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

**Case Study:
Setting soil clean-up standards at the Rocky Flats
Environmental Technology Site**

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Overview of Research Project

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

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

1. Are there views of what is the most appropriate type of public participation process that are similar regardless of the topic being discussed?
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 management, watershed planning, and radiological contamination clean-up and health effects

protection. For each venue we conducted three case studies to inquire into participants' ideas of what matters in a public participation process. A tenth case study was conducted of a National Park Service planning process. In each case study, we asked about a dozen carefully-chosen individuals to express their viewpoints about what would be the best public participation process features for a particular context. To make sense of their different points of view, we used Q methodology. Q methodology is a way of finding commonalities among many independent and different perspectives on a topic. For each case study Q analysis identified three to five perspectives of what would be the most appropriate public participation process in that case.

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

Goals of this Research Project

This research was funded by the National Science Foundation for the purpose of improving theoretical knowledge about public participation in environmental and risk decision-making. Better understandings of what different people want and expect from public participation processes will be beneficial to community members, local officials, regulatory agencies, and other interested and affected parties. 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 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. Companion reports are available about each of the other nine case studies. Other publications will be prepared that address the cross case comparisons and the summary findings from the project as a whole.

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Setting Soil Action Levels for Clean-Up of the Rocky Flats Environmental Technology Site

Introduction

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

We addressed four questions in this case study research. First, we inquired into the variety of perspectives held among participants for a process by asking about their preferences for different process features. Second, we asked how important a variety of potential outcomes were to the participants. Third, we asked how perceptions of the context influenced participants' beliefs about what is a good public participation process. Fourth, we gathered information about each of the people participating in the case study to assess how factors, such as interest group affiliation and years of involvement with the issue, influenced perspectives about process. In this report we present findings from our study of efforts to establish standards for clean-up of radioactive contaminants in soil around the Rocky Flats facility near Denver, Colorado. This case study is one of 10 that we completed as part of the full project (see Appendix A for a list of the case studies).

Background

The Rocky Flats Environmental Technology Site is located about 15 miles northwest of Denver, CO. Rocky Flats is the location of a former nuclear weapons production facility owned and operated by the Department of Energy. It began operations in 1952, with the primary mission of producing nuclear weapons components and assemblies (i.e., plutonium pits) manufactured from uranium, plutonium, beryllium, and other metals (Department of Energy 2001). Both routine operations and accidents resulted in widespread contamination of the site with radionuclides and toxic substances. In 1989 the FBI and EPA completed a safety review that resulted in the temporary shutdown of plutonium-related operations. The site was placed on the National Priorities List of CERCLA (Superfund) in 1989. Further reviews culminated in the ending of all activities related to nuclear weapons production in October, 1994. Since 1994 the mission of Rocky Flats has been clean-up, remediation, and closure. Kaiser Hill is the contractor responsible for these activities. DOE and Kaiser Hill's goal is to finish closure-related activities by 2006, at which time longterm stewardship activities will start. Many stakeholders are skeptical that this goal can be achieved. As part of this plan, the entire site will become a National Wildlife Refuge managed by the US Fish and Wildlife Service (Department of Interior).

Clean-up involves many activities and many players. As part of clean-up operations buildings are being demolished, wastes are being uncovered, stabilized, and removed, and

groundwater is being treated. Some wastes have been packaged for shipment offsite. Many technical studies have been completed to characterize wastes and their migration through soil, groundwater, and air and to assess health risks from historical releases and residual contamination to be left after site closure is completed. As part of these activities, the Department of Energy and Kaiser Hill work with the US EPA, Colorado Department of Public Health and Environment, Counties of Boulder, Broomfield, and Jefferson, Cities of Arvada, Boulder, and Superior, and the Town of Westminster. Stakeholder involvement has been extensive, including the establishment of the Rocky Flats Citizens Advisory Board (RFCAB), Rocky Flats Coalition of Local Governments (RFCLOG), and Rocky Flats Radionuclide Soil Action Levels Oversight Panel (RSALOP) among others. Each of these has produced its own workplans, studies, and workshop reports (e.g., Rocky Flats Stewardship Working Group 2001, RFCAB 2001). Conflict has not been reduced by the extensive public involvement efforts; in fact, Satterfield and Levin (2002) argue that public involvement and risk communication activities may have exacerbated conflict.

Radionuclide Soil Action Levels

One of the main areas of focus during the last several areas dealt with the levels of residual plutonium that will remain in soils after the site is fully closed and longterm stewardship begins (RAC 2000, Rood et al. 2002, Till and Meyer 2001). In 1996 the Department of Energy, US EPA, and Colorado Department of Public Health and Environment included interim “radionuclide soil action levels” (RSALs) for plutonium and other radionuclides such as Americium-241 in the Rocky Flats Clean-up Agreement. This agreement is the legally binding agreement for site remediation among the DOE, EPA, and Colorado Department of Public Health and the Environment. RSALs are a legal measure used to determine whether radioactive materials in soil must be removed or contained to reduce risk. If contamination is below the RSAL no remedial action must be taken.

