



Social and Environmental Research Institute
278 Main Street, Room 404
Greenfield, MA 01301
(413) 367-2451

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

**Case Study:
Addressing health risks from sewage sludge contaminated with
plutonium released by
Lawrence Livermore National Laboratory (CA)**

**By
Seth Tuler
Thomas Webler
Rachel Finson
Jasmine Tanguay**

**September, 2003
SERI Report #93-001**

Contact Information:

Dr. Seth Tuler, Principal Investigator
sptuler@crocker.com
413-367-2451

TABLE OF CONTENTS

Overview of Research Project	1
Introduction	4
Background	4
Research Methods	7
Preferences for Process Features	9
Preferences for Outcomes	23
Surveys	27
Contextual Variables	27
Individual Variables	28
Summary	30
References	32
Appendix A: Case Studies in Research Project	34
Appendix B: Surveys	36
Appendix C: Social and Environmental Research Institute	40

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?
2. 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 policy making, 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 Gina Margillo, Community Education and Participation Coordinator of the Environmental Health Investigations Branch of the California Department of Health Services for her help in understanding the process at Lawrence Livermore National Laboratory and the surrounding community and identifying people to participate in our study. We greatly appreciate advice on Q methodology provided by Dr. Will Focht of Oklahoma State University.

Addressing health risks from sewage sludge contaminated with plutonium released by Lawrence Livermore National Laboratory

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 our findings from our study of efforts to address health risks from plutonium contamination released from the Lawrence Livermore National Laboratory in California. Specifically, we focus on the distribution of sewage sludge in the Livermore community that was contaminated by plutonium from the National Laboratory. 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

Livermore, California is the site of a US Department of Energy National Laboratory that primarily focuses on nuclear weapons research and development. Lawrence Livermore National Laboratory (LLNL), operated by the University of California, was founded in 1951. LLNL is approximately 50 miles east of San Francisco. The Livermore site occupies 826 acres and is in the Southeast section of the Livermore Valley in Alameda County.

Many operations at LLNL handle or generate hazardous materials, mixed wastes and radioactive wastes. In 1987, the United States Environmental Protection Agency (USEPA) placed the Livermore site on the National Priorities List (NPL) of hazardous waste sites, due to volatile organic chemical contamination in the groundwater.

By virtue of being listed on the National Priorities List the federal Agency for Toxic Substances and Disease Registry (ATSDR) is required by law to assess the potential impacts of activities at LLNL on community health. ATSDR and the California Department of Health Services (CDHS) Environmental Health Investigations Branch have prepared a series of reports describing potential health risks and approaches to address them (ATSDR 2000, CDHS 2003). In 1997 an assessment conducted by ATSDR and the California Department of Health Services determined that historic releases of plutonium from LLNL resulted in radioactive contamination of sewage sludge at the Livermore Water Reclamation Plant.

Evidence of plutonium contamination offsite was available from routine monitoring of effluent and sewage sludge during the mid-1960s. In 1967 there was an unintentional release of plutonium-239 and americium-241 over a period of 20 days from LLNL to the city's sanitary sewer. An analysis by LLNL staff suggested that at least 32 million picocuries of plutonium-239 and americium-241 were released into the sewer. However, the agencies believe that plutonium concentrations that were actually released during this accident and during other times were "not well characterized."

Processed sewage sludge from the Livermore Water Reclamation Plant was distributed to the community over a period of years for household and municipal use as a soil amendment. The ATSDR-CDHS Health Consultation discussed the distribution of the sludge from 1958 – 1976 (ATSDR 2000). Contaminated sludge was used, for example, as a soil conditioner for residential lawns and gardens and for landscaping in local parks. For example, in 1994 plutonium contamination was found in Big Trees Park in Livermore. LLNL and ATSDR believe that tests are suggestive of soils probably being contaminated when sewage sludge containing low levels of contamination was used as a soil amendment on ornamental trees in the park. There were no data to suggest that the plutonium found in the soils was only from global fallout or from air or water pathways from the site. At the same time, the City of Livermore disputes the claim that sewage sludge was not used as a soil amendment in Big Trees Park. Thus, the sources of identified plutonium contamination are disputed in some instances.

Analyses of contaminated soils in Big Trees Park and elsewhere in the area found that levels of plutonium are below EPA standards of regulatory concern. The ATSDR formally found that there is no significant health risk from the plutonium. At the same time, an important finding in the Health Consultation was that the location of contaminated sewage sludge and the nature and extent of the potential public health hazard are not known. Systematic errors in LLNL's monitoring systems were identified. Because of the ways samples were taken, the results of routine and post-accident monitoring of sludge are felt to be inadequate to characterize the levels of contamination that could be found in the processed sewage sludge. Furthermore, a logbook used by the Livermore Water Reclamation Plant that identified the recipients of the sludge during the years in question has never been located. The agencies concluded that estimates of plutonium releases are based on inadequate data and faulty assumptions and that it is likely that the amounts of plutonium released into processed sludge were underestimated. As was noted in one report, "the available data indicate a potential public health hazard, however, the nature and extent of the hazard are largely uncertain" (ATSDR 2002).

As more information has become available about plutonium contamination from LLNL and the understanding that it is inadequate to clarify the associated risks has grown two important controversies have arisen regarding:

- 1) interpretation of the risk of the potentially exposed population and who should bear responsibility for the risk (e.g., the community or LLNL) and
- 2) nature of the follow-up activities after the Public Health Assessment is conducted, including how members of the community should be notified about potential risks.

In large part because of the public concerns about the risks further evaluation of the distribution of contaminated sludge was identified as an important task that should be the subject of follow-up by the federal and state health agencies.

Public participation opportunities

As part of the assessment process for characterizing the public health risks from the plutonium-contaminated sludge opportunities were created for public involvement.

