

**SUPPORT FOR NACEPT RADIATION MEETINGS**  
**FINAL REPORT**

**Submitted by**

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FINAL REPORT**

**TABLE OF CONTENTS**

	<b>Page</b>
<b>FINAL REPORT</b>	
Executive Summary	1
I. Information Gathering Method	2
II. Findings from Interviews and Discussions	6
III. Recommendations	15
<b>PROCESS REPORT</b>	i
<b>APPENDICES</b>	
A. RESOLVE Annotated Bibliography on Issues Related to the EPA Radiation Outreach and Communication Materials	
B. Stakeholder Database	
C. EPA RPD Interview Protocol and Discussion Guide	
D. EPA RPD Discussions ? Detailed Responses	
E. EPA RPD Interviews ? Detailed Responses	

# **SUPPORT FOR NACEPT RADIATION MEETINGS**

## **Final Report**

Delivery Order #028

Contract 68-W4-0001

### **EXECUTIVE SUMMARY**

#### **Findings from Interviews and Discussions with Stakeholders.**

- Results from interviews and discussions were similar. Differences were in the precision of the answers.
- Respondents were mostly experts, not lay people; even the non-professionals are very familiar with the technical issues related to radiation.
- Respondents' comments were contextual. Their descriptions about the availability and credibility of information were quite dependent on their specific circumstance, and their points of view.
- Most respondents have a desire for continued involvement.
- Outside experts are trusted, and most respondents had developed a network of people they knew personally who they called whenever they needed information.
- Information for the general public needs to be described in contexts that non-professionals can understand; on most issues early and ongoing education is needed.
- Mistrust of information from federal agencies needs to be and can be overcome.
- The Internet is preferred by many as source of information. However, improvements in existing sites are needed.
- Credibility is the most important factor to consider when developing materials or a system, with reliability and ease of use close seconds.

#### **Recommendations.**

- EPA should send thank you letters and the final report to all interviewees, discussants, and academic advisors.
- Strongly emphasize enhancing the credibility, reliability, and ease of access to radiation information.
- Improve working relationships with the other radiation offices, agencies, university programs, and NGOs.
- Extend the stakeholder database with emphasis on stakeholder groups that were under-represented by this phase of the process.
- Continue the interview and/or discussion process and hone the questions to fit the needs of some specialized groups (especially the public).
- Develop new techniques for creating and enhancing personal networks.
- Conduct interactive workshops for stakeholders to design new materials, web sites, etc. that meet the needs of the "customer."
- Consider the use of the following information provision formats and techniques: an Internet site, a toll free number, and educational programs in public schools.



## **I. INFORMATION GATHERING METHOD**

### **ANNOTATED BIBLIOGRAPHY**

**Overview.** We began this project with the assumption that empirical research had been conducted on what kind of information citizens wanted to know about radiation. We expected that reviewing this research would allow us to build upon the work already completed to discover different stakeholders' information needs. However, we did not find literature or empirical research that directly answered our question, although we did explore a substantial body of literature on risk perception and risk communication that addresses public concerns over radiation. From this literature we discovered many themes which informed our thinking as we prepared the interview and discussion protocols.

**Method.** We began by looking for information that answered the question "what does the public know and want to know about the risks from nuclear power radiation."

We used the following key terms to conduct the literature review:

- radiation, nuclear power, nuclear energy
- decommissioning, decontamination
- risk, risk analysis, risk communication
- public perception, attitudes, reaction, participation, information, awareness, understanding, knowledge
- surveys, polls, public opinion, studies, attitudes

As we discovered key literature, we entered citations into a bibliographic database (see Appendix A; the software is *Citation 7*). Researchers cited several names frequently and these names appeared in the literature repeatedly. We called these scholars to ask them if our approach to the project made sense, if they knew of any studies, interviews, surveys, polls, reports, or focus groups that would help us answer what information the public would want a Radiation Information System to have.

We spoke with:

- Thomas Dietz, Professor, Sociology and Anthropology George Mason University;
- Penelope Canan, Professor and Director Environmental Institute, Sociology Department, University of Denver;
- Eugene Rosa, Professor of Sociology and Rural Sociology, Washington State University;
- James Flynn, Senior Research Associate, Decision Research, Eugene, OR; and
- Caron Chess, Director for Environmental Communication, Cook College, Rutgers University.

While we did not find any research that directly answers the question "what are the radiation information needs of citizens", the scholarly work did point to several interesting issues that are described below.

**Major Issues.** First, it is important to develop radiation information that encompasses the various stakeholders' and general public's questions about radiation. However, we have discovered in our review of the literature that merely providing interested groups and individuals with data and technical information may not meet their interests or needs. Several risk communication studies have shown that increasing dissemination of technical information can actually increase the public's fear and mistrust instead of allaying it. It is equally or more important to develop meaningful, respectful, and long-term relationships between interested individuals, organized groups, and the agencies providing the information. Trust in the information provider turns out to be one of the most important variables for citizens seeking information. Trust in the organization develops through transparent, inclusive and ongoing relationships (See Appendix A: Gricar *et al.* 1993, Flynn 1995, Kraft 1992, Lynn 1987, Pikawka *et al.* 1992, Sandman *et al.* 1993). Because this variable was so prominent in the review of the literature, we asked respondents in the interviews and discussions how they would like to be involved in the planning process and what sources of information they relied upon.

Second, many risk communication scholars recommend acknowledging and accepting the public's fears and perceptions about radiation. Even when experts and governmental agency authorities disagree with the public's fears or weighting of risks, it is important not to dismiss them as irrational or uninformed. Risks and fears are not only a product of information about science and technology, but are shaped by our values. The research describes the various ways that people assess risks within their own cultural, organizational, or other frameworks. The review of the literature demonstrates that not addressing citizens' concerns or (simply calling them information gaps rather than trying to understand why the public feels the way they do about existing information) is likely to deepen the public's mistrust toward government agencies responsible for radiation issues.

We also found that different people find different sources of information credible (DOE 1993, Gricar, *et al.* 1993, Flynn 1995, Pikawka *et al.* 1992, Slovic 1993). People's experiences with government agencies, corporations, and non-governmental organizations shape their perceptions of the credibility of the information provider. The discussions often highlighted that pertinent agencies, companies, and non-governmental organizations will need to be involved in the framing and design of any information materials to ensure that the agency can credibly address different needs of different groups.

Finally, different individuals and groups frame or organize the categories of information very differently than do scientists and nuclear managers. Our cognitive frameworks are

influenced by our backgrounds, gender, class, and work experiences. In a pilot testing study such as this one – which aims to understand how people think and perceive – good research techniques recommend discovering the analytic categories from the data instead of theoretical models. Therefore, we included open-ended as well as closed questions in the interview protocol and discussion guide. We also elicited information within a specific context or situation. This helped respondents answer our questions without us limiting or narrowing their options.

In addition to the expertise and experience of the RESOLVE Director of Research and Education, we relied on the following sources for conducting the literature search and designing the questions:

- Fink, Arlene, *Conducting Research Literature Reviews: From Paper to the Internet*, (1998) Thousand Oaks, Sage Publications;
- Hart, Chris, *Doing a Literature Review: Releasing the Social Science Research Imagination*, (1998) Thousand Oaks, Sage Publications;
- Weiss, Robert S., *Learning from Strangers: The Art and Method of Qualitative Interview Studies*, (1994) New York, The Free Press; and
- Robson, Colin, *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*, (1993) Oxford, Basil Blackwell.

#### **LIST OF RESPONDENTS**

The next step was to develop a list of names, organizations, and telephone numbers for interviews. Both Triangle and RESOLVE have extensive contacts in the environmental community from previous projects. We also worked with EPA regions and RPD staff to gather contacts appropriate for pilot testing. To generate the names on the prospective interview and discussion candidate list, Triangle and RESOLVE:

- consulted with people they had worked with in the past,
- consulted past project lists,
- identified the names of the interest groups and checked the geographic coverage to identify gaps,
- called contacts for additional names, and
- asked key contacts to review and augment our draft lists.

For this project, Triangle used these contacts:

- the League of Women Voters “National Dialogue” project,
- the NACEPT Radiation Phase IV project,
- Hanford Nuclear Reservation, especially people from the States of Washington and Oregon,

- federal contact people suggested by EPA including EPA Region I and U.S. Department of Energy (DOE) headquarters,
- consultants, and
- plaintiffs working on DOE database development.



Triangle and RESOLVE conducted “mini-interviews” with:

- Jim Cherniak and David Rothstein, EPA Region I;
- Judson Lily, DOE Decommissioning and Decontamination;
- Mary Lou Blazek and David Stewart-Smith, Oregon Dept. of Energy;
- Mike Garner, Washington State Department of Ecology;
- Doris Cellarius, National Sierra Club;
- Toby Michelina, International Energy Strategies; and
- Paul Gunter, Nuclear Information and Resource Service.

As we added names, we kept two goals in mind. First, the list needed to include cross-sections of people, organizations and agencies, and tribal governments. Second, we needed to have a pool of at least 100 names so that we could schedule approximately 50 interviews. EPA RPD staff decided they would contact people from federal agencies, so RESOLVE and Triangle neither conducted interviews with nor held discussions with federal agency staff.

The stakeholder database is incorporated as Appendix B. It includes all names generated for the list. We did not, however, interview or schedule discussions with all these individuals. The EPA RPD staff chose a list of 14 individuals to call to schedule interviews. From these 14 names, we scheduled and interviewed nine respondents in the order we were able to schedule calls.

From the remaining list, approximately 70 individuals were contacted and spoken with until the goal of 41 discussion appointments was reached. We sent them a fax letter describing the project and requesting their participation. Since the goal was to pilot test the discussion guide with only 41 respondents, some people did receive the letter who were not scheduled for a discussion. (In the end, due to several cancellations, the final number of the discussions held was 39.) We had 30 to 45 minute discussions with these individuals. We have described some themes from these interviews and discussions in the next section.

#### **INTERVIEW PROTOCOL AND DISCUSSION GUIDELINES**

From the review of the literature, the “mini-interviews,” and EPA’s goals for the project, we developed a formal interview protocol and an informal discussion guide. At EPA’s request we decided to write an interview protocol and a discussion guide. We administered the interview protocol to nine respondents. By using the interview protocol with nine respondents we hoped it would garner enough information about the instrument to serve as an adequate pre-test or pilot.

We revised the interview protocol as a discussion guide for the Triangle and RESOLVE interviewers to use with respondents. We used the discussion guide with 39

respondents. Both the draft interview protocol and the draft discussion guide were reviewed and revised by EPA RPD staff and RESOLVE and Triangle staff.

The interview protocol and the discussion guide are in Appendix C.

**Recommendations on the Interview and Discussion Documents.** At EPA's request we enlarged the view of the project to include all environmental radiation issues and focused primarily on people working with radiation issues in some way, rather than the general public. Once these modification to the project occurred, we realized the need to change the interview protocol or discussion guide enough to acknowledge these new respondents and issues.

Now that we have pilot tested both the interview protocol and discussion guide, it is clear that both need further revisions. The interview protocol and discussion guide should be tailored to fit the experience and knowledge level of the respondents. From the interviews, we found that people tended to cluster into three groups, 1) people who work with nuclear issues full time, 2) people who are familiar with but not experts about nuclear issues, and 3) people who are interested but unfamiliar with the issues or information. Therefore, three formats should be developed, one for each experience level of the respondents.

For both the interviews and discussions, we wanted instruments that would elicit information within particular contexts and specific experiences so that the information would be rich and detailed. Therefore, we asked respondents to answer the questions with specific cases or instances in mind. However, this technique was sometimes not effective with people who work with these issues as their primary job. Asking them to describe one situation at a time often did not help them focus on contexts, but just confused them. We need to develop a different way for them to tell us what kind of situations they need information for and how they address those specific needs. The way we framed the question did not acknowledge their expertise.

Many respondents were unclear if they should answer the questions from a personal perspective or as a member of a group. We should address how we want them to answer in future guides.

Several respondents added sources of information to the list of prompts or follow-ups. In particular, several respondents from tribal governments suggested adding tribal governments as information sources. Other respondents suggested adding professional journals and published books as sources.

Finally, the interviewers found many ways to re-format the interview protocol and discussion guide to make it easier for respondents to follow and for future interviewers. Several of these changes would make the form easier to use, such as providing more space for comments and answers. Other changes included adding to the list of information sources

and reminder lists, and clarifying the meaning of several questions. A revised interview protocol and discussion guide could be developed from their comments and experience.

## **II. FINDINGS FROM INTERVIEWS AND DISCUSSIONS**

### **OVERVIEW**

**Interview and Discussion Results are Similar.** There is not a lot of substantive difference between the results of the interviews and the discussions. The difference is in the precision of the answers. Overall, discussion respondents talked more. This is especially true for questions in which respondents were asked to rate items. In the interviews, there were clear scales (1-5) and few comments about the specific items; in the discussions respondent's answers varied according to the scale they decided to use, and we got a lot more narrative.

**Respondents Are Mostly Experts, not Lay People.** It should be kept in mind that we were talking with people who are very familiar with radiation and even with the technical issues related to radiation. Even the "citizen" representatives were activists and many represented national groups that provide information to their constituents. Thus, the answers we got might be quite different from people who know little about radiation issues. We did not interview or conduct discussions with representatives of industry workers or management, labor unions, federal agencies, or the general public (especially those near radiation facilities). Using the "identified stakeholder" approach of this project does not lead to the general public. If gathering opinions from the general public is a goal, other approaches will need to be used.

**Comments were Contextual.** The descriptions of the respondents about the availability and credibility of information were quite dependent on their specific circumstance, and their points of view. People who work as regulators are more comfortable with the availability and verifiability of the data and information than those who are seeking information from the "outside."

This contextual qualifier also applies to specific issues. For example, there seems to be agreement that information on health risks, especially from historic exposures, is hard to get, and that it is even harder to prove definitively that an exposure in the past is the cause of current medical condition. The differences in opinions are over what to do about the information deficiencies and whether they are the result of a deliberate cover-up of information or some other reason.

People outside the regulatory arena also agreed that there are too many players, too many non-linked regulations, and too many sources of information. They don't know how to compare sources, or who to believe. Many mentioned being called upon frequently to talk about their information needs. They wondered why federal agencies do not cooperate on getting out information. Many called for independent

oversight of the regulators (DOE, NRC). Some respondents suggested that this might be a role for EPA nationally. Others called for partnering and cited past examples of EPA partnering on information dissemination.

Respondents consistently commented that the more specific the information they needed, the more challenging it was to find. Another consistent comment (mostly by radiation professionals) was that the general public tends to be more concerned with relatively less important (i.e. less risky) radiation issues and problems and not so concerned about other issues that are seen by the professionals as much more important or serious.

**Desire for Continued Involvement.** Respondents almost universally expressed interest in having continued involvement with the project, and all who expressed interest suggested specific ways they could help, such as being on a planning group, or reviewing new materials.

**Outside Experts are Trusted.** The most frequently used and most trusted sources of information were personal contacts with outside experts. Most respondents had developed a network of people they knew personally who they called whenever they needed information. This has important implications for the design of an EPA information system. Typical systems are impersonal, thus making the most used source of information unavailable to lay people or newcomers who have not developed a personal network. Perhaps the Internet can be used to bridge this gap and give wider access to experts (see Recommendations, page 14).

**Put Information in Context.** Many respondents suggested that information and data needs to be presented for public use in the context of recognizable occurrences in daily life or of values people might hold.

**Education is Needed.** The need for early and ongoing education about radiation was often mentioned. Multiple respondents suggested that EPA develop K-12 curriculum and disseminate it to schools. Wider use of print and electronic media, such as TV specials, was also suggested. Many respondents also said that the key to getting information is knowing what to ask and who, and where to look for the information. They felt that an EPA outreach and information system should help guide people to the right questions and sources of answers.

**Mistrust Needs to be Overcome.** Many respondents noted the historic reluctance of regulatory agencies to share information, especially if the agency believes it might create fear. They commented that this reticence has actually had the opposite effect in that people fear what they do not know or cannot easily find out about. The mistrust that has increased over the past forty years might be overcome or lessened if people are given the information they feel they need, even if others deem it

unnecessary or controversial. They suggested that people should be trusted to sort out information and make their own decisions.

**General Information Needs by User Group.** Based on these discussions and interviews we would broadly characterize the radiation information needs of four user groups:

- a. General Public/Layperson – This group of people wants information on radiation in its most simple form: key concepts explained in easy to understand plain language, such as pamphlets and short pieces. These are not necessarily activists, but ordinary citizens concerned about radiation. We did not actually talk to many people in this category, but heard about their needs from others, such as radiation professionals who often interact with local government agencies that provide this kind of information.
- b. Non-Governmental Professional Activists and Advocates – This group of people tends to want more than just general information. They often want highly specific information on particular geographic locations, waste or power facilities, or companies (but not necessarily on specific types of radiation). An example would be an organization wanting information on radioactive waste generators in their state, including quantities, radiation levels, locations, and destinations and schedules of shipments. This group faces some of the same technical challenges in understanding radiation information faced by the general public, but they tend to be more knowledgeable and have much more specific radiation information needs.
- c. Radiation Professionals – On the whole this group is much more satisfied with their access to information on radiation. For state agency representatives, many of their comments were geared towards satisfying the information needs of their clients (local government and the public). Discussions did reveal some unique radiation information needs from professionals including updates on federal regulations and licensing issues, radiation incidence information, and centralized bibliographies.
- d. Tribal Nations. Those interviewed suggested that the unique cultural circumstances and lifestyle of the tribes (as well as the Trust responsibilities of the U. S. government) warrant the creation of a specialized source of information related to tribal governments. This is described in more detail in the next section and in the interview and discussion syntheses.

#### **THEMES THAT EMERGED FROM SPECIFIC QUESTIONS (see Appendices C, D, and E)**

**Situations and Information Sources.** The situations for which respondents most commonly mentioned a need for information were:

- risk and health impacts, including dose criteria;
- recycling of contaminated waste and waste disposal;

- regulatory policy and standards for clean-up;
- inter-relationship between various agency regulations and standards; and
- policy and standards enforcement.

Despite the overall high level of expertise, the perspectives of the respondents clearly shape their perception about both the availability and the reliability of information. (We did not talk with federal representatives.) State agency representatives were more positive about the availability of data and information, and had much more ready access to data, especially for monitoring data, than other respondents. They mentioned repeatedly the need to provide comparative risk information. Some radiation professionals dismissed some of the radiation needs of other non-professional stakeholders as excessive and unnecessary, such as comprehensive release of information on all radioactive waste shippers.

Non-state government agency representatives were much less sanguine about the availability of information, feeling that they often have to fight to gain access to it more than they should have to. They also mistrusted the information and almost always sought a second outside expert opinion. (We did not talk with industry representatives who might have had a divergent viewpoint.)

The representatives of tribal governments were extremely concerned both about the way EPA is going about involving tribes in this project, and about the availability of information. To the first point, they questioned why the EPA American Indian Environmental Protection Office was not the contact point with tribal representatives and the generator of names for us to call. They also emphasized that we should be calling direct tribal government representatives on a much broader scale, and not counting on the ideas of a few organizational representatives as speaking for all tribal government interests.

To the second issue of information availability, the tribal government respondents were very unhappy with the quantity and quality of data and its availability. They suggested that a separate section be established within the EPA information system to address tribal needs. They also suggested that not all tribes have access to the Internet, and that the information will need to be presented in many formats. They want a national site inventory that shows impact on tribal Trust lands, and site specific information.

Respondents from environmental and public interest groups were more concerned than state agency representatives about possible negative implications of exposure for human health and the environment. More than their agency counterparts, they found exposure information as harder to get and less reliable. They also felt that specific data, especially for historic sources, is particularly hard to get. They doubted the reliability of the data and the interpretation given to it by the federal and state agencies, and almost

always sought second opinions from outside experts. Respondents concerned with specific sites expressed greater concern about access to data than those looking at a broader national picture.

Respondents from other organizations, such as universities, felt that data is generally available, but that it is extremely difficult to verify. They also were quick to acknowledge the controversy that surrounds many of the studies of dose and toxicity and the impacts on human health.

**Frequently Used Sources of Information.** Almost all respondents used a few sources of information very frequently or frequently. These include:

- federal agencies,
- the Internet,
- professional journals,
- national or international technical or professional organizations and publications, and
- other professional colleagues or experts in the field.

**General Themes That Emerged about the Sources.** Among all sources of radiation information, the Internet was the clear winner. However, some respondents found some web sites hard to use, and suggested ways to improve the presentation and links between the information provided.

The usefulness of the other formats varied according to whether the respondent was answering for him- or herself, or as someone who provides information to the general public. For example, respondents did not find pamphlets, flyers, and short written materials very useful, except as flags to more detailed technical analyses. Yet many of these same respondents were quick to acknowledge the value of the shorter materials to the lay person.

Likewise, the respondents with an advanced level of technical knowledge and interest, found the longer written reports very useful. However, they did not want to receive such longer materials unless they specifically requested them, and they did not think such documents were generally useful to the public.

Some respondents liked "a little bit of written materials with lots of pictures, graphs, and figures" both for themselves and for their constituents, while some felt that such materials would not be an improvement over the same data available in the two formats discussed above.

Although many of the respondents participated in professional panels and regularly attended agency presentations, they did not think that lectures and discussions are

generally useful. This is largely due to the difficulty of getting people to attend and the limited ability of program organizers to reach many people.

In the category of "other formats," there were many suggestions that were repeated by respondents. The most often mentioned was education, including K-12 curriculum development and sponsorship, talk radio shows and TV specials, and more informational press releases to the media. Other examples included:

- case studies to illustrate how radon issues were resolved in specific schools
- high school science level text books written for the public;
- speaker kits with overhead slides;
- glossary of technical terms;
- live human beings staffing toll-free customer service centers (and able to speak multiple languages);
- quarterly updated CD-ROMs sent to state radiation offices with important data and federal regulation information; and
- an interactive EPA cable television show.

Also suggested was a two-tiered information system that had some information readily understandable by lay people, with the ability for any one person to go on to additional technical information.

#### **Some Details on Sources.**

Federal agencies are consulted because they are in charge of regulating radiation sources. Sometimes the data and information is believed, sometimes it is not, but it is always sought. Respondents not in the federal agencies feel better about having access to the information when they have a working relationship with people in the agencies who they can call for assistance.

Many view the Internet as revolutionizing information flow. Even those respondents who do not use it much personally, or have trouble navigating particular web sites, recognize the Internet as the wave of the future. Despite the recognized benefits of the Internet, several respondents pointed out the need to not neglect printed materials – for some communities that is their most accessible media.

Almost all respondents mentioned professional journals (a category not on our list) as a major source of information. Scientific articles, especially those that are peer reviewed, are highly credible sources of information. Online search databases (i.e. Quest as a source for health physics journals) are commonly used by radiation professionals.

National or international technical and professional organizations and their publications are commonly used and highly regarded.



Professional colleagues and other experts are regarded as far more than "word-of-mouth" information sources because of their knowledge and stature. Many respondents turn regularly to their colleagues who they know through professional organizations, and they seem not to hesitate to call on those they do not know who have the information they need. Formal and informal networks are a major source of both general and technical information.

Use of the other sources of information varied dramatically, depending on the interest and point of view of the respondent. Some general themes are the following.

Public libraries are used for access to technical articles and journals by those people who do not have access through their agencies organizations. Also used are interlibrary loans of technical materials. Many respondents who attempt to use libraries said that libraries are not very well supplied with information, or that they are not up-to-date.

The news media is not used for accurate technical information, although people read, listen, and watch to get a sense of what the public is being told and for case examples.

Local government agencies seem to be consulted only by other local government agencies.

Citizen groups rely on each other, but are not viewed generally by other categories of respondents as major sources of information, with a major exception being the American Lung Association.

**Factors to Consider when Developing a System.** Credibility is the most important factor to consider, with reliability and ease of use running close seconds. Many respondents commented that it is very difficult to establish credibility, however. In part, this is because credibility is in the eye of the beholder. Also in part, this is because the people with the information and data are often the very agencies or organizations that run or regulate the projects. The fact that the agencies are self-monitoring leads outsiders to fear that the reports are self-serving, even if they are accurate. The way around this, as suggested by a few respondents, is for independent oversight. Others suggested that credible organizations be given the opportunity to present alternative perspectives on government managed information sources. Some radiation professionals took issue with the idea of balance as granting disproportionate exposure to view points of vocal minorities.

A number of respondents mentioned the historic tension between the people with the data and those who want the data. Many organizations were chagrined that Freedom of Information Act (FOIA) requests are their major source of information, when they believe it should be readily available. Difficulty getting information makes people wonder why it is being hidden.

Other ways to establish credibility that were mentioned by respondents include using primary data sources, citing sources clearly, and linking summaries or analyses to original sources, data, or studies.

Credibility for the less technical reader might be established by relating standards and values and results to daily occurrences in people's lives. Technical information needs to be put in a familiar context to be credible with lay readers.

**Issues of Concern.** The word "concern" in this question raised some red flags for some of the respondents because it implies fear. These respondents, who were largely the state and state organizations category, said that they work on some of the issues a lot and consider them to be very important but are not concerned about them in a "fear for our safety sense." As a result, we guided them to answer the question according to the level of attention they paid to the issue in a professional context or as "most wanting information on." This question is confusing for some and this point was lost on many.

