for designing a new effort to assess the public health risks from contamination released at the Fernald nuclear weapons facility. Since the narratives are constructed from the Q statements, references to important Q statements are included in the descriptions below.

*Perspective A*

This is a perspective that is very concerned about progress and efficiency. The primary purpose of the process is to give recommendations to the responsible agencies (14). The responsible agencies have final authority for decision-making related to public health activities, including studies.

Efficiency and progress in the process are ensured when the purposes and goals of the process should be clear to all (37), participants have reasonable expectations (15), there is an

effective leader (49), there are clear ground rules that govern interactions (23), and participants are courteous and respectful (9). It is also important that everyone involved understand under what conditions the process will end (18), to ensure that there is no conflict over closure. For the same reasons, it is not important to allow time to revisit issues and decisions (54), that consensus be used for making important decisions (16), or that values underlying people's opinions (27) be a primary topic of discussion.

To ensure that recommendations are credible and acceptable, the process needs to ensure that all important stakeholders are taking part (40). If key stakeholders are missing decisions may be contested. This is also one of the rationales for the importance of ensuring that the knowledge and experiences of local people are tapped (47). A second rationale is that the process creates an opportunity for the responsible agency to access information important to quality assessment of public health risks that might otherwise not be available.

In the process envisioned here, the agencies are primarily responsible for conducting technical studies of public health risks and ensuring that they are of high scientific quality. Consequently, the participants in the process do not need to focus on validation of information to ensure it is correct (29), ensure that recommendations are justified with evidence (20), or be involved in how to do studies (56). Similarly, there is no need to ensure full disclosure of information at all times (41) or that all participants have equal access to information (39). While these are understood as the responsibilities of the agencies, an efficient process can only be achieved if the stakeholders have trust in the agencies and with each other (7, 36). As noted above the responsible agencies recognize that their studies can be improved by tapping the knowledge and experiences of local people, such as exposure pathways that might otherwise remain unknown (47).

### *Perspective B*

Those who believe in this perspective are very concerned with access and responsible participation. Because of past experiences with an inefficient and ineffective process this perspective is also concerned with having clear purposes and goals (37) and a clear process for implementation (42). The primary interest is that the process meet the needs of the affected community. It is not a process that is oriented toward the needs of the CDC; giving recommendations to the responsible agencies (14), producing outcomes acceptable to the responsible agencies (48), and timing the process to the agencies' needs (52) are not important.

Participants should have full access to information at all times (41); this statement was ranked highest in this perspective and *lowest* in Factor A. To ensure that useful information is obtained, the process should tap the knowledge and experiences of local people (47), use the best available science in analysis (2), validate information to ensure it is correct (29), get the right information (45), and participants should be involved in deciding what studies to do and how to do them (55, 56). In addition, the responsible agencies should provide financial resources to enable more effective participation by members of the public (10).

Participants in the process, including the CDC, should be responsible to others and the process. Of high importance to this perspective is that adequate administrative support for the process should be provided (51) and the CDC should respond in a timely way to requests for

information, etc. (24). An outcome should be a plan to ensure that promises are kept (50). All participants should be accountable for what they say and do (13); no other perspectives ranked this statement as important.

Being responsible does *not* mean having reasonable expectations. Furthermore, there is suspicion of a process that focuses on building trust (7), promoting courteous and respectful behaviors (9), or promoting relationships that promote constructive collaboration (3). Such demands can be used to stifle the concerns of stakeholders and avoid discussion of controversial topics (33).

### *Perspective C*

Those holding this view about the requirements for a good process to assess the public health risks arising from operations at the Fernald nuclear weapons facility place important emphasis on the roles and responsibilities of participants. In this process there should be close collaboration among agency staff from CDC and members of the community. In this perspective, close collaboration includes involvement in technical aspects of health studies; through close involvement with the agencies it is more likely that the public health concerns of the community will be explicitly addressed.

Close collaboration with the agencies' staff requires that the process pay attention to the quality of relationships and leadership. There is a need to obtain consensus agreement about decision rules (22) and enhance trust between the community and responsible agencies (36) and among the participants (7). Those subscribing to this perspective believe that discussing values underlying people's opinions (27) will help to generate more trust and close cooperation. Trust and cooperation are also needed so that agency staff can obtain important information from the affected community (e.g., details of health status).

The close cooperation desired in this perspective is related to understanding the public health risks faced by the community nearby the Fernald facility. Ranked highly in this perspective are that participants should be involved in deciding what studies to do (55) and be able to make recommendations about how members of the community may help in gathering information. To enable participation financial resources should be provided to participants, for example, for travel expenses, consultancy fees, and hiring independent experts (10); no other perspective ranked this feature as highly important. It is not enough to rely on the best available science to inform decision-making in this process; rather a focus should be on *improving* the currently inadequate scientific understandings of health risks from Fernald. It is important that recommendations be justified with strong evidence, including sound technical analysis (20).

Although this perspective adopts a concern for the community, it believes that the best way to address the needs of the community is by working closely with the responsible agencies. Those holding this perspective rank highly the need for giving recommendations to the responsible agencies (14) and producing outcomes acceptable to the responsible agencies (48); in this way it differs fundamentally from Factor B. There is a belief by those subscribing to this perspective that with early and meaningful involvement from the beginning, community participants can become educated about the issues and it is more likely that outcomes acceptable to the responsible agencies will also be acceptable to the participants.

