

Final Report

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# Dialogue: National Stakeholders and Regional Dialogue Sessions

Hardy Stevenson and Associates Limited (HSAL)

## Discussion Document 2: Understanding the Choices

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The NWMO has committed to using a variety of methods to dialogue with Canadians in order to ensure that the study of nuclear waste management approaches reflects the values, concerns and expectations of Canadians at each step along the way.

A number of dialogue activities have been planned to learn from Canadians whether the elements they expect to be addressed in the study have been appropriately reflected and considered in Discussion Document 2. Reports on these activities will be posted on the NWMO website. Your comment is invited and appreciated.

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NUCLEAR WASTE MANAGEMENT ORGANIZATION SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

**HARDY STEVENSON AND ASSOCIATES FINAL REPORT  
FEBRUARY 2005**

# Dialogue

**National Stakeholders and  
Regional Dialogue Sessions**

**Regarding NWMO – Discussion Document #2  
*Understanding the Choices: The Future Management  
of Canada's Used Nuclear Fuel***

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**Nuclear Waste Management Organization  
National Stakeholder and Regional Dialogues**

**The Future Management of Canada's Used Nuclear Fuel**

**Discussion Document #2 – Understanding the Choices**

**Hardy Stevenson and Associates Limited (HSAL)**  
**Final Report on the Dialogues**

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**Executive Summary**

The National Stakeholder and Regional Dialogue Report summarizes the results of four Dialogue Sessions with participants representing a variety of interests in Canada's work on the long-term management of used nuclear fuel and in public policy matters. The National Dialogue Session was held in Toronto and the Regional Sessions were held in Ontario (Mississauga), Quebec (Montreal) and New Brunswick (Fredericton). Participants commented on the Assessment Framework, and provided their opinions about the strengths and limitations of the management approaches. They also provided advice to the Nuclear Waste Management Organization (NWMO) on implementation considerations.

Participants were generally supportive of a Deep Geological Disposal concept, or variations of this management approach. They understood the need to think about a staged, adaptable and flexible management approach, however participants were very supportive of making a firm decision about a management approach and moving forward.

They pointed to the impending need to make long-term decisions about used nuclear fuel management. Over the next generation, there may or may not be a renewal of nuclear power production. With no renewal, Canada may lose skilled expertise, resources, and funding for the long-term management of used nuclear fuel.

Ongoing positive relations with Aboriginal peoples will be an important part of the implementation process. The NWMO was seen to be doing a credible job in engaging youth and Aboriginal representatives but more work is still needed. Communications and public engagement will need to continue over the long term.

## 1.0 Introduction

In 2002 the Government of Canada passed the *Nuclear Fuel Waste Act*. This Act required owners of used nuclear fuel to create an organization to study the options and recommend an approach for the long-term management of used nuclear fuel. As a result, the Nuclear Waste Management Organization (NWMO) was created. In fulfilling its mandate, the NWMO is committed 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.” To achieve this, it is conducting a comprehensive three year study (from 2002 to 2005) aimed at engaging Canadians in an open and transparent dialogue, in an effort to bring the most inclusive and socially reflective recommendations to the Government of Canada on approaches for the ongoing management of used nuclear fuel.

In November 2003 the NWMO launched its first Discussion Document, *Asking the Right Questions?* This document asked Canadians whether or not the NWMO was effectively capturing the key questions which should be asked and answered in the study of potential methods of long-term management of used nuclear fuel. Following the introduction of the first Discussion Document “*Asking the Right Questions?*” and the 10 key questions that reflected the concerns, priorities and values of Canadians, the NWMO continued to build on the analytical framework through a series of research activities, and solicited comment with the public and industry experts through a variety of means, including web-based submissions, public opinion and face-to-face dialogue. Through the information gathering process and analysis of these conversations the NWMO confirmed that the organization’s comparative analysis would continue to focus on three of the initial 14 potential methods for managing used nuclear fuel. These three options include:

- Storage at nuclear reactor sites;
- Centralized storage, above or below ground;
- Deep geological disposal in the Canadian Shield.