The concern over issues is again strongly influenced by the perspective of the respondent. In general, those issues for which there was generally very high concern, included radiation risk, public health and safety, waste disposal, plans for mitigation, and distinctions between chemical and radioactive wastes. State agency representatives were concerned over the lack of public interest in radon exposure and what some viewed as disproportionate concern about comparatively less risky factors.

Those issues for which there was moderate concern often varied according to the nature of the local situation and whether the respondent was focused on a particular site. These included Superfund sites, regulatory history, and onsite/offsite issues.

Of low concern were distinctions between high and low level wastes, although this question was very confusing for many respondents who didn't know what kinds of distinctions we were referring to (i.e. legal or dose and impact). The confusions around this item puts the results in question. The same confusion surrounds the item on land use patterns.

Responses to a few of the issues require explanation. With regard to worker safety, many of the respondents said it should be of high concern, but it really is not of concern to their constituency. (Note: We did not talk with industry or labor representatives who should be added to future lists in order to balance this response.) The importance of emergency response was again situational; people focused on active sites were quite concerned. The same is true for disposition and transportation of wastes, except that many respondents mentioned in another question their concern over the current plans for recycling contaminated waste.

would not be forced to file a FOIA request to get it. In addition, as we reviewed the literature and developed the questions for interviews and discussions, we held discussions with several academic experts in this field, and in exchange for their *pro bono* advice we promised to provide them a copy of the report.

**Strongly emphasize enhancing the credibility, reliability, and ease of access to radiation information.** Above all else, the respondents told us that they are concerned first about the credibility of the information they receive, and then the reliability and ease of access to that information. Every effort should be made to enhance (and demonstrate) transparency, openness, and honesty about information that is transmitted no matter what the format. Where there is uncertainty, or more than one credible theory or approach, EPA should say so. For Internet-based information, direct links to other organizations and agencies (especially those which have an alternate view) will help enhance credibility.

**Improve working relationships with the other radiation offices, agencies, university programs, and NGOs.** During the preliminary stages of the project, EPA and RESOLVE received a number of comments and concerns from representatives of other federal and state agencies and some organizations about the purpose and nature of the project. During the interviews and discussions we received many comments that make it clear that the non-agency stakeholders can become confused by the many agencies (and sometimes groups) putting out information. They are confused further when the agencies send differing messages. Where there is a lack of coordination and understanding between federal agencies, it is more difficult for the EPA to be seen as credible in the eyes of those using their materials.

We recommend that the next concrete step be some form of meeting between the information providers at EPA, NRC, DOE, and other agencies. The purposes of this meeting should be to (1) share information about the goals and approaches of the various information programs, (2) determine gaps (in either content or target audiences) that need filling, and (3) determine overlaps in information provision that are unnecessary, and (4) decide how the agencies can best work together to enhance credibility, reliability, and access for all stakeholder groups.

A second step is to design projects that intentionally include collaboration with university programs and non-governmental organizations. Below, we note several specific projects that might be appropriate for such collaborations.

Also, EPA should work closely with those respondents who specifically indicated that they wanted to be involved in further materials development (see Appendix F).

**Extend the stakeholder database with emphasis on stakeholder groups that were under-represented by this phase of the process.** The database of stakeholders

(Appendix B) is a good start toward a set of people who can advise and assist EPA in its efforts to provide credible and easily accessible information on environmental radiation. However, the database should be extended to include people from four stakeholder types that are underrepresented in this database: industry workers and unions, industry management, federal agencies, and the public (especially people near facilities).

Also, under the Community Right to Know Act, local energy planning committees are set up to deal with emergency preparedness around toxic waste or hazardous waste transportation issues. These committees of local government and citizen representatives could disseminate information through existing communication channels. They should be involved in any future outreach efforts.

**Continue the interview and/or discussion process and hone the questions to fit the needs of some specialized groups (especially the public).** Discussions might be held with more representatives of all stakeholder groups, and especially people from under-represented stakeholder types mentioned above. As noted in section II and Appendix C, we have recommended some changes to the interview questions and discussion guidelines.

Since we used these two instruments as a "pilot" test, it will be appropriate to change them as needed for further use. The interview process will require a great deal of lead-time to account for possible Paperwork Reduction Act or OMB requirements, and the interview questions might need to be different for different groups (however, once the interviewing begins, the questions should not be changed). On the other hand, the discussion process can be modified as it goes along, since it is not subject to the same uniformity requirements as those faced by an interview process. Such modifications also make sense because different groups answer questions differently and have different interests.

**Develop new techniques for creating and enhancing personal networks.** As valuable as the Internet and other techniques may be for disseminating information, the key to enhancing credibility (and thereby having the information EPA provides accepted, used, and relied upon) is attaching a person, a face, or a voice to the information. The more EPA can do to help their "customers" get to know the technical people working on radiation issues, the more that the personal network will help the customers value the information.

In many cases, the best approach is to have one good technical person serving as the "conduit" or "bridge builder" between the agency and the customers. A good example comes from Superfund, in which Remedial Project Managers often build close, long-term, and collaborative relationships with the stakeholders concerned with a Superfund site. Selecting a solid technical person with excellent communication and collaboration

skills is likely to be preferable to selecting a better technical person, whose people skills are not as good.

**Conduct interactive workshops for stakeholders to design new materials, web sites, etc. that meet the needs of the "customer."** EPA should have direct in-person discussions with its "customers," probably in the context of public, interactive, stakeholder meetings. Such interactive public design meetings are commonly used in landscape architecture, urban planning, transportation planning, and other settings to design a "vision" of the overall information system, which the agency then produces with additional feedback from the workshop participants. Such workshops have the added benefit of helping participants build personal working networks, thus assisting with credibility enhancement.

**Consider the use of the following information provision formats and techniques, all of which are opportunities to work collaboratively with other agencies, university programs, and NGOs:**

- an Internet site, fully linked to relevant non-governmental groups, other government agencies, sites of academic journals, etc.;
- toll free number with access to experts in various aspects of radiation information (including parallel access to non-governmental information sources); and
- educational programs in public schools.

## **APPENDICES**

A. RESOLVE Annotated Bibliography on Issues Related to the EPA Radiation Outreach and Communication Materials

B. Stakeholder Database

C. EPA RPD Interview Protocol and Discussion Guide

D. EPA RPD Discussions - Detailed Responses

E. EPA RPD Interviews - Detailed Responses

# **SUPPORT FOR NACEPT RADIATION MEETINGS**

## **FINAL PROCESS REPORT**

Delivery Order #028

Contract 68-W4-0001

### **PURPOSE OF THE PROJECT**

EPA's Radiation Protection Division (RPD) is updating its outreach and communication materials about radiation in the environment. The RPD develops these materials in conjunction with its analytical and regulatory activities to inform the general public as well as targeted audiences. The issues being addressed include radiation risk and sources of radiation exposure.

RPD's activities are in the spirit of "right-to-know" about exposure to dangerous substances in the community. RPD is interested in learning what their "customers" wish to know about environmental radiation. The purpose of this project is to guide the development of radiation information that meets the needs of their user groups. RPD's user groups or customers are the public, business, consumer advocates, public health groups, environmental groups, government at all levels, tribal nations, and sister organizations within EPA. Once RPD knows the information needs, they intend to obtain the information and provide it in readily accessible formats.

The RPD needs answers to a series of questions:

- overall level of public interest in environmental radiation issues,
- whether information currently available fulfills the needs of user groups,
- what specific information is of interest to the public,
- how the information should be presented, and
- where the user groups could go to find the information.

### **PROCESS**

RESOLVE and its subcontractor Triangle Associates conducted the following tasks for EPA and provided the following deliverables (which are provided as appendices in the draft final report):

- a review of existing literature and an annotated bibliography on what radiation professionals and the general public want to know about radiation and how they want to know it,
- a protocol for conducting interviews with stakeholders and guidelines for holding discussions with stakeholders on these issues,
- a database of stakeholders who would be appropriate for interviews and discussions,
- pilot testing of the interview protocol and discussion guidelines with a subset of the identified stakeholders and a synthesis of the information gathered

on both the questions and the answers to the questions, and a draft final report (attached) summarizing the above tasks.

The original assignment from EPA was to focus the tasks on decontamination and decommissioning of nuclear power reactors. This initial focus guided the documents we reviewed for the bibliography and the participants we selected for pilot testing the interview and discussion questions. Early in the course of the project, EPA broadened the assignment to consider environmental radiation more generally. We believe this change had no real effect on the findings of the literature review. Moreover, the interview and discussion questions were developed after the assignment was broadened and does not change our assessment of the success of the interview and discussion questions.

RESOLVE assigned Senior Mediator Bruce Stedman as Project Manager. Juliana Birkhoff, RESOLVE Director of Research and Education, advised on approaches to information gathering; Contracts Manager Sophie Cook provided contract administration; Associate Gabe Petlin collected and wrote most of annotated bibliographic citations, gathered preliminary information for developing questions, and conducted 12 discussions; Senior Mediator Don Greenstein conducted 2 discussions; and Senior Program Secretary Morriisa Young provided project administrative support.

The project manager for Triangle Associates was Senior Facilitator Alinda Page, who was assisted by Associate René Alexander. Triangle Associates developed and managed the stakeholder database of contacts for interviews and discussions. Ms. Page conducted 7 interviews and 13 discussions; Ms. Alexander conducted 2 interviews and 12 discussions.

These tasks were Phase IV of this project. Deliverables for earlier phases have already been transmitted to EPA and are not related to this phase of activities.

#### **ACKNOWLEDGEMENTS**

All 48 respondents and those who offered advice early in the project gave their personal time and energy. Their guidance and insights shaped this project and its results. We very much appreciate their cooperation.

***SUPPORT FOR NACEPT RADIATION MEETINGS  
FINAL REPORT***

***APPENDICES***

- A. RESOLVE Annotated Bibliography on Issues Related to the EPA Radiation Outreach and Communication Materials**
- B. Stakeholder Database**
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- D. EPA RPD Discussions ? Detailed Responses**
- E. EPA RPD Interviews ? Detailed Responses**



## Appendix A

### RESOLVE Annotated Issues Related to EPA Radiation Outreach and Communication Materials<sup>1</sup>

1. Ahearne, John F. "Integrating Risk Into Public Policy Making." Environment 35, no. 2 (Mar 1993).

**Publisher's Abstract:** The influence that risk analysis should have on public policy is discussed. Risk analysis should play an important role in deciding how to dispose of radioactive waste, where to store wastes and what controls should be placed on energy production.

2. Barke, Richard P., and Hank C. Jenkins-Smith. "Politics and Scientific Expertise: Scientists, Risk Perception, and Nuclear Waste Policy." Risk Analysis 13, no. 4 (1993).

**RESOLVE Annotation:** This research studied whether scientists from different disciplines (i.e. life sciences Vs. physicists) have different perceptions of environmental risks. The researchers found that life scientists perceived greater risks and stronger requirements for environmental management. The research suggests that disciplinary or organizational cultures influence scientists perception of risk. The article does not tell what citizens want to know about radiation and D&D but does help explain why inclusive approaches and processes should be used to design the RIS.

**Author's Abstract:** To study the homogeneity and influences on scientists' perspectives of environmental risks, we have examined similarities and differences in risk perceptions, particularly regarding nuclear wastes, and policy preferences among 1011 scientists and engineers. We found significant differences ( $<0.05$ ) in the patterns of beliefs among scientists from different fields of research. In contrast to physicists, chemists, and engineers, life scientists tend to: (a) perceive the greatest risks from nuclear energy and nuclear waste management; (b) perceive higher levels of overall environmental risk; (c) strongly oppose imposing risks on unconsenting individuals; and (d) prefer stronger requirements for environmental management. On some issues related to priorities among public problems and calls for government action, there are significant variations among life scientists or physical scientists. We also found that-independently of field of research-perceptions of risk and its correlates are significantly associated with the type of institution in which the scientist is employed. Scientists in universities or state and local

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<sup>1</sup> In the Annotated Bibliography, we write *RESOLVE Annotations* which report whether the article or book contains information directly relevant to the scope of the project. RESOLVE was not able to acquire the full texts of all articles, books, and reports in this annotated bibliography. In those cases, we do not write annotations. In a few cases, we write annotations based on other scholar's reviews of that literature, or based on the abstract. When available, we provide author's or publisher's abstracts.

governments tend to see the risks of nuclear energy and wastes as greater than scientists who work as business consultants, for federal organ-organizations, or for private research laboratories. Significant differences also are found in priority given to environmental risks, the perceived proximity of environmental disaster, willingness to impose risks on an unconsenting population, and the necessity of accepting risks and sacrifices.

3. British Nuclear Fuels PLC. "Communicating Risks." The Futurist 28, no. 3 (May/June 1994).

**RESOLVE Annotation:** An interactive menu-driven video display at the Sellafield Nuclear Power Plant Visitor's Center records visitors' queries in order to measure which aspects of the nuclear power plant concern most people. Results finds that the primary obstacle to gaining greater public acceptance of the plant is not lack of information, but feelings of helplessness and distrust. The article is pro-nuclear.

**Publisher's Abstract:** British Nuclear Fuels (BNFL) has launched an interactive public information drive that polls local citizens on their knowledge about and support for planned radioactive waste repository. BNFL's promotion of its Visitors' Center at the Sellafield plant as a tourist attraction is discussed.

4. Carter, L.J. Nuclear Imperatives and Public Trust. Washington, DC: Resources for the Future, 1987.

**RESOLVE Annotation:** The author presents case studies on the technical and political challenges of successful management and disposition of nuclear waste in the US and five other countries, as well as transboundary international issues. The emphasis is on analyzing the political failures of the US nuclear waste program and proposing solutions based on technical soundness and public safety. The book does not address the question of what the public wants to know about radiation and D&D. The book is pro-nuclear.

5. Cohen, Gary. "Radioactive Ammo Lays Them to Waste." Multinational Monitor 17, no. 1-2 (January 1996).

**RESOLVE Annotation:** This article addresses weapons-related radioactive exposure of U.S. soldiers, and is not within the immediate scope of the RIS.

**Publisher's Abstract:** Thousands of American Gulf War soldiers were exposed to ammunition made from depleted uranium (DU) on the battlefield, inhaling the radioactive dust from these projectiles. Despite widespread concern among Gulf War vets and in US communities about the dangers of DU weapons, the military is excited about the sales potential of DU weapons. Information about DU weapons and the danger they pose to soldiers who come in contact with them is presented.

6. Cook, B.J., and J.L. Emel, & Kasperson. "A Problem of Politics or Technique? Insights from Waste Management Strategies in Sweden and France." Policy Studies Review 10, no. 4 (Winter 1991/92): 103-13.

**RESOLVE Annotation:** Nuclear waste management strategies are compared in Sweden and France, focusing on institutional arrangements, research and development activities, site investigation procedures and overall program philosophies. In Sweden, the approach

to waste repository siting and facility development emphasizes negotiation with local opponents and national interests to achieve as high a degree of consensus as possible. In France, the authority and prestige of the French state, in combination with effective use of site compensation, has been used to contain the scope of social conflict. The article does not address the question of what the public wants to know about radiation and D&D.

**Author's Abstract:** Sweden and France are in many respects in the vanguard of high-level radioactive waste disposal efforts, and they offer sharp contrasts regarding basic strategies and underlying philosophies for waste management. We compare their waste disposal programs for insight into the dilemma of siting and developing a permanent waste repository. We find that technical decisions, as well as the more obvious sociopolitical decisions about repository development, are shaped by deep seated social and political forces in each nation.

7. Cook, B.J., J.L. Emel, and R.E. & Kasperson. "Organizing and Managing Radioactive Waste Disposal as an Experiment." Journal of Policy Analysis and Management 9 (Summer 1990): 339-66.
8. Dunlap, R., M. Kraft, and eds. E. Rosa. Public Reactions to Nuclear Waste: Citizens Views of Repository Siting. Durham, NC: Duke University Press, 1993.
9. Easterling, D. and Kunreuther, H. The Dilemma of Siting a High-Level Nuclear Waste Repository. Boston, MA: Kluwer Academic Publishers, 1995.
10. Easterling, D., Slovic. "The Nevada Initiative: A Risk Communication Fiasco." Risk Analysis 13 (1993): 643-48.
11. Easterling, D., and E.W. Colglazier, & White. "Nuclear Waste's Human Dimension." Forum for Applied Research and Public Policy, Fall 1994, 91-97.

12. Fleming, Patricia. "Expert Judgment and High Level Nuclear Waste Management." Policy Studies Review 10, no. 4 (Winter 1991/92).

**RESOLVE Annotation:** This article is a critique of the clash between positivistic science and excessive relativism which commonly occurs in debates over technically complex and politically controversial disputes such as selecting a HLNW repository. Fleming calls for a middle ground which adjudicates rationally the conflict of interpretations over Yucca Mountain. This article does not directly address the question of what the public wants to know about radiation and D&D.

**Author's Abstract:** Prominent figures believe that expert judgment must play a decisive role in implementing the NWPPA. A critical, philosophical examination of this method reveals the adoption of equally problematic epistemological assumptions. A fresh approach which rejects the dichotomies bred by the controversy over the status of expert judgment is offered.

13. Flynn, James. "How Not to Sell a Nuclear Waste Dump." Wall Street Journal, April 15, 1992, A20.

**Author's Abstract:** James Flynn discusses an intended public awareness campaign that was actually a thinly-veiled advertising campaign to try and convince Nevada citizens about the safety of the proposed national nuclear waste repository at Yucca Mountain. Polls indicate the American Nuclear Energy Council campaign went seriously awry.

14. Flynn, James, et al. "Overcoming Tunnel Vision: Redirecting the US High-Level Nuclear Waste Program." Environment 39, no. 3 (Apr 1997).

**RESOLVE's Annotation:** The authors raise technical and scientific uncertainties that they argue should disqualify Yucca Mountain as the long term repository of U.S.. high level nuclear waste (HLNW). Instead they proposed dry cask storage as an interim solution for the next 100-150 years while a technically sound and socially acceptable solution is sought. Given the importance of public acceptance and trust, the authors argue that greater public participation in the HLNW program is essential and experience with siting other hazardous waste facilities has improved understanding of what is necessary to win public acceptance. This article does not directly address the question of what the public specifically wants to know about radiation and D&D other than to implicitly suggest that the public's need for credible radiation information is high. The article is neither pro nor anti-nuclear.

**Publisher's Abstract:** Since the US began producing nuclear weapons, military and civilian uses of nuclear reactors have generated a large quantity of nuclear waste. Several possible solutions to the problems of disposing of nuclear waste are discussed.

15. Flynn, James, and Paul Slovic. "Time to Rethink Nuclear Waste Storage." Issues in Science and Technology 8, no. 4 (Summer 1992).

**RESOLVE Annotation:** Two telephone surveys, one in Nevada and one in the rest of the continental United States, were conducted to measure public perceptions of risk associated with disposal of high level nuclear waste. The survey questions focused on citizens' views of the Yucca Mountain repository, risk perceptions (including sources of risk), voting behavior, willingness to accept compensation, and risk-induced behaviors. Respondents were generally opposed to the repository in Nevada. This article does not directly address the question of what citizens want to know about radiation, but does offer insight into the fears the public has about nuclear waste. The article is neither pro nor anti-nuclear.

**Publisher's Abstract:** The US Government's 35-year effort to find a permanent repository for radioactive nuclear wastes is on the verge of collapse. The government must develop a siting procedure that is both socially acceptable and technically feasible.

16. Flynn, James, Paul Slovic, and C.K. Mertz. "Decidedly Different: Expert and Public Views of Risks from a Radioactive Waste Repository." Risk Analysis 11, no. 3 (1993): 643-48.

**RESOLVE Annotation:** The researchers studied nuclear waste program managers' perceptions of risk from a high level nuclear waste facility and compared those perceptions with those of the general public. The research demonstrates that the nuclear waste program managers have very different views about nuclear waste and indeed a different conceptual framework about science, technology and risks than the public.

**Publisher's Abstract:** A questionnaire with items that had been used in a national survey of the general public was administered to persons attending an American Nuclear Society meeting. The items asked about risks associated with high-level nuclear waste (HLNW), trust in nuclear-waste program managers, costs and benefits of a repository

project, and images of a HLNW repository. The results suggest that nuclear industry experts may have very different opinions from the general public about most of these items and their images of a repository indicate a vastly different conceptual framework within which their opinions are formed.

17. Freudenberg and Rosa. "Public Responses to Technological Risks: Toward a Sociological Perspective." Sociological Quarterly 33 (1984).

**RESOLVE Annotation:** This article contains reviews of public surveys on public opinion on technological risk.

18. Freudenburg, William R, and Eugene A. Rosa. Public Reaction to Nuclear Power: Are There Critical Masses? AAAS Selected Symposia Series 93. Boulder, Colo.: Westview Press for the American Association for the Advancement of Science, 1984.

19. Fricker, Richard L. "Information Please." ABA Journal 76 (June 1990).

**RESOLVE Annotation:** We were not able to acquire this article. Unless the RIS contains information on human radiation exposure (intentional or not), this article is not relevant for the RIS.

**Publisher's Abstract:** A case brought by Las Vegas lawyer Larry Johns against the government on behalf of 220 plaintiffs who'd been exposed to radiation highlights problems with the Freedom of Information Act. Other relevant cases are discussed.

20. Gricar, Barbara Gray, Anthony Baratta, and William Key. "Bridging the Information Gap at Three Mile Island: Radiation Monitoring by Citizens -- Comment and Reply." The Journal of Applied Behavioral Science 19, no. 1 (Feb 1993): 35-54.

**RESOLVE Annotation:** The authors report on the implementation of a community-based radiation monitoring program based on the premise that citizens are more likely to believe information generated by themselves or by their neighbors than by government officials. However, evidence supporting this hypothesis is not presented. Two before-and-after surveys were administered to measure the impact on lay participants of a course on radiation safety and monitoring. Participants deemed some sources of information on radiation more credible after the course, but results overall were mixed. Participants felt better informed about the hazards of radiation and the progress of clean-up at Three Mile Island after the course. This article does not tell us what citizen's want to know about radiation, but it does provide evidence that classroom education can lessen participants' skepticism of certain sources of information on radiation. It can also increase their confidence in assessing threats to public health and safety from radiation. **Two relevant implications for the RIS from this study are 1) the importance of taking into account citizens' views on credibility of information sources when designing the RIS; and 2) that citizens' trust in the RIS may be increased if they are actively involved in the design of the system.**

**Publisher's Abstract:** After the accident involving a nuclear reactor at Three Mile

Island (TMI), Pennsylvania, in March 1979, a unique effort was made to provide local citizens with information about radiation exposure and to rebuild public confidence in information supplied by government agencies. The Citizen Radiation Monitoring Program (CRMP) trained lay persons to monitor, interpret and publicize radiation levels in 12 communities around TMI. The traditional mechanisms for information exchange between the government and the public were neither functional nor adequate. The CRMP tried to reverse this effect by involving local communities, trusting local citizens, and addressing both emotional and technical issues. Key criticizes the Gricar and Baratta presentation in regard to its multiplicity of project goals and its failure to provide a research design suitable to test these goals. Key found the data and the trappings of a research project distracting. In reply, Gricar and Baratta attempt to clarify their goals and to make several points concerning research design.

21. Hendee, William R. "Disposal of Low-Level Radioactive Waste: Problems and Implications for Physicians." Journal of the American Medical Association 269, no. 18 (May 1993).

**RESOLVE Annotation:** This article addresses public health concerns over disposal of low-level nuclear waste (e.g. transportation, opposition to disposal facilities, and opposition to involuntarily imposed risks). The article is not directly relevant to the RIS project, but offers insights into public health concerns.

**Publisher's Abstract:** The disposal of low-level radioactive waste, which includes contaminated gloves, laboratory supplies and syringes, has been a controversial public health issue for over 20 years. The waste can and should be properly disposed of somewhere, but many people think that the somewhere is a place other than their community or state.

22. Hileman, Bette. "New Details on Nuclear Weapons Program Bared." Chemical & Engineering News 72, no. 28 (Jul 1994).

**RESOLVE Annotation:** This article itself is not useful for the RIS. Obtaining the transcripts or minutes from the public meetings former DOE Secretary O'Leary refers to, may a useful source on what the public wants to know about radiation.

**Publisher's Abstract:** In a continuing effort to be more candid about Department of Energy (DOE) nuclear weapons programs, US Energy Secretary Hazel O'Leary recently declassified a substantial amount of information. On June 27, 1994, O'Leary revealed details about total US weapons-grade uranium production, testing of a bomb made of reactor-grade plutonium, radiation experiments conducted on humans since the 1920s, and underground and atmospheric nuclear weapons tests. O'Leary explains the new revelations by saying that thousands of people in meetings across the US have told her that openness in government is very important. DOE is responding in a manner that both satisfies that strong public interest and respects critical national security requirements. DOE is now indexing everything it has declassified since 1946 and putting it on the Internet so it will be easily accessible.

23. Holdren, J.P. "Radioactive Waste Management in the United States: Evolving

Policy Prospects and Dilemmas." Annual Review of Energy and the Environment  
17 (1992): 235-59.



