

The NWMO Study and Process of Collaborative Development

Jo-Ann Facella
Nuclear Waste Management Organization
49 Jackes Avenue, First Floor
Toronto, Ontario M4T 1E2
CANADA
jfacella@nwmo.ca

1. Introduction

The Nuclear Waste Management Organization (NWMO) was tasked, through federal legislation enacted in November 2002, to conduct a study of long term approaches for the management of used (spent) nuclear fuel and recommend a preferred approach to the Government of Canada. The *Nuclear Fuel Waste Act* requires the NWMO to study at least three approaches, one for each of deep geological disposal in the Canadian Shield, storage at nuclear reactor sites, and centralized storage either above or below ground. It also requires that within three years the NWMO make a recommendation to government on a preferred approach for Canada.

One of these approaches – that of deep geological disposal in the Canadian Shield – was the subject of an extensive environmental assessment through much of the 1990s. This assessment [1] concluded that, on balance the concept of deep geological disposal had been adequately demonstrated from a technical perspective, but the same was not true from a social perspective. The environmental assessment panel indicated there was no evidence of broad public support for the concept and that it lacked the required level of public acceptability to be adopted. The lesson taken from this assessment was that to choose the right technical solution, we must first ask what requirements the technology has to live up to. We need to know what social values citizens want to protect.

The NWMO delivered its recommendation to the Government of Canada in November, 2005. Once the Government decides upon a long-term management approach for Canada, the NWMO will become the implementing organization.

2. The Study Process

The NWMO took as its mission “to develop collaboratively with Canadians a management approach for the long-term care of Canada’s used nuclear fuel that is socially acceptable, technically sound, environmentally responsible and economically feasible.”

The NWMO began with the perspective that technical and scientific specialists can help in understanding the technical adequacy of the management approaches available to Canada. They can also help in understanding the impacts any approach may have on the environment, and whether the approach is affordable (economically feasible). However, scientific and technical evidence and analysis, while essential, could not be the sole basis of the choice of management approach and the NWMO's recommendation to government. The views of Canadian society in judging benefits or risks, and assessing the social implications of various approaches for long-term management, were identified early in the study process as critical to the development of a socially acceptable recommendation. For this reason, the study process was designed to ensure that not only the best scientific and technical knowledge was brought to the study, but also the values and objectives of citizens were identified and understood, and formed the road map for both the study and recommendation.

The study process was designed to ask Canadians for the list of values and objectives against which a management approach should be assessed, and then engage Canadians in a dialogue to assess the approaches against that list. Citizens were asked to provide direction on:

- The questions which ought to be asked and answered in the study, and the key issues to be addressed in the assessment of the management approaches;
- The range of technical methods which ought to be considered in the NWMO study;
- The risks, costs and benefits of each management approach; and
- Design of the overarching management structure and implementation plans.

The NWMO designed its process to be transparent and inclusive of a broad diversity of voices. In so doing the NWMO set out to ensure that a broad range of social and ethical considerations were raised and factored into decision-making at key decision-points in the study.

The study was designed as a dialogue conducted iteratively over four phases. Each of these phases was centred around a key decision in the evolution of the study and iterative development of the preferred approach. The four phases were supported by a series of public discussion documents [2] [3] [4] [5] designed to: share what the NWMO had heard from Canadians to date; describe how the NWMO was incorporating that direction in the conduct of the study phase; and, solicit input to shape and direct subsequent steps in the study. The NWMO attempted to act as a facilitator in this dialogue, rather than a proponent, particularly in the early stages of the study. Table 1 provides an overview of the four phases of the study and the focus of dialogue for each phase.