*Understanding the Choices: The Future Management of Canada’s Used Nuclear Fuel* is the NWMO’s second Discussion Document and an important step in the iterative approach to engaging Canadians in the Study to recommend an approach towards the long-term management of used nuclear fuel. While *Asking the Right Questions?* invited Canadians to focus on the complex issues involved in comprehending the various approaches to long-term management of used nuclear fuel and helped to frame the questions that would be answered in the Study, *Understanding the Choices*, released in September 2004, describes the three management approaches under study, reports on the direction the NWMO has received from citizens and its research activities, presents an assessment framework and preliminary assessment for discussion and identifies how the NWMO will move forward to achieve the next phase of its study

*Understanding the Choices* also established an Assessment Framework based on citizen values and ethical considerations and eight objectives developed by the NWMO Assessment Team as reported in June 2004 in “*Assessing the Options: Future Management of Used Nuclear Fuel in Canada.*” According to the NWMO, the Assessment Team, an independent, multi-disciplinary team of policy experts, was assembled in early 2004 in order to: “1) translate the 10 questions presented in the first discussion document into an assessment framework, taking into account the public and expert comment on those questions; and 2) conduct a preliminary assessment of alternative approaches.”<sup>1</sup> The Assessment Team was charged with conducting a holistic assessment, integrating social and ethical dimensions with technical, economic, financial and environmental considerations.

<sup>1</sup> NWMO Discussion Document 2: *Understanding the Choices*, page 6

The Assessment Framework has eight specific objectives that guide the NWMO's work in identifying a preferred approach to the management of used nuclear fuel. In this regard, the Assessment Framework assisted in providing an understanding of what would be the most socially responsible course of action. The objectives are:

- **Fairness** – There must be fairness, in substance and process, in the distribution of costs, benefits, risks and responsibilities now and in the future.
- **Public Health and Safety** – Implementation of the preferred management approach must ensure there is no public health threat involved in the management or transportation of hazardous materials.
- **Worker Health and Safety** – While all work-related tasks associated with managing used nuclear fuel can be hazardous, the chosen approach should not create undue or large risks to those employed in implementing the recommended approach.
- **Community Well-Being** – Consideration of the implications and concerns of those communities with an interest in the preferred approach, including the host community, those in the surrounding region, those in the transportation corridor, and those which feel they are affected. This includes considerations of economic, environmental, social and cultural concerns.
- **Security** – The security of facilities, materials and infrastructure must be maintained.
- **Environmental Integrity** – Environmental integrity must be maintained on a long-term basis.
- **Economic Viability** – The implemented management approach must be economically viable, as well as contributing positively to the local economy.
- **Adaptability** – The preferred approach must be adaptable to changing knowledge and conditions over time, including being modified to fit new or unforeseen circumstances.

In order to complete the next phase of its study, the NWMO invited Canadians to contribute their opinions and views on the content of *Understanding the Choices*, asking specifically:

- Is the assessment framework comprehensive and balanced? Are there gaps, and if so, what do we need to add?
- What are your thoughts on the strengths and weaknesses of each of the three management approaches?
- Are there specific elements that you feel must be built into an implementation plan? What are your thoughts on what a phased approach must include?

As part of this process, the NWMO held a National Stakeholder Dialogue for organizations with an active interest in the management of used nuclear fuel and public policy issues, as well as Regional Dialogues for each of the three provincial jurisdictions currently using nuclear power – Ontario, Quebec and New Brunswick. These dialogues are the subject of this report.

## 2.0 National Stakeholder and Regional Dialogue Process

The National Stakeholder and Regional dialogue sessions offered those organizations and individuals with an interest in public policy issues and in the long-term management of used nuclear fuel the opportunity to contribute their views on NWMO Discussion Document #2 *Understanding the Choices*.

Through the dialogue sessions, participants were given the opportunity to:

- Learn about NWMO’s milestones to date;
- Obtain a better understanding of the three management approaches;
- Learn about the Assessment Framework and the “Multi-Attribute Utility Analysis” method;
- Directly experience the assessment methodology using the Multi-Attribute Utility Analysis as a decision aid using the objective of “fairness” as an illustration at the National Stakeholder Dialogue session, and the objectives of “community well-being” or “environmental integrity” as an illustration at the Regional Dialogue sessions;
- Discuss the advantages and limitations of each management approach;
- Discuss elements of implementation.

## 2.1 How was it Determined Whom to Invite?

In its initial National Stakeholder and Regional Dialogues corresponding to Discussion Document #1, the NWMO identified and recruited a number of individuals and organizations with a record of interest in long-term management of used nuclear fuel, and those with an interest in public policy issues. Drawn from a variety of sources, participants were also considered on the basis of several considerations, established to ensure participation by representatives of a wide cross-section of societal interests, and to ensure a fair and balanced geographical representation in the case of the National session.