24. Hope, Chris, and Jon Parker. "Environmental Information for All: The Need for a Monthly Index." Energy Policy 18, no. 4 (May 1990): 312-19.

**RESOLVE Annotation:** This article addresses general environmental indicators and does not report on what the public would like to know about radiation.

**Publisher's Abstract:** The major source of environmental statistics in the UK is the Digest of Environmental Protection and Water Statistics. However, its most recent data are often quite old, and it does not contain a summary of the state of the environment. An up-to-date, monthly regional Environmental Index would offer some protection against misinformation and show that the government was serious in its intention to place the environment at the forefront of its thinking. At present, what is most important is to have a proposal for a starting point for discussions and to allow a feasibility exercise including the construction of a pilot Environmental Index to proceed. The best way to weight the UK Environmental Index is to use expert opinion to select indicators and weight them to form the sub indexes for air, water, radiation, noise, transportation, and waste. Possible objections to a monthly Environmental Index are that it is too costly, incomplete, and arbitrary.

25. Inaba, Hirotoishi. "Information: The Key to Acceptance of Expanded Nuclear Power Generation." Japan 21st 38, no. 2 (Feb 1993).

**RESOLVE Annotation:** This article provides examples of public information techniques designed to bolster public acceptance of nuclear power. No information is presented regarding what the Japanese public wants to know about radiation. The strategy of information dissemination is characterized by some critics as one-way communication from the government to the public. The article is pro-nuclear.

**Publisher's Abstract:** With 80% of its energy needs met by imports, Japan is in a vulnerable energy position. Thus the importance of nuclear power as an alternative energy to oil has been stressed since the 1970s oil crisis. Approximately 27% of Japan's electricity is supplied by nuclear power, and it is expected that 43% of electricity will depend on nuclear power in 2010. Public acceptance of nuclear power is very important. After the Chernobyl nuclear power accident, the portion of the Japanese public viewing nuclear power negatively increased. The Ministry of International Trade and Industry conducts several activities to promote the public acceptance of nuclear power, including: 1. toll-free telephone question and answer services; 2. lectures; 3. the Atomnet database, and 4. pamphlets and videos. The eight electric power companies and one atomic power company in Japan operating nuclear power plants also promote public acceptance through the mass media, public relations and public information centers.

26. Inhaber, Herbert. "Can an Economic Approach Solve the High-Level Nuclear Waste Problem?" Risk 23, no. fall.

**RESOLVE Annotation:** This article critiques previous attempts to site the HLN and prescribes a series of market based bonus or auction systems to site the facility. It does not discuss the questions that the public has about radiation, nor how they want to know it, or methods for gathering that information. The writer may be perceived as slightly pro nuclear.

27. Jack P. Young, editor, and editor Rosalyn S. Yalow. Radiation and Public Perception: Benefits and Risks. Washington, DC: American Chemical Society, 1995.
28. Jacob, G. Site Unseen: The Politics of Siting a Nuclear Waste Repository. Pittsburgh, PA: University of Pittsburgh Press, 1990.
29. James Flynn, et al. One Hundred Centuries of Solitude: Redirecting America's High-Level Nuclear Waste Policy. Boulder, San Francisco: Westview Press, 1995.

**RESOLVE Annotation:** Overall, this study is critical of DOE's approach to siting a high-level nuclear waste repository. Reports on studies and surveys (20 conducted 1983-1993) of perceptions and social behaviors (p. 70-73) concerning siting and management of high-level nuclear waste repository (especially Yucca Mountain, see YMSST 1993). Says (p. 72-3) that there are many studies indicating the public's strong aversion to nuclear power plants (and other facilities) and mistrust of DOE, NRC, EPA and other federal agencies; implies the source is YMSST 1993.

30. Johnson, Branden B. "Advancing Understanding of Knowledge's Role in Lay Risk Perception." Risk 14, no. summer.
31. Kasperson, R.E., S. Ratick, and O. and Renn. A Framework for Analyzing and Responding to the Equity Problems Involved in High-Level Radioactive Waste Disposal (NWPO-SE-019-89). Carson City, NV: Nevada Nuclear Waste Project Office, 1988.
32. Kivimaki, Mika, and Raija Kalimo. "Risk Perception Among Nuclear Power Plant Personnel: A Survey." Risk Analysis 13, no. 4 (1993): 421-24.

**RESOLVE Annotation:** This research investigated whether nuclear power plant personnel were more or less likely to perceive nuclear power plant risks than was the general public. The research found that plant workers were less likely to perceive risk, and that risk perception was connected to organizational commitment. The research does not help us understand what citizens want to know about nuclear radiation nor how they want to know it.

**Publisher's Abstract:** This study investigated risk perception, well-being, and organizational commitment among nuclear power plant personnel. The study group, 428 employees from a nuclear power plant, completed a questionnaire which included the same questions as those in previous surveys on risk perception of lay persons and industrial workers. Hazards at work were not seen as a sizable problem by nuclear power plant personnel. The study group estimated the safety of nuclear power plants better and the possibility of a serious nuclear accident as more unlikely than the general public. Compared to employees in other industrial companies, the overall perceived risks at work among plant personnel did not exceed the respective perceptions of the reference groups. Risk-related attitudes did not explain well-being among plant personnel, but the

relationship between the perceived probability of a serious nuclear accident at work and organizational commitment yielded to a significant correlation: Those plant workers who estimated the likelihood of an accident higher were less committed to the organization.

33. Kraft, M.E. "Public and State Responses to High-Level Nuclear Waste Disposal: Learning from Policy Failures." Policy Studies Review 10, no. 4,(1992): 152-56.

**RESOLVE Annotation:** This article indicates the extreme importance of public trust in public agencies. This article is mostly a hypothetical consideration of why repository siting has failed and what might have been done differently. Contrasts the assumption by DOE that opposition to repository siting is because "the public is misinformed, and once educated on the technical issues will be more accepting of siting decisions," with the finding that "research on public attitudes toward nuclear waste provides little basis for this belief" (p.159). Also notes that Bradbury (1989) found that social science information was little used by waste officials to develop public involvement programs, which (in the 1980s) "emphasized provision of information to interested parties rather than interaction and mutual problem solving" (p. 164). The relevant implication of this analysis for the RIS is that simply providing the public with technical information on radiation may not meet their information needs, not alleviate their concerns unless they are involved in the process of designing the system.

**Publisher's Abstract:** Nuclear waste policy in the United States has failed in large part because of public and state opposition to repository siting. However, that outcome was not inevitable. This paper argues that better policy design and greater attention to the crucial tasks of policy legitimization (sic) both by the US Congress and the Department of Energy might have significantly increased the chances for successful implementation. Even though the program now has a highly uncertain future, suggestions are offered for policy learning and change that may increase the probability of success.

34. Kraft, M.E., and B.B. Clary. "Citizen Participation and the NIMBY Syndrome: Public Response to Radioactive Waste Disposal." Western Political Quarterly 44 (1991): 299-328.

35. Kraft, M.E., and B.B. Clary. "Public Testimony in Nuclear Waste Repository Hearings: A Content Analysis." In Public Reactions to Nuclear Waste: Citizen Views of Repository Siting, edited by E.E. Dunlap, M.E. Kraft and E.A. Rosa. Durham, NC: Duke University Press, 1993.

**RESOLVE Annotation:** This chapter is entirely about public hearings on the waste repository siting 1984-86. The chapter is not very helpful to RIS because the information they drew out of the testimony was very general (i.e.. opposed or not; emotional or factual; criticisms of siting analysis). Does provide possible areas of concern (e.g., waste technologies, transportation, etc.) that we have incorporated into the questions.

36. Kraft, M.E., Eugene A. Rosa, and Riley E. Dunlap. "Public Opinion and Nuclear Waste Policy Making." In Public Reaction to Nuclear Waste: Citizen Views of Repository Siting, edited by R.E. Dunlap, M.E. Kraft and E.A. Rosa. Durham,

NC: Duke University Press, 1993.

**RESOLVE Annotation:** Overview chapter for entire book. See individual chapter annotations.

37. Kunreuther, H., and D. Easterling. "Gaining Acceptance for Noxious Facilities with Economic Incentives." In The Social Response to Environmental Risk: Policy Formulation in an Age of Uncertainty, edited by D.W. Bromley & K. Segerson. Boston: Kluwer, 1992.
38. Kunreuther, H., D. Easterling, and W. Desvousges, & Slovic. "Public Attitudes Toward Siting a High-Level Nuclear Waste Repository in Nevada." Risk Analysis 10 (1990): 469-84.
39. Kunreuther, H., K. Fitzgerald, and T.D. Aarts. "Siting Noxious Facilities: A Test of the Facility Siting Credo." Risk Analysis 13 (1993): 301-18.
40. Kunreuther, Howard, William H. Desvousges, and Paul Slovic. "Nevada's Predicament." Environment 30, no. 8 (Oct 1988).  
**RESOLVE Annotation:** The public opinion surveys documents the deep felt mistrusts and opposition to the Nevada nuclear waste repository. The article is not directly helpful to the RIS, because the surveys do not reveal directly what the public wants to know about radiation other than their general perceptions about risk and economic impacts of the repository.  
**Publisher's Abstract:** The US government has authorized the DEA to build a nuclear waste repository at Yucca Mountain in Nevada. The results of public opinion surveys of US and Nevada citizens concerning the repository are presented.
41. Kunreuther, Howard, and Paul R. Kleindorfer. "A Sealed-Bid Auction Mechanism for Siting Noxious Facilities." The American Economic Review 76, no. 2 (1986): 295-99.

**Author's Abstract:** A sealed bid mechanism is proposed for facilitating the siting process of noxious facilities, such as prisons, trash disposal plants, and incinerators for hazardous waste. The problem arises because there are scale economies associated with having only one plant to serve the needs of a wide region. These facilities have been opposed strongly because they produce relatively little new employment and provide limited additional taxes in relation to the perceived negative impact. Some compensation arrangement is needed to share the gains of the winners with the potential losers. A sealed-bid auction model is developed for eliciting willingness-to-pay (WTP) values when a single community is chosen as the winner among a number of possible candidates. Each community announces a WTP value that it will receive if it is the winner. A series of controlled laboratory experiments using the low-bid auction examine how close individuals are to the maximum-minimum solution. The results indicate that the average absolute percentage deviation from maximum-minimum bids is relatively small, particularly in the latter periods.



42. Lynn, Frances M. "Citizen Involvement in Hazardous Waste Sites: Two North Carolina Success Stories." Environmental Impact Assessment Review 7 (1987).  
**RESOLVE Annotation:** The article discusses two examples of citizen committees formed to review siting proposals, use of mutually agreed upon technical consultants, and interactions between project proponents and local citizen groups. Although the article is largely about public opinion and risk perception related to hazardous wastes, it also looks at the importance of creating settings for interactions between citizens and more "expert" stakeholders, what Lynn calls a "citizen infrastructure." She emphasizes the importance of giving citizens the resources they need (of which RIS would be an example) to conduct analysis of plans and facilities. She notes that managers of the facilities in these cases took the view that if citizens had information they would not be afraid of the facilities or activities, and would be more likely to work with agencies and not against them.
43. ----- . "Public Participation in Risk Management Decisions: The Right to Define, the Right to Know, and the Right to Act." Risk 11, no. spring.  
**RESOLVE Annotation:** Relates Lynn's analysis that the public wants direct engagement in several facets of risky projects. These facets suggest questions the public might be asked about what information they want, but more how they want it, and even more what they might want to do with the information once they have it. The article is mostly about public opinion and risk perception.
44. Marston, Wendy. "Friendly Fire." Sciences 34, no. 2 (Mar 1994).  
**RESOLVE Annotation:** This article describes recent disclosures by the US government about human radiation experiments and efforts of citizens to sue for compensation. It does not contain information directly relevant to the RIS unless the scope is expanded to include human radiation experimentation. The article is mildly anti-nuclear.  
**Publisher's Abstract:** The declassification of government documents detailing radiation experiments on unsuspecting citizens during the Cold War is discussed. Compensation has been promised to the victims of the secret experiments.
45. Mary Douglas, and Aaron Wildavsky. Risk and Culture. California: University of California Press, 1983.
46. McGarity, Thomas O. "Public Participation in Risk Regulation." Risk 11, no. spring.  
**RESOLVE Annotation:** McGarity outlines who the public is, and why they participate in agency decision making, discusses the pros and cons of public participation and provides six models of public participation in risk regulation. It does not help us understand what the public wants to know about D&D, nor how they want to know it, nor how to find out what they want to know.
47. Mitchell, T., and W. Scott. "Leadership Failures, the Distrusting Public, and Prospects of the Administrative State." Public Administration Review 47 (1987): 445-52.

48. Mushkatel, A.H., and K.D. Pijawka. Institutional Trust, Information, and Risk Perceptions. (NWPO-SE-055-92). Carson City, NV: Nuclear Waste Policy Office, 1992.
49. National Research Council (Committee on Decontamination and Decommissioning). A Review of Decontamination and Decommissioning Technology Development Programs at the Department of Energy. Washington, DC: National Academy of Sciences, 1998.
50. National Research Council (Committee on Risk Perception and Communication). Improving Risk Communication. Washington, DC: National Academy Press, 1989.
51. National Research Council (Committee on Technical Bases for Yucca Mountain Standards). Technical Bases for Yucca Mountain Standards. National Academy Press, 1995.

**Publisher's Abstract:** The United States currently has no place to dispose of the high-level radioactive waste resulting from the production of the nuclear weapons and the operation of nuclear electronic power plants. The only option under formal consideration at this time is to place the waste in an underground geologic repository at Yucca Mountain in Nevada. However, there is strong public debate about whether such a repository could protect humans from the radioactive waste that will be dangerous for many thousands of years. This book shows the extent to which our scientific knowledge can guide the federal government in developing a standard to protect the health of the public from wastes in such a repository as Yucca Mountain. The US Environmental Protection Agency is required to use the recommendations presented in this book as it develops its standards.

52. National Research Council, and National Academy of Sciences (Board on Radioactive Waste Management). Rethinking High-Level Radioactive Waste Disposal. Washington, DC: National Academy Press, 1990.

**RESOLVE Annotation:** We were not able to acquire this report. Flynn et al.(1995) says this report reaffirms that loss of public trust and confidence in federal government is the primary obstacle to successful waste disposal.

53. NEA Secretariat. Nuclear Power and Public Opinion. Paris, France: OECD, 1984.

**RESOLVE Annotation:** This survey of public opinion on nuclear power in several countries offers public opinion data (i.e. opposed or not opposed to nuclear power), but not information that addresses the question of what the public wants to know about radiation.

54. Nealey, Stanley M. Nuclear Power Development: Prospects in the 1990s. Columbus, OH: Battele, 1990.

**RESOLVE Annotation:** Have not acquired. Rosa and Freudenberg 1993 say this has

reviews of public surveys. Worth reviewing.

55. Nealey, Stanley, M., Barbara D. Melber, and William L. Rankin. Public Opinion and Nuclear Energy. Lexington, MA: D.C. Heath & Co., 1993.

**RESOLVE Annotation:** This book reviews public opinion surveys on nuclear energy. It does not report what the public wants to know about radiation, but the survey methodologies and questions are well documented and may provide some guidance to developing survey instruments for the RIS.

56. Nuclear Regulatory Commission. Staff Response to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Reactors. NUREG-1628, 1998.

**RESOLVE Annotation:** This is a useful technical reference on decommissioning designed to be understandable by the lay public. The document specifically addresses questions the public has posed to the NRC about the decommissioning process. It is very relevant to the RIS. The report comes from a pro-nuclear point of view.

**Author's Abstract:** The staff realized that there was a significant lack of public understanding of the decommissioning process and the risks associated with decommissioning. With the recent increase in the number of power reactors beginning the decommissioning process and the significant changes that occurred in the regulations in 1996, this report provides NRC staff responses to frequently asked questions on decommissioning nuclear power reactors. This document, through a question-and-answer format, provides information to the public on decommissioning. The questions were taken from a variety of sources over the past several years, including written inquiries to the NRC and questions asked at public meetings and during informal discussions with the NRC staff. In responding to the questions, the NRC staff attempted to provide the answers in a clear and non-technical form that an individual with no or little technical training could understand. This document is being issued for public comment. As a result of public comment or peer review and discussions, the final document may be modified from this draft.

57. Nuclear Waste Technical Review Board. Fourth Report to the US Congress and the US Secretary of Energy. Washington, DC: GPO, 1991.

**RESOLVE Annotation:** Have not acquired. Flynn et al. (1995) says that this report reaffirms that loss of public trust and confidence in federal government is the primary obstacle to successful waste disposal. Worth acquiring.

58. Oden, Wendy. "Where the Polluters Meet the Public." Colorado Business Magazine 22, no. 1 (Jan 1995).

**RESOLVE Annotation:** This article does not provide any information directly relevant to the RIS, but the Environmental Information Network (EIN) mentioned in the text could be a useful source of information on what the public wants to know about radiation and D&D.

**Publisher's Abstract:** By day Chris Lochra is a 34-year old hydrologist working for an environmental consulting firm. On summer weekends, you'll find him giving equipment



lectures to a group of outdoor enthusiasts eager to break ground on a new Colorado wilderness trail. Lorraine Granado is a Latino single mother of three, who is the founder and executive director of Cross Community Coalition, a grassroots organization that unites organizations of people of color to enhance their communities' quality of life. Paula Elofson-Gardine is a working professional in the health care field who is better known in activist circles as the "best brain-trust on Rocky Flats in the entire country. She has degrees in biology and chemistry, is radiation-certified and has more than 18 years of industrial toxics experience. She has lived five miles downwind of the Rocky Flats plant for 30-plus years and is executive director of the Environmental Information Network (EIN), a self-proclaimed "citizen watchdog organization" that focuses on hazardous waste and radioactive material issues.

59. Office of Technology Assessment (US Congress). Managing the Nation's Commercial High-Level Radioactive Waste. Washington, DC: GPO, 1982.

**RESOLVE Annotation:** We have not been able to acquire this report. Flynn et al. (1995) says this report indicates that the single greatest obstacle to successful waste disposal program is solving the severe loss of public confidence and trust in the federal government created by past problems.

60. Ortmeyer, Pat, and Arjun Makhijani. "Worse Than We Knew." Bulletin of the Atomic Scientists 53, no. 6 (Nov/Dec 1997): 46-50.

**Publisher's Abstract::** It is now clear that above-ground nuclear tests conducted in Nevada during the Cold War exposed everyone in the US to radioactive iodine--and the US government knew it.

61. Pasqualetti, Martin, and K David Pijawka. "Unsitng Nuclear Power Plants: Decommissioning Risks and Their Land Use." Professional Geographer 48, no. 1 (Feb 1996): 57(1).

**RESOLVE Annotation:** We have been able to acquire this article. Based on the abstract below, the subject matter is relevant to the RIS. However the length of the article is only one page.

**Author's Abstract:** A preliminary survey of how the public is likely to react to nuclear power plant removal is presented. Results show that due to the risk perceived by the public, power plants will remain on the landscape long after they are closed.

62. Pijawka, K.D., and A.H. Mushkatel. "Public Opposition to the Siting of the High-Level Nuclear Waste Repository: The Importance of Trust." Policy Studies Review 10, no. 4 (1992): 180-94.

**RESOLVE Annotation:** This article analyzes the relationship between political trust and public risk perceptions of nuclear waste repository siting. Survey data and analysis is presented. The authors identify three factors which explain whether the public is skeptical towards governmental and scientific risk assessments and whether they accept waste facilities. These factors are:

- 1) Acceptability of the procedures by which collective consent is obtained;

- 2) Acceptability of how the liabilities/risks are to be distributed; and
  - 3) The level of trust in institutions that regulate and manage the technology.
- Other dimensions of trust -credibility, believability, and fairness-are important factors in how the public views the risks associated with hazardous facilities such as nuclear waste repositories. Five dimensions of repository risk are:

- 1) The safety and health threat from a nuclear waste accident;
- 2) The perceived likelihood of mitigation efforts being successful;
- 3) The risks and benefits of the repository;
- 4) The perceived likelihood of an accident;
- 5) The perceived risk of a transportation accident involving nuclear waste; and

This article is relevant to the RIS in two ways: 1) it describes specific concerns the public has about nuclear waste disposal which indicates some of the radiation information needs of public; and 2) it reveals many of the components of trust that are needed for a RIS to be credible with the public.

**Author's Abstract:** This paper examines several dimensions of public opposition to the proposed siting of the high-level nuclear waste repository at Yucca Mountain. In order to provide a context for the public's views of the repository in metropolitan Clark County, both governmental studies of the public's views of the repository siting process are analyzed, as well as elements of the Nuclear Waste Policy Act. This analysis suggests that one potentially key component of the public's opposition to the siting, as well as their perceptions of risk of the facility, may be the result of a lack of trust in the Department of Energy. Empirical analysis of survey data collected in Nevada in 1988 confirms the strong relationship between political trust and repository risk perceptions.

63. Price, Stuart V. "Learning to Remove Fear from Radioactive Waste." Public Relations Quarterly 39, no. 3 (Fall 1994).

**RESOLVE Annotation:** This article describes the evolution of Federal radioactive waste communication strategy over the last 50 years. It sets out Site-Specific Advisory Boards as one possible model for involving citizens in government decision making. This article offers lessons in public involvement that are relevant to designing an RIS. The article is pro-nuclear.

**Publisher's Abstract:** Simply mentioning radioactive waste can spur immediate and emotional reactions from people. Effective communications must offer more than somber, technical explanations of that status quo. Bringing concerned citizens into the decision making process, rather than just launching one-way information packets in their direction, is a technique that can build good will and resolve many fears. The US Department of Energy (DOE) is empowering public Site-Specific Advisory Boards at some of its main waste management and environmental restoration sites. Site-Specific Advisory Boards encourage substantive dialogue between public advocates, regulators, and radioactive waste generators. Board members have ongoing opportunities to evaluate facility conditions and present recommendations to the DOE.

64. Rosa, Eugene A., and Riley E. Dunlap. "Nuclear Power: Three Decades of Public Opinion." Public Opinion Quarterly 58, no. 2 (Summer 1994): 30.

**RESOLVE Annotation:** This article surveys public opinion on nuclear power in general ways (i.e., pro or con, accept or reject local repository), but does not offer information that tells what the public wants to know about radiation.

**Author's Abstract:** The varying opinions of the public over the years with regard to nuclear power are discussed. Data show that, on the one hand, solid majorities of the public oppose the construction of more nuclear plants and are likewise opposed to their local siting; on the other, equally solid majorities believe that nuclear power should be and will be an important energy source in the nation's future. These results do not reveal a contradiction, but, rather, a pragmatic logic by which the public distinguishes between nuclear power in principle and in practice. It appears that for nuclear power, the public's collective preference for specific policy options can differ considerably from its general attitudes. Thus, Americans support the idea of leaving the nuclear option open, perhaps as a trump card against possible future energy shortages; but when it comes to the specific means for achieving that opinion, such as the siting and construction of nuclear power plants, they are solidly opposed.

65. Rosa, Eugene A., and William R. Freudenberg. "The Historical Development of Public Reactions to Nuclear Power: Implications for Nuclear Waste Policy." In Public Reactions to Nuclear Waste: Citizen Views of Repository Siting, edited by E.E. Dunlap, M.E. Kraft and E.A. Rosa. Durham, NC: Duke University Press, 1993.

**RESOLVE Annotation:** This article outlines the history of public reactions and perceptions about nuclear power and waste, the roles of various stakeholder groups, and discusses the evolution and trends of public opinion on nuclear issues. The author's show increasing opposition to nuclear power generally in the 1970s and 1980s (especially since the Three Mile Island accident), but do not report more specific data about what the public wants to know. The surveys reviewed seem only to have tested whether the respondent was in favor of nuclear power or not, and/or how close someone would live to a plant or waste facility.

66. Sandman, Peter M., et al. "Agency Communication, Community Outrage, and Perception of Risk: Three Simulation Experiments." Risk Analysis 13, no. 6 (1993): 585-98.

**RESOLVE Annotation:** The researchers conducted three experiments to discover what effect agency communication, information detail and technical risk have on citizens perception of nuclear risk. The studies demonstrate that trust is far more important for determining perceptions of risk than is the amount of information or reducing the actual risk. Education, gender and risk aversion were also significant predictors of risk perception. However, the authors note that these factors are beyond the agencies control while focusing agency efforts on becoming trustworthy - dealing responsively, openly and respectfully with concerned citizens - is within the agency's control and is more effective than providing more technical information or even reducing technical risks. This article does not tell us what people want to know about radiation or D & D but explains why more information will not answer the public's questions about nuclear radiation or D

& D.

**Publisher's Abstract:** Three experimental studies were conducted employing hypothetical news stories to compare the effects on reader risk perceptions of two situations: when agency communication behavior was reported to be responsive to citizens' risk concerns, Vs. when the agency was reported to be unresponsive. In the first two experiments, news stories of public meetings filled with distrust and controversy led to ratings indicating greater perceived risk than news stories reporting no distrust or controversy, even though the risk information was held constant. This effect appeared clearly when the differences in meeting tone were extreme and subjects made their ratings from their recall of the stories, but it was much weaker when the differences were moderate and subjects were allowed to go back over the news stories to help separate risk information from conflict information. In the third experiment, news stories about a spill cleanup systematically varied the seriousness of the spill, the amount of technical information provided in the story, and the agency behavior and resulting community outrage. The outrage manipulation significantly affected affective and cog-cognitive components of perceived risk, but not hypothetical behavioral intentions. Seriousness and technical detail had very little effect on perceived risk.