Various stakeholder groups were concerned about the level of public health protection the RSALs could provide; they felt the residual risks would be too high. Thus, questions about the validity of assumptions and assessments used to determine the RSAL’s and about their effectiveness at protecting public health over long periods of time were raised (IEER 2001). In fact, the interim RSALs were higher than remediation levels set for other sites. The Rocky Flats Citizens Advisory Board, Rocky Mountain Peace and Justice Center, Town of Westminster, City of Broomfield, local Congressman David Skaggs, and others asked for an independent assessment of the RSALs and how they were determined.

Consequently, the DOE funded an independent assessment of the RSAL’s in 1998. This independent assessment was overseen by a committee called the Rocky Flats Radionuclide Soil Action Levels Oversight Panel (RSALOP).¹ It was comprised of thirteen individuals representing various technical, community, and local government perspectives. In addition, the RSALOP provided opportunities for involvement and outreach with the broader community concerned with Rocky Flats clean-up, closure, and future use. For example, monthly working meetings were open to the public and a series of public workshops were held (RFCAB 2001). The RSALOP selected the Risk Assessment Corporation (RAC) to conduct studies:

¹ Additional information is available from the web site www.racteam.com/Experience/Projects/RSALS.htm.

- a) of soil action levels for plutonium contaminated soils elsewhere, both nationally and internationally;
- b) exploring the validity of different computer models for determining RSALs at Rocky Flats;
- c) recommending assumptions and input parameters for computer-based calculations of RSALs at Rocky Flats; and
- d) independently calculating RSALs for Rocky Flats and comparing them with those recommended in 1996 . At the same time, various public education opportunities about the RSAL's were sponsored by the RFCAB and others (RFCAB 2001).

The studies were completed by RAC in February 2000. Based on RAC's work the RSALOP recommended lowering the soil action levels from 651 picocuries per gram of soil (the 1996 interim standard) to 35 picocuries per gram of soil (RAC 2000). The RSALOP was dissolved in 2002.

Concurrently with the RSALOP process and RAC study, other groups such as the Rocky Flats Citizens Advisory Board and the Rocky Flats Coalition of Local Governments, provided opportunities for public discussion and education of the RSAL's. In addition, subsequent to the RAC study discussions to provide comment and input on DOE actions related to soil clean-up have continued. For example, a technical review of the RAC study was conducted for the Rocky Mountain Peace and Justice Center by the Institute for Energy and Environmental Research (IEER 2001), with a particular focus on whether proper assumptions about exposures from future land-use were used.

The Rocky Flats Citizen Advisory Board

The Rocky Flats Citizen Advisory Board (RFCAB) played an important role in discussions about the RSALs, by issuing recommendations, co-sponsoring workshops, and providing opportunities for public education. The RFCAB was established in 1993 as one of the Department of Energy's Site Specific Advisory Boards.² Although the RFCAB is an independent tax-exempt organization it is funded by the DOE Environmental Management Program and is required to follow requirements of the Federal Advisory Committee Act (FACA). The RFCAB was established to provide independent, community-based recommendations to the DOE, EPA, and Colorado Department of Public Health and Environment about waste management, clean-up and future use of Rocky Flats. It emphasizes public education and public involvement.

The RFCAB includes members from diverse backgrounds and stakeholder groups. It selects members based on their representation of pre-defined constituencies, including academic institutions, business, local communities, local governments, health care providers, public interest groups, environmental organizations, Rocky Flats employees, and technical disciplines. Staff from the relevant state and federal agencies and Kaiser Hill attend meetings that are also open to the public. The RFCAB meets monthly, has established working groups on particular issues, has commissioned reports and studies, and has co-sponsored workshops on topics of interest. It also works closely with site-specific advisory boards at other DOE nuclear weapons

² Additional information is available from www.rfcab.org.

sites on common issues of concern (e.g., groundwater contamination, waste transportation). The RFCAB is facilitated by a professional facilitator and uses consensus for decision-making.

The Rocky Flats Coalition of Local Governments

The Rocky Flats Coalition of Local Governments was established in 1999 by agreement among the seven county and local governments that border the Rocky Flats site.³ It has also played an important role in the setting of RSALs by, for example, providing comments and recommendations about computer modeling assumptions and parameters. The Coalition functions as DOE's Community Reuse Organization at Rocky Flats. Its purpose is to "provide an effective vehicle for local governments in the vicinity of Rocky Flats and their citizens to work together on issues of mutual concern relating to the safe, prompt, and effective cleanup and closure of Rocky Flats. The Coalition also works on future use and long-term protection issues, worker protection and health issues, and facilitates communication between state and federal agencies and local elected officials."

RFCLOG is governed by a Board of Directors, with representation from each of the seven local governments. Decision making is based on majority voting (not consensus), but at least five of the seven governments must support a motion for it to pass. The Coalition is funded by monies from each of the seven counties, cities, and towns, the DOE, State of Colorado, and other sources. Like the RFCAB, the RFCLOG has a stated interest in public involvement, has monthly meetings, and works closely with other organizations

While this case study has focused on efforts to establish soil action levels for radionuclides (i.e., plutonium) at Rocky Flats, this issue did not occur in isolation. At the same time RSALs were being proposed, evaluated, criticized, and discussed, other important issues related to clean-up, closure, and future use were also being considered. These included proposals to transfer ownership and responsibility for the site to the US Fish and Wildlife Service, determinations about possible future uses of the site, decisions about waste transportation, and public health studies about historical releases of contaminants offsite. In particular, the RFCAB and RFCLOG provided comments to the DOE expressing the importance of considering the RSALs as just one component of a larger effort to ensure that Rocky Flats is satisfactorily cleaned-up. For example, the RFCAB made a recommendation that the RSALs be revisited at a later time when new science and remediation technologies become available. The RFCLOG has noted that RSALs, as proposed, will not ensure that other water quality regulations are met. Interactions among the myriad issues at Rocky Flats inform understandings and evaluations of the process to establish soil action levels.