TABLE 1 – Overview of the Study Process

<p>Phase 1: “Conversations About Expectations”</p>	<p>Study began by listening to Canadians’ expectations and objectives for the study. Questions for dialogue included: How should the study be conducted? What questions should be asked and answered? Which options should be included and investigated?</p>
<p>Phase 2: “Exploring the Fundamental Issues”</p>	<p>Second phase was launched with release of NWMO’s first discussion document, <i>Asking the Right Questions?</i> Dialogue questions included: Has the problem been described correctly? Have appropriate ways to deal with the problem been identified? Are the right questions being asked? Is the proposed decision-making process understandable and appropriate?</p>
<p>Phase 3: “Evaluating Management Approaches”</p>	<p>Third phase was launched with the release of NWMO’s second discussion document, <i>Understanding the Choices</i>. Dialogue questions included: Is the proposed assessment framework sufficiently comprehensive and balanced - does it reflect the values and objectives of Canadians? What are the relative strengths and limitations of each of the approaches? Are there specific elements that should be built into an implementation plan?</p>
<p>Phase 4: “Finalizing the Study Report”</p>	<p>Final phase was launched with release of the <i>Draft Study Report</i>. Focus was on receiving comment, suggestions and concerns about the NWMO’s proposed recommendation prior to completion of the Final Study report.</p>

In order to elicit the range of social and ethical considerations which citizens bring to bear on the issue, the NWMO used a broad range of engagement and dialogue initiatives including: background papers prepared by a wide variety of specialists,; nation-wide surveys, focus groups, issue-focused workshops and roundtables, e-dialogues, open houses and public information and discussion sessions.

Some of these techniques were used to hear from a statistically representative cross-section of citizens, including those who would not otherwise involve themselves in the study. Some were used to elicit the concerns of those directly interested in the issue. Some were used for more in-depth conversation among those with a specialized interest. Throughout, a website served as a platform, not only for making publicly available reports commissioned by the NWMO, but also to share what was said and inviting comment from Canadians on any of these topics. Each dialogue initiative was conducted, and reported on, by third parties in order to ensure the accuracy and transparency of the reporting.

3. Selected Dialogue Initiatives

Individual dialogue initiatives were, for the most part, designed to bring together people from a diversity of perspectives to work through issues, create shared meaning, and identify common ground. Participants in these initiatives (and interested Canadians more broadly) were encouraged to examine their own

thinking and learn through talking with each other, and listening to and understanding perspectives which are different from their own. Dialogue initiatives were designed to identify areas of common ground among diverse perspectives while identifying and acknowledging differences from which an integrated view could emerge. From the many dialogue initiatives undertaken by the NWMO, two are briefly described in the discussion which follows as illustrative of elements of the broader dialogue process.

3.1 Citizens' Dialogue on Values

Among the NWMO's early dialogue initiatives was a citizens' dialogue on values [6]. As part of the larger iterative dialogue process, this initiative was used to help ensure, as much as possible, that the study was grounded in the values of Canadian society. As an early initiative, this deliberative dialogue helped set the tone for subsequent initiatives and the dialogue process as a whole.

The Citizens' Dialogue on Values initiative was designed and implemented by the Canadian Policy Research Networks (CPRN), a not-for-profit policy think-tank with a reputation for using public dialogue as a means to involve citizens more directly in discussion of important public policy issues facing Canada. Over the course of this initiative, 462 Canadians gathered in 12 cities across the country between January and March 2004 for day-long deliberative dialogue sessions. Participants were randomly selected to be representative of the Canadian population and came to the sessions as unaffiliated individuals, rather than as representatives of stakeholder or special-interest groups.

Several key challenges not often encountered in other public policy issues needed to be addressed in the design of the initiative. First is the fact that few citizens, outside of experts, are familiar with issues related to nuclear energy and nuclear waste and the technical complexity of the issue can be overwhelming. A second challenge is the very long-term nature of the hazard posed by used nuclear fuel, and the difficulty many citizens have in conceiving of the possible impacts of decisions made today into the far future. For these reasons, the dialogue was designed to focus on the core questions that citizens are best placed to answer: What responsibilities do we have to future generations? How should society deal with uncertainty? The dialogue was designed to give participants enough information to understand the broad issues at play for society, examine different values-based perspectives and deliberate with each other about what is most important with respect to the long-term management of used nuclear fuel.