67. Schaefer, J. State Opposition to Federal Nuclear Waste Repository Siting: A Case Study of Wisconsin. 1976-1988. Green Bay, WI: Center for Public Affairs, University of Wisconsin-Green Bay, 1988.

**RESOLVE Annotation:** We were not able to acquire this report. Our understanding from another source is that this is a review of how one state educated the public on radiation issues (so as to be in opposition to a high level repository). The report may be useful for understanding what the public wants to know about radiation.

68. Secretary of Energy Advisory Board, Task Force on Radioactive Waste Management. Earning Public Trust and Confidence: Requisites for Managing Radioactive Wastes. Washington, DC: Department of Energy, 1993.

69. Shrader-Frechette, Kristin. "Academy Recommendations on the Proposed Yucca Mountain Waste Repository: Overview and Criticisms." Risk 8, no. winter.

**RESOLVE Annotation:** Shrader-Frechette reviews the Academy's recommendations on Yucca Mountain. The article does not address what citizens want to know about radiation, how they want to know it or how to find out what they want to know. It is not clear if the writer is pro or anti nuclear.

70. Simpson, John. "The NRC Weighs Public Input on Plant Cleanup Standards." Public Utilities Fortnightly 131, no. 13 (Jul 1993).

**Publisher's Abstract:** The Nuclear Regulatory Commission (NRC) is preparing to develop radiological criteria for decommissioning nuclear power plants. The criteria will apply to plants that operate for their normal lifespan, those that shut down prematurely, as well as a range of other NRC-licensed facilities, including materials licensees, fuel reprocessing and fabrication plants, and independent spent fuel storage

installations. The criteria have been years in the making, and their progress is being monitored closely by the Environmental Protection Agency, which shares with the NRC the authority to regulate radiological hazards. In its Rulemaking Issues Paper, the NRC outlined for discussion 4 fundamental objectives as a basis for developing decommissioning criteria: 1. establishing limits above which risks to the public are deemed unacceptable, 2. establishing goals below which the risks to the public are deemed trivial, 3. establishing criteria for what is achievable using the best available cleanup technology, and 4. removing all radioactivity attributable to plant activity.

71. Sjobert, Lennart, and Britt-marie Drottz-Sjoberg. "Physical and Managed Risk of Nuclear Waste." Risk 18, no. spring.

**RESOLVE Annotation:** This article discusses the differences between politicians and experts opinions with those of the public regarding the location of a low level radioactive waste site. The researchers interviewed pro and anti individuals to discover what caused the differences in perceptions. (The article does not include the interview protocol.) The original research may contain valuable questions or methods.

72. Slovic, P., et al. "Perceived Risk, Stigma, and Potential Economic Impacts of a High-Level Nuclear Waste Repository in Nevada." Risk Analysis 11, no. 4 (1991): 683-96.

73. Slovic, Paul. "Perceived Risk, Trust and Democracy." Risk Analysis 13, no. 6 (1993): 675-82.

**RESOLVE Annotation:** Slovic integrates many empirical studies on risk communication, risk perception, and trust to develop a clear and convincing explanation of why more information and better communication do not have significant effects on the public's perception of risk from nuclear facilities. Slovic demonstrates that the public's trust in the individuals or agencies communicating about nuclear issues has a far greater impact on citizen's perception of risk than does any other factor. The research is fundamental for understanding the processes needed for designing and operating the RIS.

**Publisher's Abstract:** Risk management has become increasingly politicized and contentious. Polarized views, controversy, and overt conflict have become pervasive. Risk-perception research has recently begun to provide a new perspective on this problem. Distrust in risk analysis and risk management plays a central role in this perspective. According to this view, the conflicts and controversies surrounding risk management are not due to public ignorance or irrationality but, instead, are seen as a side effect of our remarkable form of participatory democracy, amplified by powerful technological and social changes that systematically destroy trust. Recognizing the importance of trust and understanding the "dynamics of the system" that destroys trust has vast implications for how we approach risk management in the future.

74. -----, "Perception of Risk." Science 236, no. 4799 (Apr 1987).

**RESOLVE Annotation:** This article does not provide information on what the public wants to know about radiation, but the research is fundamental for understanding the processes needed for designing and operating the RIS.

**Publisher's Abstract:** Research which examines the judgments people make when they are asked to characterize and evaluate hazardous activities and technologies is presented. The assumption is made that those who promote and regulate health and safety need to understand how people think about and respond to risk.

75. -----, "Public Perception of Risk." Journal of Environmental Health 59, no. 9 (May 1997).

**RESOLVE Annotation:** Drawing upon numerous studies on risk perception, Slovic argues that the public's concerns can not be blamed on ignorance or irrationality. Instead, public reaction to risk can be attributable to sensitivity to technical, social, and psychological qualities of hazards. These qualities include: uncertainty in risk assessments, perceived inequity in the distribution of risks and benefits, and aversion to involuntary exposure to risk. Another important aspect in the risk-perception problem is the role of trust. Slovic further argues that the limitations of risk science, the importance and difficulty of maintaining trust, and the complex sociopolitical nature of risk, call for the need for a new approach that emphasizes greater public participation in risk assessment and risk decision-making. He reasons that a more democratic decision making process improves the relevance and quality of technical analysis, and increases the legitimacy and public acceptance of resulting decisions. This article does not address the question of what the public wants to know about radiation, but it does offer an important perspective on the likely need for a participatory approach in order to make an RIS legitimate and trusted by the public.

**Publisher's Abstract:** Slovic argues that new perspectives and new approaches are needed to manage public health risks effectively in US society.

76. Slovic, Paul, James H. Flynn, and Mark Layman. "Perceived Risk, Trust, and the Politics of Nuclear Waste." Science 254, no. 5038 (Dec 1991).

**Publisher's Abstract:** The DOE's program for disposing of high-level radioactive wastes has been impeded by overwhelming political opposition fueled by public perceptions of risk. Postponing the permanent repository and employing dry-cask storage of wastes on site would provide the time necessary for difficult social and political issues to be resolved.

77. Slovic, Paul, Mark Layman, and James H. Flynn. "Perceived Risk, Trust and Nuclear Waste: Lesson from Yucca Mountain." In Public Reaction to Nuclear Waste: Citizen Views of Repository Siting, edited by R.E. Dunlap, M.E. Kraft and E.A. Rosa. Durham, NC: Duke University Press, 1993.

**RESOLVE Annotation:** This study reviews attitude, perception, and opinion surveys regarding management of high level radioactive waste. Most of the survey questions appear to have been about overall perceptions of nuclear waste and the proposed Yucca Mountain repository; therefore the article is not very helpful for the RIS work. However, there was reported deep distrust of DOE and other federal agencies, and more trust in state agencies and politicians. They also report significant negative word associations with "underground nuclear waste repository."

78. Slovic, Paul, Mark Layment, and James H. Flynn. "Risk Perception, Trust and Nuclear Waste: Lessons from Yucca Mountain." Environment 33, no. 3 (Apr 1991).

**Resolve Annotation:** The authors analyze the political failure of DOE's Yucca Mountain waste repository program to overcome public opposition. One reason for the program's lack of success is the gulf between public perception of risks associated with nuclear waste and the prevailing view of the technical community which believes nuclear wastes can be stored safely in underground isolation. Understanding public perceptions of risk from radiation, nuclear power, and nuclear waste, the authors argue, is a first step in resolving the impasse over the waste management problem. To provide greater understanding of public perception of nuclear waste, the authors employed mental imagery as an analytic tool. In four telephone surveys 3,334 individuals were asked to respond to the term underground nuclear waste repository. The surveys yielded 9,439 word associations which were overwhelmingly negative. The four most common single word associations were dangerous (539), danger (378), death (306), and pollution (276). These surveys, others cited, and the article itself do not answer the question of what does the public want to know about radiation, but the "crisis in confidence" in nuclear waste storage documented in this article and in much of the literature does point to some of the obstacles that will have to be overcome in order to design a radiation information system that is perceived as credible and trustworthy by the public.

**Publisher's Abstract:** Public fear of nuclear power has become a major obstacle to the US government's search for a suitable site for storing radioactive wastes. The results of four surveys of public perception of the risks from nuclear waste storage are presented.

79. Slovic, Paul, S Lichtenstein, and B. Fischhoff. "Images of Disaster: Perception and Acceptance of Risks from Nuclear Power." In Energy Risk Management, edited by G. Goodman and W. Rowe, 223-45. London: Academic Press, 1979.
80. Soderberg, O. "Information Strategies in Sweden Concerning the Disposal of Nuclear Waste." Advisory Group Meeting on Public Understanding of Radioactive Waste Management Issues. Vienna, June, 1989.
81. Stanley M. Nealey, Barbara D. Melber, and William L. Rankin. Public Opinion and Nuclear Energy. Lexington, MA, Toronto: D.C. Heath and Company, 1983.
82. Surrey, John. "Ethics of Nuclear Decommissioning." Energy Policy 20, no. 7 (Jul 1992): 632-41.

**Publisher's Abstract:** What to do with the nuclear reactors that reach the end of their operating lives over the next 30 years entails ethical issues of an intergenerational kind. Nuclear decommissioning options are examined in the light of these ethical issues. Prompt dismantlement appears preferable to other options involving postponed dismantlement, some kind of entombment, or doing nothing. This would avoid bequeathing future generations with the disamenity of entombed reactors or responsibility for dismantling other disused reactors. In addition, the choice of option depends on the



health risks through time and whether a sufficient decommissioning fund exists to avoid passing on debt and constrained choice. There is a strong case for supporting research and development from public funds to develop the technology and reduce both the health risks and the costs, particularly if dismantlement is left to future generations.

83. Swift, Peter. "Nuclear Reactions: When the Nightmare Comes True." British Telecom World, Dec 1989, 67-68.

**RESOLVE Annotation:** This radiation information system is designed to get information on radiation out to the public in emergency situations. The article does not address the question of what the public wants to know about radiation.

**Publisher's Abstract:** The Radioactive Monitoring Network (RIMNET) is part of a national response plan to help keep the UK public fully informed with information about nuclear pollution advisories. Hourly radiation checks at meteorological stations, a computer database, and a technical coordination group provide information to the public and to central and local government officials. A radiation alert activates a complete government screening program for crops, food, livestock and water. Computers are used to forecast the direction of a radioactive cloud and to project the pattern of contamination over Britain. All data from 46 field stations in the UK and Northern Ireland are transmitted to RIMNET's Central Database Facility (London). All information is relayed to a backup computer in Lancaster, England, over leased landlines. One of the key elements of the system is communication. The network is designed to allow Britain to respond quickly and efficiently to a nuclear incident.

84. Thurber, J.A. Report on Selected Published Works and Written Comments Regarding the Office of Civilian Radioactive Waste Management Program (1989-1993). American University, Washington, DC: Center for Congressional and Presidential Studies, School of Public Affairs, 1994.

85. Trauth, Jeannette M. "A Case Study of Health Risk Communication: What the Public Wants and What It Gets." Risk 5, no. winter.

**RESOLVE Annotation:** Content analysis of local newspaper coverage of public health risk issues associated with the USX Clariton Coke Works near Pittsburgh, combined with surveys of local residents identifies the types of information residents find most useful in making personal decisions about possible health risks and identifies the most credible source(s) of information. Information deemed useful includes:

- \* Interpretive information and critical background, rather than unqualified risk statements;
- \* Lists of the types and amounts of toxic chemicals released into the local environment;
- \* Explanations of known immediate and long term health effects; and
- \* Distinguishing between "release" and "exposure" of toxic chemicals.

The most credible source of information is family physicians, followed by environmental organizations. Federal, state, and industry sources were ranked as the least credible. This article does not address nuclear issues, but provides some comparative description of the polled resident's information needs in other environmental pollutant areas and their

**opinions on the credibility of various information sources.**

86. Tsuchiya, Fumiyuki. "Nuclear Power and Its Potential (Part 4): Learning to Live with Nuclear Power." Japan 21st 35, no. 5 (May 1990): 26-27.

**RESOLVE Annotation:** This article is of no significant use for the RIS. It reports on the strategy of overcoming the public's "collective illusions" on nuclear power with better information. It does not provide information on what the public wants to know about radiation.

**Publisher's Abstract:** Although people may be given current information regarding energy demand and environmental problems, often they retain uncertainties regarding the issue of radioactivity. These uncertainties arise because the need for nuclear power generation cannot be explained in a way that can put a logical end to collective illusions about radioactivity. In a nuclear reactor design, the fail-safe principle is maintained in a manner that is totally unimaginable in terms of common sense. Thompson, who taught nuclear reactor design at the Massachusetts Institute of Technology, has designed a nuclear reactor in which the control rods fall naturally even if the operator lets go of them. Thompson's idea for a safe design is endorsed by the possibility that something usually will happen when an individual is under extreme pressure. Nuclear power plant accidents must be recorded in human history in terms of a hard lesson for nuclear power plant designers. Such accidents can be accepted as a warning against the fallacy that a nuclear reactor is perfectly designed to be free from accidents.

87. US Department of Energy (DOE). Recommendation by the Secretary of Energy of Candidate Sites for Site Characterization for the First Radioactive-Waste Repository (DOE/S-0048). Washington, DC: GPO, 1986.

88. US Department of Energy (DOE) (Advisory Board Task for on Radioactive Waste Management). Earning Public Trust and Confidence: Requisites for Managing Radioactive Waste. Washington, DC: GPO, 1993.

**RESOLVE Annotation:** This report makes recommendations about how to combat the loss of public trust and acknowledges that DOE lacked at that time institutional capacity to strengthen public confidence. This report may be useful for creating questions for the RIS.

89. US Department of Energy (DOE) (Office of Civilian Radioactive Waste Management). Integrated Database for 1990: US Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics. Washington, DC: GPO, 1990.

90. US Department of Energy (DOE) (Yucca Mountain Site Characterization Office). Yucca Mountain Project Public Participation Program and Guidance (Draft). Washington, DC: GPO, 1993.

91. Van der Pligt, Jan. Nuclear Energy and the Public. Cambridge, MA: Blackwell, 1992.

92. Vari, Anna. "Public Perceptions About Equity & Fairness: Siting Low-Level Waste Disposal Facilities in the US and Hungary." *Risk* 7, no. spring.  
**Resolve's Annotation:** The author concludes that the legitimacy of a siting decision depends on the level of consensus between key stakeholders on the overall necessity of the facility, the design of a fair siting process, and the fair distribution of risks and benefits. Vari recommends, therefore, that before planning a siting process, the views of main actors regarding the principles and criteria for fair processes and outcomes be explored, discussed, and a mutually acceptable agreement be negotiated. This article does not contain information directly useful for the RIS, but if it is later learned that citizens would like an RIS to contain information on different models of siting procedural fairness then this article and others like it would be useful.  
**Publisher's Abstract:** This paper focuses on the perceptions of fairness associated with the siting of low- and intermediate level radioactive waste (LLRW and ILRW) disposal facilities. The study investigates publicly expressed responses to LLRW and ILRW disposal facility siting processes in the US, specifically in New York, and Hungary. In New York, 100 letters of protest and petitions by residents and environmental groups from candidate siting areas were analyzed. In Hungary, texts of 24 semi-structured interviews with residents, activists, and government offices of the "short-listed" community and county were investigated. Arguments associated with the fairness issue were collected from the interviews and analyzed in terms of the conceptual framework described.
93. Weart, S.R. Nuclear Fear: A History of Images. Cambridge, MA: Harvard University Press, 1988.  
**RESOLVE Annotation:** Not acquired. Flynn et al. (1995) says that this book shows that "nuclear fears are deeply rooted in our social and cultural consciousness." This book is unlikely to tell us what the public wants to know about radiation.
94. Wellock, Thomas Raymond. Critical Masses: Opposition to Nuclear Power in California, 1958-1978. Madison, WI: University of Wisconsin Press, 1998.  
**RESOLVE Annotation:** We were not able to acquire this book, but from reading the book review below (by James Flynn), we believe this could be an important source of information on public perception and fear of nuclear power. Like much of the public perception/public opinion literature annotated in this bibliography, we suspect that this book will not tell us directly what the public wants to know about radiation.  
**Book Review:** In Thomas Raymond Wellock's hands, the failed attempts to site nuclear power facilities in California during the 1960s and 1970s provide new and important sources for understanding why this technology went into a terminal decline. The author discusses five significant siting attempts in some detail. He also covers a sixth episode-at Diablo Canyon-as it influenced the development of anti-nuclear sentiment, especially within the Sierra Club. Wellock shows that a combination of social, cultural, economic, and political conditions marked the end of the nuclear option for California even before the dramatic events of Three Mile Island in 1979. With admirable skill, he transcends the case study format and ranges over a landscape of individuals, clubs and social groups,

industries, politicians and parties, communities, and political jurisdictions including towns, cities, water districts, counties, the state of California, and the federal government. He includes important court cases and decisions as well as the development of key state regulatory agencies. The struggle for local and state control over nuclear power is central to this account, a movement that became a national issue and reached its final logical conclusion at Shoreham, New York, in 1988. The author's commentary on social values and their place in the growth of anti-nuclear strength is unfailingly interesting and informative, though readers may disagree with his more sweeping claims about the role of "non-materialist" values. The book has two deficiencies, which perhaps reflect more on the publisher than on the author. The notes are extensive and well written, but there is no bibliography and the index is haphazard and inadequate. Let us hope that the time has not passed when major university presses provide these for scholarly books. In summary, among the thousands of articles and hundreds of books that have addressed the rise and fall of nuclear power, Wellock's book joins the top rank of efforts to account for the curious and dramatic history of this technology. This is a fine effort and an important book.

95. Wiltshire, S. "Public Participation in Department of Energy High-Level Waste Management Programs." Tennessee Law Review 53 (1986): 554-57.
96. Wolfe, Bertram, et al. "Yucca Mountain." Environment 39, no. 7 (Sep 1997).  
**RESOLVE Annotation:** This article addresses the technical and political challenges and controversies surrounding the Yucca Mountain repository, and does not address the question of what does the public want to know about radiation.  
**Publisher's Abstract:** Wolfe and Carter comment on Flynn et al's evaluation of Yucca Mountain with regards to nuclear energy and Flynn et al respond.
97. Yucca Mountain Socioeconomic Study Team (YMSST). The State of Nevada, Yucca Mountain Socioeconomic Studies, 1986-1992: An Annotated Guide. Carson City, NV: Nuclear Waste Policy Office, 1993.

## **Appendix C**

### **EPA RPD Discussion Guide**

**Stakeholder Category**\_\_\_\_\_

#### **Who are RESOLVE & TRIANGLE**

U. S. EPA's Radiation Protection Division is updating its public outreach and communications materials

EPA asked us to help, gather info to inform design of public outreach and information about radiation

Want to satisfy public's "Right to Know" -- collecting, analyzing, managing and distributing information & data on naturally occurring and human made radiation. Want to design public outreach useful to: public, local, state and Tribal governments, and radiation professionals

Want to find out what you want to know about radiation so EPA can design outreach that meets your needs and interests

Having discussions to find out information for EPA

Do they have 30 minutes for a discussion?

Now or when?

Schedule time

Number to call?

Can fax copy of a letter from EPA explaining purpose of project. Fax number?

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## **EPA RPD Discussion Guide**

Want to know about your information needs and how EPA can fulfill the U. S. EPA's Radiation Protection Division updating its outreach and communications material about radiation. Wants to design public outreach and communications about radiation which is useful to general public and special audiences. This discussion is part of EPA's outreach to interested people.

A. In what situations do you need information about radiation?

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(Reminder: find out-what the context was, what did you want to know, why did you want to know it)

B. Can you usually find the information you need?

C. Why or why not?

D. Where would you go to find that information?

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Reminders:

Public library

University library

Personal contacts-organizations or committee you belong to

Newspapers

Federal Internet sites

Medical professionals

Other; please specify \_\_\_\_\_



E. Was the information you wanted easy to find?

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F. If no, why was it hard to find? \_\_\_\_\_

A:\Appendix C EPA RPP Discussion Guide.doc\_

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G. If yes, why was it easy to find? \_\_\_\_\_

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H. Can you think of a current situation that you would like some radiation information for? -

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(Reminder: find out-what was the context, what did you want to know, why did you want to know it)

I. How would you find the information that you wanted? \_\_\_\_\_

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J. What are some of the other situations that you need radiation information for? \_\_\_\_\_

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K. Which sources of information on radiation do you use most frequently?

Reminder:

Public agencies: EPA, DOE, NRC, state agencies, local agencies

Non-governmental organizations: Environmental groups, trade organizations

Citizen groups

Word of mouth-personal contacts

Public library

The Internet,

News media

DOE Information Repositories

Other: Please specify \_\_\_\_\_

L. When designing public outreach and information what is more important to you—ease of use, reliability, credibility, balance between pro and con views and information? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

M. There are many formats for presenting information, of the following formats which are most useful to you and the least useful to you?

\_\_\_\_\_ Pamphlets, flyers, short written materials

\_\_\_\_\_ Longer ,written materials

\_\_\_\_\_ A little bit of written materials with lots of pictures, graphs and figures

\_\_\_\_\_ Lectures or discussion

\_\_\_\_\_ The Internet or worldwide web

N. Are there other factors that are important to you as the EPA designs the public outreach? \_\_\_\_\_

O. There are many issues related to radiation. How concerned or interested in these topics is your constituency or the people you talk frequently with?

Radiation

risk \_\_\_\_\_

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Public health and  
safety

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Worker  
safety

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Waste disposal

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Nuclear power plants

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Industrial  
activities

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Plans for mitigation, cleanup, decommissioning, monitoring, reuse and  
emergency response for facilities that formerly handled radioactive material

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Emergency  
response

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Disposition and transportation of  
wastes\_\_\_\_\_

Changing land patterns around facilities that handle radioactive material  
(currently and  
historically)\_\_\_\_\_

Distinctions between high level and low level radioactive waste\_\_\_\_\_

Distinctions between chemical and radioactive wastes\_\_\_\_\_

Superfund  
sites\_\_\_\_\_

Onsite/offsite issues (specific contaminated sites, current and past  
emissions, burials, spills and  
releases)\_\_\_\_\_

Regulatory and inspection history of  
facilities\_\_\_\_\_

Others: please  
specify\_\_\_\_\_

P. As EPA improves its public outreach, would you like to continue to be  
involved?\_\_\_\_\_

Q. How would you like to be involved?\_\_\_\_\_

R. If you would like to be involved is it ok if we give your name and  
telephone number to an EPA staff person?\_\_\_\_\_

Thank you very much for helping us and giving up your time, I just have a one more question.

S. Can I ask you if you think there is any aspect of radiation information that has not been covered in this interview? \_\_\_\_\_

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Thank you again for your time and thought.

## **Appendix C**

### **EPA RPD Interview Protocol**

**Stakeholder Category**\_\_\_\_\_

Hello, my name is \_\_\_\_\_, from (Triangle Associates or RESOLVE). The U. S. EPA's Radiation Protection Division is seeking to update its information and educational materials on radiation in the environment. EPA currently provides basic radiation information through publications and a web site.

The EPA has asked us to help them gather background information that they will use to improve their outreach and communications service to ensure that the public can access accurate information about radiation in the environment. EPA is interested in knowing the information needs of the public, those affected by potential radiation hazards, local, state and tribal governments, and environmental professionals.

We would like to interview you because of your work with radiation protection, environmental, or public education issues. Do you have some time right now or can I schedule a time to talk to you? The interview will take between 30 – 45 minutes.

Ok, then I will call you at (time)\_\_\_\_\_. Is this the telephone number you will be at? \_\_\_\_\_

If it would be helpful, I could fax you a copy of a letter from EPA that explains the purpose of this project. What is your fax number?\_\_\_\_\_

Thank you, I will call you at (time) on (date) at (number).



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## EPA RPD Interview Schedule

Hello, my name is \_\_\_\_\_. I am calling from (Triangle Associates or RESOLVE) to talk to you about ways to improve information and educational materials on radiation in the environment. U. S. EPA's Radiation Protection is sponsoring this project to improve its public outreach about radiation in the environment. The EPA has asked us to help them identify ways of providing information that are useful to environmental professionals and the public. We are talking to people like you to find out what you want to know about radiation in the environment so that EPA can design services that meet your interests.

First, I am going to ask you some questions about your experience getting the radiation information you want or need.

A. Can you think of a time when you wanted to know something about radiation?

aNo bYes

B. If yes, can you tell me about the situation?

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(Reminder: find out-what was the context, what did you want to know, why did you want to know it)

C. Did you find the information you were looking for?

aNo bYes

D. If no, why not?



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E. If yes, how did you find that information?