Research Methods

We selected individuals to participate in our study who:

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

We did not consider -- nor did we care about -- their views on the substantive nature of the policy issue. To help us identify people for our case study research we obtained input from Dr.

³ Additional information is available from www.rfclog.org.

Judith Bradbury, Battelle Pacific Northwest Laboratory, who is familiar with this case (Bradbury et al. 1999, 2003).

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

Data were gathered from each person during June and July 2002 (we met with 10 in person in Colorado; two were contacted and provided responses via the mail). We asked each participant to do four tasks:

- 1) complete an exercise 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 the context in which the process occurs, 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, although we expected, of course, that their experiences would inform their ideas for a new process. In the following sections we discuss each of these tasks and our findings.

Table 1. Participants in the Rocky Flats Case Study.⁴

- Suzanne Allen (member of RFCAB; business community representative)
- John Corsi (Kaiser Hill)
- Gerald DePoorter (former chair of the RFCAB)
- Sam Dixon (elected official, City of Westminster; member of RFCLOG)
- Jeff Eggleston (chair of RFCAB; health industry representative)
- Pat Etchart (DOE Rocky Flats, Office of Communications)
- Shirley Garcia (member of RFCAB; government representative; staff of City of Broomfield)
- Victor Holm (member of RFCAB; technical representative)
- Ken Korkia (RFCAB staffperson)
- Tom Marshall (Rocky Mountain Peace and Justice Center, Boulder, CO; former chair of RFCAB and current member of RFCAB; public interest group representative)
- LeRoy Moore (Rocky Mountain Peace and Justice Center, Boulder, CO; former member of RFCAB; former member of RSALOP)
- Hank Stovall (elected official, City of Broomfield; member of RFCLOG; former member of RSALOP)

⁴ Identification of membership on the CAB and RFCLOG in Table 1 refer to memberships during 2002, when we met with these individuals. Some have since left (e.g., LeRoy Moore, Jeffrey Eggleston). Victor Holm is now the chair of the CAB.

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.⁵ 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.⁶ 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.

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 DOE’s process to set clean-up levels for contaminated soils at the Rocky Flats site 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.

⁵ 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.

⁶ 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. 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.
- 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 Department of Energy, who then makes 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 Department of Energy responds 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 Department of Energy.
- 37) The purposes and goals of the process are clear to all involved.
- 38) The process does not make any pre-existing conflicts worse.

Table 2, continued.

- 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 Department of Energy.
- 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 Department of Energy's 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.

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

This is how the Q sort happened. We asked each participant to read all the statements through once or twice. Then we asked them to sort the statements into three piles, the left-hand pile being the less important ideas, the right-most pile being the most important ideas, and the middle pile being in between. The Q sort was further constrained by forcing participants to sort the cards into a specific pattern. This pattern is shown in Figure 1.⁷ 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.

⁷ 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.

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

Figure 1. Layout for Q sort cards.

Shaded	Shaded	Shaded	Shaded	Shaded	Unshaded	Shaded	Shaded	Shaded	Shaded	Shaded
Shaded	Shaded	Shaded	Shaded	Shaded	Unshaded	Shaded	Shaded	Shaded	Shaded	Shaded
Shaded	Shaded	Shaded	Shaded	Shaded	Unshaded	Shaded	Shaded	Shaded	Shaded	Shaded
Shaded	Shaded	Shaded	Shaded	Unshaded	Unshaded	Unshaded	Shaded	Shaded	Shaded	Shaded
Shaded	Shaded	Shaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Shaded	Shaded	Shaded
Shaded	Shaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Shaded	Shaded
Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded
Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded
Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded	Unshaded

Least
Important

Most
important

Q Method Data Analysis

Q sort data were entered into a computer program called MQMethod.⁸ This program computes the statistical analysis.⁹

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

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

MQMethod is basically a factor analysis program. A factor analysis is a way of identifying a handful of underlying variables that account for changes among a much larger group of measured variables. In this instance, the 12 Q sorts are the measured variables and the factor analysis reduced them to three 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

⁸ This freeware program is available through <http://www.qmethod.org>. Readers interested in learning more about Q method will find this website informative.

⁹ 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.

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

Three distinct and coherent factors — or what we will continue to call perspectives on public participation process — emerged from the analysis.¹⁰ 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 three perspectives. The end product of the Q study is a set of narrative descriptions of each perspective, which are discussed below.

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

Table 4 shows that there are three different perspectives on what would be an appropriate public participation process.¹¹ Table 5, which presents the correlation coefficients among the factors, indicates that these three perspectives are largely independent. The closest correlation is between perspectives A and C, which are 45% alike.