In combination with the belief that it is possible to get what one wants by working with the responsible agencies, there is little support for avoiding controversy, because then important concerns of the community may be ignored. For example, the process should not limit topics of discussion to avoid quagmires (33) or worry about making pre-existing conflicts worse (38). Still, the purposes and goals of the process should be clear to all (37). Effective leadership (49), combined with adequate administrative support (51) are important to ensuring that the process can achieve its goals. Administrative support should include financial resources to complete health studies in a timely manner and to reimburse participants for expenses. Adequate resources must also be provided to prevent the process and studies from being held hostage to budget cuts.

#### *Perspective D*

According to this perspective, a good process promotes discussion of the health risks posed by contamination from Fernald, including their uncertainties and how to best address their public health consequences. According to Alice, “if people think they have been allowed to give their opinions and that their view point is being given a fair hearing then they will be more likely to agree with the final decision, even if it disagrees with their outcome preferences.”

Those holding this perspective believe it is very important to acknowledge and explore uncertainties (4); this statement was ranked higher in this perspective than any of the others. By acknowledging that understandings of risks are uncertain, the process must attend to making decisions without full understandings. Science by itself is inadequate for making public health decisions where uncertainties are large. Thus, there is a need to reach agreements and make decisions consensually (16, 22).

Furthermore, the process should endeavor to create an atmosphere where participants can discuss technically difficult and emotionally laden issues. To accomplish this goal participants should feel safe and comfortable (21), controversial topics should be avoided (33), an effective leader should guide the process (49), and listening should be encouraged (1).

The concern in this perspective about technical information is primarily related to access. All participants should have equal access to information (39). A secondary concern is for the quality of information (45, 2). An underlying assumption is that people participating in the process are capable of achieving a high level of understanding of complicated technical issues. The level of understanding necessary for them to advise the federal agencies, moreover, can be achieved quickly. On the other hand, there is no interest in discussion of values underlying people’s opinions (27), even if it could help people understand preferences in the face of high uncertainties.

Among those subscribing to this perspective there is a concern for the capabilities of the responsible agencies; the process should be well-timed to their ability to act (52). Deliberations should not be allowed to endlessly cycle around by re-visiting issues and decisions (54), a tendency that can be exacerbated when uncertainties are high. Toward this end, it is also important that participants have reasonable expectations about what the responsible agencies can accomplish (15), within their missions and with the information that is available.

While there is a desire to achieve outcomes that are timely, it is not important to those subscribing to this perspective that anyone's needs in particular be met. The lowest ranked statements in this perspective are that the process produces outcomes acceptable to the responsible agencies (48) or to one's own organization (46).

### *Comparison of Perspectives*

There are many similarities and differences among these perspectives. Here we will highlight several.

There are two main areas of agreement. First, none of the perspectives places much emphasis on reaching out broadly to the community about the process or issues. For example, three statements received relatively low emphasis from each perspective:

- reach out in a number of different ways through different mechanisms to different communities on different issue points, throughout the process (6),
- there are mechanisms for communicating to the broader public about what decisions are being considered and made (28),
- participants who represent groups check in with their memberships regularly to ensure that they represent their views accurately (30).

Second, there is much emphasis within these perspectives for a need for clarity. The need for purposes and goals to be clear was important in three of the perspectives (37; A, B, C). All perspectives placed emphasis on the need for effective leadership (49). Such views may be traceable back to perceptions that the clarity of the prior process was lacking, as evidenced by the evaluation conducted by COSMOS (2001b) and responses to our survey (see below).

Third, there is little desire to discuss values among three of the perspectives (A, B, D) and only moderate support in Perspective C. The perspectives mainly see the key issues as requiring analysis and technical deliberation. At the same time, the relative importance of information (i.e., quality, sources, sharing) varies among the perspectives.

There are also areas of divergence among the perspectives. First, the perspectives represent divergent views about the control of the agencies in the process. In Perspectives A and C it is important that the CDC retain authority for making final decisions (14), but it is much less important in Perspective B. This difference is marked in Perspective A where it is also important that participants have reasonable expectations about what the agencies can do (15), consensus should not be used (16), and there is little support for sharing information fully (41).

Second, while there is no support for restricting participation, for example, to those that are knowledgeable (19; see also statement 8), there is not equal agreement on the need to include all important stakeholders (40).

Third, there are important underlying differences about what is to be achieved by the process. Those subscribing to Perspective C feel that CDC has the power/mission to address the problems. They want to give the agencies recommendations while at the same time working very closely with them. Those holding Perspective A want the agency to receive

recommendations but they also have a more narrow vision of the purpose of the process and the agencies' missions. Those subscribing to Perspective B do not see the CDC as being able to address all the problems they want addressed. Other responsible parties will need to be tapped.

### **Preferences for Outcomes**

Because previous research has suggested that some people are strategic about which process features they prefer – they prefer processes that they think will produce specific end goals – we asked people to express their preferences for twenty different outcomes. In this section we describe the method by which this was accomplished and our findings.

#### *Method*

Twenty outcomes were written as statements on individual cards similar to those used for the Q sort (Table 6). They were selected by the research team based on data and experience in other studies.

The potential outcomes that can result from an environmental decision-making process can be of two general types. First, outcomes can be related to the building of capacity. Such outcomes include developing skills and knowledge, building relationships, and bringing new resources to the community. These types of outcomes are exemplified by outcomes 1 – 12 in Table 6. Second, outcomes can be related to substantive policy outcomes. Such outcomes include clear outcomes, a clear plan for implementation, equity in outcome distribution, and building support for outcomes. These types of outcomes are exemplified by outcomes 13-20 in Table 6.

After the Q sort was completed, we asked the participant to sort these outcome cards into three piles, where the right-most pile would be the outcomes they strongly preferred, and the middle and left-most piles were less preferred. Then we asked the person to choose from the right-most pile the three outcomes that they most preferred. This process resulted in four piles of cards, ranked from most preferred to least (or not) preferred.