First, as part of the ATSDR/CDHS health assessment and health consultation process, a formal *Site Team* was convened by the CDHS in 1997 under contract with the ATSDR. The Site Team process is a non-standard mechanism for ATSDR to involve the public in health assessment and consultation studies. The use of this non-standard mechanism was implemented as a pilot effort to evaluate the feasibility of such teams to contribute to ATSDR's community involvement process (Evans 2003). Members of the Site Team included individuals from federal, state, and local agencies, officials from health and regulatory agencies, the City of Livermore, members of public interest groups, and non-affiliated members of the local community. The Site Team members participated in meetings with the ATSDR and CDHS, made recommendations about issues of concern, and reviewed draft reports (e.g., Health Consultations). They also participated in larger, public meetings sponsored by the lead agencies. In 1999 the ATSDR ceased funding to the CDHS for the site team. ATSDR then took over management of the process.

Based on our interviews as part of this case study we learned that key stakeholders and staff at ATSDR felt that the Site Team process was not successful. There was significant conflict and polarization on both the substantive issues before the Site Team and regarding the Site Team and ATSDR assessment processes. Key stakeholders and members of participating public interest groups felt that the agency was not responsive to the community's concerns and was at times dishonest. ATSDR staff felt that the Site Team was not representative of the broader Livermore population and was raising extraneous issues. Moreover, in their view the Site Team became more polarized as members from the Livermore community who were not affiliated with any particular interest group ceased participating during the process.¹

Consequently, in 2000 the CDHS convened a second *ad hoc* group, the *Sludge Working Group* (SWG), to ensure continued community participation in the assessment process. All Sludge Working Group members were on the Site Team, but not all Site Team members were part of the Sludge Working Group. This group is a self-selected sub-set of the Site Team. Initially, all Site Team members were invited, including LLNL. However, there was no effort to include ATSDR in the work of this group. The group has met periodically since 2000.

The purpose of the Sludge Working Group was to develop a framework to address the issue of plutonium-contaminated sludge and protect public health (CDHS 2003). Members of the SWG include local community members, state and county health officials, a representative of the City of Livermore, a representative from the Livermore Water Reclamation Plant, San Francisco Bay Area Physicians for Social Responsibility (PSR), Tri-Valley Communities Against a

¹ In order to reach out to members of the Livermore community who are not affiliated with any of the public interest groups or participating in on-going processes ATSDR conducted a survey. Over 1400 health concern comment forms, fact sheets, and meeting announcements were distributed to residents within 1.5 miles of the site. According to ATSDR only one response was received as of May, 2003 (Evans 2003). No claims about the beliefs or attitudes of this sample can be made based on such a small response rate. We do not know what the people in this sample believe. It may be that they: are satisfied with the process, have no specific health concerns, failed to receive the comment form, did not understand the comment form, were too busy to respond, or wanted to use non-response as a means for making a political statement.

Radioactive Environment, and Western States Legal Foundation (WSLF). Activities of the SWG have been primarily directed towards:

- 1) gathering information that would help clarify the nature and extent of the potential hazard including, identifying and interviewing retired workers at the Livermore Water Reclamation Plant and seeking the “log book” that had the names and addresses of the households that received the sludge.
- 2) developing a framework to address community concerns about the potential hazard, including how to notify members of the public about potential contamination, provide opportunities for soil testing, and address any fear and anxiety that arise.

The SWG was guided by a concern for the ways that large scientific uncertainties would be addressed. They based their approach on the foundations of the precautionary principle and community right to know. Recently, the CDHS, with the input and support of the Sludge Working Group, proposed a process for continuing to involve the broader community in efforts to address concerns arising about plutonium contamination (CDHS 2003). The Alameda County Department of Environmental Health was recommended as the lead agency for efforts to notify the public and conduct soil testing.

In addition to these two groups that brought together representatives from key stakeholder groups, opportunities for public involvement included public meetings and advocacy-group sponsored educational activities for community members about radiation and health. For example, Centers for Disease Control and Prevention funding was secured by three community-based advocacy groups to conduct workshops, hold community meetings, collaborate with communities, and develop materials to educate communities about energy-related public health activities. The California Department of Health Services’s Environmental Health Investigations Branch and Radiological Health Branch and the Alameda County Public Health Department assisted in the training workshops conducted by San Francisco Bay Area Physicians for Social Responsibility, Tri-Valley CAREs, and Western States Legal Foundation.

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 Gina Margillo, Community Education and Participation Coordinator of the Environmental Health Investigations Branch of the California Department of Health Services, who is familiar with this case.

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 13 people participated in our study. The list of participants is shown in Table 1.

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

- 1) complete a Q sort exercise (described below) to reveal their preferences about process features,
- 2) express their preferences for 20 different statements describing potential outcomes from a process,
- 3) complete a survey in which they assessed on 37 different variables the context in which the process was occurring, and
- 4) 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. In the following sections we discuss each of these tasks and our findings.

Table 1. Participants in the Livermore Case Study.

- Tracy Bateau (Environmental Health Investigations Branch, CDHS; member of SWG)
- Paul Charpe (Division of Health Assessment and Consultation, ATSDR)
- Burt Cooper (Division of Health Assessment and Consultation, ATSDR)
- Mark Evans (Division of Health Assessment and Consultation, ATSDR)
- Pamela Evans (Alameda County Department of Environmental Health; member of SWG)
- Marion Fulk (community member; member of SWG)
- Marylia Kelley (Tri-Valley CAREs; member of Site Team and SWG)
- Trisha Pritikin (member of Site Team)
- James Seward (Lawrence Livermore National Laboratory; member of Site Team)
- Patrice Sutton (Western States Legal Foundation; member of Site Team and SWG)
- Jacque Touray (City of Livermore; member of Site Team and SWG)
- Marilyn Underwood (Environmental Health Investigations Branch, CDHS; member of Site Team and SWG)
- Jeff Wong (Radiologic Health Branch, CDHS; member of Site Team and SWG)

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.² 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.³ 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 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.
- 2) Use the best available science in the analysis.
- 3) Establish relationships that promote constructive collaboration among participants.
- 4) Acknowledge and explore uncertainties.
- 5) Develop a common language and understanding among participants.
- 6) Reach out in a number of different ways through different mechanisms to different communities on different issue points, throughout the process.
- 7) Work to build trust among the different participants during the process.
- 8) Hold meetings at different times and places so no one is excluded from participating.
- 9) Participants should be courteous and respectful to one another.
- 10) Provide financial resources that enable people to participate effectively (e.g., travel, hire experts).
- 11) Participants should see beyond their individual interests to what is good for the larger community.
- 12) The process cannot be open to just anyone who wants to participate, participation has to be restricted in some way.