What is particularly important is that every person loaded significantly on at least one perspective. Only one person, Paul¹², loaded significantly on two factors each. This result suggests that this individual expressed a point of view that is unique and not captured by any of the three “ideal types” emerging from this solution. It suggests there is another factor solution that might be appropriate.¹³ However, when we investigated this possibility, through additional judgmental hand rotation of factors and inclusion of additional factors, we discovered all new solutions that were produced had many more participants confounded on more than one factor, higher inter-factor correlations, and/or less variance explained. Thus, these alternative solutions were not as informative about the differences in preferences among the participants in our study.

¹⁰ 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.

¹¹ Recall that the condition of instruction was: *Imagine that the DOE's process to set clean-up levels for contaminated soils at the Rocky Flats site 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.

¹² Again, aliases are used to protect the confidentiality of those participating in our study.

¹³ There are, in principle, an infinite number of possible factor solutions. None is “more right” than another in any objective sense. Researchers justify their solution on various grounds. One solution, called the “varimax” solution, is popular. It is the solution that maximizes the variance explained. In other words, it explains more of the variation in the data than does any other solution.

Table 4 reveals that the first perspective is strongly held by five of the people in our study. Perspective A accounts for 24% of all the variance; this is the highest of all factors. This means that among our small group of participants it is the most widely held view. Bernhard has a positive, and nearly significant, loading score (0.41 n.s.)¹⁴ on this factor, suggesting agreement with some portions of it. David, Nancy, and Richard also have positive loading scores (0.38 n.s., 0.38 n.s., 0.33 n.s., respectively) suggesting agreement with some portions of Perspective A.

Perspective B, in Table 4, is shared by three individuals. In addition, David has a negative loading score on this factor (-0.27 n.s.); this means that he opposes some aspects of Perspective B. Luc has a positive loading score (0.37 n.s.) on this factor, suggesting agreement with some portions of it. This perspective is weakly correlated with Perspective A (inter-factor correlation is 0.45, in Table 5).

Perspective C is defined by five individuals, including one that also loads positively on Perspective B (Paul). Paul loaded more strongly on Perspective B, which is why he is listed under that perspective in Table 4. In addition, Bonnie has a negative loading score on this factor (-0.32 n.s.); this means that she opposes some aspects of Perspective C. This perspective is weakly correlated with Perspective B (inter-factor correlation is 0.37, in Table 5).

In each of the following sections we present the perspective narratives. These describe views the participants in our study have about the process they would create if they were responsible for setting clean-up standards for Rocky Flats soils. Since the narratives are constructed from the Q statements, references to important Q statements are included in the descriptions below.

¹⁴ n.s. means “not statistically significant at the 0.05 level or better.”

Table 3.
Ranking of each statement for each perspective.

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

Table 3, continued.

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

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

	Loading scores on perspectives		
	A	B	C
<i>Perspective A</i>			
Linda	0.76	0.07	0.13
Scott	0.71	-0.11	0.14
Eva	0.66	0.05	0.05
Joanne	0.65	0.17	0.11
Bethany	0.65	0.19	0.02
<i>Perspective B</i>			
Bonnie	-0.03	0.79	-0.32
Paul	0.01	0.70	0.42
Bernhard	0.41	0.68	-0.18
<i>Perspective C</i>			
Luc	0.06	0.37	0.73
David	0.38	-0.27	0.72
Richard	0.33	-0.04	0.68
Nancy	0.38	0.22	0.48
Variance explained	24%	16%	18%

Table 5.
Correlations Between Perspectives

Perspective	A	B	C
A	1.0	0.12	0.45
B		1.0	0.37
C			1.0

Perspective A

This is a perspective that sees the need for a process that includes important stakeholders working together in a well-managed, efficient process that results in meaningful outcomes. The most highly ranked statement is that the process should conclude with a clear plan for implementation of recommendations (42). Two additional highly ranked features are that the purposes and goals should be clear to all (37) and that the process make progress on the right problem (44) – even if the definition of the problem evolves during the process.

While the process should result in well-crafted and relevant outcomes, those holding this viewpoint do not believe that the recommendations have to be acceptable to the DOE (48) or to one's own organization (46). Recommendations do not have to be acceptable to the DOE because there are other important agencies/institutions with responsibilities for managing Rocky Flats during clean-up and post-closure, such as local government.

Several factors are important to laying the foundation for achieving progress on the right problem (44) and concluding with a clear plan for implementation. First, all important stakeholders should take part (40). Second, the participants – including the DOE -- should be accountable and honest; they should see beyond their self-interests to the larger good (11), they should attend meetings regularly (17), and the DOE should respond to requests for information, questions, etc. in a timely, truthful manner (24). Third, the discussions among the participants should be well-run to ensure that people do not get side-tracked from agreed-upon purposes and goals (37, 44). This requires that there be an unbiased/independent facilitator (35) and clear groundrules for interaction (23). Finally, there needs to be high quality information on which to base discussions and recommendations; the process should use the best available science for analysis (2).