#### *Outcome Ranking Results*

The outcome data were entered into an excel spreadsheet. As part of this case study report we did not conduct any further analyses of these data because the number of study participants is small.<sup>13</sup>

Table 7 shows the importance given to each of the potential outcomes by the ten respondents. Each outcome card was placed by a respondent in one of four groups. The Table shows how often a card was placed in each group.

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<sup>13</sup> These data are being used for further statistical analyses as part of our cross-case comparisons that will be described in a future report.

**Table 6. List of Outcome Statements**

1. The process improves the participants' skills to take part effectively in processes like this (e.g., problems solving, conflict resolution, communication)
2. The process improves participants' understandings of the issues.
3. The process improves participants' understandings of others' beliefs, values, and perspectives.
4. The process enhances trust between the community and the CDC.
5. The process enhances trust among different parties/stakeholders in the community.
6. The process develops access to networks that allow new resources to be brought to the community (e.g., financial, technical).
7. The process promotes a regional sense of place.
8. The process improves people's ability to work together better.
9. The process strengthens democracy and rebuilds people's faith in government.
10. The process does not make any pre-existing conflicts worse.
11. The process builds the confidence and self-esteem of the participants.
12. The process helps create new and lasting interest groups that can continue to work on the issues.
13. The process results in clear outcomes.
14. There is a clear plan for how to implement the outcomes.
15. Costs and benefits of the outcomes are distributed in an equitable way.
16. The outcomes are personally desirable to me or my organization.
17. The outcomes satisfy the CDC.
18. The outcomes have broad-based support within the community.
19. Participants feel a sense of ownership in the outcomes of the process.
20. One outcome of the process is a plan to ensure that the promises made are actually followed through, that organizations are accountable for their promises.

The results show that participants in our study have little consensus about which outcomes are preferred. At the same time they were in the main concerned with substantive policy outcomes more than they were with capacity building outcomes. The most highly ranked statements were:

- “the process results in clear outcomes” (#13) and
- “there is a clear plan for how to implement the outcomes” (#14).

They also gave support for outcomes that ensured that:

- “participants feel a sense of ownership in the outcomes of the process” (#19) and
- “one outcome of the process is a plan to ensure that the promises made are actually followed through, that organizations are accountable for their promises” (#20).

The capacity building related outcome that appeared to be most important to these respondents was that “the process enhances trust between the community and the CDC” (#4). Six of the capacity-building outcomes had either no one or one person rank them within the two most important piles categories, suggesting these were not critically important:

- “the process improves the participants’ skills to take part effectively in processes like this (e.g., problems solving, conflict resolution, communication)” (#1),
- “the process improves participants’ understandings of others’ beliefs, values, and perspectives” (#3),
- “the process promotes a regional sense of place” (#7),
- “the process improves people’s ability to work together better” (#8),
- “the process does not make any pre-existing conflicts worse” (10), and
- “the process builds the confidence and self-esteem of the participants” (#11).

One of the substantive policy outcomes received no ranking in the highest importance pile (“the outcomes are personally desirable to me or my organization,” #16).

The lack of emphasis on capacity-building may have arisen in our study because our study occurred after several years of prior deliberations, analysis, and decision-making on public health assessments about radiological releases from Fernald according to some of our interviewees. Building skills, developing understandings, improving relationships, and other capacity-related outcomes were emphasized more strongly during these earlier years.

**Table 7.**  
**Ratings of outcome statements**

| <b>Outcome</b>  | <b>Group 1<br/>(lowest)</b> | <b>Group 2</b> | <b>Group 3</b> | <b>Group 4<br/>(highest)</b> |
|---|-----------------------------|----------------|----------------|------------------------------|
| <b><i>Capacity Building Outcomes</i></b>  |                             |                |                |                              |
| 1. The process improves the participants' skills to take part effectively in processes like this (e.g., problems solving, conflict resolution, communication)   | 5                           | 5              | 0              | 0                            |
| 2. The process improves participants' understandings of the issues.   | 0                           | 6              | 2              | 2                            |
| 3. The process improves participants' understandings of others' beliefs, values, and perspectives.  | 4                           | 5              | 0              | 1                            |
| 4. The process enhances trust between the community and the CDC.  | 1                           | 3              | 3              | 3                            |
| 5. The process enhances trust among different parties/stakeholders in the community.  | 0                           | 6              | 2              | 2                            |
| 6. The process develops access to networks that allow new resources to be brought to the community (e.g., financial, technical).                                | 1                           | 4              | 4              | 1                            |
| 7. The process promotes a regional sense of place.  | 4                           | 5              | 1              | 0                            |
| 8. The process improves people's ability to work together better.   | 4                           | 5              | 1              | 0                            |
| 9. The process strengthens democracy and rebuilds people's faith in government.   | 4                           | 4              | 1              | 1                            |
| 10. The process does not make any pre-existing conflicts worse.   | 4                           | 5              | 1              | 0                            |
| 11. The process builds the confidence and self-esteem of the participants.  | 8                           | 2              | 0              | 0                            |
| 12. The process helps create new and lasting interest groups that can continue to work on the issues.   | 1                           | 7              | 2              | 0                            |
| <b><i>Substantive Policy Outcomes</i></b>   |                             |                |                |                              |
| 13. The process results in clear outcomes.  | 0                           | 2              | 1              | 7                            |
| 14. There is a clear plan for how to implement the outcomes.  | 1                           | 1              | 3              | 5                            |
| 15. Costs and benefits of the outcomes are distributed in an equitable way.   | 4                           | 4              | 1              | 1                            |
| 16. The outcomes are personally desirable to me or my organization.   | 7                           | 2              | 1              | 0                            |
| 17. The outcomes satisfy the CDC.   | 4                           | 4              | 1              | 1                            |
| 18. The outcomes have broad-based support within the community.   | 1                           | 4              | 4              | 1                            |
| 19. Participants feel a sense of ownership in the outcomes of the process.  | 0                           | 2              | 5              | 3                            |
| 20. One outcome of the process is a plan to ensure that the promises made are actually followed through, that organizations are accountable for their promises. | 0                           | 3              | 4              | 3                            |

## Surveys

Participants were asked to complete two surveys. Copies of the surveys are in Appendix B.