² 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.

³ 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.

Table 2, continued.

- 13) Participants should be accountable for what they say, sincere in their promises, and reliable in carrying them out.
- 14) The process gives recommendations to the responsible agencies, who then make the final decisions.
- 15) Participants should have reasonable expectations about what the agencies are able to do.
- 16) All important decisions are made according to consensus (including the agenda).
- 17) Participants should attend meetings regularly and see tasks through to completion.
- 18) It is clear under what conditions the process will end.
- 19) Participants should be able to deal with complex technical issues.
- 20) Every recommendation is justified with evidence.
- 21) Participants should feel comfortable and safe at the meetings.
- 22) Consensus is used to decide what rule is used to make decisions (simple majority vote, 2/3 majority vote, etc.).
- 23) There are clear groundrules that govern how people should interact.
- 24) The responsible agencies respond in a timely way to all questions, comments, and requests.
- 25) Pay attention to the physical arrangement of tables and chairs at the meetings.
- 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.
- 27) Discuss the values underlying people's opinions about the issues.
- 28) There are mechanisms for communicating to the broader public about what decisions are being considered and made.
- 29) Validate all information to make certain it is correct.
- 30) Participants who represent groups check in with their memberships regularly to ensure that they represent their views accurately.
- 31) Everyone has an equal chance to put their concerns on the agenda.
- 32) The process improves the participants' skills to participate effectively in processes like this (e.g., problems solving, conflict resolution, communication).
- 33) The process has to be able to limit topics of discussion in order to avoid quagmires.
- 34) The process improves participants' understandings.
- 35) The process requires unbiased and independent facilitation.
- 36) The process ends up enhancing the trust between the community and the responsible agencies.
- 37) The purposes and goals of the process are clear to all involved.
- 38) The process does not make any pre-existing conflicts worse.
- 39) All participants have equal access to information.
- 40) All important stakeholders are taking part in the process.
- 41) There is full disclosure of information at all times.
- 42) At the end of the process there is a clear plan for how to implement the final decision.
- 43) The staff involved are receptive to questions or requests for information from the public.
- 44) The process makes progress on solving the right problem.
- 45) Get the right information.
- 46) The process produces outcomes that are acceptable to me or my organization.
- 47) The process taps the knowledge and experiences of local people.
- 48) The process produces outcomes that are acceptable to the responsible agencies.
- 49) The process needs an effective leader.
- 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.
- 51) There is adequate administrative support (e.g., funding, staffing) for the life of the process.
- 52) The process is well-timed to the responsible agencies' window of opportunity to act.
- 53) There is adequate notification of meetings, comment periods, etc.
- 54) Allow time to re-visit issues and decisions, even if it means extending the timetable.
- 55) Participants are involved in deciding *what* studies ought to be done.
- 56) 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 the process to assess risks from plutonium contamination from sewage sludge is going to be done again. Sort the statements according to what you believe should be the most important to least important factors 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 for this particular issue. 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.

Figure 1. Layout for Q sort cards.

Least
Important

Most
important

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 1.⁴ 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.

Q Method Data Analysis

Q sort data were entered into a computer program called MQMethod.⁵ This program computes the statistical analysis.⁶

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

⁴ 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.

⁵ This freeware program is available through <http://www.qmethod.org>. Readers interested in learning more about Q method will find this website informative.

⁶ 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.

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 13 Q sorts are the measured variables and the factor analysis reduced them to five 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.

Q Method Results

Five distinct and coherent factors — or what we will continue to call perspectives on public participation process — emerged from the analysis.⁷ 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 five 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.

⁷ 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.

Table 3.
Ranking of each statement for each perspective.

No.	Statement	Perspective				
		A	B	C	D	E
1	Set up a situation that encourages all participants to listen to what others say and to consider it carefully.	3	2	1	-3	2
2	Use the best available science in the analysis.	3	5	0	0	3
3	Establish relationships that promote constructive collaboration among participants.	0	3	0	-5	-1
4	Acknowledge and explore uncertainties.	5	-5	4	1	4
5	Develop a common language and understanding among participants.	-1	0	-1	-4	1
6	Reach out in a number of different ways through different mechanisms to different communities on different issue points, throughout the process.	-3	-1	3	-1	0
7	Work to build trust among the different participants during the process.	1	3	-2	1	0
8	Hold meetings at different times and places so no one is excluded from participating.	-1	-5	2	0	3
9	Participants should be courteous and respectful to one another.	3	2	0	0	-3
10	Provide financial resources that enable people to participate effectively (e.g., travel, hire experts).	-4	-1	0	0	4
11	Participants should see beyond their individual interests to what is good for the larger community.	-2	5	1	2	-2
12	The process cannot be open to just anyone who wants to participate, participation has to be restricted in some way.	-1	-4	-5	-5	0
13	Participants should be accountable for what they say, sincere in their promises, and reliable in carrying them out.	2	0	1	2	0
14	The process gives recommendations to the responsible agencies, who then make the final decisions.	0	-1	-3	-5	0
15	Participants should have reasonable expectations about what the agencies are able to do.	-2	3	-2	-2	-1
16	All important decisions are made according to consensus (including the agenda).	4	-5	0	-1	1
17	Participants should attend meetings regularly and see tasks through to completion.	1	0	0	4	0
18	It is clear under what conditions the process will end.	1	1	-2	-4	-3
19	Participants should be able to deal with complex technical issues.	-1	-4	-5	-3	-1
20	Every recommendation is justified with evidence.	4	-2	-3	-1	-3
21	Participants should feel comfortable and safe at the meetings.	-5	2	4	-2	-2
22	Consensus is used to decide what rule is used to make decisions (simple majority vote, 2/3 majority vote, etc.).	-1	-3	-2	3	-2
23	There are clear groundrules that govern how people should interact.	2	0	0	-2	-4
24	The responsible agencies respond in a timely way to all questions, comments, and requests.	-1	3	3	2	1
25	Pay attention to the physical arrangement of tables and chairs at the meetings.	-5	-2	-3	1	-5
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	0	1	3	-1
27	Discuss the values underlying people's opinions about the issues.	-2	-4	-2	-2	1
28	There are mechanisms for communicating to the broader public about what decisions are being considered and made.	0	-1	4	0	-1
29	Validate all information to make certain it is correct.	1	0	-1	0	5
30	Participants who represent groups check in with their memberships regularly to ensure that they represent their views accurately.	5	-3	1	-2	-2
31	Everyone has an equal chance to put their concerns on the agenda.	2	0	0	1	1

Table 3, continued.

