# Communicating the Safety of Radioactive Waste Disposal Facilities: *International and U.S. Experience*

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**Abstract.** The scientific and engineering aspects of waste management safety are no longer of exclusive importance. The ability of waste management organizations to communicate effectively and to adapt to an evolving social context within which waste management decisions are made, have emerged as critical contributors to public confidence. This changing context along with examples of how waste management professionals and organizations are working to improve the quality of their communication about the safety of radioactive waste disposal facilities, are discussed.

## 1. Introduction

Today's environment for communicating about safety is complex. Public fear and concern about exposures to hazards, generally, have increased, along with a corresponding demand for more information and greater participation in safety-related decision making. While informing and involving stakeholders is indeed challenging, James Creighton, reminds us, that "[i]ncreasingly, public participation in governmental decision making is considered part of the very definition of democracy" [1]. It is in this context that institutions seeking to achieve acceptable solutions to the management of high-level radioactive and spent nuclear fuel wastes, also seek to improve the quality of their communication about, and public understanding of, the safety and risks of these solutions.

In the United States, statutory provisions for stakeholder participation exist under both the National Environmental Policy Act and the Nuclear Waste Policy Act. The latter applies to the disposal of high-level radioactive waste and spent nuclear fuel. In addition, environmental standards and licensing criteria for disposal of high-level radioactive waste and spent fuel are developed with extensive public participation and input. In many other countries, as well, legislation requires that regulatory processes be open to the public, with consultation of the public by the regulatory bodies and public hearings being held in the case of major decisions. In some cases, these laws are reflected and reinforced by international treaties or conventions, such as the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management [2] and the Espoo Convention [3], both of which also require provision of information to neighboring countries. In matters of environmental decision making, generally (including decisions about radioactive waste disposal), 36 European nations have signed on to the Aarhus Convention [4], committing these nations to take measures that ensure public participation and early access to information. This convention includes a presumption in favor of access, and imposes on its participants the duty to make information "effectively accessible" to the public by providing information on the types and scope of information that exists and the processes by which it can be obtained.

Given the greater access to safety information and trends toward greater participation in waste safety decision making, it is important that waste management organizations and practitioners understand how they can provide information that is understandable, and therefore, more likely to be applied accurately when informed stakeholders become participants. Waste management organizations and regulators appreciate now, more than in earlier years, that part of their job is helping stakeholders, including the general public, understand issues of safety and risk, no matter how complex they may be. The public may not make technical decisions, but their opinions deserve consideration by those who are making the

decisions. Listening to and communicating with the public does not mean that agendas and priorities must be based solely on prevailing public concerns. Implementers, regulators and policy makers in many nations are working to improve safety communication in order to enhance the quality of stakeholder participation in waste management decision making.

Addressing these challenges on an international level is the Forum on Stakeholder Confidence (FSC). The Forum was created under a mandate from the OECD Nuclear Energy Agency Radioactive Waste Management Committee (RWMC) to facilitate the sharing of international experience in addressing the societal dimension of radioactive waste management. It comprises nominees from NEA member countries, most of whom represent national organizations (implementers, regulators, policy makers, and research and development organizations) with responsibility for, and experience with, interacting with stakeholders. The focus of its activities, workshops, and publications is to foster greater awareness of the lessons and experiences from these national efforts. At its opening workshop, in 2000, the FSC explored the relationship between the changing environment in which radioactive waste decisions must be made, the importance of trust for institutional players, the increasing interest in stakeholder participation, and the changing character of interaction among the players ("dialogue dynamic"). The FSC observed that the complex interplay among these variables compelled radioactive waste management institutions to seek ways to adapt in order to realize new solutions. [5].