However, because this is a process that focuses on the participation of important stakeholders there is no need to make the process broadly accessible. For example, meetings do not need to be held in different locations or at different times (8). Similarly, while it is very important that the best available science be used for analysis (2), there is no need to make all information widely available – participants need to focus on what is important to solving the problem at hand. Thus, it is only of moderate importance that the process tap knowledge and experience of local people (47), there be full disclosure of information at all times (41), and participants have equal access to information (39). Allowing restrictions on who can participate (12) was ranked lower in all other perspectives. The lack of attention to broad accessibility is, in part, a result of the process having already gone on for a number of years; there is a feeling that the concerns of the general public and understanding of other's values, for example, are already known.

Finally, the concern for efficiency among those holding this viewpoint contributes to their preference for additional procedural constraints on features that might allow the process to be side-tracked, waste people's time, or prevent important decisions from being made. There are decisions that must be made, even if everyone cannot be happy. For example, consensus is rejected by those holding this perspective. Consensus should not be used to make decisions (16) or to determine decision rules (22). Decision-making authority – including the making of formal recommendations – should not be open to all, because otherwise the process can get bogged down. To also increase efficiency and decrease the possibility that the process will be

sidetracked to “wrong” problems there is no support for allowing everyone an equal chance to put their concerns on the agenda (31). Rather, an independent/unbiased facilitator will ensure that the agenda addresses the important concerns of stakeholders that are on topic.

Perspective B

This perspective describes a process that maximizes the opportunity of people to participate effectively. Participants should be able to influence the outcomes of the process. Consequently, those supporting this perspective are sensitive to issues of access, accountability, and power.

Meaningful access to the process is ensured when everyone is on the same footing. All participants should have equal access to important information (39, 41). There should be adequate notification of meetings (53) and meetings should be held at different times and locations (8). Meetings held only during working hours or in far-away locations (e.g., Denver) are not appropriate; the needs of volunteer participants should be considered. Access is also enhanced when efforts are made to minimize feelings of intimidation. For example, there is some support for paying attention to the physical arrangement of tables and chairs in meetings (25).

The concerns of all participants should be protected by an unbiased/independent facilitator (35). Participants should have an equal chance to put concerns on the agenda (31). Discussion of topics should not be limited in order to avoid quagmires (33). And, participants should not be constrained by having “reasonable” expectations about what DOE can do (15) because that can marginalize some views. In fact, there is a sense that the more DOE and Kaiser Hill are pushed the more they will do. To further protect the interests and needs of all stakeholders, consensus is very important to this perspective. Consensus should be used to make all important decisions (16), including recommendations, and to determine decision rules (22).

The character of meetings is important to this perspective, because the quality of interactions can affect accessibility and power. There should be ground rules to govern interaction (23). Here the importance is on ensuring that participants feel listened to (1) and that they are able to explore all concerns and make progress on the problems of interest to them. As one high loader on this perspective noted, the problems identified by the participants may be different than the “right” problems as defined by government agencies (44).

A somewhat less important concern for those holding this perspective has to do with the role of technical information. Procedural features having to do with the quality of information were ranked from medium to low importance (2, 4, 45, 47, 55, 56), in part because they were interpreted as being primarily related to *technical* information. While technical information and analysis are important there are other justifications for making recommendations. Moreover, those holding this perspective emphasize that scientific understandings are always limited.

At the same time, there is a concern that people not be excluded because of lack of technical knowledge; discussions, reports, etc. should be conducted at a level understandable to the participants. There should be access to independent technical people that can help to explain complicated issues and documents and point out areas of concern. As one high loader on this perspective noted, what is critical is that both technical and non-technical information be clear,

honest, and open about biases. A good process, moreover, will help participants develop better understandings of technical issues.

This perspective does not place much emphasis on whether the process produces a plan to ensure that promises are followed through (50) or that the process is well timed to the agencies' opportunity to act (52). There is skepticism about requirements to meet DOE schedules at the expense of having a meaningful dialogue – especially because there is a sense that DOE often fails to meet its own schedules. Furthermore, producing recommendations for the DOE, who then makes the final decisions (14), is viewed as very unimportant. There is a perception that DOE measures success based on the *quantity* of recommendations emerging from the process rather than the *quality* of recommendations. Instead, recommendations are important to creating a paper trail that undermine claims that the public is behind all of DOE's decisions. At the same time, participants want to make progress; it is just that their view of progress may differ significantly from the DOE's or contractor's view of progress. With a view more toward the broad, long-term needs of the affected community there is little desire to meet the more narrow bureaucratic needs of the DOE's or its contractors' focus on clean-up.

Perspective C

People who hold this perspective believe that a process should focus on scientific and public health aspects when setting soil action levels for the site. This is a process that retains the authority of the responsible authorities and allows them to make their own choices, as informed by participants in the process.

Making progress on the right problem is important to those adhering to this view about a good process (44). A high quality science-based process to solve the right problem requires that a process use the best available science in analysis (2), use the right information (45), and justify recommendations with evidence (20). Because they often have the information, agency staff must be responsive to requests for information, etc. (24). Because the issues needing attention are highly technical the process should avoid simplifying information for those without a firm understanding of the science. Participants should be able to deal with complex technical issues (19).