32	The process improves the participants' skills to participate effectively in processes like this (e.g., problems solving, conflict resolution, communication).	-4	-1	-1	-4	0
33	The process has to be able to limit topics of discussion in order to avoid quagmires.	0	0	-4	1	0
34	The process improves participants' understandings.	2	1	1	-3	3
35	The process requires unbiased and independent facilitation.	5	0	-1	3	2
36	The process ends up enhancing the trust between the community and responsible agencies.	0	2	-4	0	-5
37	The purposes and goals of the process are clear to all involved.	1	5	5	-2	1
38	The process does not make any pre-existing conflicts worse.	0	1	-4	-1	2
39	All participants have equal access to information.	-3	-3	5	-3	1
40	All important stakeholders are taking part in the process.	2	4	-1	2	2
41	There is full disclosure of information at all times.	-4	-1	2	5	5
42	At the end of the process there is a clear plan for how to implement the final decision.	0	1	2	5	-3
43	The staff involved are receptive to questions or requests for information from the public.	4	1	3	1	3
44	The process makes progress on solving the right problem.	3	4	2	4	-4
45	Get the right information.	1	2	-1	2	5
46	The process produces outcomes that are acceptable to me or my organization.	-3	-3	-1	-1	-2
47	The process taps the knowledge and experiences of local people.	2	1	5	4	0
48	The process produces outcomes that are acceptable to the responsible agencies.	1	-2	-5	0	-4
49	The process needs an effective leader.	-2	4	0	2	-5
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.	0	0	3	3	0
51	There is adequate administrative support (e.g., funding, staffing) for the life of the process.	-3	2	1	1	2
52	The process is well-timed to the responsible agency's window of opportunity to act.	-5	-2	-3	0	-1
53	There is adequate notification of meetings, comment periods, etc.	0	1	2	-1	2
54	Allow time to re-visit issues and decisions, even if it means extending the timetable.	-1	-2	-2	-1	4
55	Participants are involved in deciding <i>what</i> studies ought to be done.	-2	-1	2	5	-2
56	Participants are involved in deciding <i>how</i> studies ought to be done.	-2	-2	0	0	-1

Table 4 shows that there are five different perspectives on what would be the appropriate public participation process.⁸ Table 5, which presents the correlation coefficients among the factors, indicates that these five perspectives are largely independent. The closest correlation is between perspectives C and D, which are 31% alike.

What is particularly important is that all but three people loaded significantly on only one perspective. The exceptions are Angela, Lucy, and Don⁹, who loaded significantly on two factors each. Don is a significant *positive* loader on Perspective C and a significant *negative* loader on Perspective A. This result suggests that these individuals expressed points of view that are unique and not captured by any of the five “ideal types” emerging from this solution. It

⁸ Recall that the condition of instruction was: *Imagine that the process to assess risks from plutonium contamination from sewage sludge is going to be done again. Sort the statements according to what you believe should be the most important to least important factors guiding the design of the process.* In other words, we are gathering peoples' ideas of what would be the most appropriate process right now.

⁹ To maintain confidentiality we have used aliases for each of the people who participated in our study.

suggests there is another factor solution that might be appropriate.¹⁰ However, when we investigated this possibility, through additional judgmental hand rotation of factors, inclusion of additional factors, or exclusion of existing 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.

Table 4 reveals that the first perspective is strongly held by two of the people in our study. Perspective A accounts for 11% of all the variance. In addition, Don has a negative and significant loading score on this factor (-0.45); this means that she opposes aspects of Perspective A. Joy has a positive, and nearly significant, loading score (0.40 n.s.)¹¹ on this factor, suggesting agreement with some portions of it. On the other hand, Cynthia has a negative loading score (-0.34 n.s.) on this factor, suggesting disagreement with some portions of it.

Perspective B, in Table 4, is shared by five individuals, including Angela who is also a significant loader on Perspective A. Angela loaded more strongly on Perspective A, which is why she is listed under that line in Table 4. Cynthia also comes close to loading significantly on this factor (0.39 n.s.) suggesting agreement with some of its aspects. Joy has a negative loading score (-0.26 n.s.) on this factor, suggesting disagreement with some portions of it.

Perspective C is defined by five individuals, including one that also loads significantly on Perspective B (Lucy). Lucy loaded more strongly on Perspective B, which is why she is listed under that line in Table 4. Karen has a nearly significant positive loading score (0.41 n.s.) on this factor, suggesting agreement with portions of it. Perspective C accounts for 20% 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 D is defined by two participants. Lucy and Natalie have positive, but non-significant loadings (0.30 n.s. and 0.37 n.s., respectively), on this perspective, suggesting their agreement with some portions of it. On the other hand, Bob has a negative loading score (-0.37 n.s.) on this factor, suggesting disagreement with some portions of it. This perspective is weakly correlated with Perspective C (inter-factor correlation is 0.31, in Table 5).

Perspective E is defined by only one person (Fred). 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 different points of view. Lucy and Karen also helped to define this factor by being positively correlated with it (0.39 n.s. and 0.35 n.s., respectively). Bob and Don are negatively associated with this perspective (-0.29 n.s. and -0.27 n.s., respectively).

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 plutonium

¹⁰ 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.

¹¹ n.s. means “not statistically significant at the 0.05 level or better.”

contaminated soil caused by releases from the Lawrence Livermore National Laboratory at the present moment. Since the narratives are constructed from the Q statements, references to important Q statements are included in the descriptions below.