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F. Where was that information? \_\_\_\_\_

Reminders:

Public library

University library

Personal contacts-organizations or committee you belong to

Newspapers

Internet

Government sites

Medical Professionals

Other: Please specify \_\_\_\_\_

G. Was the information you wanted easy to find?

aNo bYes

H. If no, why was it hard to find? \_\_\_\_\_

I. If yes, why was it easy to find? \_\_\_\_\_

J. Can you think of a current situation that you want information on radiation hazards or radiation in the environment for? \_\_\_\_\_

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(Reminder: find out-what was the context, what did you want to know, why did you want to know it)

K. How would you find the information that you wanted? \_\_\_\_\_

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L. What are some of the other situations that you need radiation information for? \_\_\_\_\_

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Now, I would like to ask you some question about sources of information on radiation.

M. Which sources of information on radiation do you use most frequently? On a scale of 1-6, 6 being most frequently and 1 being never, please rank each of the following information sources.

- \_\_\_\_\_ Public agencies, EPA, DOE, NRC, state agencies, local agencies
- \_\_\_\_\_ Non-governmental organizations
- \_\_\_\_\_ Word of mouth-personal contacts
- \_\_\_\_\_ Public library
- \_\_\_\_\_ The Internet
- \_\_\_\_\_ News media
- \_\_\_\_\_ Medical Professionals
- \_\_\_\_\_ Other, Please specify \_\_\_\_\_

As the EPA develops its public outreach on radiation, they will try to develop systems that meet the most people's needs. The next question will help the EPA decide which factors to pay most attention to as they design their public outreach.

N. On a scale of 1-6, 6 being most important and 1 being not at all important, how would you rank the following factors?

- \_\_\_\_\_ Easy to use
- \_\_\_\_\_ Reliable (the public outreach is dependable, users trust it, have faith and confidence in it)

\_\_\_\_\_ Credible (the information from the public outreach system is believable, plausible, it is worth people's confidence)

\_\_\_\_\_ Balanced (pro's and con's)

\_\_\_\_\_ Other; please specify \_\_\_\_\_

O. There are many formats for presenting information, of the following formats which are most useful to you and the least useful to you?

\_\_\_\_\_ Pamphlets, flyers, short written materials

\_\_\_\_\_ Longer ,written materials

\_\_\_\_\_ A little bit of written materials with lots of pictures, graphs and figures

\_\_\_\_\_ Lectures or discussion

\_\_\_\_\_ The Internet or world wide web

P. There are many issues related to environmental radiation. For each of these, can I ask you how concerned or interested the people you serve seem to be?

On a scale of 1-6, 6 being most concerned/interested and 1 being not at all concerned/interested how would you rank the following issues?

\_\_\_\_\_ Radiation risk

\_\_\_\_\_ Public health and safety

\_\_\_\_\_ Worker safety

\_\_\_\_\_ Waste disposal

\_\_\_\_\_ Nuclear power plants

\_\_\_\_\_ Industrial activities

\_\_\_\_\_ Plans for mitigation, cleanup, decommissioning, monitoring, reuse and emergency response for facilities that formerly handled radioactive material

\_\_\_\_\_ Emergency response

\_\_\_\_\_ Disposition and transportation of wastes

\_\_\_\_\_ Changing land use patterns around facilities that handle radioactive material (currently and historically)

\_\_\_\_\_ Distinctions between high level wastes and low level wastes

\_\_\_\_\_ Distinctions between chemical and radioactive wastes

\_\_\_\_\_ Superfund sites

\_\_\_\_\_ Onsite/offsite issues (specific contaminated sites; current and past emissions, burials, spills, releases)

\_\_\_\_\_ Regulatory & inspection history of facilities

\_\_\_\_\_ Others; please specify?

Q. As EPA improves its public outreach function, would you like to continue to be involved? \_\_\_\_\_

U.S. EPA Headquarters Library  
Mail code 3201  
1200 Pennsylvania Avenue NW  
Washington DC 20460

R. How would you like to be involved? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

S. If yes, would you like us to pass your name, telephone number and address on to the EPA so that they can get in touch with you? \_\_\_\_\_

Thank you very much for helping us and giving up your time, I just have a one more question.

T. Can I ask you if you think there is any aspect of radiation information that has not been covered in this interview? \_\_\_\_\_

Thank you again for your time and thought.

Write any extra notes here if you need more room.

Don't forget to write the question number next to the answer.

## **Appendix D**

### **EPA RPD Discussions – Detailed Responses**

For questions A-I, situations in which information was needed, the following was offered by respondents:

Respondent #1 (National Community and Site Specific Organizations): First, there is the situation of risk analysis for operational emissions and for clean-up decisions; second, there is the range of estimates for individual doses for safety and clean-up standards. The information cannot usually be found because there is a wide range of operational standards that are not expressed in terms of the underlying risks that members of the public and the media often ask about. There are questions about which standards apply under what circumstances, and why there are differences in standards between agencies, and why there are differences in the underlying risk levels utilized to generate the standards.

To seek information, we go to Internet sites of federal and state agencies and other organizations; to independent experts who are often at universities; and to other organizations. Personal contacts are very important.

The information is hard to find because standards are presented in individual regulations without comparisons to other radiation or radionuclide standards, for example, DOE puts out materials saying acceptable public radiation exposure is 100 millirem/year. The average person looking for a standard would only find one for DOE, but not for EPA. DOE operational exposure figures give no explanation of how they are measured, then there is a different figure and standard for hazardous air particulate emissions.

Respondent #2 (Consultants): Radiation in utility business. It is very difficult to find needed information, esp., in relation to DOE Weapons Complex and exposure to workers. There is some info. from epidemiological studies including the "RERF" (formerly, the Atomic Bomb Casualty Commission, and some for discreet sites, but more is needed.

What sources are used depends on what is being looked for. Exposure data is historic and very hard to get, and sometimes not reliable. There is also the question of the potential recycling of radioactive waste that is being done outside of the NEPA process and unregulated. There are 1.5 million tons of wastes that are being promoted for recycling into products for public use without the requirement to inform the public. EPA should look at this.

Sources used most frequently are personal contacts and federal Internet sites (and others). Information is also available from the Argon or DOE lab sites, Congressional reports, state and local agencies involved in oversight, and the network of organizations interested in the topic.

Respondent #3 (National Community and Site Specific Organizations): Clean-up at nuclear sites and transportation of waste, esp. with regard to Hanford. Information is generally available, primarily because I don't need much. I've been doing this for years and have a lot in my head. Don't know why EPA is doing this when they have so many more important things to do I



would not go to EPA for information. I would use DOE sources, and the Center for Disease Control. Also, the media (radio, magazines like NRDC publications) All the information we need to know is already available.

**Respondent #4 (Other National Groups):** Worker exposures at DOE facilities, commercial industry, uranium mining sites; exposure of people involved in transportation of wastes such as truck drivers, longshoremen, medical emergency workers, rural responders who are first at a site; exposure of communities next to sites. Information of health effect is very difficult to find. There are not that many studies and lots of unanswered questions.

I mostly use personal contacts and experts in the medical field to get information. I don't use the Internet or web.

**Respondent #5 (Tribes and Tribal Organizations):** Any information on radiation related to geographical locales. They have 17 tribes in their state who have a great lack of technology to find any information on radiation. Information on mitigation. Nevada Indian Environmental Coalition (NIEC) gets information from the EPA website (but it mostly has information on indoor air), University of Nevada, and public meetings with the state and EPA on such topics as Radon. They find it inconvenient to have to 'order' information or carry it if they are not connected to the Internet. When they are present at meetings the information is a bit more accessible.

**Respondent #6 (States and State Organizations):** Need information on radiation when it relates to a public perception of how a particular topic affects them. For example, how a medical x-ray affects a person. Give them comparisons of the dose in tangible terms. Can usually find information due to familiarity and frequency with their sources. Use the CRCPD, NRC, FDA, and technical documents gathered from professional contacts, federal Internet sites, and the national low level waste group. Easy to find through these channels.

Has difficulty finding information on very simple topics like 'waste volumes or activity of waste at certain sites'. It becomes challenging when the information must be verified by multiple sources (i.e. to have credibility, validity for the state legislature) or has to be double checked for how recent the data/or information is.

**Respondent #7 (National Community and Site Specific Organizations):** Local oversight committee on radiation. Need information, when contacted, on health affects. Must follow up on claims to verify or disprove risks and affects. Using the Internet, email list called 'radsafe', and a lot of knowledgeable contacts, can find some information. But not always b/c of not knowing where to look or the information is not readily available. Once the right avenues are found, it is easy to find.

**Respondent #8 (States and State Organizations):** Specific information about an industrial park having food sterilization going on and a nearby school wants to know the risks. Can usually find the information readily as this person is a professional and knows who to contact. First contacts the National Council of Radiation Protection and Measurements, then the organizations and committees he works with; the International Commission on Radiation Protection (authorized by Congress and independent), the International Commission on Radiological Units, and the National Academy of Sciences Hazards Committee for Biological Effects of Ionizing Radiation.

Though this information is easy to find for him, it is very technical and not easily accessible to the general public.

**Respondent #9 (National Community and Site Specific Organizations):** Information on environmental cleanup of nuclear weapons sites for the general public.

The information is accessible from Industry, trade, and environmental groups along with other personal contacts. Federal Internet sites and other sites are great for a variety and diversity of sources.

**Respondent #10 (Public Interest Groups):** Need general information on radiation to provide to public. Using contacts at DOE sites or contractors for information, increasingly using government Internet sites, frequently uses personal contacts and academic journals. Information is easy to find when there is an actual process or decision happening. For example, if DOE is involved in NEPA decision or process that is underway, you can find information on it.

Information is hard to find if you need specifics or greater detail. Information on exposure or monitoring is hard to get hold of.

**Respondent #11 (States and State Organizations):** Radiation related to health affects . Radon. Working to gather information, or update it to provide to the general public. Their organization is a source of information for other organizations. They know where to go for new information and research. They have access that the members of the public do not. They first check with organizations who make their living compiling information, check reviews, scientific information, and federal Internet sites. The information system on radiation that currently exists is sponsored by government and non-government organizations. We feed, not the other.

The more specific it is, the more challenging it is to locate for them or the general public. Members of the public are looking for more basic information that is not necessarily current.

**Respondent #12 (National Environmental Organizations):** Laws regulations and policies, who does what where. Wanted to find out about Yucca Mountain, who is going to issue the health regulations, who will enforce, who will set and implement? Like to have a one-stop, user-friendly technical information source about radiation terms and radiation risk. There is not a good site that talks about linear no-threshold theory, why it applies to radiation, health affects on human body, risk modeling for the human body. Put info in perspective. He knows there are different principles - but if someone doesn't know, it would be helpful for the EPA to say why they are different and how.

Information is usually found after a lot of digging. (Not a typical answer) works with EPA and knows whom to call. Use some Internet sites (Health Physics Society has the worst site ever, even though you think it would be good). Suggests the EPA work with the Health Physics site, NCRP site as well. University of Michigan- use a university to help link. Books are a good source of information (BEIR books, NAS books are great for Radon), professional reports by ICRP and NCRP—and need to be up on the web.

When can't find the information- better way to ask can he find in a form that is usable to him? Is the language arcane? Information may be out there, but it is not accessible. In some cases it is

just not there. EPA may not need a 'hotline', but they need a well stocked website that is accessible.

**Respondent #13 (Tribal Governments and Organizations):**

**Note:** This respondent was very distressed about the approach being taken to gather information about tribal interests. Specifically, he wondered why the EPA American Indian Environmental Protection Office was not consulted and did not send out the letter. He also emphasized that to find out what the tribal nations want, you have to talk with them directly and cannot rely on a few interest organizations, some of which don't have any direct membership or accountability. He cited the many times he has been called to represent tribal interests, and has said to call the tribe directly, only to be quoted in a report as speaking for the tribes.

He is very frustrated about the lack of comprehensive outreach directly to tribal representatives and wants it to be different. He reminded me that they are sovereign nations to whom the U.S. government has Trust responsibilities, and that they must be treated differently than other interest groups. He says that the issue of veracity of the findings is directly related to the approach taken to gathering data, and that the approach being used here will not be credible among the tribes.

However, he also wants to cooperate with this effort as much as possible and agreed to complete the interview provided that we are clear that he does not represent all tribes. I told him that we would pass his concerns passed along to both the sponsoring EPA office and the AIEP Office.

**Comments:** He needs data about the land in and around sites that is owned by the tribes through Trusts. If EPA puts together this data base, there will be a question of veracity because there is a lack of confidence in regulatory standards and enforcement around past facilities. The data needs corroboration or an independent oversight group.

He would set up a whole subject matter area on matters pertaining to tribes. What is in the data base should be guided by Trust responsibilities. There is a question of EPA's regulatory or oversight role, for example on DOD or DOE sites that include tribal lands. The data base should cover federal sites, utilities that must meet federal standards, and environmental management sites.

The data base should cover all tribal interests, including land rights, cultural uses, health and welfare, and the data gathered by states that monitor sites for cumulative impact information.

**Respondent #14 (States and state organizations):** setting clean-up regulations for implementing NRC guidelines. Looking for draft NRC guidance and for information on radiation risk and what dose levels mean.

The information can usually be found. There's a lot of international and national guidance through the ICRP's and NCRP's that give a lot of information on dose/risk. It is readily available. To get the information, respondent goes to federal Internet sites, especially the NRC site, to experts in the field, especially the Battelle NW Labs, and to personal and organizational contacts, especially the CRCPD Committee on Decommissioning and Decontamination. The information is easy to find if you're willing to dig a little.

Respondent #15 (National Community and Site Specific Organizations): When people make Freedom of Information (FOIA) requests for certain devices. School kids doing special projects who want to know "everything there is to know about radiation"; real estate agents or potential land purchasers where there are possible burial sites or contamination. The information can usually be found, either because we keep it, or it has been sent to us, or it is in the library across the hall. Respondent also has a lot of contact with other Agreement states and works through the Southern States Energy Board. Professional organizations, including the Health Physics Society, and International Committee on Radiation Protection (ICRP), and the American Nuclear Society, are also good sources for information. Finally, many vendors produce data and information. Information is easy to find. And, respondent has been working in the field for thirty+ years.

Respondent #16 (National Environmental Organizations): Effects on health; medical information about exposures; information on accidental releases. Finding out what exposure levels are requires getting monitoring records, metrology reports that are not always available or reliable. Accidental spill information is not routinely reported to the public. Information is hard to get, and not always reliable. We often have to use FOIA requests that are a lot of trouble.

The integrity of reports is questionable because many facilities are self-monitoring. Need independent oversight. Also, it's hard to get old records on facilities – "stonewalling" by operators. About risk levels there is an ongoing debate in the professional and scientific community about the impact of low level exposure, so it's hard to know what is true. Even when we get data, it is often hard to sort out, especially for lay people, so we must consult with independent experts.

Sources used include federal and state agencies, and county health departments. Experts there and outside (in universities) are a major source of information. We also turn to elected officials when we can't get information. Federal Internet sites are heavily used, along with other Internet sites. We are often forced to make FOIA requests.

Respondent #17 (States and State Organizations): Will this be used for all areas of EPA – Not just RPD, Water, Air, etc? Nothing technical they need to know. Need to know what regulatory info from EPA. Need to know EPA's approach or rationale for a given rule. Distribute pamphlet about Radon. Keeps them from having to duplicate. Always useful to set EPA protocols and guidance. Resource. Have all the information National Academy of Sciences, ICRP, NCRP, recognized organizations that are not regulators, federal sites – NRC.

Respondent #18 (National Community and Site Specific Organization): Used to help others understand risk management as it related to environmental cleanup. Can sometimes find the information (speaking for citizens that call their organization) They feel that citizens don't know where to look for information or the information is not readily available and in an easy to read and understand format. They go to the DOE website, their own library which contain many different federal documents, think tank materials and non-profit documents. They feel that the information is out there if you know where to look. Often times the information needs to be synthesized in an easy-to-use manner for the layperson.

Respondent #19 (National Community and Site Specific Organizations): Need information because state has a federal nuclear facility or proposed nuclear facilities and citizens from all over the state need information, from basic to complex. Our organization, in conjunction with other federal agencies, deals with Superfund style clean up and the State, DOE and EPA will publish proposed clean up plan and people will call with questions. I hate to sound negative but people seem to be comfortable with the knowledge (or in many cases, lack of knowledge) about radiation. Most frequently they get their information from the media, whose job is to sensationalize info to increase viewership. People are familiar with media scare features, Three-Mile Island and Homer Simpson and they are comfortable with their misconceptions. Often times citizens call when they can't find information on TV and come to a public hearing about a proposed incinerator of mixed waste and think that 1 microgram will kill them! The information is out there if people want to look for it but there is a very low interest in really finding out about radiation. We do lots of county fairs and malls to try to get the word out and most people are comfortable with their misconceptions. It is hard b/c people don't seem to care and a negative education has already occurred through the media (shows like the Simpsons, etc. ) People also are quick to think that the federal government is not being upfront with them and they have a skepticism related to radioactivity regardless of who produces the materials.

Respondent #20 (Canadians): Respondent is a specialist in aboriginal relations in Canada, not in nuclear power. He recently spoke at the Second International Symposium on Ionizing Radiation – Environmental Approaches for Nuclear Facilities, held in Ottawa, and was brought to our attention by a conference attendee. He was quite happy to help us, but could not talk about nuclear situations in detail since that is not his specialty. His keynote presentation entitled "Citizen Engagement from an Aboriginal and Environmental Perspective" is available as power point slides from The Willow Group who managed the conference. He made the point that there are very specialized laws and cultural considerations when consulting with aboriginal tribes. He faxed the program for the conference that contains other useful international references and people (included in Appendix).

Respondent also recommended that we get a copy of the 'Seaborn Report' on hearings held concerning depositing nuclear waste in vaults in the Canadian Shield. This is native land for many aboriginal tribes and would have impacted them significantly. He referred us to the Canadian government web site for the Canadian Environmental Assessment Agency in order that we might locate the person who managed the hearings process.

Respondent #21 (Tribal Governments and Organizations): How much radiation is out there; how it is dispersed; what are the impacts on human health and the environment? What impacts on the unique tribal lifestyle and culture? Respondent usually cannot find the information, and it's hard to get. Everybody's afraid to turn loose of the pertinent information; afraid they'll get sued. This causes us to suspect that something bad happened whether it did or not, then there are denial, etc. It's hard to do scientific studies that are relevant unless the expert understands the unique lifestyle and culture.

To get information respondent relies on hired technical experts and outside experts, including medical professionals. It's hard to trust the information that comes from the agencies.

Respondent #22 (State and state organizations): Technical information about uses of radioactive materials at site. Technical information that would help in evaluating releases. It has gotten

better in the past few years; now we can usually find the information we need. This is because we have established good personal relationships with the people in the federal agencies. You have to know the right question to ask them, also. They don't volunteer information.

Respondent # 23 (National Environmental Organization): We are in the process of working with the DOE to establish a national database on the amounts of radioactive waste currently stored or handled at the DOE sites. Issue came up-will know about the quantity and the type but will not know about the risk and the dose. Can usually find the information he needs, generally. But by and large -the risk to the public- bottom line this information is not available. Because there have been no Uniform Clean-Up Standards set. EPA has chosen not to exercise jurisdiction/regulation over DOE, have looked to NRC decommissioning rule as the generally applicable regulation.

To get information on dose or risk generally, EPA has info in the public domain. BEIR materials, EPA, materials from the NRC, International standards, NEI, Internet. Public domain stuff is very general. IEER, NIRS. Again, specific is hard to find. Monitoring and getting it translated so you can understand it.

Respondent #24 (Tribal Government and Organization) To produce the Tribal Decision Maker's Guide to Plutonium we needed good information on the effects of radiation on cell structure. It was hard to get good information. It was not available or if it was available, we were not aware of it and other people didn't know it existed. We couldn't find information in plain English. More complicated information was available. We mostly used our office library.

This kind of information is hard to find because it is generally done in so simplified a way that it is inaccurate and misleading, or it is so complicated and geared for the professional that the layperson can't read it.

Respondent #25 (Tribal Government and Organization): Mined uranium on Navaho land. Did not find information other than word of mouth. Didn't know where to go. Looked in the library, but I knew nothing to be able understand any of it. Asked Dept of Interior, but they weren't helpful. We need someone who can translate technical information to the public. I call nuclear power plants and put the information on e-mail for others to get. Tried to get information on transport of nuclear waste from a DOE workshop, but it wasn't helpful. The DOE was preaching to the choir in their technical language and not to the general public. We have to beat them with a stick to get any understandable information out of them. How are they going to train any local groups to handle emergency situations from a waste transport accident? The routes are secret.

Respondent #26 (Local Government Organization): Received a call from a local public health official, who was getting called by concerned citizens about radiation risks, about a Superfund site in her community. Referred them to an EPA website run by the Office of Air and Radiation. Don't know what happened, don't normally follow-up.

Respondent #27 (National Community and Site Specific Organization): We wanted to find out about U.S. Ecology a major nuclear waste management company in California. We wanted statistical data on the kinds of radioactive waste they were handling. The company claimed the majority was low level radiological (hospital) waste. We called the California Dept. of Health, but they refused to give the information saying it was proprietary. We're thinking of going to the California Dept of Transportation. California does not keep data on radioactive waste producers, nor records of shipments. The potential for abuse is high, because the public doesn't have access to this information.

Eventually it took the intervention of Congressman Miller to get some of the waste stream information released. We face issues of proprietary and classified information. It shouldn't have to be that hard to get information. We were able to gather some of data we were looking for, but only on a piece meal basis.

What we want is a geographically organized comprehensive inventory(including radio nucleides) of what radioactive waste is being generated, in what quantities, by whom, and where is it going. Toxic Release Inventory is one model. We've worked to make TRI more user friendly, geographically organized, and company specific. We've tried asking universities informally to share information on radioactive waste, but we can't always rely on voluntary information sharing. The EPA is the correct agency to house this information, because it is the only agency that can require reporting.

Respondent #28 (Academic/Scholarly Journal): It's generally easy for me to gain access to information on radiation. I have 33 years experience as a health physicist. I don't really have any specific information needs—I'm linked into the best sources on radiation. Example: I needed published information on thyroid blocking. I checked Medline (online medical information searchable index) and Quest (online searchable index of health physicist journals). I checked other on-line health physicist journals. The search yielded a large volume of articles on the topic. I frequently use the NRC website as a source of regulatory information. I also serve on scientific committees of the NCRPM and have access to information through colleagues.

Respondent #29 (Academic/Scholarly Journal): Nuclear Testing sites (NTS), level of Radiation in Water sources (Lake Mead, Colorado River, Atlas Mine contribution to problem), soil testing for plutonium, man made radiation sources v. natural (non-man made sources of radiation), variant model values.

Definitional information is readily available, but too general for those who have a technical background and desire the specifics and background data. Or the information is too specific. Sampling data—technical people want the background testing data, the data that reflects how the test was taken and number of samples taken. Background information can be in an addendum to public documents. Government responds to damage control and the public is too naïve and doesn't understand that even without man-made problems radiation exists throughout our daily lives.

Information obtained mostly from libraries, DOE, Universities, project managers. This information can be too technical or too general for public to get information but he can break it down and share with public at large. Machine and human error is high. Public cannot verify information. Background information not supplied. Ground water contaminants model is too conservative.

Peer review by an outside entity reflecting DOE data inaccuracies would be helpful. Public doesn't have a technical comprehension for the data—they need it broken down into easily understood information.

Most information comes from library, web; no problem for him in past twelve years getting detailed information. Feeling that DOE censors information—he shares his data with public. He believes that the sophistication and education needed to comprehend radiation issues makes it difficult for most people to comprehend government information published or to know where to look for information people want.

Respondent #30 (State and State Organization): We help implement EPA's Radon Program. We have to explain radiation risk to the public in Colorado. Need information on comparable risk to other non-radiation risk factors. What is the outside ambient radon level in the U.S., are there good measurements? NCIP did a report on background levels

In this case we contacted our local EPA representative and searched the literature, but the numbers tend to be too geographically specific. We did not find the information on national ambient radon levels, because up until now no one has not thought it important enough to measure.



Respondent #31 (State and State Organization): Our information needs are met. We provide radon information to our customers who don't have the information: School districts don't have the time or knowledge to deal radon issues. We provide free radon testing for schools and consultants to tailor specific solutions for the school. The schools are in shock over testing. The health department can only address the health issues, but we offer a full solution that combines testing, diagnosis by NYSERDA, and then a heating and ventilation solution that addresses both health concerns and energy efficiency. The goal is to provide no or low cost solutions. The energy cost savings can hopefully cover the costs of the making the upgrades. Sometimes there is a two year pay back.

The school administrators don't know who to contact about radon. They depend on who does the testing to guide them. Radon is not on their radar screens. We've produced a number of publications: "Indoor Air Quality: A Guide to Your Home", "A Home Owner's Guide to Ventilation", and "Active Soil Depressurization for School Units." There needs to be greater awareness of indoor air quality issues in the schools. When parents have access to general information they become concerned and their concerns are what drives the schools to take action.

Respondent #32 (State and State Organization): Radio nuclides in nuclear medicine. Looked through publications and did not find information. Then found a website on nuclear medicine. We can also ask other staff people, use my personal library, or our division library with a computerized index. We also use commercial software such as Quest indexes on health physics, and health physics journals and newsletters. Occasionally use the Vanderbilt library system, sometimes NRD, DOE, FDA, and EPA. Couldn't imagine using the newspapers. In general it is easy for me to get the radiation information I need, but it is not always routine and occasionally impossible.