Based on these factors, 11 categories of interest were established with the aim of recruiting a balanced cross section of participants. These categories include:

Local and municipal government	Professional Services
Education/Academic	Labour
Environment	Youth
Health	Emergency Preparedness
Social/Cultural and Faith Perspectives	Consumer
Industry/Economic	



## 2.2 Who were the Participants?

Hardy Stevenson and Associates Limited (HSAL) were asked to assist with organizing and facilitating the Dialogue Sessions. Based on participation in the previous National Stakeholder and Regional Dialogue sessions, the firm approached and attempted to engage the same set of participants for the sessions corresponding to Discussion Document #2, *Understanding the Choices*. Participants were contacted by telephone and by e-mail. In cases in which the original participants were unable to attend, HSAL identified other qualified representatives from the same organization or from the same category of interest in an attempt to recruit them for the dialogue process.

For complete lists of dialogue participants, refer to 5.0 List of Dialogue Participants.

## 2.3 The Dialogue Process

Participants in each of the dialogue sessions were provided with a variety of background materials prior to the sessions. These materials included Discussion Document #2 – *Understanding the Choices* (to be used as the foundation for the dialogue), a copy of the session agenda, and a copy of Discussion Document #1 – *Asking the Right Questions?* At the dialogue session each participant was also given the NWMO National and Regional Dialogue Workbook, which was designed to facilitate discussion and exercise sessions, and included NWMO fact sheets on each of the three management approaches.

Each dialogue session took place over two consecutive days. For dates and times of each session, refer to individual session summaries contained within this report. In each session, dialogue was divided into specific segments, with agenda that included:

- A review of the purposes of each session.
- A review of the session agenda.
- An overview presentation of NWMO’s milestones and the management approaches.
- A presentation outlining the Assessment Framework methodology.
- Instructions for the exercises. These included an individual task; a small group discussion; and a large group sharing exercise.
- A discussion of the advantages and disadvantages of the targeted approaches, and a review of the dialogue so far.
- A discussion of the considerations for the implementation of the management approaches.

Participants were also provided with Principles for Participation. The principles were designed to facilitate the most open, fair and inclusive solicitation of information as possible. These included:

- An understanding that the process is not seeking consensus.
- Allowing that thoughts be offered in either French or English at the National, New Brunswick, Ontario and Quebec sessions (all materials were available in both French and English, and simultaneous translation was available to participants during the Quebec session).
- An understanding that comments will not be attributed when preparing notes on the workshops.

## 2.4 Dialogue Content

Each dialogue session included the following exercises:

- Fairness exercise/community well-being/environmental integrity exercise (*Note: fairness was used as a focus of dialogue at the National Stakeholder session; community well-being was used as a focus of dialogue at the New Brunswick and Ontario Regional sessions; and environmental integrity was used as the focus of dialogue at the Quebec Regional session. The process of each exercise remained the same, but with a different Assessment objective*).
- Advantages and limitations of each management approach.
- Implementation considerations for each management approach.

## **Fairness/Community Well-Being/Environmental Integrity Exercise**

The intent of these exercises was to have participants conduct one of the steps in the multi-attribute utility analysis to understand the scoring process in analyzing the individual objectives. Using the Colour Scale exercise participants assessed the extent to which, from the participant's point of view, each of the three management approaches, deep geological disposal in the Canadian Shield, centralized storage above or below ground and storage at nuclear reactor sites meet the expectations of fairness, community well-being or environmental integrity. The approaches were then discussed on the basis of all eight objectives.

### *Fairness*

The Assessment Team defined "fairness" as described below, and devised a list of numerous "influences" that contribute to fairness. According to the idea of fairness, "the selected approach, among other things, should produce a fair sharing of costs, benefits, risks and responsibilities now and in the future that is regarded as being as fair as possible. The management system and technologies used should ensure that the persons and communities likely to be most directly affected by any activities or consequences of the management of the used nuclear fuel have the opportunity to participate in decisions in advance of the construction or establishment of the waste repository; that characteristics of the distribution of short-term and long-term health, environmental, or economic costs and obligations are understood and accepted at the time of decision; and that adequate attention is given, as far as is possible by the current generation, to intra-generational, inter-generational and inter-species aspects of the system selected.

In its assessment of fairness, the Assessment Team considered issues of both substantive and procedural fairness. Substantive fairness includes consideration of how the costs and benefits associated with the approach would be distributed across various people and between humans and other species. It also includes consideration of inter-generational fairness. A key question for inter-generational fairness is the balance struck between the desires that the current generation take responsibility for resolving the problem once-and-for-all versus the desire not to overly constrain future generations by the choices we make today.