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

	Loading scores on perspectives				
	A	B	C	D	E
<i>Perspective A</i>					
Sam	0.73	0.12	0.11	-0.04	-0.11
Angela	0.51	0.47	0.12	0.14	0.13
<i>Perspective B</i>					
Peter	0.07	0.78	0.30	-0.14	-0.18
Natalie	-0.02	0.70	-0.06	0.37	0.09
Bob	-0.02	0.64	0.07	-0.37	-0.29
Lucy	-0.04	0.49	0.46	0.30	0.39
<i>Perspective C</i>					
Betty	0.29	0.09	0.78	0.10	0.17
Don	-0.45	0.02	0.76	-0.01	-0.27
Joy	0.40	-0.26	0.69	0.23	0.02
Cynthia	-0.34	0.39	0.60	0.17	0.20
<i>Perspective D</i>					
Ann	0.11	0.17	0.09	0.83	-0.22
Karen	0.05	-0.08	0.41	0.61	0.35
<i>Perspective E</i>					
Fred	0.24	-0.05	0.25	-0.12	0.83
Variance explained	11%	17%	20%	12%	10%

Table 5.
Correlations Between Perspectives.

Perspective	A	B	C	D	E
A	1.0	0.15	0.12	0.05	0.11
B		1.0	0.15	0.13	-0.06
C			1.0	0.31	0.24
D				1.0	0.01
E					1.0

Perspective A

This perspective is about making recommendations that are based on a good understanding of the evidence about the nature of the problem and to effectively communicate with the community. In this perspective the definition of the right problem (44) should be locally determined. One of the people who loaded highly on this perspective expressed the concern, during the Q sort, that interest groups from outside the local area could insist that the problem be redefined in a way that is inconsistent with local desires.

High quality decisions are based on good evidence. Thus, it is very important that the uncertainties be acknowledged and explored (4). Those subscribing to this view also believe that it is very important that every recommendation should be justified with the evidence (20) and the best available science be used for analysis (2).

Effective communication with the community is important for two reasons. First, the public should be informed enough so that they can express their concerns and preferences. Second, they should be helped to understand the decisions that are being made (including their rationale). Those subscribing to this view believe it is their job to interpret technical information using a variety of analytical tools and to communicate the results in a language that the (lay) public can understand. During our interviews as part of the Q sorts we learned of an underlying belief that the general public is not capable of understanding all of the relevant technical details of health assessments; the process should, therefore, improve their understandings (34) but not focus on fully disclosing all information (41).

As part of the effort to communicate effectively with the local community, deliberations should be moderated by an independent facilitator (35) and the process should be set-up to encourage listening (1). The goal of good communication is supported when participants are courteous and respectful (9) and accountable for what they say and do (13). At the same time staff should be receptive to questions and requests for information (43). The reason why it is so important that participants check in with group membership (30) is to ensure that the process addresses concerns of the membership of locally relevant interest groups.

However, while the responsible agencies need to listen to peoples' concerns, and while it needs to create a space for people to learn and discuss their concerns (35, 9, 43, 1, 23), the public should not be involved in determining what should be the responsible agencies' response (e.g., ATSDR). In other words, responsibility for what the agencies do should be retained by them.

Perspective B

Those who subscribe to this perspective are very concerned about addressing the key problems in an efficient and well-run process.

At the core of this perspective is a concern about the clarity of purposes and goals (37) that allow the participants to stay focused on the right problem (44). These are promoted when participants see beyond their self-interests to the common good (11) and participants have reasonable expectations about what the responsible agencies can do (15). Effective leadership (49) was ranked more highly in this perspective than the others. Consensus is not a desired feature because its use can allow the process to get stuck (16, 22).

The ways that participants interact can also affect whether the process stays on track. Thus, this perspective describes a process in which all important stakeholders attend (40), participants interact collaboratively (3), and participants are courteous and respectful (9). Such behaviors are encouraged when participants feel comfortable and safe (21). Establishing trust between the community and the agency (36) and establishing trust among the participants (7) were ranked higher in this perspective than any other.

The quality of information is important to those holding this perspective. The best available science should be used for analysis (2); this statement was ranked more highly here than in the other perspectives. Data must be evaluated to assess the quality of data used to make public health determinations. Thus, it is important to identify weaknesses and gaps. At the same time, there was no support for exploring uncertainties in the data (4); doing so can lead the process astray.

While the quality of information used for public health decision-making should be high, there is qualified support for sharing information. To be sure, before reports or public health assessments are shared with the public analyses and documents should be reviewed to ensure there are no major flaws in data interpretation of logic.

Perspective C

The concerns and needs of local people sit at the center of this perspective while the needs and wishes of the responsible agencies are peripheral. For the process to operate effectively, there needs to be clear goals for what the process should achieve (37).

The overall focus in this perspective is on generating and sharing relevant information with the community. The most highly ranked statement in this perspective is to tap the knowledge of local residents (47). It is also important to ensure that participants have equal access to information (39) and that uncertainties be acknowledged and explored (4). To ensure that relevant information is gathered, participants should be involved in deciding which studies to do (55). All of these desired features reflect a recognition that understandings of problems and their potential solutions must emerge during the process and be defined by stakeholders and (health) agency representatives together. In order to ensure that information is broadly disseminated there must be mechanisms for communicating with the broader public (28).

The needs of local people are more likely to be met when the process is accessible and inviting. For the public to be able to participate, they need to feel comfortable and safe about participating (21). It is also important that staff are receptive to questions (43), that the agency responds in a timely way to all questions, comments, and requests (24), that the process reach out in multiple ways (6), meetings be held at various times and places (8), and that there is adequate notification of meetings (53). Part of feeling safe in this case has to do with the concern about what might happen to property values if information about the distribution of plutonium in the community is released. This tempers enthusiasm for making all information readily available (41).