Respondent #33 (State and State Organization): Recently working on a guidance document on radioactivity in municipal solid waste transfer stations. An NAS study is available as well as literature in health physics journals. There is more information available than needed for this task. Relatively easy for me to get information. I would go to Federal agencies for documents such as FDA, NRC Nu-Reg documents, and EPA documents. The Regulatory Analysis Code of Federal Regulations. Professional journals and organizations and international organizations such as Health Physics Society, International Commission on Radiation Protection (ICRP), National Commission on Radiation Protection and Management (NCRPM), International Commission on Radiological Units (ICRU), International Atomic Energy Agency (IAEA), American Association of Physicists in Medicine (AAPM), American College of Radiation (ACR). The National Conference of Radiation Control Program Directors (NCRCD) is very active in information dissemination and sends out regular broadcast e-mails.

Respondent #34 (State and State Organization): There is great controversy over determining ground water contamination at the Nevada Test Site. A lot of money is being spent. 300 curies may be tied in ground water and alluvium. The EPA could help demystify what is known and not known about radioactive ground water contamination in Nevada and explain this to the people of Nevada.

Another issue is Yucca Mountain. It is hard to interpret the complex models, but they show that the high level waste repository will eventually leak (exposure levels of 25 milirams up to 25 kilometers from the site. The EPA will eventually have to understand this and explain what it

means.

To get information on Yucca Mountain, you have to go to the Office of Civilian Radioactive Waste Management, a separate agency from DOE whose sole purpose is management of Yucca Mountain. For Nevada Test Site, you go to DOE's Environmental Management division. Going to separate agencies is one of the challenges in getting information. What information you could get wouldn't be of much use unless you were a highly technical person such as a radiation physicist. I rely almost exclusively on EPA and DOE information.

The Southern Nevada situation is pretty unique. There is a need for information much more tailored to the local environment. There needs to be openness about radiation historically in the environment

**Respondent #35 (State and State Organization):** Does training and analysis of radiation for state agencies and emergency response for the approximately 130 incidents that occur each year.

**Example:** Needed information on regulation information. Florida has naturally occurring radiation and the EPA acceptable norms on naturally occurring radiation. Situation: needed information on public health risks from slag material in a residential area. Used the extensive in-house library. Our entire radiation staff are health physicists. We have access to a lot of information.

**Respondent #36 (State and State Organization):** Radioactive Waste related to plant decommissioning, regulatory protection programs. Conflict of States and Federal Laws. Can a state enact laws more restrictive than federal regulations? Gathering information for state legislature and their constituents need to know both sides of issue and cost benefit analysis v. risks to public. Information is accessible through web. The regulations giving the various agencies their individual authority are difficult to locate. A web sight with a synopsis would be useful with "hotlinks" to specific statutes. They get most information from Internet, some from libraries or Federal agencies. Web sights with links to pamphlets in PDF format are useful for circulating. Most information is in language for layperson with graphics making it easily decipherable.

**Respondent #37 (Industry/Trade Association):** Answered as a provider of radiation information. Gets many calls from students and the public concerned about radiation. Example: Caller concerned about radon exposure in the home, has an earthen cellar. Suggests additional testing to verify. Gave him EPA Radon booklet, suggested companies that do abatement. Eventually state passed a law requiring reporting of radon information for property transactions. Sends adults to university web sites and federal Internet sites

Gets questions related to transportation from the public. Also questions from school kids. He sends them to [www.NRC.gov/NRC/school.html](http://www.NRC.gov/NRC/school.html) and other sites for kids web information on radiation. Site also has a teacher's corner Other good sites: NRC Penn State, NEI.

Gets e-mails from kids and sends them EPA materials. Sees a need for information on radiation geared towards kids.

Respondent #38 (States and State Organizations): Need information regarding disposal of recycled radioactive low level waste. Pertaining to the area of Riceland, WA. Can usually find the information either by attending the International Low Level Waste Forum or through the contractor. They provide a low level waste notes that summarizes these issues Nationwide. The respondent uses organizations and personal contacts along with the sources listed above. In addition uses the national low level radiation waste Internet sites. Because of the respondent's participation in the International Low Level Waste Forum, he is able to get information from a variety of contacts through this network of participants.

Respondent #39 (States and State Organizations): Shipment of radioactive waste into a state for disposal. Information about half life and health hazards. Need basic information concerning low level waste and how it differs from high level waste and how compacts were formed. Respondent can usually find the information he needs. Works with personal contacts to gather information includes facilitating a forum among states to promote communication among states. This is part of the compact states Low Level Radiation Waste Forum. In addition to participation in professional organizations and personal contacts, he gets information from DOE and NRC as well as the University Library. Answers are usually easy to find because he needs basic information-questions are not usually ones that 'stump' the experts.

For questions H & I, a current situation in which information is needed, the comments were:

Respondent #1 (National Community and Site Specific Organizations): The 100-Area clean-up site on the Hanford Nuclear Reservation with regard to applicable standards and risk information for doses. To get information, it was necessary to go to each individual regulatory source, then put together a matrix for public use that compared standards. Such info is not presented in EPA or DOE documents about the clean-up.

Respondent #2 (Consultants): We're currently in court over the recycling of nuclear waste materials. Need to know the characteristics of the waste, whether it is contaminated on the surface or volumetrically contaminated. DOE is "hustling" nickel.

Respondent #3 (National Community and Site Specific Organizations): No other situations.

Respondent #4 (Other National Groups): No new situations to add.

Respondent #5 (Tribes and Tribal Organizations): Any nuclear testing in the state. When testing the tribes want to know what are the affects? Tribes want to know any study results instead of having to search for them. Naval Air station. They want to know about any disposal of wastes. They feel there is total lack of consultation with tribes when waste is transported through towns or reservations. Foreign spent fuel is being transported on its way to Idaho and there is not proper consultation. The state does not have one person who notifies or works with the tribes. Do not find the information they need on DOE transporting waste to Yucca mountain. Notification of WHIPP being transported. Why not send an email to tribes notifying them *before* nuclear waste goes through their reservations

Respondent #6 (States and State Organizations): Transportation of radioactive waste Naturally

occurring radioactive material. In looking for information on the transportation of waste they 1) check with people who have expertise in the field, 2) check with agencies: DOE, 3) DOE sites and 4) contact whoever has shipping responsibility (sometimes the NRC) It is difficult to find information on how or by whom low level waste is shipped. There is no tracking (i.e. foreign spent fuel to DOE sites.)

Respondent #7 (National Community and Site Specific Organizations): What in the decay chain in some radioactive waste on the reservation will become a problem? Is it chemical or radioactive? Who to call? Try personal contacts and DOE contractors to get the information, but these are not complete answers.

Respondent #8 (States and State Organizations): Food irradiation, fear of irradiation. Finding out about E. coli and food contamination- which is more dangerous put in terms that is understandable for the general public. Sources include the Internet, and agencies.

Respondent #9 (National Community and Site Specific Organizations): Migration of plutonium through clay soils. Goes to the National Resource Center for Plutonium or calls someone first in the scientific field at the consortium of three universities. In addition to these scientists, can find academic documents electronically through their website. library.

Respondent #10 (Public Interest Groups): Discussions with DOE and their central Internet Database. Putting information online about the annual waste streams. Help the DOE make record keeping and monitoring on the web. The general public and agencies should all have the same information available to them. To get this information, he calls someone who is working on the project.

Respondent #11 (States and State Organizations): Gaps exist right now on health. Non-ionizing radiation. Prevalence of cell phones. General public health concerns. Research reports. Vague science. Ionizing radiation- risk from low level radiation. Reviewing the subject. Edge of science. Another issue that is becoming more of an interest is what makes different people suffer or have different reactions to radiation. Sensitivity varies from one person to another, can we understand some of the factors that make a difference. Following the scientific literature.

Respondent #12 (National Environmental Organizations): Very often need information on site cleanup. Organization doing a case study of different sites around the country and how they handle waste. Wants documents associated with clean-up and remediation at the sites. Some are available from the web, or document room Best luck from getting information from contractor or regulator or government agency making documents publicly available.

Respondent #13 (Tribal Governments and Organizations): See comments above under questions A-I, Respondent #13. Nothing new to add.

Respondent #14 (States and state organizations): Sometimes people call us and we go to our data base of environmental samples we and licensees have collected. The information is in our data base.

Respondent #15 (National Community and Site Specific Organizations) See situations listed above Questions A-I nothing new to add The sources for information are the same.

**Respondent #16 (National Environmental Organizations):** Information on emissions and the implications for health. We go to the agencies charged with oversight, and to other public agencies and experts who can verify or refute what is reported.

**Respondent #17 (States and State Organizations):** Very rare in terms of physics of the matter, keep in house. Radio chemistry lab that does develop methods, need new radio methods they can employ. Sometimes EPA is a source of these methods, but other researchers and other vendors are developing these as well. Research methods for doing radio chemistry. If all of sudden they had a new resource for this knowledge, this would be great. EPA used to sponsor research into Radon Mitigation, but no longer. Always on the lookout for better methods and innovations.

**Respondent #18 (National Community and Site Specific Organization):** Another situation where info would be needed is for environmental clean-up issues to help local governments understand the direct and indirect impacts to the local community where again, I would suggest the DOE website

**Respondent #19 (National Community and Site Specific Organizations):** Citizens wanted to know about an advanced mixed waste treatment facility and what that means to them and their community.

**Respondent #20 (Canadians):** See Questions A-I for Respondent 20.

**Respondent #21 (Tribal Governments and Organizations):** Tank waste remediation situations. The potential for seismic events. The potential for another explosion. The same inside and outside experts are relied upon to produce information.

**Respondent #22 (State and state organizations):** It's been a tough uphill battle for the past ten years. In the past we fought to be notified of incidents, and still we don't always get the information we want on the major problems. There has been a huge turn around from the public affairs office at the site. We also negotiated a memorandum of understanding (MOU) with the site, and now have meetings every six weeks with management. That's a big breakthrough, so I don't want to sound all negative. It's just taken such a struggle over such a long time.

**Respondent # 23 (National Environmental Organization):** DOE defense program sites.

**Respondent #24 (Tribal Government and Organization):** We needed information on radiation risk. We ran into difficulty. Most work is done by either ideologues or those in the radiation profession, so it is not always objective. We're trying to create a different model of environmental justice – distributive vs. zero sum game. We need to create a new metrics on radiation risk to compare it to other risks. We would usually try to get the information by calling a colleague in the field –health physicists, environmental engineers, nuclear physicists, and people in the nuclear industry

**Respondent #25 (Tribal Government and Organization):** Information on a nuclear power plant in Cincinnati, OH. Stakeholders want to know what to do with ground clean-up of contaminated soil.

Respondent #26 (Local Government Organization): Get many calls asking for radon information from health officers and city officers wondering about their radon profile. We have a lot of information on radon and it is easy for us to access additional radon information. There are radon publications on-line from the EPA, they also have an indoor air information clearing house with a toll-free number. EPA also has another clearing house for ordering bulk copies of indoor air information. Don't use libraries, mostly government and other Internet sites. NAS Bier 6 Report is frequently used. I can get the information I need, because I've been working in this area for five years, so I know where to turn to. I'm not on the consumer level, I'm a professional, so its easier for me.

Respondent #27 (National Community and Site Specific Organization): Shallow trenches holding nuclear waste in Ward Valley in the East Mojave Dessert, critical habitat for desert tortoise.

Respondent #28 (Academic/Scholarly Journal): No additional situations.

Respondent #29 (Academic/Scholarly Journal): Transport of low level waste- what is the dose of radiation form a truck in transit? This type of information would help people gain insights and get good information. People misuse information for their own agenda. Refuse to consider other positions on the issue and only use it for own purposes. NIMBY. Gathered most information from Internet, library, and federal agencies. Wants supporting documentation or reference to sites where he can look it over. Yucca Mt., Nevada

Respondent #30 (State and State Organization): Very localized information. Example: radio iodine fallout data county by county. There exists good information for the Nevada Test Site, but not good information on other types of fallout such as long half life materials, e.g., cesium 137 or stronium 90, -the two primary long term isotopes. This information is not available in a comprehensive way. This data could be used to estimate what is the total radiation dose someone may have received from background levels, from DOE facilities, and from other sources if you live in a given location. There is no comprehensive database on radiation dose levels by geographic location. The EPA could create a database with a massive bibliography of all literature on radiation and all radiation in the environment.

Respondent #31 (State and State Organization): No additional situations

Respondent #32 (State and State Organization): Recently needed to know why americium 243 was turning up in sewer sludge. Used the Quest program to find references.

Respondent #33(State and State Organization): No additional situations

Respondent #34 (State and State Organization): No additional situations

Respondent #35 (State and State Organization): It is very difficult to enforce EPA regulations, e.g. 1998 Federal Regulations on radon in drinking water require that drinking water contribute less radon to the air than is naturally occurring. \$80 million has been spent to prevent 80 deaths (1 in a million). We keep making lower protection standards that cost more money I question regulatory agency conducting in-house risk assessments. The EPA's in-house risk assessments are not an exact science. Would prefer to see independent risk assessments done by either 1)

EPA contractors, 2) Health Physics Society, 3) a Science Advisory Board, or 4) National Council on Radiation Protection. Feels this would be less controversial, e.g. Federal Guidance Report #13 was controversial.

The EPA is in the habit of calculating low risks times large populations. This is not the best use of time. The exposure to that large of a population may not be realistic. We don't know how many people are exposed to radon in drinking water. Not enough is known to justify the large amounts of money being spent to remove health risks from drinking water. Can't clean up naturally occurring radiation.

**Respondent #36 (State and State Organization):**

- Yucca Mt,
- Marrismum Process- what it means, re: protecting the public NRC explanation.
- Public should have access to criteria for decommissioning a plant.
- Information obtained from Internet, technological trade papers, Government pamphlets and brochures.

**Respondent #37 (Industry/Trade Association):** No additional situations

**Respondent #38 (States and State Organizations):** Needs technical information. Usually calls the Department of Health or a contractor to get the information.

**Respondent #39 (States and State Organizations):** No other situations.

For question J, asking for another situation that the respondent needed radiation information on, the responses were:

**Respondent #1 (National Community and Site Specific Organizations):** The controversy over applicable emissions standards for DOE facilities and the rules for calculating them.

**Respondent #2 (Consultants):** All around weapons sites the data is terrible. People don't know where the waste is located. Ex. - law suit in Ohio for workers exposure was settled but is not being enforced.

People need information even if the risks aren't great to make their own decisions and lessen their fears.

**Respondent #3 (National Community and Site Specific Organizations):** No other situations.

**Respondent #4 (Other National Groups):** No other situations.

**Respondent #5 (Tribes and Tribal Organizations):** Feels completely out of the loop and disrespected on the tribal notification of transportation of waste issues.

**Respondent #6 (States and State Organizations):** Response to incidents and accidents. Information on risks to the public. Also, information on benefits (medical) of radiation. Need to expand the availability of surveys done nationally on x-ray radiation. Have state level

surveys/studies available.

**Respondent #7 (National Community and Site Specific Organizations):** Chemical aspects of radio-nucleids. Transportation issues. Penetrating power of low level waste components. Hormesis.

**Respondent #8 (States and State Organizations):** Safe Drinking Water Act and how radioactivity affects drinking water. Where do you get information about it? The general public needs to know about natural radiation and its occurrence.

**Respondent #9 (National Community and Site Specific Organizations):** Potential impacts of new projects/missions that could be performed at the Pantex plant. As these missions are being started, what are the impacts.

**Respondent #10 (Public Interest Groups):** Help explain issues or pending decisions or be engaged in the process or decision.

**Respondent #11 (States and State Organizations):** See above answers from Respondent #11.

**Respondent #12 (National Environmental Organizations):** Generally helpful to have information on methodological information. Can find in books. Or get it from journal article or from colleagues.

**Respondent #13 (Tribal Governments and Organizations):** No other situations.

**Respondent #14 (States and state organizations):** How to apply CERCLA to radiation sites.

**Respondent #15 (National Community and Site Specific Organizations):** See response to Questions A-I Respondent #15.

**Respondent #16 (National Environmental Organizations):** No additional situations.

**Respondent #17 (States and State Organizations):** No additional situations.

**Respondent #18 (National Community and Site Specific Organization):** It really all comes down to risk and understanding what it means to transport, store and clean up nuclear materials.

**Respondent #19 (National Community and Site Specific Organizations):** Nuclear weapons testing and fall-out and emergency responders in transit.

**Respondent #20 (Canadians):** see earlier response questions above for Respondent #20.

**Respondent #21 (Tribal Governments and Organizations):** see earlier response for Respondent #21.

**Respondent #22 (State and state organizations):** see earlier response for Respondent #22.

**Respondent #23 (National Environmental Organization)** see earlier response for Respondent #23.



**Respondent #24 (Tribal Government and Organization):** Hanford clean-up activities affecting tribes and other DOE facilities. Decommissioning and Decontamination of nuclear power plants and work with community organizations and tribe. People tend to treat radiation as one discreet body of knowledge. People make riskier decisions, e.g. routing radioactive transport away from interstate highways actually creates more risks on smaller roads.

**Respondent #25 (Tribal Government and Organization):** Receives several e-mails on low level radioactive waste in Ward Hospital in Lowe Valley, CO. Wants information provided in plain language, not technical language.

**Respondent #26 (Local Government Organization):** Someone (a local government official) called me who was on a shipping route for radioactive spent reactor fuel and contaminated soil. They were getting calls from concerned local residents who wanted information. I told them about DOE and EPA web sites and the quasi-government agency Urban Energy and Transport Agency. I'm not sure about the follow-up. I get many calls for radon information.

**Respondent #27 (National Community and Site Specific Organization):** No additional situations

**Respondent #28 (Academic/Scholarly Journal):** No additional situations

**Respondent #29 (Academic/Scholarly Journal):** Nuclear issues with public. He desires entire breadth of information from basic to complex. A package of information concise & in booklet form would be nice.

**Respondent #30 (State and State Organization):** No additional situations

**Respondent #31 (State and State Organization):** No additional situations

**Respondent #32 (State and State Organization):** Many routine situations. Example: volumetric contamination research.

**Respondent #33 (State and State Organization):** No additional situations

**Respondent #34 (State and State Organization):** No additional situations

**Respondent #35 (State and State Organization):** No additional situations

**Respondent #36 (State and State Organization):**

- Low level radiation issues
- Pilot plant issues
- Transportation of radioactive material
- Drinking water and hydrology issues

**Respondent #37 (Industry/Trade Association):** No additional situations

**Respondent #38 (States and State Organizations):** No additional situations

**Respondent #39 (States and State Organizations):** No additional situations



For question K, frequently used sources of information, the responses were:

Note: most respondents only mentioned the sources they use most frequently.

**Federal agencies** - very frequently; very frequently; very frequently (add DHHS); somewhat frequently; frequently; frequently; very frequently; (DOE's information is focused on nuclear weapons and they have done a lousy job getting information to the public other federal agencies: used at one time or another) frequently; frequently; frequently; frequently; very frequently; very frequently; (related to policy- don't consider EPA, NRC, or DOE to be the primary or original sources of basic information on radiation- they use the same information from ICRP, NCRP, BEIR committees to get their information and adapting it) frequently to moderately; most important and most frequently; very, very frequently; (not relied on because not trustworthy) rarely; some; frequently; very frequently; infrequent; frequently; frequently (NRC); infrequently; (NRC more than DOE and EPA); DOE and EPA almost exclusively; sometimes; (EPA, NRC, DOE, National Governors Association) frequently.

**State agencies** - frequently; very frequently; frequently; frequently; frequently; frequently; frequently; less frequently (except for information they generate); rarely; very frequently; frequently; very frequently; very frequently; not frequently; (depends on the issue) rarely; (not their jurisdiction - this is for the West, East is different) rarely; not frequently; not often; frequently; most frequently; (lead states like CA, AZ, IL, and TX) frequently; sometimes; frequently.

**Local agencies** - never; not frequently, frequently, some; frequently; frequently; frequently; rarely; rarely, rarely; very frequently; very frequently; rarely, none; never; not frequently; never; frequently; never.

**Non-governmental organizations** - frequently (but with scrutiny, e.g. ANA fine, but NIRS off the board); occasionally; (for targeted information e.g. American Lung Association) sometimes; e.g. (NIRS, Safe Energy Community Council) sometimes; (weigh NGOs' perspective carefully for example a website displayed a map of all radioactively contaminated sites in Colorado and listed every single mine that ever existed in the state. This kind of information can be misleading, because there is no way of distinguishing the degree of risk and contamination. The American Lung Association has good information. NCRP maintains publications) frequently, frequently; frequently; periodic contact.

**Environmental groups** - very frequently (consult regularly with IEER), frequently consult with Corbin Harney ,

**Trade organizations**- never; rarely, frequently; rarely-too biased; some; frequently; rarely; infrequently; unreliable - rarely; very frequently; very frequently; very frequently; none; rarely, frequently;

**Citizen groups** - very frequently; rarely, rarely; some; frequently; frequently; rarely; (point of view of not a citizen as a professional in the field, have different needs-too site oriented or infused with a specific point of view) rarely; very frequently; (they ask us) very frequently,

(unreliable) rarely; rarely; (as I am skeptical of much of their info whether they are pro-nuclear or anti-nuclear) rarely; rarely; frequently.

**Personal contacts or word-of-mouth** – very frequently; very frequently; very frequently; frequently; frequently; frequently; frequently; frequently; (International groups and scientific organizations) frequently; frequently; very frequently; (professional organizations) very frequently; (original authors who are very important and highly credible) frequently; rarely; rarely; frequently; most used source; moderately; frequently; occasionally; (from other state representatives) frequently; frequently.

**Public library** – rarely, not often (geographically limited), rarely, rarely; rarely; rarely; for scientific and medical journals: frequently; rarely; (the State library) frequently; never; never; never; rarely; never; never; never; sometimes; no; frequently; no; frequently

**The Internet** – (to a regular grouping of web sites for universities and agencies) very frequently; (use EPA web site for current policies and studies) very frequently; (check the Western Shoshone National Council) frequently; frequently; frequently; frequently; frequently; frequently; frequently; frequently; (just a vehicle to find resources that were written by the credible sources) frequently; (to search public agency and NGO websites) very frequently; (EPA's websites differ greatly, Canadian websites have great information to see how they have analyzed the problems) very frequently; some; frequently; very frequently; very frequently; occasionally; frequently, frequently; frequently.

**News media** – rarely; frequently; frequently; some; (keep up with it to see how issues are being framed for the general public) some; (source for science information) rarely; (for health issues) frequently; rarely; (use it to provide information to the public to see what's of concern) frequently; (almost always confused-not reliable- but use only to gauge where interest lies or to see where misinformation is being promulgated) frequently; rarely; (the bulk of information that the average citizen gets is from the news media and they may try to show good informational pieces but it is difficult to get basic accurate info out but I would like to see it used more for an educational tool) rarely;; never; never; rarely; almost never; occasionally for case examples.

**DOE information repositories** – sometimes; sometimes; rarely; frequently; frequently; frequently; rarely; occasionally; (to see what official line is) frequently; rarely; (the DOE website) frequently, (but no other repositories) rarely; rarely; frequently; rarely.

**Other -**

- Hanford Health Information Network: frequently;
- Research reports and treatises: frequently;
- Experts in the field: frequently;
- Personal knowledge gained from years of being involved: always;
- State office of emergency management: frequently;
- Internet newsgroups and professional publications: frequently;
- Nuclear Energy Institute and Institute for Energy Education and Research: frequently;
- National Council on Radiation Protection and Measurements, International Commission on Radiological Protection, National Academy of Sciences: frequently;
- NRC website (for decisions, hearing testimony) frequently;

- Trade journals with good information on new techniques and new technology – frequently;
- Data or studies from Universities; frequently
- Tribal organization-frequently;
- Federal register, agency circulars, publication-frequently;
- ICRP: frequently, also IAEA, some medical professional journals, Industry: frequently;
- British Nuclear Fuels, Cogema (French company), Technical media, conferences/symposia: frequently;
- Congressional Research Service Report on the nuclear waste stream sponsored by Senator Boxer, health physics journals, IAEA, CRCPD, ICRU, published books, NAS, BEIR Reports: frequently.

For question L, factors to consider when designing public outreach, the following comments were made:

**Respondent #1 (National Community and Site Specific Organizations):** Need to present a range of views on health effects and dose; needs to have transparency so that users can easily find and review source documents. Need to link information from other reports.

**Respondent #2 (Consultants):** All the suggested factors are important, and credibility is the most important.

**Respondent #3 (National Community and Site Specific Organizations):** After we answer why EPA needs to do this, the thing that should be considered is the target audience. Tailor the information.

**Respondent #4 (Other National Groups):** Needs to be balanced in terms of viewpoints. Give a lot of information with alternatives that will let people make their own decisions. Bad if people can't get information. Ex. – National Cancer Institute Study which was suppressed for eight years until a lawsuit forced its release. This is clearly a needed public health risk report, but agency has yet to notify public or medical community of its availability.

**Respondent #5 (Tribes and Tribal Organizations):** The main factor to consider is credibility. Especially the DOE. Important to show pro and con, and Indian views on the topic.