Procedural fairness is mainly a function of the degree to which the approach would allow for the participation of concerned citizens in key decisions about how the approach would be implemented. This, in turn, depends in part on the opportunities for decision-making provided by the approach and the availability of information that would be helpful for driving those decisions."<sup>2</sup> Participants in the National Stakeholder Dialogue session used the colour scale exercise explained below to assess the extent to which each of the three management approaches; deep geological disposal in the Canadian Shield, storage at nuclear reactor sites and centralized storage above or below ground, promotes the objective of fairness.

### *Community Well-being*

The notion of Community Well-being was defined by the Assessment Team as described below and consists of numerous "influences" related to each other.

According to the idea of community well-being, the management approach "that is selected and the way it is implemented will determine the specific communities that are impacted and the nature of those impacts. For example, towns near the facilities required by the approach may be affected economically through impacts on jobs and property values. Differing attitudes within a community can lead to polarization that can severely degrade the social fabric. Nearby communities are not the only ones, however, that may be implicated. Many groups may feel that their shared interests are affected regardless of whether they live physically close to used nuclear fuel management facilities. Depending on the sites that are eventually proposed for consideration, Canada's Aboriginal peoples may have a particularly significant stake.

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<sup>2</sup> NWMO Discussion Document 2: *Understanding the Choices*, page 56

The organizational system and the technologies selected for management of used nuclear fuel should be such that the nearby communities and all those in the region that could be involved in, or affected by, the construction, filling, maintenance or monitoring of the used nuclear fuel management facility, or by the transportation, manufacture of containers or other related industrial activities, will not be adversely affected through chemical contamination or other environmental disruption. Instead, they will benefit as much as possible from the economic activity; and at the same time not be handicapped socially or culturally by virtue of being host to the used nuclear fuel which other parts of the country do not want. Implications for the well-being of all communities with a shared interest are to be considered in the selection and implementation of the management system and related infrastructure.”<sup>3</sup> Participants in the New Brunswick and Ontario Regional Dialogue sessions used the Colour Scale exercise explained below to assess the extent to which each of the three management approaches promotes the objective of community well-being.

*Colour Scale*

The following colour scale was used to allow participants to assess each of the management approaches with regard to the objective of fairness or community well-being. They were asked to colour each contributing element or “influence” to reflect their assessment of the particular management approach. For both fairness and community well-being they were also asked to assign an overall rating to each management approach. The colour scale was based on the following determinants:

Green	GOOD. Not a significant issue or problem; essentially no impact or effect; about as good as could be expected; in the top one per cent of possibilities.
Blue	PRETTY GOOD. A small or minimal issue; very low impact or effect; the factor cannot or ought not to be ignored, but it is not as important as it is in other contexts or alternatives; it is at the more favourable (25 per cent) range of possibilities.
Yellow	MIDDLE. A moderate or moderately important issue; the factor represents a magnitude or level of importance in the middle (50 per cent) of possibilities; although it may be of a magnitude to raise concerns, the factor is a bigger or more important concern in other alternatives or contexts.
Orange	POOR. A relatively high or adverse magnitude; within the higher, more adverse (75 per cent) range of possibilities, but not necessarily extreme or unacceptable in and of itself.
Red	VERY POOR. Very high or among the most extreme (top 99 per cent) of possibilities or alternatives. Deserving of significant attention. Depending on related or interacting considerations, possibly unacceptable.
	Information insufficient for assessment or for differentiating the alternatives; or, not formally assessed.

For each management approach, participants were encouraged to discuss whether or not their overall ratings of fairness or community well-being were the same or different, and for what reasons. They were also asked to discuss whether or not their views about the contributing elements to fairness or community

<sup>3</sup> NWMO Discussion Document 2: *Understanding the Choices*,” page 62

well-being were the same or different, and for what reasons. Finally, they were asked to consider which influences and relationships should be added or changed and why.