Consistent with the CPRN methodology, an adaptation of the ChoiceWork Dialogue methodology developed by Viewpoint Learning, dialogue participants were supported by a workbook that provided key factual information and describes different perspectives on the issue to be discussed. In the creation of the workbook, and other materials, a balance needed to be struck between providing sufficient information to enable participants to understand the broad context

needed for an informed discussion and overwhelming participants with too much detail or specific technical information.

Dialogue participants were presented with four perspectives, each representing a plausible view that could be held by a segment of society. An effort was made to describe the perspectives in as factual and objective a way as possible and use language that would resonate with participants. Arguments were offered in favour and against each perspective, reflecting different values people may hold dear. Through discussion in self-directed small group setting, or in facilitated plenary, participants could choose or reject elements from the different perspectives, or identify their own new ideas. In looking at the advantages and disadvantages presented with each perspective, and in thinking through the issues as a group, participants were encouraged to explore what was really important to them.

From this dialogue initiative emerged a set of values which citizens appear to bring to bear on the long-term management of used nuclear fuel. This set of values became a foundation element of the framework used in subsequent phases of the study to assess the management approaches. These values were elaborated upon, and ultimately confirmed, through further dialogue initiatives which included: discussion sessions conducted across the country with the interested public; public attitude research conducted with a random sample of the public; and national and regional stakeholder dialogues. The study's dialogue on values also included collaborative work with aboriginal peoples to understand their views, perspectives and insights, and a Roundtable on Ethics to help articulate the fundamental ethical issues to be considered. The application of these values to the assessment of the management approaches was also the subject of extensive dialogue later in the study.

3.2 Envisioning Future Scenarios

Given the very long time frames over which used nuclear fuel remains hazardous to people and the environment, decisions made today will necessarily have repercussions for generations to come which ought to be considered. This was the starting premise for a major scenarios exercise, a second early initiative in the NWMO's study process. Through this initiative, a broad range of perspectives on how the future might unfold were identified and explored. Conditions that would influence today's decision about the choice and design of a management approach for used nuclear fuel were identified through the process, which were then captured in the form of questions to be asked of the management approaches under study.

The design of the scenarios exercise [7] reflects a method which has been developed and tested over several decades and which incorporates the experience of Royal Dutch/Shell and Stanford Research Institute (SRI) International. In partnership with Global Business Networks (GBN), the NWMO convened a Scenarios Team consisting of 26 individuals drawn from a broad range of interests and locations across Canada. Selection of the team followed an iterative process of (1) identifying communities of interest important to the NWMO's work; (2)

seeking advice from within each community of interest as to who might be both interested in contributing and available to give the required time commitment; (3) following leads to potential members and inviting participation, keeping in mind geographic, gender, and age distribution.

Four workshops, each several days in duration, were held over a six month period with work continuing between sessions. Using the insight of the diverse team of individuals, a range of ‘plausible’ futures was developed. The Team’s deliberations began with a brainstorming of the key factors and drivers that influence the nature of used nuclear fuel and the conditions in which it might be managed. To span the kind of time frame needed, the group explored four time horizons: 25 years (1 generation) into the future, 175 years (7 generations) into the future; 500 years (20 generations) into the future and 10,000 years (400 generations) into the future. After reviewing the dozens of factors and drivers, two sets were identified as those most important and uncertain, which eventually came to form the axes of a matrix within which different futures were developed. One of these sets related to the “magnitude of the challenge” presented by the used nuclear fuel issue. The second set related to the social, economic, and environmental “well-being of society”.

At the end of the exercise, the group had described four detailed scenarios for the 25 year time-frame, 12 much less detailed scenarios for the 175-year time-frame, 16 conditions or “end-points” for the 500 year time frame, and a number of simple “what-ifs” for the 10,000-year time-frame.