**Respondent #6 (States and State Organizations):** Equal importance on all. Credibility is important with the EPA as many groups and people have a bias against them.

**Respondent #7 (National Community and Site Specific Organizations):** #1 is credibility. It is not useful to have pro and con-want scientifically accurate and verifiable data.

**Respondent #8 (States and State Organizations):** All are equal. If something is credible but unreadable, it is useless. Can't sacrifice one for the other

**Respondent #9 (National Community and Site Specific Organizations):** #1 and #2 are credibility and balance.

Respondent #10 (Public Interest Groups): #1 Credibility. Data being accurate and fair. Want validity. There are too many inconsistencies now. #2 is ease of use.

Respondent #11 (States and State Organizations): All are important – but when it comes to pro and con (does this mean scientific questions being answered by non credible or non verifiable just to show pro or con?)

Respondent #12 (National Environmental Organizations): #1,2,3 of ease of use, reliability, and credibility

Respondent #13 (Tribal Governments and Organizations): No comment

Respondent #14 (States and state organizations): Ease of use and credibility are very important; balance of pros and cons is not, as she would be looking for scientific proof.

Respondent #15 (National Community and Site Specific Organizations): Reliability and credibility are the most important. Give direct results from case studies.

Respondent #16 (National Environmental Organizations): Credibility is most important, and self-monitoring is a real problem for credibility. Need independent oversight. There is a tendency by the agencies to discount the ambiguity and uncertainty in data or analyses, and to conclude that things are ok when they are really quite uncertain. They need to acknowledge it instead. Also, there is not enough data in many cases, especially related to health risks. Then, the agencies say "no data" but do nothing about it. No data becomes translated to no public health risk.

Agencies have a propensity towards panic prevention that is manipulated by the proponents of toxic tolerance. EPA must be very careful about what it says about tolerance to low level exposures.

Respondent #17 (States and State Organizations): #1 Reliability and Credibility

Respondent #18 (National Community and Site Specific Organization): Reliability is most important but the other three are very important but without reliability you have nothing.

Respondent #19 (National Community and Site Specific Organizations): Ease of use and credibility are both critical; you must have information that is accurate and understandable for people to be able to use that information.

Respondent #20 (Canadians): no response

Respondent #21 (Tribal Governments and Organizations): Most important is to tell the truth. Identifying pros and cons would be good because at least it would provide the public with a sense of fairness. People need access to classified information to make decisions

Respondent #22 (State and state organizations): Why is EPA doing this project? They ought to contract it out. Just because the information comes from them, it loses credibility. Need to come from an independent source. They also need to use material that's peer reviewed.

**Respondent # 23 (National Environmental Organization):** #1 and #2 –equally high, credibility and reliability.

**Respondent # 24 (Tribal Government and Organization):** The information has to be tiered so you can get the basics and then move up the ladder to more complex information. Put radiation information in context in comparison with other risks, e.g. a woman next to TMI is concerned with human-made radiation, but not worried about naturally occurring radon in her home.

**Respondent # 25 (Tribal Government and Organization):** Information needs to be honest and clear. There is a great imbalance. Most people can't understand the information.

**Respondent # 26 (Local Government Organization):** There is no one ideal system for information dissemination. You need to approach different audiences in different ways. Radon information is usually not decipherable to the general public.

**Respondent # 27 (National Community and Site Specific Organization):** User friendly, geographically organized, company-specific, inventory of all radioactive waste generators, exact quantities, and dates and destinations of waste shipments. In an EPA radiation information system credible organizations should have the opportunity to present alternative analysis and perspectives.

**Respondent # 28 (Academic/Scholarly Journal):** There are huge differences in the information needs and capabilities of the general public vs. professionals. Most information on radiation is not understandable by the average person. You have to first reinterpret information and put it in language that the public can understand. For example: there is great controversy on current theoretical debate over the effects of radiation and the linear no-threshold model. Experts tend to think differently than the public which tends to think that there exists no safe level of radiation exposure.

**Respondent # 29 (Academic/Scholarly Journal):** Pro & con is most useful. People must learn to view radiation differently. It is a natural phenomenon as well as artificial—need a thorough risk & benefit analysis. EPA nowhere to be found. DOE is everywhere. Atomic energy act gives full authority to federal agencies. Problems lie between state and federal agencies abuse of power with no information sharing.

**Respondent # 30 (State and State Organization):** It is hard to have "balance" in a non-interactive information system where people are biased going in. Should be a realistic balance. Just because there are two sides doesn't mean both are equally legitimate, for example if 5% think one way and 95% think another –that is not necessarily balance.

**Respondent # 31 (State and State Organization):** There needs to be basic information on why radon is an important health issue.

**Respondent # 32 (State and State Organization):** The EPA tells people they have a drinking water standard that limits exposure to 4 millirams per year, but it is not true. They need to tell people what the limitations are of these standards and just exactly what the standards mean.

Respondent # 33 (State and State Organization): Information for public should be about at the 8th grade science level.

Respondent # 34 (State and State Organization): Need to expand public education on radiation in the environment on the Internet. The basic primers are there. There needs to be more geographically specific information on where are the contaminated sites and what are the risks? In Nevada we've spent Billions of dollars on the nuclear weapons complex and the public knows almost nothing. Its no surprise they have deep fears. We need to do a better job educating the public. For radioactivity we need to tell them where most of it is, what is going to be done with it, and whether it is safe. If the government wants to play the "its harmless" game they are fooling themselves. They need to explain radiation to the public in honest credible ways. People's fears won't go away.

Respondent # 35 (State and State Organization): All factors important. The EPA needs to take a realistic approach in explaining risks to the public.

Respondent # 36 (State and State Organization): Balance of information reflects both sides of issue presented — reliability based on scientific principle easily explained for people with no technical training.

Respondent # 37 (Industry/Trade Association): Depends on where stakeholders are coming from. Some members of the public become skeptical and say things like "You're not telling me anything negative." (Therefore I don't believe you.) We use the EPA book on radon because it has become a credible source. Materials should use agreed upon legal definitions of radiation terms. When dealing with risk-based issues you encounter emotional reactions, narrow mindedness, and balance is tough. There are different versions of the truth. That's why we need a federal agency to maintain a balanced perspective, a neutral referee to sort out different sides and come to some balance. This requires critical thinking, "Modicum of the Golden Mean."

Respondent #38 (States and State Organizations): All are important. Can't be a one-sided presentation. Give people information they can use to help them take a position. Very important for all Federal agencies and industry to get information out to the public that is clear, simple, concise, and diverse so we develop a general belief among the public that they are getting the full story.

Respondent #39 (States and State Organizations): All factors are very important. Balance is important and it is in the eye of the beholder, but data that is made available needs to be based on science not on allegations or gears. Especially if there is a difference between the NRC and EPA views on acceptable doses and background radiation required before D & D power plant can be officially closed.

For question M, relating to possible formats for presenting information and the usefulness of each format, the following comments were made:

Pamphlets, flyers, short written materials – very useful; (sometimes too short) useful; (make them easy to reproduce) useful; (and easy to obtain) very useful; useful; not useful; useful; somewhat useful; somewhat useful; (if is going to general public, but you sacrifice information



for readability) useful; useful; (different for different things just for general public distribution-know audience and subject) useful; most useful and easiest; very useful; better than others; (need a combination of all types of formats, but they can't just be slick public relations documents, they need to have substance) useful; not at all; not useful; not useful; (for the public) useful; useful; (for the public) very useful; valuable; (especially with case studies of radon) useful; (when they tell the whole story) useful; important for public; (EPA has a good document on naturally occurring radiation); EPA's radon pamphlets are well regarded by some; very useful; very useful.

Longer written materials – not very useful; useful; somewhat useful; not useful; useful; less useful; somewhat useful; not useful; useful-but for different audience; useful if you want the data; useful if you want the information; neutral about ease of use, not most or least useful; not useful; not useful; very useful; longer is better, but context matters; (for professionals) useful, (public, has short attention span); valuable, good for parents and teachers, not great for the public; important but less for public; ok; less useful.

A little bit of written materials with lots of pictures, graphs and figures- useful (also need overarching charts), very useful; useful; somewhat useful (depends on what it is showing, make sure it's appropriate for this format); not useful; less useful; somewhat useful; very useful; somewhat useful; (the "dog and pony show" type of written and oral presentation keep the listener or reader interested and work very well) useful; (for the general public) useful; least useful; (only if there is good and understandable visuals) very useful; somewhat useful; (longer is better, but context matters; useful for professionals, public, has short attention span) valuable; (good for parents and teachers, not great for the public) valuable; important (but less for public), (especially for general public) very useful; (must be enough written material to be useful not just pretty, if that is the case,) very useful.

Lectures or discussions – not very useful; (hard to get people to come out) not useful; ("especially when public meetings are held and the EPA send PR people who can't answer technical questions"); not useful; not useful at all; not useful; useful; not useful; not at all useful; (because of attendance-depends on interest of topic) less useful; somewhat useful; (for site specific) useful; somewhat useful; (if you are working with an already-educated audience for more in-depth discussions but not for newcomers) useful; (depends on the person lecturing) not useful; (does this include a public meeting or public hearing?) useful; not useful; (helpful in tandem with other materials) useful; (can be helpful e.g. helps local governments set up outreach sessions) useful; useful; not effective; (good if people come, but unlikely to come unless there is a local controversy) useful; less useful; (difficult for public, essential for low level waste siting and site remediation), not useful; not useful

The Internet – (Need a "transparent" site as sources are known and available that includes simple comparative charts and information about where to go to get applicable information for a specific standard. Need cross-cutting overarching comparisons, not the "boatload" of information currently available on the EPA site. Need to link radiation releases in terms of toxic release in an inventory of sites.) very useful; (it's where people are going) very useful; (provide grant information on this site, guidelines, where tribes should go to look for this info, link to organizations with resources) very useful; useful; most useful; very useful; most useful; more useful than the others; (can be general or specific- and people logging on will look for things if they are interested) very useful; very useful; (the Internet is the most useful source of

information, but not all tribal governments have access) very useful; very useful; (if you're looking for something specific, it is usually out of date-links to printed information are out of date- so at the moment EPA's website is more for advertising instead of serious information dissemination) useful; most useful; (especially with good visual and reaches a wide audience) very useful; somewhat useful; very useful; most powerful tool, (most flexibility to provide tiers of information and context) useful; useful; useful; (wave of the future, but there is too much to sort through which can be very time consuming, impressed that able to download government agency fact sheets) very useful; (needs to be geared towards school, plant managers and parents e.g. radon issues) good; helpful; (becoming more important at local level) useful, (good, but not everyone has access) very useful; very useful.

Other:

The distribution must be tailored to the audience; otherwise materials just get thrown away. Do a combination of all these depending on the audience.

Videos and CD-ROMs would be very useful. A CD that contains all the EPA regulations, guidelines, decisions re: substances containing radioactive waste. How waste clean up relates to policies i.e. The Clean Water Act. Policy issues related to radiation. This information is not accessible to people who are not in the know. A CD that could be distributed to libraries or professionals.

-Lectures are not an effective way to reach 250 million people. Typical radiation professor would lose the audience within 30 seconds. The public doesn't understand the terms -e.g. rads, millirads are different by a factor of 1000.

-Case Studies (radon): Allows people to look at the problem in the context of a specific school building with its particular characteristics, how the problem was solved and why, in a simple format people can understand. Can be in a Tools for Schools format on Indoor Air Quality. Needs to be written in a positive way that shows the authors understand the job of a school plant manager.

-For the Public: balanced television documentaries, e.g. Nova.

-Realistic documentation that people could understand and respect. Examples: CRCPPM developed public information; The League of Women Voters has done good work at finding out what the public wants they published the "Nuclear Waste Primer." An excellent publication. The EPA should get the states together and develop materials. Most committees have a core group of technical experts and a group of non-expert advisors.

-Pamphlets that are short and concise with a point of contact (person with more info. at agency) and web sight for further information. Graphics, maps, on net in PDF format for downloading and easy sharing access.

-All are important, unfortunately some teachers can't use the Internet. Hard copy is still the best medium.

For question N, additional comments on factors that are important as the EPA designs public outreach, the comments were:

**Respondent #1 (National Community and Site Specific Organizations):** EPA needs to clearly segregate voluntary or involuntary human caused exposures. Clearly show where exposure can be reduced if showing comparisons between two. Ex. – DOE materials always show facility exposure compared to living in a city. This is not a useful risk comparison. Need to compare with medical or airplane flight exposure, for example. Don't end up with EPA's site looking like DOE's that is clearly "politicized" and lobbied.

**Respondent #2 (Consultants):** Look at the report from the U.S. Occupational Safety and Health Review Commission (the court for OSHA). Also, see what role EPA can play in regulating classified sites and data, and letting the public know.

**Respondent #3 (National Community and Site Specific Organizations):** Same comment about why is EPA doing this.

**Respondent #4 (Other National Groups):** Certainly should involve stakeholders in reviewing and choosing materials for clarity, user friendliness etc.

**Respondent #5 (Tribes and Tribal Organizations):** Tribes need to connect via the web to a particular area that is appropriate for just them. B/c of their status with the government.

**Respondent #6 (States and State Organizations):** Appreciate the EPA soliciting input on this, but they need to consider partnering.

**Respondent #7 (National Community and Site Specific Organizations):** Scientifically verifiable. Also, need to insure that the data is reviewed by outside scientific experts in the field. And when scientific opinions differ, show the evidence on both sides.

**Respondent #8 (States and State Organizations):** No more fear, give people real information. Don't educate through fear.

**Respondent #9 (National Community and Site Specific Organizations):** Important to design materials/services with credibility of EPA to reduce or allay people's irrational fears about radiation. Use "real-world" terms and demonstrate the differences in types of radiation.

**Respondent #10 (Public Interest Groups):** The EPA representatives are NOT comfortable speaking or participating at public meetings. There seems to be a variety of reasons for this; EPA politics and the individuals do not seem clear on EPA positions (if they have any) or are not 'high up' enough in the EPA to give information or opinions.

**Respondent #11 (States and State Organizations):** EPA – one experience, look up a paper document issued on the Internet, tried to download, couldn't go section to section. Whoever does their website, some are excellent since you can go item by item, otherwise long download- Make user friendly (i.e. don't want a 1,000 page documents if they want one page.) Developing outreach information- using focus groups to help format and including or excluding information. Need to have focus group reflecting the audience you're targeting

**Respondent #12 (National Environmental Organizations):** Inside the beltway person who needs technical and policy information. But there are a lot of people interested who need site specific-good, objective information as citizens. Agency should be serving them FIRST. They have to live with the decisions, the radiation risks and affects. Need to build credibility among the general public. This should be a high priority. Create and update a list of Internet links. Act as a gateway to other sites.

**Respondent #13 (Tribal Governments and Organizations):** The information should be separated by levels of expertise, some for lay people and some for technical people.

**Respondent #14 (States and state organizations):** There should be a place where you can find what questions the public has asked other states who are implementing some form of regulations or clean-up. Then we could be better prepared to answer questions and provide information.

**Respondent #15 (National Community and Site Specific Organizations):** Must look at and report on long-term effects, such as the 500 generation effects of waste ionizing radiation.

**Respondent #16 (National Environmental Organizations):** no comments

**Respondent #17 (States and State Organizations):** What is most important is the format and the media for these efforts can be seriously influenced by the subject at hand. One format does not fit all issues. Consult with the proper contacts. Depends on their approach (Radon and Air is not a regulatory responsibility but they recognize their job as public information and not enforcement), but then a program such as Radon and Water- there is nothing in the public's hands to describe where the EPA is going on this. No rules, no clarity. If the regulatory arm of the EPA is interested in getting information out, should communicate it with the non regulatory.

**Respondent #18 (National Community and Site Specific Organization):** Try to involve the public on a real level and also determine your target audience. You can not cover a range from layperson to expert or technical staff and use the same information. Scope and scale will have to change with the audience you intend to target.

**Respondent #19 (National Community and Site Specific Organizations):** Define the goal (what the EPA wants to do? What audiences do you want to reach?) Also need to address basic risk communications (it needs to be basic and short, unlike the EPA regulations webpage now) as well as educational and somewhat interactive or entertaining to keep people interested.

**Respondent #20 (Canadians):** no comment.

**Respondent #21 (Tribal Governments and Organizations):** Stay away from being too flashy; it turns the public off. Work with someone who believes in an easy reading standard even for highly technical information.

**Respondent #22 (State and state organizations):** no comment.

**Respondent # 23 (National Environmental Organization):** From his perspective EPA interaction has been a void. Has not aggressively (since abandoning rule-making procedure) gone after what it typically does- setting standards for radiation in unlicensed sites. Watches the EPA in

Resource Conservation and Recovery Act in hazardous waste. Doesn't pay attention in EPA-irrelevant force in management clean-up of DOE sites. If the EPA ventures back into rulemaking standards he and his colleagues will be interested. NRC guidelines are what they look at.

Respondent # 24 (Tribal Government and Organization): Information needs to be tailored to individual audiences, e.g. tribes or local governments. There needs to be radiation text book geared towards the layperson at the introductory college science or senior high school science level.

Respondent # 25 (Tribal Government and Organization): 50 page book form for high schools and teachers. Hire nice people.

Respondent # 26 (Local Government Organization):

- Speaker kits w/overhead slides
- Check lists on indoor air quality
- Tools for schools
- Information that enables stakeholders to effect change

Respondent # 27 (National Community and Site Specific Organization):

- Glossary of technical terms
- Some communities lack access to the internet and thus need hard copies
- Need a human being customer service person able to answer questions in English, Spanish, Tagalog (Philippines), and other languages. Staff must be culturally sensitive.

Respondent # 28 (Academic/Scholarly Journal): Trust – lack of trust comes when the disseminating agency is also the regulatory agency. The public will not buy information on radiation from NRC, and would be unlikely to trust the EPA on Superfund site information. The public is likely to trust the EPA to provide information on radiation.

A centralized database on nuclear waste producers and shippers is not needed. The safety record of nuclear waste transport is extremely good. Putting out more information would just raise public fears and would be used by activists to throw up road blocks causing delays in shipping. There are several agencies already responsible for radioactive waste shipment and has concern that the EPA is creating more bureaucracy. He doesn't understand why the EPA is looking for new things to do.

Respondent # 29 (Academic/Scholarly Journal): Depends on the audience but pamphlets are good, little bit of written with graphics and pictures that transmit the information in basic terms is acceptable. Technical data and supporting information he gets off the net. like videos, interactive programs, CDs, short and concise material, use of slide shows geared to audience he offers Radiation 101-105 from basic to very technical. Teach about it in schools. Get information out to children at a young age.

Respondent # 30 (State and State Organization): Communicating risk to the public is very challenging when people are fearful of radiation.

Respondent # 31 (State and State Organization): No additional

Respondent # 32 (State and State Organization): I need a computer that can answer every question we have on radiation. There are 49 state radiation control agencies all trying to provide information to the public. Then there are many other entities interacting. There needs to be an entity to "package" one common system to help all states keep up to date information they need to interact with federal agencies. Suggestion: Technical overlay with quarterly updates sent to state radiation professions quarterly via CD-ROM, including:

- all proposed promulgation of Federal Rules (radiation professionals often find out about new rules too late
- Technical updates on licensing issues
- Radiation incident information
- Updates on publications on radiation

There are two very different arenas –technical people need answers to their questions. Lay people needs theirs. Need good quality information –fair and unbiased.

Respondent # 33 (State and State Organization): No additional situations

Respondent # 34 (State and State Organization): In Nevada a professional video "Yucca Mountain What's Up Doc?" did very well in the schools. It was a response to DOE. It was a frank and honest presentation: here's radiation and what's really going on.

Respondent # 35 (State and State Organization): No additional situations

Respondent # 36 (State and State Organization): State Legislatures and their constituents want to be involved and heard. It would be important for Feds to have regular public meetings and/or hold focus groups to hear from the public at large and allow a Q&A session. This would allow agencies to see if they are meeting their own goals.

Respondent # 37 (Industry/Trade Association): The EPA could use cable TV systems to provide programs that have interactive scheduling tailored to viewer's concerns. We have history channels, animal channels, nature/science channels, Disney channels, why not an EPA Channel?

Respondent #38 (States and State Organizations): Need to make a lot more information accessible.

Respondent #38 (States and State Organizations): no comments.

For question O, relating to how concerned or interested in the following topics and issues of radiation the respondent and/or the constituency of people they serve, the comments were as follows:

Radiation risk – very; very; (key issue that comes up repeatedly) very important; important; very important; very important; very; very interested; (in terms people can understand, including dose comparisons in layperson terms) very interested; very concerned; very interested; very interested; (issue of how EPA represents radiation risks to radiation dose) moderately interested; very interested; very interested, very; very; very interested; moderate; very; very; not;

(perceptions out of whack when people are living next to a nuclear power plant) ; most important; very concerned; TOP; important; very important.

Public health and safety – very; very; very (risk is always posed in this context); important; very important; very important; very interested; interested; very concerned (layperson terms); very concerned; very interested; very interested; very interested; very interested; (need to be part of risk discussion) very interested; very important; very important; very interested; moderate; very; high (is it safe or not?); top; (people concerned about cancer and radiation even though there is low incidence); very concerned; very important; very important.

Worker safety – very; very; very (key for Defense Weapons Complex); important; not applicable, very important; very; (radiological health) very interested; very important; (not raised as often as it should be) somewhat concerned; very interested; not as interested; very (an awful lot of misinformation); moderate interest; very interested; very interested but need to be part of risk discussion; very important; very important; very interested; not asking about it; concerned; very concerned; risk rankings from DOE; very important; very important.

Waste disposal – very; very; (an awful lot of misinformation) very interested; (can't separate this from other concerns) important; very interested, very important; very; very interested; somewhat interested; very concerned; very interested; interested; very interested; very interested; (biggest interest in Idaho) very interested; very important; very interested; very interested; moderate; top concern; top concern; moderate; hot topic is low level waste; huge interest; very important.

Nuclear power plants – very; very; (not in Northwest because Trojan closed and only one left in Washington state) not very; important; very important; (as there are no nuclear reactors in UT) not interested; not very interested; very interested; NA in their area; less concerned; (as the lead state agency in responding to accidents-from that perspective-) interested; very interested; ("mixed bag" because people aren't too concerned about the plants but are very concerned about the waste product build-up and bi-products) very interested; very interested; not very interested; not very interested; very interested; very interested; interested; less; value of power vs. risk; low interest; very interested; not as much a concern today; (no plants in state) na- (more with waste products if they are being moved and dumped locally) interested; important, less important.

Industrial activities – very; not very; not at all; very; very interested, not interested; (as they relate to DOE sites) very interested; (food irradiation) very interested; interested; (unless related to radiation) not very concerned; not interested; not as interested; (especially research and development lab wastes and long lived materials) very interested; (EPA in control to orphaned control of radiation sources that can be traced back to an owner for licensing) very interest; very interested; (tied in with clean up and disposal but) very interested; very interested; somewhat interested; interested; low; moderate; some concern with waste sites, dumps, sumps, landfills; important; very important.

Plans for mitigation, clean up, decommissioning, monitoring, reuse and emergency response for facilities that formerly handled radioactive material – very; very; very; very important; (when related to Indian reservations) extremely important; very interested; very interested; very interested; NA; more and more interested; very interested; somewhat interested; (many plants currently planning for D and D) very interested; very interested; very interested; very interested;

very important; very important; very interested; less; not experienced; moderate interest; major concern – to him and his audiences; important; very important.

Emergency response – extremely; not very; some; important; very important, not as interested as other topics; interested (but not a high priority); very interested; not interested; (especially when it relates to transportation spills) very interested; very interested; not interested; very interested; very interested; interested (because of on-going operators/transportation); very important; very important; somewhat interested; high; very; very; top; huge interest (as no preparedness in the rural communities while large urban areas are somewhat prepared.); somewhat important; very important.

Disposition and transportation of wastes – very; not very; very; very important; very important, very interested; very interested; (transportation of WHIP) very interested; not a big interest; very interested; (only in terms of emergency perspective) interested; not interested; moderately interested; very interested; interested; very important; very important; very interested; moderate; very; very; low; (intermodal transport - rail and truck but no explanation of reasoning for why each used and when depending on high or low level risks); very important; very important.

Changing land patterns around facilities that handle radioactive material (currently and historically) – very; not very; not very; important; very important when related to sacred sites (tribal), not interested; very interested; less important; growing interest; (decommissioning-residual activity that can be left on a site, change needs to be factored in) interested; not interested; slight to moderate interest (if it would help us evaluate possible scenarios of future use); very interested; not important; very important; somewhat important; extremely interested; less; low; (Yucca Mt., down gradient communities being kept from expansion, ground water problems and water quality issues) very concerned; not that important; very important.

Distinctions high level and low level radioactive wastes – very; (what does this mean – legal distinctions or real world effects?); (need a better understanding of what this means and the potentially high risks related to low level waste) very; (because it is used as an excuse for not doing difficult clean-up or for poor decisions-people mislead to feel they should be less concerned over lower radiation exposures) very important; important very important-biggest concern, very interested; very interested (add transuranic wastes: very interested); very concerned; somewhat interested; medium interest; not interested; somewhat interested; not interested; very interested; (most people are not interested in this highly bureaucratic regulatory stuff and are only interested in the extent that they want it translated to public and health worker impacts); extremely interested; not at all (because there is no distinction); interested; no one cares; somewhat; (mostly people do not understand; needs clarification because some LLNW is more dangerous than HLNW, people are confused on this and so is the media.); important; very important.