The concerns of this perspective are firmly grounded in the community, not the needs of the agencies involved. In this case the responsible agencies are understood to include the Department of Energy and laboratory management (i.e., University of California), not the federal, state, or

county health agencies that have a role in assessing and responding to health risks that have resulted from contamination released by the Laboratory. The lowest ranked item was that the process should produce outcomes acceptable to the DOE/LLNL (48). There was no support for enhancing trust between the community and the DOE/LLNL (36), or that the process give recommendations to the agency (14). Nor was there support for the statements about the process not making other conflicts worse (38) or avoiding quagmires (33).

Perspective D

Those holding this perspective are interested in addressing and solving problems in a manner that ensures agency accountability and allows full participation of the community. There is an underlying distrust of the motivations of the responsible agencies to redress public health risks that have arisen as a result of contamination released from the laboratory.

The most important statement ranked in this perspective is that there should be full disclosure of information at all times (41). Three other highly ranked statements are that the participants should be involved in deciding what studies ought to be done (55), the process should tap the knowledge and experiences of local community members (47), and opportunities for participation should be meaningful and “not empty shells” (26). It is also important that all important stakeholders take part (40). In other words, community members should be full participants in efforts to understand public health risks from contamination from the facility and make progress on important problems (44).

In combination with ensuring that the community is fully involved, the process should be set-up in a way that ensures accountability. At the end of the process there should be a clear plan to implement decisions (42). An important outcome should be that there is a plan to ensure that promises are followed through (50). Agency staff, in particular, should attend meetings regularly (17) and serve in a long-term capacity.

Accountability is also ensured in the process by attending to features that protect participants. Consensus should be used to decide decisions rules (22); this statement is ranked more highly in this perspective than any of the others. There should be unbiased/independent facilitation (35). Barriers should not be created that can intimidate or prevent full participation; thus, the need to attend to the arrangement of tables and chairs (25) is ranked more highly in this perspective than the others.

At the same time there is a tension in this perspective between the responsible agencies and the public. Statement number 50 addresses the agency following through with its promises. It is ranked higher than statement 13 that is also concerned with accountability, but speaks more broadly to all participants. It is very important that community members be willing to speak-up even if agency representatives feel that they are being confrontational; in some cases they must take strong stands to ensure that their concerns are not being dismissed without good reason (e.g., evidence, high quality data).

Another way that this tension is realized in this perspective is in the low rankings given to items that have to do with the participants adopting what might be termed a cooperative attitude toward the deliberations (1, 3, 5, 15). In this perspective non-confrontational behavior is seen as

something that can benefit the agency, in part because it may mean that people are less likely to challenge the agency.

Perspective E

A concern with broad and informed discussion of the issues is a primary focus of this perspective. Information must be validated *and* it must be fully available for public discussion and consideration. Validating information was the most highly ranked statement in this perspective. Those holding this perspective are interested in the truth of the matter.

Several of the most important ranked statements in this perspective have to do with the quality of information. Information should be validated (29), fully disclosed (41), and analysis should be based on the best available science (2). The right information should be obtained (45) and uncertainties should be acknowledged and explored (4). Getting the right information that is currently available (45) was ranked higher in this perspective than in any of the others. Because the concern is with the “truth” there should always be more time to revisit issues if the information warrants further discussion and analysis (54). This statement was ranked much higher in this perspective than in the others. There is recognition that understandings of problems and their potential solutions emerge during the process.

Those holding this perspective are also concerned with the public’s role in the discussion of the information. They believe that the public should be supported to be part of the process, by providing financial resources to support participation (10) and know the information (41). The process should be set-up to enable their ability to participate, for example by holding meetings at different times and places (8) and using independent facilitation (35).

The main point of a process that is reflected in this perspective is to improve understandings (34). It is also important, relative to the other perspectives, to give recommendations (14). But it is not important to produce outcomes acceptable to the responsible agencies (48) or improve trust with the responsible agencies (36). That is why setting up a situation that encourages listening gets a relatively high ranking (1) and leadership and making progress on the right problem are so unimportant (49, 44; both statements ranked lower here than in the other perspectives).

Comparison of Perspectives

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

Each of the perspectives expresses a concern for the quality of information and analysis that is used to inform deliberations and decision-making. This concern can be expressed in different ways, however. For example, those subscribing to Perspective A emphasize the use of the best science for analysis. Those subscribing to Perspectives A, C, and E emphasize the need to explore uncertainties. People who agree with Perspectives C and D emphasize the need to tap local knowledge to inform deliberations. Perspective E emphasizes the desire to validate all information, but no other perspective emphasizes this feature explicitly (i.e., by ranking statement 29 highly).

An area of agreement is related to the absence of desire to discuss values (27). There appears to be an underlying agreement that the issue is more one of facts (e.g., where the plutonium is, who is exposed, and what the risks are). However, it is odd that values arise so little as an important topic of discussion when the uncertainties are so high. Values can be important when discussing, for example, the ethics of notification. One person participating in our study suggested that the lack of discussion of values may be a consequence of significant disagreement in values and a feeling that discussing them will not be productive.

The last two areas of agreement that we wish to highlight are the lack of emphasis that the process should improve participants' skills (32). As will be discussed below, in regard to outcome preferences, capacity building is not emphasized as a preferred type of outcome from the process designs preferred by the participants in our case study. Furthermore, participants should not necessarily be able to deal with complex technical issues (19). As discussed below in regard to perceptions of the context, there is a belief that participants with this issue are already well-informed about the issues.

There are important areas of disagreement among these perspectives. First, there is a split among the perspectives about access to information. Those subscribing to Perspectives C and D place a strong emphasis on openness and full disclosure of information. On the other hand, Perspectives A and B place much less emphasis on this feature.

Expressions about the purposes of the process reflect disagreement. People who agree with Perspectives C and D emphasize the needs of the community and want to involve them as full partners. They are much less concerned about the needs of the responsible agencies (DOE, LLNL, or ATSDR). On the other hand, while Perspective A is also concerned about addressing the needs of the local community, those subscribing to this view place stronger emphasis on the need to communicate findings, recommendations, and decisions to the responsible agencies. Agencies have the responsibility to interpret technical information for an uninformed community (which is why access to all information is not emphasized). In addition, those subscribing to Perspective A believe that final authority remains in the hands of the agencies.