## 2. Technical Excellence Alone Is Not Enough

For at least two decades, it has been observed that factors other than numerical data can exert a powerful influence on public perceptions of safety and risk. Perceptions of fairness, trustworthiness, integrity, and motivation, among others, also feature prominently in the public's evaluation of safety information [6, 7]. Such perceptions are further complicated by the fact that radioactive waste management issues are often linked to broader societal controversies over environmental protection, risk, energy policy and sustainability. Because of changes in society's decision-making environment, and heightened public sensitivity to all matters connected with environmental protection, nuclear power, radioactivity, and radioactive waste, any decision regarding whether, when and how to implement waste management solutions will typically require thorough public examination and the involvement of many relevant stakeholders. The quality of safety information provided to, and the quality of communication with these stakeholders will have much to do with how proposed waste management solutions are perceived by them.

From its inception, in 2000, the FSC has recognized that, because of changing expectations in the broader society, waste management institutions are challenged to engage in new forms of dialogue and decision making processes that address the views of a broad range of interested stakeholders. The FSC described the changing character of dialogue and decision making processes as a shift from the traditional *"decide, announce and defend"* model, focused only on technical content, to one of *"engage, interact and cooperate,"* for which both technical content and quality of the process are of comparable importance to a productive outcome. In this climate, scientific and engineering aspects of waste management safety are no longer exclusively important. The ability of radioactive waste organizations, including regulators, to adapt to this new context is now accepted as critical contributors to public confidence. Technical competence, while still essential, must be viewed as necessary, but no longer sufficient. Stakeholder confidence and trust in regulatory and implementing institutions are seen as key conditions for a successful societal decision-making process for radioactive waste management. To be fully effective in carrying out their mission, regulatory authorities (such as the Nuclear Regulatory Commission in the United States) need not only be independent, competent and reliable, but also strive to achieve the confidence and earn the trust of stakeholders and the public at large [8].

In short, stakeholder confidence in institutions, and in the processes those institutions use for reaching decisions that affect safety, is seen as a key condition for ultimate societal acceptance of decisions regarding the management of radioactive waste. In order to build confidence in these processes it is important that they be explained, and even more important, that they can be understood as being open, transparent, fair and broadly participatory. It is important, therefore, that radioactive waste management organizations expand their vision and practice of safety communication to include these process elements, along with technical information, if they are to communicate effectively with the broader community of stakeholders.

## 3. Changes by Individuals and Organizations that Improve Safety Communication

Effective communication about the safety of waste management issues requires considerably greater effort, time and resources, than have traditionally been devoted to the task. It is one thing to commit to openness in the abstract. It is quite another for individuals and institutions to make the difficult changes and commit limited resources to make it a reality. There are many challenges to translating complex technical and policy issues into language that is accessible and understandable, such that a broader community of stakeholders may understand and participate meaningfully in an open decision making process. Many waste management professionals and organizations fail to apprehend the need for public understanding of and participation in decisions that they view as technical in nature. Many of the decisions concerning radioactive waste disposal, while certainly informed by technical information provided by experts, are, in fact, laden with choices of values. These include, for example, choices about "who or what should be protected?", "for how long?", and "at what expense?" Openness also implies that individuals and organizations are open to the potential for stakeholders' input to influence the decision-making process, and stakeholders want to know if and how their participation influences the ultimate decisions.

As waste management practitioners, we recognize that our communication roles are evolving. In particular, as dialogue and stakeholder involvement has assumed a more visible part of the waste management process, we, as scientists and engineers, are called upon to address new questions raised by the general public. Those who represent implementers are engaging in more frequent dialogue with the public. Regulators are becoming involved in the waste management process far earlier than before. Indeed, those of us who represent regulatory agencies frequently find ourselves in the role of "safety communicators" and "peoples' experts" and recognize the need to be involved in that role from the start of consultations with local communities, before final decisions on facilities, sites, and concepts are reached [8]. Across the board, we now know that that there needs to be greater clarity of roles for the institutional actors as well as greater visibility of those actors and their actions.