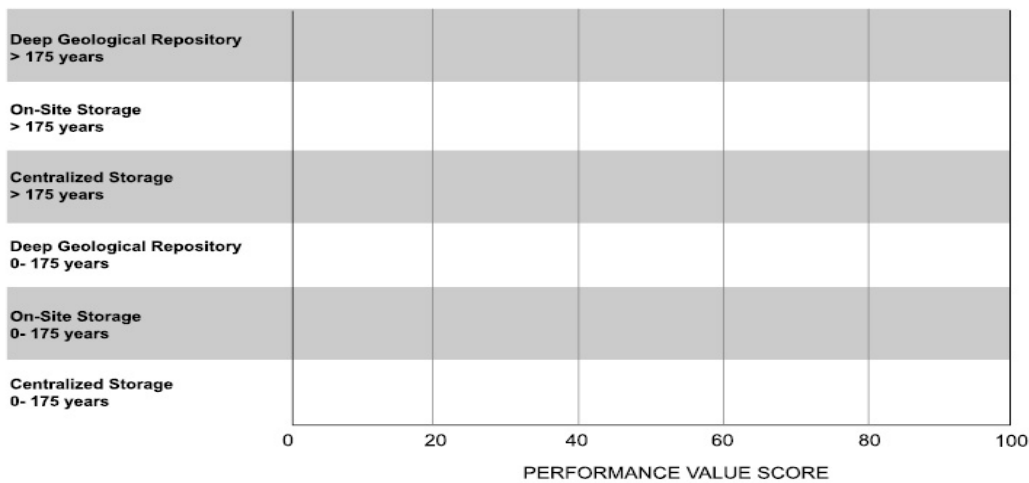
*Environmental Integrity*

The intent of this exercise was to score how well the deep geological disposal in the Canadian Shield, centralized storage above or below ground and storage at nuclear reactor sites management approaches perform with respect to the objective of achieving “Environmental Integrity.”

According to the idea of environmental integrity," the selected management approach needs to ensure that environmental integrity over the long-term is maintained. Concerns include the possibility of localized or widespread damage to the ecosystem or alteration of environmental characteristics resulting from chronic or unexpected release of radioactive or non-radioactive contaminants. Concerns also include stresses and damage associated with new infrastructure (such as roads and facilities) and operations (e.g. transportation). The management system should be designed and technologies selected such that the physical, chemical and biological stresses on the environment imposed by the used nuclear fuel management facility, including cumulative effects, changes over long time periods, and the potential consequences of failure of any part of the containment system, are within the natural capacity of the environmental processes to accept and adjust, thus ensuring the long-term integrity of the environment.” The various components of environmental integrity are summarized in the numerous “influences.”<sup>4</sup>

Participants in the Quebec Regional Dialogue session used the Environmental Integrity Performance Value Score Graph (see Figure 1: Environmental Integrity Performance Value Score Graph) explained below to assess how each of the three management approaches would perform with respect to the objective of achieving environmental Integrity. Participants were instructed to assign a score to each management approach for two time frames (zero to 175 years, and greater than 175 years) with respect to the environmental integrity objective. They were instructed to assign a quantitative score to the objective.

Figure 1



**Environmental Integrity Performance Value Score Graph**

<sup>4</sup> NWMO Discussion Document 2: “Understanding the Choices,” page 67

The following scale was used to assist participants in determining a quantitative score. If a management approach scores poorly against the objective of environmental integrity it would be given a score in the lower range of the scale. Conversely, if a management approach scores highly against the objective it would be given a score on the upper range of the scale. The Graph uses a scale from 0 to 100.

0	EXTREMELY POOR. An extremely poor, unacceptable level of performance on the objective
20	POOR. A poor level of performance on the objective of environmental integrity. The management approach should be scored at a lower level of performance.
40	MODERATE PERFORMANCE. The management approach is sub-optimal in terms of environmental integrity, but more in the middle range. The environmental effects may still be of a magnitude to raise concerns.
60	Good. While the objective of environmental integrity is achieved there may still be some concerns. More influences that are positive than unacceptable.
80	VERY GOOD. Very good performance with respect to the objective of environmental integrity. Few negative environmental consequences are expected.
100	IDEAL PERFORMANCE. An ideal performance with respect to the objective, where no adverse environmental consequences would occur.

Participants discussed their individual scores and the group range of scores in terms of whether environmental integrity was the same or different for each management approach, and for what reasons. They were also asked to consider which approach would perform better in each time frame and why. They then discussed what influences on the objective of environmental integrity contributed to acceptable or unacceptable performance between the management approaches. Finally, they were asked to discuss which influences and relationships should be added or changed and why.

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### **The Advantages and Limitations of the Management Approaches: Social Responsibility**

Participants were then encouraged to focus on the overarching question of “what is the most socially responsible, most appropriate management approach for Canada?” They were invited to share their views about the advantages and limitations of each management approach with other participants, the meaning of those advantages and limitations, and an in-depth discussion of those advantages and limitations.

Following small group discussions of the advantages and limitations of each management approach, participants were led through a structured sharing with the large group, and were reminded of the eight objectives included in the Assessment Framework. They were charged with discussing:

- What are the advantages of each management approach? For what reasons?
- What are the limitations of each management approach? For what reasons?
- What do these advantages and limitations mean for determining the most socially responsible, most appropriate management approach?
- What influences of the objectives help to achieve the most appropriate management approach? Why?
- What choices will have to be made about each management approach to best achieve all the objectives?