Trust between the community and the DOE (and its contractors) and collaborative relationships among participants are critical because they allow confidence in the work of others (36, 7, 3), especially when there can be conflicting technical experts and uncertain scientific understandings. They are also necessary when knowledge is always improving and there are no uniform national standards for soil clean-up levels. Finally, they are important because the process must result in decisions for time-sensitive problems (e.g., initial decisions must be made to ensure that actions can be taken later within planned schedules). The process must ensure that the best can be done with what is known now.

As part of a credible, science-based decision-making process, the responsible agency should know what it expects from participants and make those reasons clear to the participants. Those associated with this perspective felt that past efforts at Rocky Flats failed to be clear about what was needed from the participants. At the same time, the process should focus on the issues at hand and not get side-tracked into value-oriented, ideological debates (27). Thus, it is hoped that

participants will be able to see beyond their self-interests to the larger good (11) and have reasonable expectations about what the agencies can do (15). In addition, participants should be accountable for what they say and do (13). It is easy to derail a discussion with tangential issues; an effective leader is important to keep the process focused (49). There is a feeling that if the DOE, Kaiser-Hill, and the participants can focus on the important problems at hand and stay away from self-interests, then the participants will be able to make reasonable, competent recommendations that promote the broader good.

This perspective does not place a strong emphasis on making the process widely accessible. Meetings do not have to be held at different times and locations (8) to facilitate participation, in part because past experience reveals that “core” participants will come and that “John Q. Public” will rarely come no matter how meetings are arranged. This is also a reason that it is not important to make participants feel comfortable and safe (21) or provide financial resources to enable participation (10). The need to ensure that all important stakeholders take part in the process (40) receives weak support in this perspective. Finally, consensus is viewed as a way of allowing the process to be side-tracked; thus, it is not supported (16, 22). One person leading on this perspective noted that consensus recommendations must please so many competing interests that they are often “watered down” and have limited value.

Comparison of Perspectives

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

First, all of the perspectives place importance on making progress on problems. They also agree that there may not be a clear definition of the “right” problems at the beginning of the process. In Perspective B there is also an emphasis on the possibility of differing definitions of the important problems that should be addressed.

Second, each perspective is concerned with bringing relevant and high quality information into the process to inform recommendations and decisions. Perspectives A and C, however, place much more emphasis on technical information. Perspective B recognizes other types of information as important and relevant to making recommendations.

Third, there is a general lack of concern about some issues, including whether the process improves participants’ understandings (34) or skills (32). Statements about each of these qualities received relatively little emphasis, perhaps because there is a feeling that the concerns of the general public and understanding of other’s values, for example, are already known because people have been working on these issues for a long time. This lack of emphasis on skill building and developing understandings as part of the process also reflects the lack of emphasis given to capacity-related outcomes (see below). Furthermore, there is little concern that the process produce outcomes that are acceptable to the DOE (48) or that the process might make pre-existing conflicts worse (38).

Fourth, each of the Perspectives places importance on the need for either effective leadership or facilitation. However, the reasons differed. Perspectives A and C see facilitation and leadership as a way to keep the process focused and to avoid tangential issues. On the other

hand, facilitation within Perspective B is viewed as a means to ensure access to deliberations and to avoid important concerns from being sidelined.

There are important areas of disagreement among these perspectives. One important area of disagreement concerns the use of consensus. Perspective B places much importance on the use of consensus to protect stakeholders, while Perspectives A and C prefer to not use consensus. In Perspective A consensus is viewed as a barrier to making decisions. In Perspective C there is a worry that consensus leads to “watered down” recommendations.

Second, there is a divergence about access and who should be a participant. Both Perspectives A and C suggest limitations on who can participate. Allowing restrictions on who can participate (12) was ranked highest in Perspective A. According to Perspective C there is a need for participants to have technical understandings of the issues (19), because complex issues should not be over-simplified. Both of these Perspectives also give higher support for participants having reasonable expectations about what the DOE can do (15). In contrast, Perspective B places strong emphasis on access and openness. In this Perspective attention should be given to making meetings and information broadly accessible. Restrictions on who can participate can marginalize important viewpoints.

Third, while each perspective places importance on the character of relationships and interactions among participants, they are concerned about different aspects. In Perspective A participants, including the DOE, should be accountable and honest; they should see beyond their self-interests to the larger good (11), they should attend meetings regularly (17), and the DOE should respond to requests for information, questions, etc. in a timely manner (24). Accountability and a concern that participants adopt an orientation toward the common-good (11) are also apparent in Perspective C. In addition, Perspective C emphasizes trust among the participants. In Perspective B the weaker emphasis given to statement 11 reflects the concern that the viewpoints of some not be marginalized because more powerful stakeholders define them as contrary to the “common good.” In Perspective B the emphasis is place on ensuring that participants feel listened to (1).

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 Department of Energy.
- 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 Department of Energy.
- 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 further analyses of these data because the number of study participants is small.¹⁵

¹⁵ These data are being used for further statistical analyses as part of our cross-case comparisons that will be described in a future report.

Table 7 shows the importance given to each of the potential outcomes by the twelve 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, and less concerned with capacity building. The most highly ranked statements 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),
- “the outcomes have broad-based support within the community” (#18), and
- “there is a clear plan for how to implement the outcomes” (#14).