The first survey included questions that asked the person to document their perception of the present conditions in which the public participation process existed. For example, people were asked to assess on a scale from low (0) to high (+4) the communication and conflict resolution skills that stakeholders in the community have at the present moment.

The second survey included five questions which inquired into the affiliation the individual had with interest groups associated with the controversy, his or her motivations for participating, and his or her experience with similar public participation processes.

### *Contextual Variables*

The first survey included 32 questions that asked the person to document their perception of the present conditions in which the public participation process existed. The instrument included in Appendix B provides information about the responses we received as well. The number of times a statement was rated along the scale of low (0) to high (+4) is shown in the appropriate cells. Because of the small number of respondents, and our commitment to protect confidentiality, we will discuss the responses in general terms.

The results shown in Appendix B reveal that there are often disagreements about how individuals assessed contextual conditions. This is rather remarkable, given that they have been working together for years. One way to examine the degree of agreement or disagreement among those participating in our study is to compute the maximum difference in rankings that were given for each of the questions. Answers were spread across five columns (thus, the maximum difference can be 4). We looked to see which columns were occupied with a response.

For seven of the 32 questions there was a maximum difference of four between the lowest and highest rankings, meaning that there were assessments of low (0) through high (+4) given. For 16 of the questions there is a maximum difference of three between the lowest and highest rankings. Only for one question was there a difference of one (#31).

For many of these questions there is general agreement on rankings for how people assess the contextual feature. For example, there is a strong feeling that the issue is important to the regional population (#16) and that there is a sense of urgency to “reach closure” (#32). In addition, there is general agreement that the key stakeholders are well-organized with clear leadership (#29) that they are familiar with the issues (#12), and that they have little experience working with the responsible agencies (CDC; #18). Most felt that the resources available for the agencies to run a good public participation process were inadequate (#6), there are a number of well-established interest groups in the area (#30), and there are a number of places where meetings could be held that participants will feel are safe (neutral) and accessible (#31).

On the other hand, there are some features of the context for which there are divergent perceptions, with a relatively large fraction of those responding with ratings of high and others responding with ratings of low. Many of these have to do with the experiences, relationships,

and perceived commitments of the responsible agencies. For example, there is a split among the perceptions about the level of trust between the interest groups and the CDC (#4), clarity of the mandate for the process (#26), and support from local population for the process (#15). There are divergent views among those participating in our study about the level of support from within the agencies for the process (#2), political pressure on the CDC to really involve and listen to the local stakeholder groups (#1), previous experience that the CDC has had with public participation (#3), and the level of importance of this issue to the regional population (#16). Finally, viewpoints are diverse regarding whether there is a commitment of the CDC to hearing all points of view (#7) and seeing the process through to its end (#8).

We conclude from these results that we cannot take for granted that people will have similar perceptions about contextual conditions (such as trust, commitment interest groups, etc.). Just looking at these data, we see that people who have been active in the Fernald Health Effects Subcommittee for some time still disagree about some important issues.

Furthermore, we are able to make a few observations about how the context is viewed among those who subscribe to the four different perspectives about the process, as discussed above.<sup>14</sup> For example, there is a stronger perception about the commitment of the CDC to hearing all points of view (#7) from those who are associated with Perspective A. Those subscribing to Perspective B see this commitment as much weaker. Those subscribing to Perspective A are also among those who feel more strongly that there is support from the political leadership for this process. On the other hand, those subscribing to Perspective A tend to feel that stakeholders' skills at problem solving, conflict resolution, and communication are weaker than those who subscribe to Perspective B.

### *Individual Variables*

The second survey was used to gather information about each person's interest group affiliation, his or her motivations for participating, and his or her experience with similar public participation processes.

The responses from the ten individuals reveal that most were interested in both local and national issues (8 of 10; as opposed to either local or national). They were also affiliated with a variety of interest groups (which is one of the reasons we chose them to participate in this case study). Two were members of the local community group Fernald Residents for Environment, Safety, and Health (FRESH), two were staff of the CDC's Radiation Studies Branch, one with a state regulatory agency. Others were local residents and university-based researchers. Two of the participants in our study had served as chair of the Fernald Health Effects Subcommittee.

Table 8 shows how the individuals described their motivations for participating in efforts to characterize and address public health risks from historical contamination from Fernald. In the survey, respondents were asked to assign a "1" for their most important motivating factor and a "2" for their second most important motivating factor. In this Table we have counted the number of times a factor was selected by a respondent, whether or not it was identified as a "1" or "2."

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<sup>14</sup> The data on which these findings are based are not presented here. Because of the small sample size these data would reveal people's identities. In our analysis of all ten case studies this analysis is done statistically. Those results are not presented in this report.

The results illustrate that protection of health was the most salient factor motivating people (10 times), as would be expected in a case that addresses health effects of radiological and chemical contamination from a Department of Energy nuclear weapons facility. A sense of civic duty was selected four times. Three people said that they participated because it was a job responsibility. One person said that protecting ecological systems, improving social or environmental justice, and finding answers to why so many illnesses have occurred in the area (“other”). No one selected economic or quality of life reasons as an important motivation to participate.