With greater visibility and interaction, however, comes greater exposure to potential criticism and public dissatisfaction with the effectiveness of that interaction. Implementers and regulators, in particular, have been frank in analyzing the discomfort of public rejection and are working to bring about major systemic changes to their organizations' interactions with stakeholders [5]. Making changes to organizational culture is admittedly slow and painful, but such change is underway. FSC has documented the experiences of many national programs and institutions that are learning and adapting to demands for better and broader communication about the safety and risk of radioactive waste management [9, 10].

In practice, improvements in safety communication result from changes made by individuals and organizations at both the interpersonal and at the strategic level.

At the interpersonal level, individuals representing waste management organizations are applying a variety of skills and tools to communicate in sensitive situations where people are worried about their health and safety and about the protection of their environment. To be effective, safety communicators are learning to

listen with empathy; translate technical information into terms that are both understandable and respectful; manage conflict; and work to build trust and credibility, in their actions as individuals and those of the agencies they represent. Ideally, since all employees have the potential to serve as ambassadors for their organization, waste management organizations should encourage every employee to cultivate these skills. Initially, however, when attempting to bring about agency-wide improvements in safety communication, many organizations find it useful to seek out the assistance of professionals in communication, facilitation, or conflict resolution.

At the strategic level, waste management organizations are committing to long-term planning and coordinated safety communication efforts; cultivating and nourishing strategic partnerships with stakeholders; formulating honest, consistent messages; and developing and continually refining appropriate organizational tools for both internal and external communication about safety. FSC has also compiled a short guide to the array of tools and techniques various radioactive waste management organizations are developing and applying to the challenges of enhancing stakeholder interaction [11].

## 4. Case study: Improving Communication in the U.S. about the Regulation of High-Level Waste Repository Safety

In the United States, the Nuclear Regulatory Commission (NRC) strives to serve the public interest as a reliable, objective, open, and efficient regulator. In that regard, NRC views nuclear regulation as the public's business, and has identified openness in its regulatory process as an explicit goal of the Agency [12]. In articulating this objective, NRC recognizes that it must inform the public about the regulatory process, and offer a reasonable opportunity for meaningful participation in that process. NRC long ago established mechanisms and procedures to afford the public access to major regulatory decisions. Over the past six years, the NRC has worked to enhance its public interactions and foster confidence in NRC's actions as an effective and independent regulator. NRC continues to make changes to provide the public with process and risk information that is clear and understandable.

In 1999, NRC proposed new regulations for the potential repository at Yucca Mountain, Nevada. These proposed regulations represented a significant change from prescriptive, generic criteria, developed in the late 1970s, to a more risk-informed rulemaking framework that incorporated insights about repository risks and performance that have emerged over the past twenty years. NRC technical staff held public meetings in Nevada, near the site of the potential repository, as well as in Las Vegas, to obtain public comments on the proposed criteria. I, along with my colleagues, other scientists, engineers, and attorneys, who had drafted the NRC's proposed regulations, went to Nevada to discuss the timing and technical content of NRC's proposal, to answer questions, and to invite the public to comment.

We were knowledgeable about the technical bases for the proposed requirements, and experienced with presenting complex technical and policy issues to scientific and technical audiences. We were not prepared, however, for the range and intensity of questions and comments from the audience. Many participants had questions about issues that were not directly applicable to the proposed regulations, but which reflected deep interest and concern. Over the course of the meetings, the questions and comments from the audience clearly showed that we had not succeeded in communicating the reasons behind, and safety of, NRC's proposed regulations. It was obvious that these meetings had not contributed to public confidence in us, the NRC staff, or in the Commission's proposal. Our observations were confirmed by written comments NRC received after the meetings. Our observations and the public feedback convinced us of the need to improve NRC's approach to future interactions and involvement with the public.