Three of the substantive policy outcomes had no one rank them in the most important pile, suggesting these were not critically important:

- “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 Department of Energy” (#17).

Several other outcomes also received low rankings that suggest their lack of importance to those participating in our study. The outcomes receiving the most rankings in the lowest category were:

- “the process promotes a regional sense of place” (#7),
- “the process builds the confidence and self-esteem of the participants” (#11),
- “the process develops access to networks that allow new resources to be brought to the community (e.g., financial, technical)” (#6), and
- “the outcomes satisfy the Department of Energy” (#17).

Three of these are related to capacity building. In addition, five other outcomes related to capacity-building had no one rank them in the most important pile:

- “the process improves participants’ understandings of the issues” (#2),
- “the process enhances trust among different parties/stakeholders in the community” (#5),
- “the process improves people’s ability to work together better” (#8),
- “the process does not make any pre-existing conflicts worse” (#10), and
- “the process helps create new and lasting interest groups that can continue to work on the issues” (#12).

The lack of emphasis on capacity-building may have arisen in our study because decisions related to soil clean-up levels were being made after several years of prior deliberations, analysis, and decision-making on other clean-up issues at Rocky Flats according to some of our interviewees. Building skills, developing understandings, improving relationships, and other capacity-related outcomes were emphasized more strongly during these earlier years. This may also be the reason that such issues received little emphasis as process features (see above).

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)	2	6	2	2
2. The process improves participants' understandings of the issues.	1	5	6	0
3. The process improves participants' understandings of others' beliefs, values, and perspectives.	2	6	2	2
4. The process enhances trust between the community and the Department of Energy.	0	8	2	2
5. The process enhances trust among different parties/stakeholders in the community.	1	6	5	0
6. The process develops access to networks that allow new resources to be brought to the community (e.g., financial, technical).	6	6	0	0
7. The process promotes a regional sense of place.	9	2	1	0
8. The process improves people's ability to work together better.	2	6	4	0
9. The process strengthens democracy and rebuilds people's faith in government.	4	3	3	2
10. The process does not make any pre-existing conflicts worse.	4	5	3	0
11. The process builds the confidence and self-esteem of the participants.	8	3	1	0
12. The process helps create new and lasting interest groups that can continue to work on the issues.	5	6	1	0
<i>Substantive Policy Outcomes</i>				
13. The process results in clear outcomes.	0	2	2	8
14. There is a clear plan for how to implement the outcomes.	0	3	3	6
15. Costs and benefits of the outcomes are distributed in an equitable way.	6	2	4	0
16. The outcomes are personally desirable to me or my organization.	4	5	3	0
17. The outcomes satisfy the Department of Energy.	9	2	1	0
18. The outcomes have broad-based support within the community.	0	3	2	7
19. Participants feel a sense of ownership in the outcomes of the process.	0	3	5	4
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	2	3	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 32 questions that asked the person to document their perception of the present conditions in which the public participation process existed. The instrument included in Appendix B provides information about the responses we received as well. The number of times a statement was rated along the scale of low (0) to high (+4) is shown in the appropriate cells. Because of the small number of respondents, and our commitment to protect confidentiality, we will discuss the responses in general terms.

One way to examine the degree of agreement or disagreement among those participating in our study is to compute the maximum difference in rankings that were given for each of the questions. Answers were spread across five columns (thus, the maximum difference can be 4). We looked to see which columns were occupied with a response.

For only 1 of the 32 questions is there a maximum difference of four between the lowest and highest rankings, meaning that there were assessments of 0 through 5 given. For 18 of the questions there is a maximum difference of three between the lowest and highest rankings which suggests disagreement among those involved in our study. For thirteen questions there is a difference of 2. For no questions is there a difference of one. The questions for which there is general agreement included:

- there is political pressure on the DOE to really involve and listen to the local stakeholder groups (#1),
- the level of commitment by the DOE to seeing the process through to its end (#8),
- the community is not economically dependent on the Rocky Flats site (#9),
- there is support from political leadership for this process (#14),
- the degree to which expert resources to the stakeholder participants are available (#19), and
- the number of places where meetings could be held that participants feel are safe (neutral) and accessible (#31).

The results shown in Appendix B reveal that while there are disagreements about how individuals assessed contextual conditions, among these people there is relatively strong agreement over how the context is perceived for many variables. Yet, just looking at these data we see that people who have been active with Rocky Flats clean-up for some time still disagree

about some important issues. 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.).

Furthermore, we are able to make a few observations about how the context is viewed among those who subscribe to the three different perspectives about the process, as discussed above.¹⁶ For example, those who subscribe to Perspective B believe that there is less support from local political leadership for the process (#14), fewer expert resources available to the stakeholders (#19), a weaker sense of place in the regional community (#21), less clarity about the policy issue being addressed (#24), less clarity about the mandate for what the process is intended to accomplish (#26), and fewer well-established interest groups in the area (#30) than do those who subscribe to Perspectives A and C. Furthermore, those who subscribe to Perspectives A and C believe that there is stronger scientific consensus about the policy issue (#25) than do those holding Perspective B. On the other hand, those who subscribe to Perspectives A and B feel that the importance of this issue to the regional population (#16) is stronger than those who subscribe to Perspective C.