The need to develop trust was only emphasized by those subscribing to Perspective B. They wish to improve trust between the agencies and the community and among different stakeholders in the community. Those holding Perspectives C and E give very little support to the need for improving trust between the agencies and the community. Another aspect that differentiates between Perspectives B and D is related to how far participant's can push. In Perspective D there is a desire that participants have reasonable expectations about what the responsible agencies can do. In Perspective D there is a fear that community people's voices will be stifled if they are not allowed to speak-up.

As suggested above, there was disagreement about the importance of exploring and acknowledging uncertainties (4). Those subscribing to Perspective B, for example, give weak support for this feature because it can get the process off track. Those subscribing to Perspectives A and E, on the other hand, view this as very important. Their overall concerns may have less to do with efficiency and progress (e.g., statements 37 and 44), and more to do with achieving as full understandings as possible about the problem (34).

Finally, the use of consensus and other features that could affect the process's focus are an area of disagreement. Consensus can prevent a process from reaching agreements in a timely manner (Perspective B). On the other hand, consensus can be important for legitimizing agreements (Perspective A) or protecting the interests of stakeholders and community members (Perspective D). The ability to revisit issues and limit topics of discussion are also features that distinguish perspectives.

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.

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 responsible agencies.
- 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 responsible agencies.
- 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.

Outcome Ranking Results

The outcome data were entered into an excel spreadsheet. As part of this case study report we did not conduct any statistical analyses of these data because the number of study participants is small.¹²

Table 7 shows the importance given to each of the potential outcomes by the thirteen 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.

The results show that participants in our study have little consensus about which outcomes they prefer. At the same time there is an overall trend suggesting that they were mainly concerned with substantive policy outcomes rather than those related to capacity building. No outcomes related to capacity building had more than two people rank them as high. The statements most often ranked high were that:

- “the process results in clear outcomes” (#13),
- “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),
- “participants feel a sense of ownership in the outcomes of the process” (#19), and
- “there is a clear plan for how to implement the outcomes” (#14).

Three substantive policy outcomes did not have anyone ranking them as high, suggesting that they were not critical to people in this case:

¹² These data are being used for further statistical analyses as part of our cross-case comparisons that will be described in a future report.

- “costs and benefits of the outcomes are distributed in an equitable way” (#15),
- “the outcomes are personally desirable to me or my organization” (#16), and
- “the outcomes satisfy the responsible agencies” (#17).

The capacity building outcomes that received moderate support included:

- “The process improves participants’ understandings of the issues” (#2) and
- “The process enhances trust between the community and the responsible agencies” (#4).

Table 7.
Ratings of outcome statements

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

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 37 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 these people have been working together for years. One way to examine this disagreement is to compute the maximum difference in rankings that were given for each of the questions. We looked to see which columns were occupied with a response.

For 14 of the 37 questions there was a maximum difference in scores. This means that there was significant disagreement among some of the participants. At least one person rated the item “very high” and at least one other person rated it “very low.” In other words, 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 and perceived commitments of the DOE and ATSDR. The questions for which there was broadest range of perceptions were:

- political pressure on the DOE to really involve and listen to the local stakeholder groups (#1),
- political pressure on the ATSDR to really involve and listen to the local stakeholder groups (#2),
- support for the process from within the responsible agencies (#3),
- previous experience that the DOE has had with public participation (#5),
- resources available to the ATSDR that would help them run a good public participation process (#8),
- commitment of the ATSDR to hearing all points of view (#9),
- commitment by the ATSDR to seeing the process through to its end (#12),
- cultural diversity among the regional communities (#21),
- availability of expert resources to the stakeholder participants (#23),
- commitment among key stakeholder groups to cooperate (#26),

- extent of scientific consensus about the policy issue (#29), and
- clarity of the mandate for what the process is intended to accomplish (#30).

For 11 of the questions there is a maximum difference of three between the lowest and highest rankings – ratings were spread across four columns. These also indicate substantial differences in perceptions. For only two questions there is a difference of one, indicating basic agreement about their perceptions of some contextual factors:

- it is clear who speaks for which groups in the community (#34) and
- there are a large number of well established groups in the area (#35).

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 process 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 five different perspectives about the process, as discussed above.¹³ For example, there is a stronger perception about the commitment of the ATSDR to hearing all points of view (#9), the commitment by the ATSDR to seeing the process through to its end (#12), the clarity of the mandate for what the process is intended to accomplish (#30), and the number of other ongoing processes involving the community and Lawrence Livermore National Laboratory (#31) among those who are associated with Perspective A. Those subscribing to the other perspectives view the commitment and clarity as weaker and the number of related activities as fewer. On the other hand, those subscribing to Perspective A feel that stakeholders' skills at problem solving, conflict resolution, and communication (#15) are weaker than those associated with Perspectives C, D, and E. Among those who subscribe to Perspectives A and B there is a stronger feeling that there is pressure on DOE and ATSDR to really involve and listen to the local stakeholder groups (#1, #2) than among those from Perspectives C or D.

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 thirteen individuals reveal that most were interested in both local and national issues (9 of 13; 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). Three worked for the ATSDR, three for the California Department of Health Services, one as the Medical Director of LLNL, one for the City of Livermore, and one for the County Health Department. Two were members of advocacy groups that are concerned with health and disarmament issues arising from LLNL (as well as more broadly). Two considered themselves as community members but did not affiliate themselves with any particular group. Several of the participants in our study were members of the ATSDR Site Team and the Sludge Working Group.

¹³ 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.

Table 8 shows how the individuals described their motivations for participating in efforts to characterize and address public health risks from plutonium contaminated sludge distribution in the Livermore community. 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.”

The results illustrate that protection of public health was by far the most salient factor motivating people (10 times), as would be expected in a case that addresses health effects of radiological contamination from a Department of Energy facility. Significantly, six people said that they participated because it was a job responsibility. Five people were motivated by a desire to improve social or environmental justice and three to protect ecological systems. A sense of civic duty was selected once. One person said that applying extensive knowledge from prior processes and about environmental exposures to this problem was an important reason for participating (“other”). No one selected one’s own health or the health of one’s family, 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.