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### **Emerging Implementation Considerations**

In order to discuss implementation, participants considered the following questions:

- What elements of an implementation plan must NWMO consider in the chosen approach? Why?
- We have heard that we need to take action now, but also maintain adaptability. Given this situation, what are the requirements of a staged approach? Why?
- If the answer doesn't lie among the management approaches under study, where would it lie?

### 3.0 Report on the Dialogue Sessions

#### The Assessment Framework

National Stakeholder and Regional Dialogue participants understood and accepted the Assessment Framework methodology and multi-attribute utility analysis as a logical method of understanding the tradeoffs associated with the management approaches. The assessment tool provides transparency. Several participants suggested that the Assessment Framework Methodology should be used to foster dialogue with Canadians across the country and at reactor sites. Participants accepted and added to the objectives used to evaluate the management approaches. Additions included: political viability and Aboriginal interests as separate new objectives.

Among the participants there were different views expressed about the meaning of the “adaptability” objective and about the need for a staged approach. Although they agreed that the future may have more advanced knowledge of the science of nuclear energy and nuclear technology and that future generations might wish to make decisions that are appropriate to their own understanding, they thought that the NWMO would be expected to recommend a management approach that has certainty, and consequently a lesser requirement for adaptability. They also pointed to a high price tag associated with a more adaptable or staged management approach.

Participants identified several areas of weakness. First, the results of the Assessment Framework are somewhat dependent on larger issues outside of the purview of the Nuclear Fuel Waste Act. For example, a decision to retrieve the material, a decision to reprocess, a decision to continue or discontinue Canada’s domestic nuclear energy program may change the scoring of each management approach. Second, Canadians in various regions and people several generations hence may score the management approaches differently.

Finally, while it was understood that the Assessment Team was informed about the science related to the management approaches, it was not clear to participants how the basic science important to the choice of a management approach influenced the outcome of the Assessment Team’s preliminary assessment. Participants stated that the science is important, particularly the ability of the geology to support long-term environmental integrity. Future explanations of the preferred management approaches could benefit from a discussion of the supporting scientific and technical information.

#### Strengths and Limitations of Each Management Approach

##### *Deep Geological Disposal in the Canadian Shield*

Deep geological disposal in the Canadian Shield was the management approach preferred by most of the participants. This approach was seen to best achieve public health and safety, environmental integrity, security, economic viability and community well-being objectives. The worker health and safety objective was seen to be consistent for all management approaches. The poorer performance of this management approach in terms of adaptability was seen to be less important as there could be flexibility built into the design. Participants felt that many of the problems associated with other management approaches could be avoided or mitigated through deep geological disposal. Deep geological disposal provides the ability to choose and partner with communities. Participants thought that this approach is robust with respect to issues related to climate change and glaciation.



### *Storage at Nuclear Reactor Sites*

Overall participants felt that storage at nuclear reactor sites was acceptable over the short-term. It would be accessible and would avoid issues of transportation. Local communities would continue to receive economic benefits. New Brunswick Regional participants felt that this was particularly important. However, they cautioned that critical long-term policy decisions will need to be made over the next 10 to 30 years, rather than the timeframe of many generations. Nuclear energy production and research provides a supportive backdrop to storage at nuclear reactor sites in terms of providing ongoing funds for management and maintenance, training and human resources and research. After that, responsibility for long-term management may shift to government and related political institutions.

Over a longer timeframe, storage at nuclear reactor sites is seen to be the least desirable option. Like the other approaches, it will require a siting process – if only for the reason of asking local communities whether they want to continue to accept the used nuclear fuel over the longer term. It does not avoid aboriginal land claim questions. If one community says no, an alternative management approach would then be required for this or all nuclear reactor sites. Reactor site storage may be a breach of trust for local communities who did not ask to be the long-term hosts of used nuclear fuel. Storage at nuclear reactor sites also raises serious intergenerational fairness issues for many participants.

Other inherent difficulties include, reactor sites have been appropriately sited for power production but poorly sited for extended storage of used nuclear fuel. Many of the sites may have unsuitable geology; they are in the middle of large population centres and near drinking water. The cost of ongoing maintenance and repackaging at seven sites was seen to be too high. If storage at nuclear reactor sites is only an interim solution, in the long-term this management approach must still address the future need for a permanent solution.