**Table 8.**  
**Number of people selecting factors that explain their motives**  
**for being involved in this process.**

| <b>Reason for participation</b>  | <b>Number of times selected</b> |
|--|---------------------------------|
| Protect the health of myself and/or my family                          | 3                               |
| Protect the health of others (e.g., community, vulnerable populations) | 7                               |
| Economic effects to others (e.g., community, region)                   | 0                               |
| Economic effects to myself and/or family                               | 0                               |
| Improve the quality of life (e.g., recreational opportunities)         | 0                               |
| Protect ecological systems (conservation or preservation)              | 1                               |
| Sense of civic duty  | 4                               |
| It’s my job  | 3                               |
| Improve social or environmental justice                                | 1                               |
| Other  | 1                               |

**Summary**

This paper reports on the results from a case study that was performed as part of a larger research project whose goal was to advance knowledge of how best to involve members of the public in decision-making about contentious environmental and public health issues. We addressed four questions in this case study research having to do with people’s preferences for process features and outcomes, and how these are linked to their perceptions of the context, and individual factors, such as interest group affiliation and years of involvement with the issue. In this report we present our findings from our study of the Fernald Health Effects Subcommittee and its efforts to assess and respond to public health risks from historical releases of contaminants from Fernald.

Our analysis revealed four distinct preferences for process design among the 10 people who participated in our case study research. Perspective A is mainly concerned with progress and efficiency in efforts to address public health risks from the Fernald facility. This was the most widely shared perspective among our participants. However, four did not express any significant support for this viewpoint. Perspective B emphasizes access to the process and to information

and the commitment of the sponsoring agency. Those holding Perspective C emphasize the roles and responsibilities of participants; there should be close collaboration among agency staff from CDC and members of the community because this makes it more likely that the public health concerns of the community will be explicitly addressed. According to Perspective D a good process promotes discussion of the health risks posed by contamination from Fernald, including their uncertainties and how to best address their public health consequences. Because of inherent uncertainties, science alone is inadequate to make public health decisions. Hence, there is strong support for a consensus based, deliberative, and participatory process.

While people involved with assessing health risks from Fernald hold different ideas about what is a good process, there is general agreement about the types of outcomes that a process should endeavor to produce. Among those who participated in our study there was much more emphasis on substantive policy outcomes than capacity building outcomes. Preferences for process and for outcomes arise in part from people's perceptions of the context in which the effort is situated and who is participating. Although the sample in this case study is small (10 people), some suggestive trends were apparent in our results.

This report discusses one case study out of ten in our full project. The limited number of people in this case study make it impossible for us to draw any significant conclusions about the relationship between people's preferences for public participation process, and their preferred outcomes, personal beliefs and motivations, and personal assessment of the contextual conditions. What this case study does reveal is that even among a small group of regular and experienced planners and participants there can be vast differences in all of these areas. One implication of this finding is that planners and participants in processes like this should engage in on-going discussions about process preferences and assessments of context and outcome preferences. Our final report from this research project will include a statistical analysis among these types of variables for 117 participants in our ten case studies. From these results we expect to be able to make specific recommendations for improving public participation.

## References

- ATSDR 2000. *Feed Materials Production Center (USDOE) Public Health Assessment*. CERCLIS NO. OH6890008976. Draft Report. Atlanta, GA: Division of Health Assessment and Consultation, ATSDR.
- CDC 1998. *Estimation of the Impact of the Former Feed Material Production Center (FMPC) in Lung Cancer Mortality in the Surrounding the Community*. Atlanta, GA: Radiation Studies Branch, NCEH, CDC.
- CDC 2000. *Screening Level estimates of the Lifetime Risk of Developing Kidney Cancer, Female Breast Cancer, Bone Cancer, and Leukemia Resulting from the Maximum Estimated Exposure to Radioactive Materials Released from the Former Feed Materials Production Center (FMPC)*. Atlanta, GA: Radiation Studies Branch, NCEH, CDC.
- COSMOS 2001a. *Evaluation of the Health Effects Subcommittee Advisory Process. Executive Summary*. Task Order #9, Contract No. 282-98-0027. Bethesda, MD: COSMOS Corporation.
- COSMOS 2001b. *Evaluation of the Health Effects Subcommittee Advisory Process. Volume 1, Final Report*. Task Order #9, Contract No. 282-98-0027. Bethesda, MD: COSMOS Corporation.
- COSMOS 2001c. *Evaluation of the Health Effects Subcommittee Advisory Process. Volume 2, Final Report*. Task Order #9, Contract No. 282-98-0027. Bethesda, MD: COSMOS Corporation.
- Brown S. R. 1980. *Political subjectivity*. New Haven: Yale University Press.
- Brown, S. 1986. Q Technique and method: Principles and procedures. In W.D. Berry and M.S. Lewis-Beck (eds.) *New tools for social scientists*. Thousand Oaks, CA: Sage.
- Brown, S. 1996. Q Methodology and qualitative research. *Qualitative health research*. 6(4): 561-567. <http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod/srbqhe.htm>
- Depoe, S. 1997. Public involvement, civic discovery, and the formation of environmental policy: A comparative analysis of the Fernald Citizens Task Force and the Fernald Health Effects Subcommittee. In S. L. Senach (ed.) *Proceedings of the 4th Biennial Conference on Communication and Environment*, pg. 244-253. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Dryzek, D. 1996. *Democracy in capitalist times*. NY: Oxford.
- Focht, W. J. 1995. *A heuristic political inquiry into NIMBY conflict: Exploring solutions to gridlock*. Unpublished Ph.D. dissertation. Oklahoma: Oklahoma State University.