Reason for participation	Number of times selected
Protect the health of myself and/or my family	0
Protect the health of others (e.g., community, vulnerable populations)	10
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)	3
Sense of civic duty	1
It’s my job	6
Improve social or environmental justice	5
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 process to address potential health risks arising from distribution of plutonium-contaminated sludge to the Livermore community from LLNL.

Our analysis revealed five distinct preferences for process design among the 13 people who participated in our case study research. Perspective A is mainly concerned about effective communication with the community and about making recommendations that are based on a good understanding of the evidence about the nature of the problem. There is a concern that the involvement of interest groups from outside the local area could insist that the problem be redefined in a way that is inconsistent with local desires. Those who subscribe to Perspective B are very concerned about addressing the key problems in an efficient and well-run process. These features are promoted when participants see beyond their self-interests to the common good and participants have reasonable expectations about what the responsible agencies can do. Perspective C emphasizes the concerns and needs of local people, while the needs and wishes of the ATSDR and DOE are peripheral. The overall focus in this perspective is on generating and sharing relevant information with the community. The needs of local people are more likely to be met when the process is accessible and inviting. Those holding Perspective D are interested in addressing and solving problems in a manner that ensures agency accountability and allows full participation of the community. Community members should be full participants in efforts to understand public health risks from contamination from the facility and make progress on important problems. There is an underlying distrust of the motivations of the responsible agencies to redress public health risks that have arisen as a result of contamination released from the LLNL. According to Perspective E a good process is concerned with creating broad and informed discussion of the issues. Information must be validated *and* it must be fully available for public discussion and consideration; those holding this perspective are interested in the truth of the matter.

While people involved with assessing the health risks from plutonium contaminated sludge from LLNL 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 (13 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

- Agency for Toxic Substances and Disease Registry 2000. *Health Consultation: Lawrence Livermore National Laboratory, Big Trees Park 1998 Sampling, Livermore, Alameda, California*. CERCLIS #CA2890012584. Atlanta: Agency for Toxic Substances and Disease Registry.
- Agency for Toxic Substances and Disease Registry 2002. *Public Health Assessment: Plutonium-239 in Sewage Sludge Used as a Soil or Soil Amendment in the Livermore Community*. Public Comment Version. Atlanta: Agency for Toxic Substances and Disease Registry.
- 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>
- California Department of Health Services 2003. Proposed process to address the historic distribution of sewage sludge containing plutonium released from the Lawrence Livermore National Laboratory. Oakland, California: Environmental Health Investigations Branch, California Department of Health Services. Available on web at: <http://www.dhs.ca.gov/ps/deodc/ehib/ehib2/topics/LLNL.html>
- Dryzek, D. 1996. *Democracy in capitalist times*. NY: Oxford.
- Evans, Mark 2003. Personal communication.
- 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
- 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.
- 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 Islands 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 Low				Very High	Don't Know
1) Political pressure on the DOE to really involve and listen to the local stakeholder groups.	2	4	2	2	1	2
2) Political pressure on the ATSDR to really involve and listen to the local stakeholder groups.	2	3	3	2	1	2
3) Support for the process from within the responsible agencies.	1	2	4	3	1	2
4) Previous experience that the DOE has had with public participation.	1	2	2	2	1	5
5) Level of trust between interest groups and the DOE.	6	4	1	0	0	2
6) Level of trust between interest groups and the ATSDR.	3	6	4	0	0	0
7) Level of trust among interest groups involved in the process.	1	0	1	4	4	3
8) Resources available to the ATSDR that would help them run a good public participation process.	2	2	3	2	1	3
9) Commitment of the ATSDR to hearing all points of view.	3	1	4	2	3	0
10) Commitment of the DOE to hearing all points of view.	3	7	1	1	0	1
11) Commitment by the DOE to seeing the process through to its end.	4	3	1	1	0	3
12) Commitment by the ATSDR to seeing the process through to its end.	2	0	2	2	3	4
13) The community's economic dependence on LLNL.	0	0	1	6	5	1
14) Stakeholders' prior experience working with each other on similar processes.	1	0	0	6	4	2
15) Stakeholders' skills at problem solving, conflict resolution, communication.	0	3	3	3	4	0
16) Stakeholders' familiarity with the issue.	0	0	1	3	9	0
17) How knowledgeable stakeholders are about each other's beliefs and values.	0	0	3	3	4	3
18) Support from political leadership for this process.	1	1	4	3	0	4
19) Support from local population for this process.	2	3	5	2	0	1

20) Level of importance of this issue to the regional population.	0	6	1	3	1	2
21) Cultural diversity among the regional communities.	2	5	0	2	2	2
22) Prior experience of participants working with the ATSDR.	0	1	2	6	1	3
23) Availability of expert resources to the stakeholder participants.	2	4	4	1	2	0
24) Density of networks connecting the key interest groups.	0	1	3	3	4	2
25) How strong is the sense of place in the regional communities?	0	0	1	4	0	8
26) Commitment among key stakeholder groups to cooperate.	1	2	1	4	4	1
27) Existing strength of local democracy in the region.	0	0	3	4	1	5
28) Clarity of the policy issue being addressed.	0	0	5	2	2	4
29) Extent of scientific consensus about the policy issue.	2	2	5	2	1	1
30) Clarity of the mandate for what the process is intended to accomplish.	1	3	3	2	4	0
31) Number of other ongoing processes involving the community and Lawrence Livermore National Laboratory.	0	1	4	2	3	3
32) Number of other ongoing processes involving the community and ATSDR.	6	3	2	1	0	1
33) Number of other conflicts between the community and state or federal governmental agencies.	0	3	3	4	0	3
34) The extent to which key interest groups have established leadership, we already know who speaks for which groups in the community.	0	0	0	2	9	2
35) Number of well-established interest groups in the area.	0	0	0	4	7	2
36) Number of places where meetings could be held that participants will feel are safe (neutral) and accessible.	0	0	1	4	5	3
37) Amount of time available to solve the problem and reach closure.	0	1	0	7	2	3

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.