### *Centralized storage above or below ground*

Centralized storage above or below ground was seen to have some of the strengths and weaknesses of both of the other management approaches. However, it also captures many of the fundamental weaknesses. Its strengths include the ability to monitor wastes at one site as opposed to many sites. It provides for flexibility and adaptability. Given the ability to find suitable geology and partner with local communities, it can be designed to protect public health and safety and community well-being.

The major limitation of centralized storage above or below ground was its cost and political uncertainties as a long-term solution. Participants assumed that there would still be the need for a second siting process related to the future permanent home for used nuclear fuel. They asked, why go through the cost and local community disruption a second time? In terms of limitations, centralized storage is seen to be less secure, have medium performance in terms of environmental integrity, and perform poorly in terms of economic integrity. If centralized storage above or below ground is only an interim solution and a second site would be required for a long-term solution for used fuel, then it could have twice the transportation problems as a deep geological disposal facility alone.

## **Implementation Considerations**

Many of the National and Regional participants praised the NWMO for its citizen engagement activities, outreach to aboriginal groups and success at providing clear communications. They expected that all of these activities would continue during implementation. Participants made the following additional suggestions for implementation.

While people currently engaged in dialogue with the NWMO have a basic understanding of the issues and underlying science and technology, they pointed to the challenge of understanding the science of nuclear technology and of used nuclear fuel management among the general public. Also, people seem to frame the used nuclear fuel management issue in terms of their experience with household waste and related 3Rs

programs of reduce, reuse and recycle. There is a need to reframe how the public sees used nuclear fuel management in a way that better addresses the long-term management challenges. They suggested that a broader level of public education and engagement is required as a backdrop to used nuclear fuel management communications.

How the NWMO approaches local communities will be important. In general, the concept of a voluntary siting program or search for a willing host needs to be conducted with the understanding that sound science and a geologically suitable site should drive a site selection process to identify a number of potential areas or candidate sites for further studies and investigations. The NWMO should then partner with a broad range of organizations and municipalities – including Provincial Governments in determining a final, suitable location for used fuel. They felt that with incentives, it would not be difficult to find an area to site the facility. Community impacts can be managed and local communities will need to feel ownership of the issues and solutions. There will be many organizations and municipalities that will consider themselves to be suitable. These organizations could be considered as co-proponents with the NWMO.

NWMO is seen to be doing a credible job in engaging aboriginal communities to date. In addition, NWMO has performed well in engaging youth in the Dialogue sessions, however, these activities should continue and expand during the implementation process. Participants recognized that land claims issues and partnerships with aboriginal groups will be important during the implementation process. The NWMO will need to continue its broad-based dialogue with Canadians. NWMO must also insure that its communications with Canadians is coherent and seen to be logical. At a fundamental level, the choice of management approach must make sense to all Canadians.

While communications and engagement is important, there is a strong expectation that the science, technology and geology supporting a management approach will be sound. Research and development should continue during the implementation phases. It is recommended that the NWMO create the trust and credibility for the preferred management approach by funding a peer review process. There should also be intervener funding for participants at future regulatory hearings. The NWMO should consider expanding its Board of Directors to include a broader range of interests. In addition, politicians will need to be engaged at all levels and cooperation and partnership will be needed between Federal, Provincial, Municipal, and Aboriginal peoples jurisdictions.

Several participants desired a management approach that would be practical, approvable and economically viable. They pointed out that many of the significant decisions affecting all of the management approaches will occur in the short term and will be linked to decisions about the long-term future of nuclear energy. Some participants also suggested that we must find ways to reduce the volume of waste produced. They felt that it may be difficult to obtain approval for management approaches that are less secure. And, it may be hard to justify the cost of leaving a used nuclear fuel management approach adaptable and flexible if there will be little likelihood that there will be a future use for the used nuclear fuel. Others went further and suggested that the used nuclear fuel management facility should be seen as a financial asset. Canada may have an opportunity to recoup the costs of the facility from the international community.

Finally, the sentiment among most of the National Stakeholder and Regional Dialogue participants was: get on with it.

### **Other Management Approaches**

Participants were able to suggest other approaches for long-term management of used nuclear fuel, and were asked: If a solution doesn't lie among the three management approaches studied so far, where would it lie? After considerable discussion, various participants presented the NWMO with several variations related to two management approaches:

- 1) Centralized Storage
  - a. central storage at a long-term geologically suitable location; or
  - b. near surface underground storage combined with deep geologic disposal; or

- c. centralized storage deep underground, without decision to dispose.
- 2) Deep Geological Disposal
- a. fully retrievable deep underground disposal, without decision to seal; or
  - b. two-stage decision to store and then seal in deep underground repository at a reactor site;  
or
  - c. underground at a reactor site or
  - d. seal, but focus on ease of retrieval.