The scenarios exercise brought together individuals with very different, and in some cases competing interests, to collaboratively develop a path forward on an issue of high uncertainty – the vision of the future which should be considered in the assessment of the approaches. Through the scenario methodology, very diverse perspectives were integrated into a range of futures which could direct the assessment of the management approaches in the study. The questions which emerged from the exercise influenced the set of objectives and influence diagrams later used in the assessment of the approaches. A subset of the scenarios was also later used in the assessment process as part of a sensitivity analysis.

4. The Common Ground

Over the course of the NWMO’s dialogue with Canadians much common ground emerged. This common ground includes a set of values and ethical principles. It also includes a set of objectives, which also emerged from the dialogue process, as those which are important to assessing the appropriateness of any approach for used fuel management in Canada. This common ground, outlined in Table 2, served as the preliminary framework for the assessment of the management approaches under study. Through subsequent phases of work, this high level

framework was further developed and then again confirmed through dialogue.

Importantly, the common ground which emerged from the study extended beyond the technical options to be implemented to include the *way* in which to a management approach is implemented. More specifically, much agreement was expressed concerning the principles and expectations for how decisions are taken, how citizens are involved, and how any management approach is implemented and monitored over time. Continuous learning, flexibility, phased implementation, the ability to monitor and retrieve the waste and the ongoing involvement of citizens in decision-making emerged as essential design elements of an “appropriate” implementation plan.

Table 2 - Points of Common Ground: Assessment Framework

<i>Citizen values which should inform selection of preferred approach:</i> Safety from harm; Responsibility to ourselves and future generations; Adaptability to respond to new knowledge; Stewardship in use of all resources; Accountability and Transparency to rebuild trust; Knowledge to inform citizens and support decision-making; Inclusion through broad engagement and many perspectives.
<i>Ethical principles:</i> Respect for Life in all its forms; Respect for People and Cultures; Respect for Future Generations; Justice across groups, regions and generations; Fairness to everyone affected and particularly to minorities and marginalized groups; Sensitivity to the differences in values and interpretation that different individuals and groups bring to the dialogue.
<i>Objectives:</i> Public Health and Safety; Fairness in the distribution of costs, benefits, risks and responsibilities within this generation and across generations; Worker Health and Safety; Community Well-Being, including all communities with a shared interest; Security of facilities, materials and infrastructure; Environmental Integrity; Economic Viability of the waste management system; Adaptability to changing knowledge and conditions over time.

5. Adaptive Phased Management

The NWMO developed the Adaptive Phased Management approach as, its preferred approach, in response to the direction it heard from the dialogue process. Adaptive Phased Management consists of both a technical method and a management system. The key attributes of the approach include:

- Ultimate centralized containment and isolation of used nuclear fuel in an appropriate geological formation;
- Phased and adaptive decision-making, with explicit decision points to incorporate new social learning and technological innovation;
- Optional shallow storage at the central site as a contingency;
- Continuous monitoring;
- Provision for retrievability;
- Citizen engagement throughout all phases of implementation; and

- A future society will decide whether and when to seal and backfill the repository.

The NWMO believes that a management approach which incorporates the most significant advantages of each of the three approaches studied, supported by a phased decision-making process designed to actively and collaboratively manage risk and uncertainties, better meets the values and objectives of citizens than any of the three approaches taken individually.

The NWMO believes that the evidence of common ground that has emerged from the dialogue provides the foundation for the Adaptive Phased Management approach to be taken. Adaptive Phased Management tries to find an optimal balance of what are at times competing societal objectives. It is responsible, in that it brings to bear the knowledge, expertise and wisdom of a wide variety of specialist communities to help understand the options. It is also responsive to what we understand to be the values and expectations of Canadians in providing safe and secure isolation of used nuclear fuel for the very long term.

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