Reflecting on this experience, we sought specific ways NRC might improve. We wanted to design future interactions with the public that would better communicate NRC's primary mission of protecting public

health and safety and the environment. We also wanted to convey better NRC's duty and commitment to be open and receptive to people's input, and to act in ways that would enhance their confidence in the Agency. Eventually, NRC made many significant changes-- organizational changes, process changes, and, eventually, policy changes, all of which reflect, to greater or lesser degrees, NRC's commitment to improve stakeholder confidence. They also reflect a conscious change in our expectations of interactions with stakeholders. Our intent is to inform, not persuade, to improve common understanding of technical and policy issues and to foster a more meaningful dialogue.

At first, we made identified simple changes to our meeting preparation. These included identifying lessons learned in earlier meetings; allowing staff more time and resources to prepare for stakeholder interactions; assigning a project manager for each public meeting who is not also a speaker at the meeting; and providing expert coaching for all speakers in risk communication techniques. As scientists and engineers, we are effective when communicating with our colleagues. We are accustomed to interacting with other technically trained specialists who insist on precise and complex explanations of technical and policy issues. As a group, we are not, generally speaking, familiar with risk communication nor are we trained public affairs specialists. As a result, we often use technical jargon and acronyms our speech and in our presentations, rather than the more direct, plain language explanations the public seeks and has a right to expect. To address these communication challenges, NRC obtained expert training in risk communication, and we continue to increase the number of staff members that receive training before interacting with the public. We now review all of our presentations for clarity and plain language.

Next, we adapted our processes for interacting with stakeholders. In response to requests from the public, NRC extended the allotted time, to allow for broader public involvement, and to allow enough time for the public to understand and evaluate the technical information and policy implications. Besides showing that we heard the public's concern, and were able to grant the extension request, extending the time available for comment also allowed us more time to review transcripts of the earlier meetings. We were then able to catalogue the comments and questions brought up at the meeting, and later provide personalized answers to some specific questions we had not answered adequately, at the meetings.

Working with a trained facilitator, we restructured the format used for public meetings. For instance, formal presentations, if needed at all, are much shorter, and we intersperse them with multiple opportunities for questions and dialogue. We also use other formats, such as public round-table discussions, poster sessions, open houses, and displays at technical conferences, as the situation warrants. Whichever format we select, we make greater efforts, when scheduling interactions, to recognize that stakeholders interested in Yucca Mountain have multiple demands on their time, and attention. Many attendees at NRC's public meetings have complained of schedule conflicts with public meetings conducted by other organizations, such as the U.S. Department of Energy, State and local governments, as well as by multiple other review or oversight bodies.

To coordinate and carry out a more ambitious approach to public interaction, still more organizational changes were needed. We established a High-level Waste (HLW) public outreach team of technical and support professionals from various disciplines and offices within NRC, including members from NRC's Spent Fuel Project Office, NRC's Office of Public Affairs, and NRC's contractors at the Center for Nuclear Waste Regulatory Analyses. This team developed, and subsequently updated, a Communications Plan for NRC's HLW regulatory program. We have improved our coordination with other agency offices and divisions, and we represent the U.S. and NRC at international forums, such as FSC, on issues involving stakeholder interactions. Eventually, senior technical staff was assigned responsibility for HLW regulatory communications, and staff excellence in interacting with stakeholders about NRC's HLW regulatory program are consistently recognized and rewarded.

It is important to keep in mind that these improvements, as significant as they are, did not occur in isolation. As NRC's HLW regulatory program pursued greater effectiveness in engaging stakeholders, the NRC as a whole was coming to grips with the need to improve the quality of its interactions with stakeholders and to place greater importance on inspiring their confidence and trust.