- Kalof, L. 1998. Understanding the social construction of environmental concern, *Human Ecology Review* 4(2) 101-105.
- Kalof, L. 2000. The Multi-Layered Discourses of Animal Concern. In Helen Addams and John Stroop (eds.) *Social Discourse and Environmental Policy*. London: Edward Elgar Publishers.
- McGinnis, M. and Woolley, J. 2000. Changing California: From Wastesheds to Healthy Watersheds. Report. Center for Coastal Studies: Santa Barbara, CA. Available at: [www.msi.ucsb.edu/mslinks/OCPC/OCPCtexts/watersh.htm](http://www.msi.ucsb.edu/mslinks/OCPC/OCPCtexts/watersh.htm)
- McKeown, B. and Thomas, D. 1988. *Q Methodology*. Sage University Paper Series on Quantitative Applications in the Social Sciences 07-066. Beverly Hills, CA: Sage.
- National Research Council 1996. *Understanding risk: Informing decisions in a democratic society*. Washington, DC: National Academy Press.
- Normand, V. and Salazar, D. 1998. Assessing the meaning of ecosystem management in the North Cascades. In D.L. Soden, B. Lamb, and J. Tennert (eds.), *Ecosystems Management: A Social Science Perspective*, pg. 105-127. Dubuque Iowa: Kendall/Hunt Publishing.
- Pelletier, D., Kraak, V., McCullum, C., Uusitalo, U., and Rich, R., 1999. The shaping of collective values through deliberative democracy: An empirical study from New York's North Country, *Policy Sciences* 32(2):103-131.
- Radiological Assessments Corporation (RAC) 1998. *Task 6: Radiation doses and risk to residents from FMPC operations from 1951-1988*. Volumes 1 and 2 (Final Report). Neeses, SC: RAC.
- Stephenson, W. 1953. *The study of behavior*. Chicago: University of Chicago Press.
- Woolley, J. and McGinnis, M, 2000. The conflicting discourses of restoration, *Society and Natural Resources* 13:339-357.
- Woolley, J, McGinnis, M, and Herms, W. 1998. Survey methodologies for the study of ecosystem restoration and management: The importance of Q-Methodology. In Kate Snow (ed.), *Critical methodologies for the study of ecosystem health*. Ann Arbor, MI: Sleeping Bear Press.

## Appendix A: Case Studies in Research Project

1. Forest management in the Finger Lakes National Forest (NY). A process begun in 1998 to bring together citizens and stakeholders to identify issues for consideration in a revision of the forest management plan and also to resolve conflicts about trail use, land use management, and habitat management.
2. Forest management in the Applegate region (OR). An on-going project, begun in the early 1990's, to address forest planning issues in the Applegate region of southern Oregon is based within the Applegate Partnership. It has included a rich diversity of public participation opportunities.
3. Forest management in the greater Flagstaff region (AZ). An on-going effort of diverse stakeholders to address forest management issues in the Flagstaff region, including wildfire planning, is centered within the Greater Flagstaff Forests Partnership. It was established under a cooperative agreement with the US Forest Service. An Advisory Council provides recommendations to the Forest Service and it plans and assesses field experiments and technical studies to inform decision-making.
4. Morro Bay National Estuary Program (CA). Located near San Louis Obispo, this project is funded by the EPA National Estuary Program. It is a consensus-based approach that draws on citizens as well as stakeholder groups to participate in drawing up a management plan for the estuary.
5. Dungeness River Management (WA). A Dungeness River Management Team, established by the Clallam County Board of Commissioners and the Jamestown S'Klallam Tribal Council, has addressed a variety of water quality and water quantity issues arising from this river located in the Olympic Peninsula. The team includes participation from diverse stakeholders and state, county, local, and Tribal governments.
6. Raritan Basin Watershed Management Project (NJ). A long-term effort sponsored by the EPA to address non-point source pollution. Diverse participation has included local and state officials, community members, river protection committees.
7. Setting standards for clean-up of radionuclides in soils at Rocky Flats (CO). Various mechanisms have been used to provide input to the Department of Energy about the setting of "soil action levels" for clean-up of soils contaminated with plutonium. One process involves a Site Specific Advisory Board. A second is focused on providing input from local governments.

8. Assessing public health risks from radiological contamination at Fernald (OH). Fernald had one of four subcommittees established by the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry to provide advice about public and worker health related studies and activities around nuclear weapons facilities. This process has engaged local citizens in complex deliberations over the design and conduct of environmental health studies, including analysis of uncertainties.
9. Plutonium contamination from sewage sludge in Livermore, California. The Lawrence Livermore National Laboratory (CA) has been placed on the National Priorities List of Superfund sites for a variety of contamination problems. As one example, federal agencies determined that operations at LLNL contaminated processed sewage sludge from the Livermore Water Reclamation Plant with plutonium. As part of the assessment process for characterizing the public health risks from the plutonium contaminated sludge two opportunities were created for public involvement.
10. Boston Harbor National Park Area (MA). A unique participation process that was started by the National Park Service in 1996 as an alternative to the “command and control” approach to running national parks. It consists of a two-tiered participation process consisting of an advisory council of 28 stakeholder group representatives who advise a partnership of 13 members that is responsible for managing the park.