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 twelve individuals reveal that most were interested in both local and national issues (10 of 12). Two people wrote that they were interested only in local issues, although one remarked on the need to work on national issues as well because they affect what happens at the local level.

Those that participated in our study were affiliated with a variety of interest groups. In response to the question about which interest groups a person most identified people identified themselves with business and private industry (3 times), environmental groups (8 times), community groups (3 times), state and federal agencies (once), peace and social justice groups (once), educational and research institutions (2 times), local government (4 times), and site contractor (once). Religious groups, property rights, and Native American and Tribal Government were never selected.

Table 8 shows how the individuals described their motivations for participating in efforts to determine soil clean-up levels for Rocky Flats. 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."¹⁷

The results illustrate that protection of public health was by far the most salient factor motivating people (9 times for protection of health of others and 3 times for protection of health

¹⁶ 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.

¹⁷ One respondent only identified one motivating factor.

of self and/or family), as would be expected in a case that addresses radiological hazards in a populated region. Protection of ecological systems was ranked as important three times. Three people ranked “it was their job” as an important motivating factor and two people ranked “a sense of civic duty” as an important motivating factor

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	3
Protect the health of others (e.g., community, vulnerable populations)	9
Economic effects to myself and/or family	1
Economic effects to others (e.g., community, region)	1
Improve the quality of life (e.g., recreational opportunities, farm life)	
Protect ecological systems (conservation, preservation, or stewardship)	3
Sense of civic duty	2
It’s my job	3
Improve social or environmental justice	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 issues related to the setting of clean-up standards for soil contaminated with radionuclides around Rocky Flats.

Our analysis revealed three distinct preferences for process design among the 12 people who participated in our case study research. Perspective A is mainly concerned with achieving meaningful outcomes through a process that includes important stakeholders working together in a well-managed, efficient process. Those subscribing to Perspective B feel that a process should maximize the opportunity of people to participate effectively. Those supporting this perspective are sensitive to issues of access, accountability, and power that enhance participants’ ability to influence outcomes. Perspective C describes a process focused on the scientific and public health aspects of setting soil action levels for the site. This is a process that retains the authority of the responsible authorities and allows them to make their own choices, as informed by participants in the process.

While people involved with planning for Rocky Flats clean-up 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 emphasis on substantive policy 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 (12 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 important 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.

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Appendix A: Case Studies in Research Project

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

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

Appendix B: Surveys

Name: _____

Case: _____

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

		Very Low				Very High	Don't Know
1	Political pressure on the DOE to really involve and listen to the local stakeholder groups.	0	1	1	9	1	0
2	Support for the process from within the DOE.	0	1	6	4	1	0
3	Previous experience that the DOE has had with public participation.	0	3	4	2	2	1
4	Level of trust between interest groups and the DOE.	0	4	6	1	0	1
5	Level of trust among interest groups involved in the process.	0	2	5	4	0	1
6	Resources available to the DOE that would help them run a good public participation process.	0	1	3	5	2	1
7	Commitment of the DOE to hearing all points of view.	0	1	7	4	0	0
8	Commitment by the DOE to seeing the process through to its end.	0	0	3	6	2	1
9	The community's economic dependence on the Rocky Flats site.	2	8	1	1	0	0
10	Stakeholders' prior experience working with each other on similar processes.	0	1	4	5	1	1
11	Stakeholders' skills at problem solving, conflict resolution, communication.	0	2	4	5	1	0
12	Stakeholders' familiarity with the issue.	0	0	4	5	3	0
13	How knowledgeable stakeholders are about each other's beliefs and values.	0	1	5	4	2	0
14	Support from political leadership for this process.	0	0	3	3	6	0
15	Support from local population for this process.	0	2	5	5	0	0
16	Level of importance of this issue to the regional population.	0	4	3	2	3	0
17	Cultural diversity among the regional communities.	1	4	4	2	1	0
18	Prior experience of participants working with the DOE.	0	1	5	5	0	1
19	Availability of expert resources to the stakeholder participants.	0	0	3	6	3	0
20	Density of networks connecting the key interest groups.	0	3	3	6	0	0
21	How strong is the sense of place in the regional communities?	0	3	1	5	2	1
22	Commitment among key stakeholder groups to cooperate.	0	2	5	3	2	0
23	Existing strength of local democracy in the region.	0	2	4	4	2	0
24	Clarity of the policy issue being addressed.	0	1	4	3	4	0
25	Extent of scientific consensus about the policy issue.	0	1	5	4	2	0
26	Clarity of the mandate for what the process is intended to accomplish.	0	1	3	5	3	0
27	Number of other ongoing processes involving the community and the Rocky Flats site.	0	3	1	4	3	1
28	Number of other ongoing processes involving the community and state or federal governmental agencies.	0	3	5	2	0	2

29	The extent to which key interest groups have established leadership, we already know who speaks for which groups in the community.	0	1	2	5	4	0
30	Number of well-established interest groups in the area.	0	0	3	6	3	0
31	Number of places where meetings could be held that participants will feel are safe (neutral) and accessible.	0	0	1	5	6	0
32	Amount of time available to solve the problem and reach closure.	0	6	3	2	1	0

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