Communications plans are now required for all major NRC program initiatives. In 2003, the Chairman of the NRC chartered a task force on external communications, and a report of its findings and recommendations were issued in a public report later that year [13]. Coincident with the release of this report, the Chairman announced his intent to appoint an agency Director of Communications who would report directly to the Chairman and provide policy and guidance for communications activities across the agency. The new Director assumed his position in 2004. Last year, NRC issued guidelines for agency staff for interacting with stakeholders [14] and, as a separate document, published the technical basis for the NRC's guidelines [15]. In 2005, NRC issued similar guidelines for improving internal risk communication [16]. All of these documents are available to the public. Also, in 2005, the Commission has directed NRC staff to publicize the results of research projects in understandable terms, particularly those results involving conservative bounding analyses, using plain language, and in a manner that fosters understanding of the context and limitations of NRC's research findings. In addition, the Commission also directed NRC staff to add a "For the Record" section to its Web site to provide NRC responses to inaccurate, misleading or false information in print, on television and radio, to provide the public with accurate and truthful information.

We have now applied this new approach at more than thirty public meetings. In response to specific public requests, NRC held workshops and meetings to explain NRC's licensing, inspection, and hearing processes. We have responded to requests from local government officials in Nevada to conduct meetings in local communities where residents can hear and ask questions about NRC's licensing and oversight role for the potential repository. Management and organizational commitment, intensive staff preparation, training and rehearsal by all speakers, and actively anticipating questions and discussing suitable answers in advance, have all helped to foster more constructive interactions with citizens in Nevada. Follow-up meetings on proposed NRC regulations, as well as information workshops, meetings, and displays on NRC's regulatory process, hearing process, and draft licensing guide, have generated many high-quality, constructive comments from a wide array of stakeholders. We have received positive feedback from meeting attendees and local government officials, and have been invited to conduct more meetings, from other communities within Nevada. In general, media coverage of NRC's actions with respect to Yucca Mountain has been more accurate and balanced. These are all positive signs that NRC's efforts to improve its communications with the public are on the right track and are making progress.

To support NRC's communications goals for its HLW program, we are continuing to develop communication tools that aid the technical staff in conveying key technical and related policy messages. We try to identify key scientific and regulatory concepts that need to be "translated" from technical language to plain language. Among the more important of these are the role of performance assessment modeling and NRC's identification of key technical issues for evaluating safety at Yucca Mountain. We continually prepare and update handouts, displays, and presentation materials to help NRC's stakeholders better understand NRC's policies, and the technical bases for its regulatory decisions. As we develop these materials, we examine them carefully to evaluate the following: Are stated messages expressed effectively? Are NRC's core messages of commitment to safety, independence, and fairness, consistently reinforced? And, do the materials provide a means for follow up and feedback?

To build on these improvements, NRC may face significant new challenges in the coming year. Next year, NRC may receive a license application from the Department of Energy for the proposed repository. U.S. law sets forth a three to four year time frame for the NRC to make its licensing decision. Balancing NRC's

commitments to openness and stakeholder confidence with demands on time and staff resources, as well as with the constraints imposed by NRC's hearing process, may well compel more changes beyond those discussed above.

## 5. Conclusions

In seeking to improve its communication about safety and increase stakeholder confidence in its regulatory programs, the U.S. NRC has made, and continues to make changes as an organization. At the same time, NRC is also encouraging and supporting its staff members to improve their individual interactions with stakeholders on behalf of the NRC. Many of these changes could be seen as small, common-sense improvements. Taken as a whole, however, these improvements reflect a changing vision and increased commitment to discharge our regulatory responsibilities through a more inclusive regulatory process. By engaging the public earlier, listening to individual issues and concerns, and providing understandable and honest responses, we are earnestly working to make NRC's regulation of nuclear waste understandable and worthy of the public's trust. Many of the examples of NRC's experience that I have discussed here are mirrored in other national waste management programs. They serve as indicators of an evolving international concern for enhancing the quality of safety information available to stakeholders. The U.S. welcomes the opportunity to learn from the many waste management organizations and regulatory bodies represented at this conference, as we work together in pursuit of this common objective.

***NOTE:*** *The views expressed herein are those of the author and do not reflect any judgment or determination by NRC on matters addressed or the acceptability of a license application for a geologic repository at Yucca Mountain.*

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