Distinctions chemical and radioactive wastes – very; (what does this mean?); (more public fear related to radioactive, but chemical has greater risks, esp. in water) very interested; important; very important, very interested; interested; very important; very important (their group is interested in groundwater pollution from Pantex plant); important; not interested; very interested; (chemical fires, spills, etc.) somewhat; not interested, very interested; – not an issue; no; people accept chemical waste more than radioactive waste, some concern based on comparison of it and depending on location, urban areas very concerned, rural not as concerned; important, very



important.

Superfund sites – very; very; not very (too long to get clean-up people are losing interest); important; very important (how does a site become designated? For example, Anaconda mines in Yerington Nevada); not interested (no sites in their area); very interested; very interested; somewhat interested; interested; interested; somewhat interested; (staff has been attending MARSIM course) very interested; (EPA's policies relative to dealing w/ states with radiation Superfund sites) highly interested; very interested; very important; not very interested; somewhat interested (if its generic); moderate; very important.

Onsite/offsite issues (specific contaminated sites, current and past emissions, burials, spills and releases)– very; very; not very (except hen one occurs); important; very interested, some interest; very interested; very concerned; declining interest (people are tired of hearing about it, just want to know when it will be cleaned up); somewhat interested; in the capacity of obtaining information to respond to the public interest- interested; somewhat interested, very; very; only if they pertain to Superfund-or are unaware of- very interested; very interested; should fold into clean up but very interested; very important; somewhat important; extremely important; moderate (but spills and releases high; concern); not a big concern (depends on locale as well. Each NTS site is a Superfund site); very important; very important.

Regulatory and inspection history of facilities – very; extremely; some; important (because having information shows how flawed processes and records were in the past and how little is actually known about what it will take to clean up sites); interested, very interested; somewhat interested; very interested; not at all interested; not interested; interested; somewhat interested; (a lot of FOIA requests from potential land purchases) very concerned; very interested; very interested (but don't think it is appropriate for EPA to get involved in); very interested; very interested; somewhat interested; somewhat interested; not much; concerned; (yes; he's given up on NTSB like some neutral uninterested body to inspect and share information with public neutral method); very important; less important.

Other –

- 
- Compensation for people who have been exposed: very;
- 
- Independent oversight for D & D: extremely; make information available to people with competence to do analysis (federal system is overstretched): very;
- 
- What clean-up progress is being made: very;
- 
- Transportation notification: very important;
- 
- Positive health benefits – x-rays, cancer therapies: very important;
- 
- Recycling metals contaminated with radiation; very interested;
- 
- Uranium mining: high;
- 
- Nuclear weapons testing: high;

- 
- Radiation and medicine: moderate;
- 
- Nuclear weapons: moderate
- 
- Local issues are what gets people interested, schools are primarily interested in radon issues, generally there are no other sources of radiation in schools;
- 
- Radon;
- 
- Hot new topic- potassium iodide to lessen the effects of exposure in the event of a power plant accident, 5 millirams of exposure in a round trip transcontinental flight may exceed allowable levels for some flight crews
- 
- Illness and disease and risks to the environment from bio-accumulation: interested
- 
- Issues of external regulation. Clarity of roles of EPA, NRC, and DOE needed. Issues of EPA having standards: very interested;
- 
- NORM, NARM, and TEN NORM: interested;
- 
- Really all comes down to risk and perceived risk: very interested;
- 
- Columbia River issues are of the very highest interest;
- 
- Didn't mention clean-up standards. Didn't mention public participation in decisions about disposition of radioactive waste: very interested
- 
- Needs to be independent monitoring of what's going on in agencies. EPA could fulfill that role, but EPA is extremely weak, so it might not want the job.
- 
- For generators in the region, knowledge that waste will be disposed of in a safe manner and a reasonable time.
- 
- How interstate commerce usage affects waste transport across state lines.

For questions P and Q, respondent interest in follow up involvement or participation, the contacts are listed in a separate memorandum provided to the EPA.

**For question R, other aspects of radiation information to consider, the following were offered:**

**—EPA needs to look very seriously at this. I have very serious doubts that headquarters can contribute much to the information issue. EPA should concentrate on its much bigger mission of overseeing ongoing clean-up work. This idea turns me off.**

- There has been a negative attitude from DOE and DHHS towards citizens knowing information and making their own decisions about health issues. Example is the Cancer Study. Agencies are afraid public will overreact and there will be unnecessary surgeries, i.e., thyroidectomies, so they won't release information. People, especially workers, need the information and to be educated about what it means. Then they will know when surgery is necessary, etc.**
- Needs to be more clarification to the general public of the difference between man made and naturally occurring radiation. More linkage to the tribes so they know who to contact for the proper information.**
- Everyone is waiting for ONE federal agency to regulate. Get it together!**
- Depleted uranium is a big one. EPA needs to set minimum standards to get the sites cleaned up.**
- Prolonged missions in space- radiation in the environment is different than all mentioned above. Too general.**
- Two types of folks in the general public- very afraid, or completely apathetic. Think about that when designing materials and outreach.**
- No mention of Radon-b/c they are already doing a good job**
- Need info on non ionizing radiation. Part of the problems they face at the state- conflicting positions at the Federal agencies. Differences in their approaches to the same issues- come up with different limits. It would be useful nationally to have one- forces the state to develop their own, look in different places, confuses everyone- and creates a lack of credibility of state workers by in the general public.**
- Respondent has talked with many representatives of DOE, DOD, EPA and other agencies over the years, but nothing changes with regard to outreach to tribal nations. It's very frustrating.**
- Very important to get copies of report on this project out without having us use FOIA to get it.**
- Information usually exists; people need to be told where to look for it.**
- In listening to the public, they're still not over "radiation syndrome", that is, fear beyond reason about radiation risks. This is because they can't feel or touch it or smell it like they can chemicals, so they don't know if it's around and hurting them. Need education.**
- It's important for people to get information about radiation from someone other than the regulatory agencies. Radiation impacts as a topic is often conspicuous by omission from the information stream. It can't be left in the hands of DOE and NRC.**

**--Do wish they could have provided context for these questions. They tried to develop questions that tried to address all possible audiences. Need to recognize that the level of understanding in this survey was high. This discussion was not in context. Need to do a better job of targeting their audiences. For Radon, they do a good job. Where they have a regulatory function their approach has been 'one-size fits all' (response to comments on rules). This approach has not served them well. Unspecific purpose.**

**-- Feel that you need to address exposure risk modeling to make it easy for people to use and understand how it works (interactive activities or models) Also feel it is critical to integrate with DOE, local and state governments and other portions of the EPA offices (such as the federal facilities re-use office)**

**-- EPA needs to set standards for all of the above, not just put out information on other agencies Then, they need to get information out about the standards they set. EPA keeps asking the same questions and getting the same answers and not doing anything.**

**-- The EPA staff, at the site, with one exception, has almost never given us credible, useful information. They always say "We haven't got enough staff," "It's not our responsibility", "Check with DOE on that". At this point, it would never dawn on us to ask. They're just not included in our circle of information sources.**

**--Forfeit all attempts to est. guidelines/regulations/input in the DOE disposition of its contaminated sites as well as ongoing management of nuclear materials- either in favor of DOE or NRC. NACEPT panel explanation- DOE initially asked EPA to est. guidelines. DOE said they didn't need them anymore and EPA backed off. WHAT? If EPA is seriously considering returning to this effort, he would be willing to assist them to go back to a public participation forum. CERCLA and RCRA have broad experience- and the EPA punted. The situation is getting worse. The political movement to tear apart DOE is increasing- so where is their cleanup process going to wind up? Nowhere? With no guidance? No specifications? There isn't a whole lot of time. This is a very odd way of going about this. Hey, EPA "A- identify the problem B. establish guidelines C. Go from there. Public opinion poll is not going to help you."  
Nuclear power plants happy with NRC. DOE does not want to go anywhere, and it does not want the EPA to meddle, so there are a lot of barriers. Will be shocked if this goes anywhere.**

## **Appendix E**

### **EPA RPD Interviews – Detailed Responses**

**For questions A-I, a situation in which information was needed, the following was offered by respondents:**

**Respondent # 1 (States and state organizations):** From perspective as a regulator, how to improve quality of images at x-ray facilities without giving more radiation to patients. Overall questions of quality control. The information was found by contacting professional groups, such as medical physicists, who referred them to written materials; they also purchased materials. They also relied on information from x-ray film manufacturers. The information was "somewhat easy and somewhat hard" to find because sometimes it was "in the brains" of people they needed to contact and sometimes it was readily available from print sources.

**Respondent # 2 (National environmental organizations):** The purchase of real estate near a nuclear power station. The information was not found because the agencies contacted could not define the amount of current discharge and bio-accumulation of radiation into the environment. Sources checked were the public library, the Internet, and federal, state and private organizations. Also, the yellow pages. The information was not easy to find.

**Respondent # 3 (Tribal Governments and Organizations):** They are often asked about where there might be a problem around the country, and they don't have an extensive data base of sites or situations. A site inventory for different types of problems, including radon gases or effects of mill tailings, is needed. They need to know the effects in uptake especially related to a subsistence or pastoral lifestyle. What's going into the food chain, not just what happened at a site. Example is the Rio Puerco site in New Mexico where there was a financial settlement, but no mitigation. It is impossible to know the real impact on the lives of the people who may have been exposed or have eaten something that was exposed.

The information was not found because there is not such an inventory. Information is anecdotal by site, but not systematic.

**Respondent # 4 (Other National Public Interest Groups):** EMFR. This group is self-contained citizens monitoring group for Three Mile Island (TMI) and gather much of their own information. They provide their data to other professionals, groups, and citizens who need information that is independent. Information is needed that is independent of an Electrical Utility if there is an incident at a nuclear power plant. Information that is independent of a carrier if there is an accident in transport is also needed. The EMFR – Radiation Monitoring Group at TMI has their own radiation monitoring equipment and THEY provide precise empirical data independent of the government. The EMFR gets information from the company who owns TMI, the Department of Environmental Protection, and a University Laboratory. The EMFR also uses personal contacts, federal Internet sites, and medical professionals for additional data/information that they include in their newsletters.

Presently the information comes from the Emergency Management Agency or a company and is not easy to get. Also, this issue is not accessibility of information, but the voracity of the info provided. Government tends to play things down.

**Respondent # 5 (Local Government Organizations):** Not very many situations where information is needed. Recently a source was discovered in a dumpster, and the local fire and police department were called in a long with the DOE representatives and the contractors. It turned out to be unimportant. Town is the home community for the Idaho National Engineering and Environmental Laboratory. Information is usually available, in part because the respondent has a 25 year history with the lab and is personally acquainted with many staff members. This facilitates information gathering when it is needed. Respondent also gets a lot of information through serving on various advisory committees, including the SSAB for the site.

Personal contacts are the most used sources of information. The Internet is sometimes used, as is the public reading room at the library. Information is generally easy to find when you know what questions to ask of whom.

**Respondent # 6 (National Environmental Organizations):** Deregulation and recycling of radioactive wastes, with respect to new regulations and background studies and methodologies utilized to make calculations. Information is hard to find on the Internet, especially on the NRC site. NRC people are impossible to deal with and DOE people are even worse. EPA people are cooperative up to a point.

Generally, information is not easy to find. To find information respondent uses the Federal Register at the Repository at the Library. Respondent is unhappy that it is usually ten days behind. This is a much more accessible and easier to deal with then the Internet. Respondent also uses organization and committee contacts. It has been very difficult to persuade EPA to put respondent on the distribution list for documents, and it is very costly to get the documents from the agency. This puts interest groups and citizens at a great disadvantage compared to agencies that are tied into the information sources.

**Respondent # 7 (States and State Organizations):** Mostly have all the information already. Cannot think of a time when they could not find the information they needed. They use a number of different sources depending on the type of information they need. Using the NRC, DOE, appropriate organizations and committees, EPA labs, university and public libraries, and professional and scientific publications, they can find what they need.

The issue was not *finding* the information, but knowing when they were getting *good* information.

**Respondent # 8 (National Environmental Organization):** Began with a healthy distrust of radiation risks. Has an interest in energy and avoiding nuclear power. Interest in knowing about radioactive materials on islands in the Columbia River near Hanford. This information was not easy to find. First it takes time to make something an issue before it is 'covered' and there is information about it. Many things have not been measured, therefore there isn't information on it.

In order to get information, this respondent uses federal and state experts, the DOE or DOH to find out health affects. Also uses personal contacts and organizations with which they have a relationship. Specific information is always hard to find.

**Respondent #9 (Other National Public Interest Groups):** Frequently in contact with patients from Hanford, or others involved with radiological suites at hospitals. Information is not easy to find. Information on

exposure is usually lacking. There are radiation exposure databases maintained by the PNNL, but that was all that was mentioned.

It is very difficult or impossible to get information. There is no symmetry. Need to attempt to create it from job data.

**For questions J-K, a current situation in which information is needed, the following was offered by respondents:**

**Respondent # 1 (States and state organizations):** Information on radium in water. We collected samples for which the analysis produced different results. It became a research project with EPA lab's participation. Very "hands-on".

**Respondent # 2 (National environmental organizations):** Medical exposures for diagnostic and treatment purposes. Went about seeking info in the same manner as above, with similar results.

**Respondent # 3 (Tribal Governments and Organizations):** Where did veterans, esp. WWII, serve and what was their exposure? Can't make a causal link between exposure and later disease or death of these "atomic workers". Also uranium miners.

**Respondent # 4 (Other National Public Interest Groups):** The EMFR monitors 24-7. Seasonal issues at TMI. Largest civilian radiation monitoring network in the world. Important to dispel myths, but give clear instructions on risks.

**Respondent #5 (Local Government Organizations):** State hearing for an air permit on Advanced Waste Facility. There was only a tiny radiation discharge and the local people weren't very concerned; however, people from a city in a nearby state read about it in the newspapers and got upset. Respondent was able to get them with experts and they were satisfied. I usually can get to the experts, and that is usually satisfactory. Fear comes from a lack of information generally. People often don't pay attention until late in a process, then act from fear.

**Respondent #6 (National Environmental Organizations):** The current plans for recycling scrap metal and possibly concrete that is contaminated, the intention of the agencies with respect to recycling of depleted uranium, decommissioning criteria especially as related to standards for water and to background information and the ongoing battle between EPA and NRC. To get the information I would talk to people I know in the agencies.

**Respondent #7 (States and State Organizations):** Tritium in landfills. Some information is available but whether it is verifiable, is in question. Many times, when looking for information, especially on the web, political aspects enter into it depending on the website. There needs to be a more extensive range of information including what other people found and *when*. To find information on this situation they look in radiological health reports, journals with monitoring results, and research literature.

**Respondent # 8 (National Environmental Organization):** no additional information.

**Respondent #9 (Other National Public Interest Groups):** State asked for comments or proposed revision for standards for soil. Used the NRC and DOE documents for information.

**For question L, asking for another situation that the respondent needed radiation information on, what was mentioned was:**

Respondent # 1 (States and state organizations): Setting clean-up standards. To get information they read professional journals, attended conferences, and NRC workshops.

Respondent # 2 (National environmental organizations): General information on sources and consequences of radiation exposure.

Respondent # 3 (Tribal Governments and Organizations): Down wind communities from the DOE weapons complex sites.

Respondent # 4 (Other National Public Interest Groups): potassium iodine in a nuclear accident, Y2K and nuclear power, Radon, transport of radioactive materials, and what will happen to TMI when it shuts down.

Respondent #5 (local Government Organizations): Foreign reactor fuel coming on trains to our state.

Respondent #6 (National Environmental Organizations): See above J-K, Respondent #6.

Respondent #7 (States and State Organizations): None. But wanted to note that they thought it was a disaster that the 'cross check' program was cancelled.

Respondent # 8 (National Environmental Organization): no others given.

Respondent #9 (Other National Public Interest Groups): Information needed that relates to wildlife and environmental questions

**For question M, asking the respondent to rate sources of information on radiation (on a scale of 1-5, 1 being the most frequent, 5 being never), the following was offered:**

Federal agencies – 1 (MARSIM training and manuals); 3; 3; 1;2;1; 2; 2; 1

State government agencies – 1; 2; 5; 3; 3; 2; 3; 2; 2

Local government agencies – 5; 1; 5; 4; 5; 5; 5; 4; 3

Non-governmental organizations – 1; 1, 3; 2; 4; 2; 1; 2, 1

Personal Contacts or word-of-mouth – 2; 1; 1; 2; 3, 1; 1; 2; 1

Public libraries – 5, 3; 5; 3; 2; 5; 5; 4, 5

The Internet – 4, 2; 2; 1; 4, 2, 1; 1; 3

News media – 3 (unreliable but we read it); 1, 4; 1; 3; 4; 5, 3; 3

Medical professionals – 5, 1, 3 (hard to get releases); 4; 4; 1, 1; 4, 2



Other – other professionals: 3; professional journals; other professionals: 3; bookstores: 1; other Tribal governments: 1; people who are doing the actual monitoring and reporting: 1; experts: 3; mail from agencies, journals: 1, EML, NIEHS, American Nuclear Society, American Academy of Health Physics: 1, Agency for Toxic Substances and Disease Registry: 1, professional journals: 2, experts: 2; Consortium for Risk Evaluation, Hanford Health Information Network, Medline: 1.

**For question N, factors to consider when designing public outreach (using a scale of 1-5, 1 being most important, 5 being not at all important), the ratings were:**

Easy to use – 3; 1; 1; 1; 3; 1; 2; 1; 3

Reliable – 3; 1; 1; 1; 1; 1; 2; 1; 1

Credible – 1 (absolutely essential); 1; 1; 1; 1; 1; 1; 1; 1

Balanced between pro and con views of information – 2; 3; 1; 1; 2; 1; 1; 3; 2

Other – name the sources of information: 1; primary sources: 1;

Respondent # 1 (States and state organizations): Make it so that the reader will be able to put what is read in perspective with other factors in their lives, such as non-ionizing radiation (hair dryers and power lines). People must realize that electro-magnetic fields around hair dryers, for example, is greater than exposure to a power line. Need to put in a range of values and common daily occurrences. Have comparisons with background in the area or with some other factor.

Respondent # 2 (National environmental organizations): Use lay language and avoid jargon; the fewer the acronyms the better. It must be decipherable.

Respondent #5 (Local Government Organization): clearly identify the level of technical information included in a report. Use a variety of mechanisms for outreach.

Respondent # 6 (National Environmental Organization): put in leading edge or against the commonly accepted wisdom articles and research findings. The peer review process that has been shaped to be a method of excluding research findings that are outside the mainstream has damaged credibility. This is a serious impediment to research work on ionizing radiation. Those considered "experts" often have direct or indirect support from industry, and that damages credibility.

Respondent #7 (States and State Organizations): use credible expert groups

Respondent # 8 (National Environmental Organization): writing and reading levels must fit the audiences. Some simple to read materials; accessible and well publicized (people of all kinds must know it's available) Documentation and evidence of peer review There are too many self-styled experts.

Respondent #9 (Other National Public Interest Groups): Comprehensive 2, based on experimental evidence vs epidemiological evidence: 1; animal vs. human experiments 1.

**For question O, relating to possible formats for presenting information, (on a scale of 1-5, 1 being the most useful, 5 being not useful) the following ratings were given:**

Pamphlets, etc. - 2; 1; 3; 1; 2; 4; 2; 1; 3

Longer written materials - 1; 2; 2; 2; 3; 3; 1; 2; 1

A combination of short written materials with graphs and figures - 2; 3; 1; 1; 1; 3; 3; 2; 3

Lectures and discussions - 3; 3; 3; 3; 2; 2; 2; 3; 2

Internet/www - 1; 2; 2; 1; 3; 2; 1; 1; 3

Other - develop and disseminate K-12 information for schools: 1; public access TV: 1; talk radio shows: 1; other media: 2; continuing education or adult education for credit: public access television and distance learning to get people educated and make contacts: 1; direct contact with researchers, reliable scientific literature: 1; personal monitoring and indirect observation: 1; using the National Radiation Protection of Great Britain "At A Glance" series and plagiarize like crazy: 1; more press releases to print and TV media, quality radio talk shows, TV specials on nuclear waste, clean-up, and transport: 1.

**For question P, respondents were asked to rate how concerned or important the following issues related to environmental radiation are to them and the people they serve (using a scale of 1-5, 1 being very interested or concerned, 5 being not concerned or interested), the following ratings were given:**

Radiation risk - 2; 1; 1; 1; 4; 1; 1; 2; 1

Public health and safety - 2; 1; 1; 1; 3; 1; 1; 1; 1

Worker safety - 4; 3; 3; 1; 2; 1; 2; 1; 1

Waste disposal - your waste = 1, other's = 5; 2; 1; 1; 2; 1; 1; 1; 2

Nuclear power plants - 1; 3; 3; 1; 2; 1; 1; 2; 1

Industrial activities - 5; 3; 3; 3; 3; 1; 2; 2; 2

Plans for mitigation, cleanup, decommissioning, monitoring, reuse and emergency response for facilities that formerly handled radioactive material - 3; 3; 1; 1; 2; 1; 3; 1; 1

Emergency response - 1; 2; 1; 1; 3; 1; 1; 2; 1

Disposition and transportation of waste - 5; 3; 1; 1; 3; 1; 3; 1; 1

Changing land use patterns around facilities that handle radioactive material (currently and historically) - 3, 2, 1, 2; 4; 1; 4; 2; 1

Distinctions between high level and low level wastes - 5; 3; 2; 2; 3; 1; 1, 2, no response

Distinctions between chemical and radioactive waste - 1, 3; 3; 3; 3; 1, 3, 2; 2

Superfund sites - 2, 3; 1, 4, 4, 1, 5, 1, 1

Onsite/offsite (specific contaminated sites; current and past emissions, burials, spills, releases) – of live next to sites 3, if not 5; 1; 1; 1; 3; 1; interest: 1, importance: 4; 2; 1

Regulatory and inspection history of facilities – 3; 3; 1; 1; 2; 1; 1; 2; 1

Other

Respondent # 1 (States and state organizations): radon: 1 (people may be apathetic, but should be concerned); non-ionizing issues such as cell phones and power lines: 1; x-rays for mammography: 2; orphan sources (materials that have escaped from regulations and inspections at scrap metal facilities, for example): 4

Respondent # 2 (National environmental organizations): discharges to air and water: 2; D & D: 3

Respondent # 3 (Tribal Governments and Organizations): cultural significance of sites; access to sites where there is cultural significance

Respondent # 4 (Other National Public Interest Groups): tracking health issues. Most Gov. and private agencies have no health or cancer registry. Needs longitudinal Health tracking: 1

Respondent #5 (Local Government Organization): Regulatory enforcement: 1; updating standards: 1; unwillingness by the bureaucrats to consider new information: 1

Respondent #6 (National environmental organizations) no additional.

Respondent #7 (States and State Organizations): no additional.

Respondent # 8 (National Environmental Organization): government policy in general on nuclear power and nuclear war, clean-ups and destruction of planned nuclear weapons (i.e. nerve gas)

Respondent #9 (Other National Public Interest Groups): offsite exposure pathways and water.

For questions Q, R & S, asking if the respondent would like to be contacted or further involved, the contact names are listed separately in Appendix F.

**For questions T, other aspects of radiation information to consider, the following were mentioned:**

--The currently available information doesn't put risk in perspective. Put things on the system that should be of interest because of risk, even though public might seem apathetic. Also, when creating and targeting information, recognize that there is a bi-polar level of public interest, that is, there are those who fear radiation in any form, and there are those who have great apathy about radiation. It is important to start educating people at an early age about radiation so they can make informed choices. There should be a K-12 curriculum developed and distributed to schools.

--Distinguish between positive societal benefits of nuclear medicine versus the adverse consequences of nuclear power. Need clear distinctions not lumping. Suggested EPA use partnering such as what was done in the early 90's with 'SWOOP' at Los Alamos; DOE and Citizen groups.

--Public involvement can be greatly improved by having workshops when setting standards, etc. Need to get balanced participation between interest groups industry, and govt.; interest and environmental groups usually way outnumbered. Also need to reach out to general public, not just interested "stakeholders" who are part of the inner group. Open public meeting process needs to be iterative, so that people have a chance to follow the issues over time.

--EPA needs to reach out, not just wait for public to initiate contact, and it needs to follow-through.

--We all need to get this report without having to fight for it through FOI.

--The EPA needs to understand the public perspective. In terms of outreach, the public falls into two groups; completely interested, or completely unconcerned. The public is perfectly accepting of a risk that has a 1/100 chance of killing them but are completely fearful of a risk that has a 1/1,000,000 chance of killing them. The EPA needs to know that public misconception is very prevalent.

--Risk to the general public. People really should know what to be afraid of and what not to fear. The majority of the population won't be interested unless you can really get them to see how it affects their everyday lives. Link information with what touches people at home and in their communities.