## Appendix B: Surveys

Name: \_\_\_\_\_

Case: \_\_\_\_\_

Below are a number of factors that can affect public participation. We would like you to measure the level of each factor at the PRESENT MOMENT.

|   | Very<br>Low | 0 | 1 | 2 | 3 | 4 | Very<br>High | Don't<br>Know |
|---|-------------|---|---|---|---|---|--------------|---------------|
| 1. Political pressure on the CDC to really involve and listen to the local stakeholder groups.  |             | 2 | 1 | 2 | 2 | 2 |              | 1             |
| 2. Support for the process from within the CDC.   |             | 1 | 3 | 2 | 3 | 1 |              | 0             |
| 3. Previous experience that the CDC has had with public participation.                          |             | 2 | 1 | 4 | 1 | 1 |              | 1             |
| 4. Level of trust between interest groups and the CDC.  |             | 0 | 5 | 2 | 3 | 0 |              | 0             |
| 5. Level of trust among interest groups involved in the process.                                |             | 0 | 3 | 6 | 1 | 0 |              | 0             |
| 6. Resources available to the CDC that would help them run a good public participation process. |             | 1 | 5 | 2 | 2 | 0 |              | 0             |
| 7. Commitment of the CDC to hearing all points of view.   |             | 0 | 2 | 2 | 2 | 4 |              | 0             |
| 8. Commitment by the CDC to seeing the process through to its end.                              |             | 2 | 2 | 2 | 2 | 2 |              | 0             |
| 9. The community's economic dependence on the site.   |             | 4 | 2 | 2 | 2 | 0 |              | 0             |
| 10. Stakeholders' prior experience working with each other on similar processes.                |             | 1 | 5 | 0 | 4 | 0 |              | 0             |
| 11. Stakeholders' skills at problem solving, conflict resolution, communication.                |             | 0 | 1 | 4 | 4 | 1 |              | 0             |
| 12. Stakeholders' familiarity with the issue.   |             | 1 | 0 | 0 | 5 | 3 |              | 1             |
| 13. How knowledgeable stakeholders are about each other's beliefs and values.                   |             | 0 | 0 | 5 | 4 | 1 |              | 0             |
| 14. Support from political leadership for this process.   |             | 0 | 5 | 1 | 2 | 2 |              | 0             |
| 15. Support from local population for this process.   |             | 0 | 4 | 1 | 3 | 2 |              | 0             |
| 16. Level of importance of this issue to the regional population.                               |             | 1 | 1 | 1 | 3 | 4 |              | 0             |
| 17. Cultural diversity among the regional communities.  |             | 4 | 3 | 3 | 0 | 0 |              | 0             |
| 18. Prior experience of participants working with the CDC.                                      |             | 1 | 5 | 3 | 1 | 0 |              | 0             |
| 19. Availability of expert resources to the stakeholder participants.                           |             | 0 | 1 | 3 | 2 | 4 |              | 0             |

|  |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
| 20. Density of networks connecting the key interest groups.  | 1 | 3 | 4 | 1 | 0 | 1 |
| 21. How strong is the sense of place in the regional communities?  | 0 | 1 | 1 | 5 | 2 | 1 |
| 22. Commitment among key stakeholder groups to cooperate.  | 0 | 0 | 3 | 6 | 1 | 0 |
| 23. Existing strength of local democracy in the region.  | 0 | 0 | 4 | 2 | 1 | 3 |
| 24. Clarity of the policy issue being addressed.   | 0 | 1 | 6 | 1 | 1 | 1 |
| 25. Extent of scientific consensus about the policy issue.   | 0 | 2 | 4 | 3 | 1 | 0 |
| 26. Clarity of the mandate for what the process is intended to accomplish.   | 1 | 5 | 1 | 3 | 0 | 0 |
| 27. Number of other ongoing processes involving the community and the CDC.   | 2 | 2 | 1 | 1 | 1 | 3 |
| 28. Number of other conflicts between the community and state or federal governmental agencies.  | 1 | 1 | 2 | 3 | 0 | 3 |
| 29. The extent to which key interest groups have established leadership, we already know who speaks for which groups in the community. | 0 | 0 | 1 | 4 | 4 | 1 |
| 30. Number of well-established interest groups in the area.  | 0 | 0 | 1 | 2 | 4 | 3 |
| 31. Number of places where meetings could be held that participants will feel are safe (neutral) and accessible.                       | 0 | 0 | 0 | 4 | 4 | 2 |
| 32. Amount of time available to reach closure.   | 2 | 4 | 2 | 0 | 1 | 1 |

Name: \_\_\_\_\_

Case: \_\_\_\_\_

1. In how many other participatory processes like this have you participated during the last 10 years?

| 0 | 1 | 2 | 3 | 4 | 5 or more |
|---|---|---|---|---|-----------|
|   |   |   |   |   |           |

2. With which interest groups do you most closely identify? Please rank the top two, placing a "1" next to the most important group and a "2" next to the second most important group.

- \_\_\_\_\_ Business / Private Industry
- \_\_\_\_\_ Education / Research
- \_\_\_\_\_ Environmental
- \_\_\_\_\_ Native American
- \_\_\_\_\_ Property Rights
- \_\_\_\_\_ Community Groups
- \_\_\_\_\_ Religion
- \_\_\_\_\_ Peace or Social Justice
- \_\_\_\_\_ Local Government
- \_\_\_\_\_ State or Federal Government
- \_\_\_\_\_ Tribal Government
- \_\_\_\_\_ Other, please specify: \_\_\_\_\_

3. Are you mainly interested in: (Check ONE)

- \_\_\_\_\_ Local Issues
- \_\_\_\_\_ National Issues
- \_\_\_\_\_ Both Equally Important

4. For how many years have you been involved in issues related to this process?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 or more |
|---|---|---|---|---|---|---|---|---|---|------------|
|   |   |   |   |   |   |   |   |   |   |            |

5. What best explains your motives for being involved in this process? Please rank the top three. Place a "1" next to the most important reason you got involved, a "2" next to the second most important reason, and a "3" next to the third most important reason.

- \_\_\_\_\_ Protect the health of myself and/or my family
- \_\_\_\_\_ Protect the health of others (e.g., community, vulnerable populations)
- \_\_\_\_\_ Economic effects to myself and/or family
- \_\_\_\_\_ Economic effects to others (e.g., community, region)
- \_\_\_\_\_ Improve the quality of life (e.g., recreational opportunities)
- \_\_\_\_\_ Protect ecological systems (conservation or preservation)
- \_\_\_\_\_ Sense of civic duty
- \_\_\_\_\_ It's my job
- \_\_\_\_\_ Improve social or environmental justice
- \_\_\_\_\_ Other, please specify: \_\_\_\_\_

## **Appendix C: SERI background**

The Social and Environmental Research Institute is a tax-exempt public foundation that conducts research on a broad range of social and environmental issues (founded 1995). The Institute is committed to the integrity of theory and practice. It conducts applied research projects that realize the practical gains provided by theory and as a means to realize concrete benefits to individuals, society, and the environment. The Institute conducts theoretical and applied research in two principal areas: discursive approaches to policy; and social relations to the environment.

The Institute's research on discursive policy approaches addresses the roles of participatory, discursive, and democratic methods at all stages of the policy processes, including design, research, decision-making, implementation, and evaluation. Research in these areas seeks to improve our understandings and to enhance and develop processes that involve a search for just, equitable, and integrative solutions based on deliberating issues, clarifying interests, perspectives, and values; identifying and addressing issues of power and lines of influence; discovering common understandings; identifying mutual responsibilities; and negotiating shared principles. The Institute's main goals within these areas are to further theoretical and practical understanding of the conditions that lead to collective efforts to define and address shared problems, how individuals come to see their private interests linked with the shared interests of their fellow citizens and the non-human world, and the factors that facilitate collaborative learning about issues, self, and others. Specific areas of research include how: to integrate multiple values, technical and social expertise, and diverse interests; to provide a fair opportunity for the airing and consideration of concerns, opinions, and viewpoints; to provide opportunities for disenfranchised groups to develop knowledge and to influence all stages of policy processes; to design processes that are adaptive to changing knowledge and social, political, and environmental conditions; and to promote the development of skills of constructive dialogue and collective problem-solving. Our mission is grounded in a fundamental commitment to creating a society that maintains respect for diverse values and interdependencies between human spheres and the biophysical environment, and that furthers its development by providing opportunities for learning, in part through participatory policy processes, including design, research, decision-making, implementation, and evaluation.

The Institute's research on social relations to the environment includes a wide variety of themes and efforts whose common thread is a focus on how the natural environment shapes and influences people and society and how human actions affect the natural environment. Research in these areas aims to better our understanding of how people form beliefs and values about nature; how they rationalize their environmental actions; how they orchestrate and conceptualize environmental experiences; how social, economic, institutional, and cultural forces shape individual attitudes, beliefs, and actions; and how people draw on their experiences to nurture themselves, to mediate their environmental actions, and to socialize others. The Institute's main goals within these research areas are to enhance and develop psychological and social theory by drawing in new understandings of how the natural environment both mediates human action and thinking as well as offers new possibilities for learning; and to aid in the search for ways to balance human needs with environmental integrity. Areas of research include: environmental attitudes and behavior, valuation of non-market goods, environmental perceptions, human dimensions of global environmental change, environmental education, environmental health, and

sustainable development. Our work in these areas is driven by a recognition that humans and the natural environment are tightly coupled, especially as technology and world population growth increase the ability of human actions to affect natural systems.

#### **List of related publications available from SERI**

- Tuler, S. and Webler, T. 1995. Process Evaluation for Discursive Decision Making in Environmental and Risk Policy, *Human Ecology Review* 2(1):62-71.
- Webler, T. and Tuler, S. 1997. Valuing diversity, *Whole Terrain* 6:59-65.
- Tuler, S. and Webler, T. 1999. Voices from the forest: What participants expect of a public participation process, *Society and Natural Resources* 12:437-453.
- Tuler, S. and Webler, T. 2000. Public participation: Relevance and application in the National Park Service, *Park Science* 20(1):24-26, 47.
- Webler, T. and Tuler, S. 2000. Fairness and Competence in Citizen Participation: Reflections from a Case Study, *Administration and Society* 32(5):56-595.
- Webler, T., Tuler, S., and Krueger, R. 2001. What is a good public participation process? Five perspectives from the public, *Environmental Management* 27(3):435-450.
- Webler, T. and Tuler, S. 2001. Public Participation in Watershed Management Planning: Views on Process from People in the Field, *Human Ecology Review* 8(2):29-39.
- Tuler, S., Webler, T., Shockey, I., Stern, P. C., 2002. Factors influencing the participation of local governmental officials in the National Estuary Program, *Coastal Management* 30(1):101-120.
- Webler, T. and Tuler, S. 2002. Unlocking the Puzzle of Public Participation, *Bulletin of Science, Technology, & Society* 22(3):179-189.
- Webler, T. 2002. Radiation Risk Perception and Communication: A Case Study of the Brookhaven National Laboratory. SERI Report 4. Leverett, MA: Social and Environmental Research Institute.
- Tuler, S. 2002. Radiation Risk Perception and Communication: A Case Study of the Fernald Environmental Management Project. SERI Report 5. Leverett, MA: Social and Environmental Research Institute.
- Webler, T., Tuler, S., Shockey, I., Stern, P. C., and Beattie, R. (2003). Participation by local governmental officials in watershed management planning, *Society and Natural Resources* 16:105-121.

Reports for each of the case studies are also available from SERI.