*1a. Centralized Storage at a Long-term Geologically Suitable Location*

This management approach involves consolidating the used nuclear fuel at one central location on top of a suitable pluton on the Canadian Shield. A small quantity of used nuclear fuel would be placed in containers and deposited in a geologic facility at a depth below ground, where its performance could be monitored and research could be conducted. The remaining used nuclear fuel would remain in storage at the surface. Continuing research could lead to a conclusion about the timing of permanent emplacement of the used nuclear fuel. It could involve at or near surface storage with ongoing underground investigations. The approach would offer adaptability and a phased approach toward ongoing research of permanent Deep Geological Disposal.

*1b. Near Surface Underground Storage Combined with Deep Geologic Disposal*

Some participants suggested near surface underground centralized storage combined with ongoing research into Deep Geological Disposal. The wastes would continue to be received at a central site and repackaged until a decision was made to move the used nuclear fuel from central storage to a deep geologic repository at the same site. While the wastes were being stored, the deep geologic disposal facility would be constructed. There would be ongoing research on deep geologic disposal until uncertainties would be sufficiently reduced to allow permanent disposal.

*1c. Centralized Storage Deep Underground without Decision to Dispose*

Some participants suggested a convertible geological storage option. The option would involve underground storage at a centralized site for 30 years. The centralized storage site would be located at a deep geological repository site. After 30 years the used nuclear fuel would be repacked and then placed far below ground surface in proper format for Deep Geological Disposal. Other participants suggested that straight Deep Geological Disposal, without centralized storage, would instead be preferred. For both options, the decision of when to close the deep geological facility would pass from this generation to future generations.

*2a. Fully Retrievable Deep Geological Disposal*

This management approach involves consolidating and storing used nuclear fuel in a pluton on the Canadian Shield in a Deep Geological Disposal facility. The initial commitment would be to undertake centralized storage 500 to 1,000 metres underground. The used nuclear fuel would be placed in suitable storage containers in the emplacement rooms and the access tunnels and shafts would be left open to facilitate monitoring. Some emplacement rooms would be backfilled and sealed as test sections to allow an examination of how the system is functioning over time. Future generations could decide later whether they want to make the management approach a permanent disposal site by backfilling and sealing the remaining used fuel storage containers within the emplacement rooms, plus the access tunnels and shafts.

This hybrid approach combines both passive and active safety. It would reduce the cost of a potential double environmental assessment and double siting process – assessment and siting of a centralized storage facility followed by the assessment and siting of a Deep Geological Disposal facility by future generations.

*2b. Two-Stage Store and then Seal in a Deep Underground Repository at a Reactor Site*

New Brunswick Regional Dialogue participants suggested an alternate management concept of a retrievable design that they defined as Deep Geological Disposal “B” option. This would be characterized by a period in which it will be relatively easy to retrieve the waste. The option would involve a second stage where sealing could be completed in a permanent manner. Future generations would be able to have access to the material up to a point in time, should they desire. Future generations would then decide to make Deep Geological Disposal a permanent option.

*2c. Permanent Storage at a Reactor Site at Point Lepreau*

Because of the geography at Point Lepreau, some participants suggested that it makes more sense to leave the used nuclear fuel permanently at Point Lepreau, when compared to the geography of other reactor sites. This option could be an above ground facility. In this regard they suggested that there could be a variation in implementation among the management approaches – one approach could be appropriate for one site or province, and another approach for other sites and provinces. In addition, New Brunswick participants saw that a local management solution would retain jobs in the Region.

*2d. Sealed Underground Site with Easy Retrieval*

Several participants suggested that new technologies in the future may make it easier to retrieve used nuclear fuel. They cited the possible future use of reprocessing which results in the high-level waste being solidified through vitrification and may provide for environmental integrity but relatively easy access if the used nuclear fuel needed to be retrieved.

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## 4.0 Summary of Dialogue Sessions

### 4.1 National Stakeholder Dialogue Session

#### NWMO National Stakeholder Dialogue Session

Monday Jan. 31 and Tuesday Feb. 1, 2005

Courtyard Marriott Toronto Hotel

475 Yonge Street

Toronto, Ontario

#### Summary Notes

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### 1. Introduction

The January 31 and February 1, 2005 National Dialogue brought together a broad cross-section of 18 Canadians representing National Stakeholder organizations to discuss the Assessment Team’s evaluation of the management options as presented in their 2004 report to the NWMO, *Assessing the Options: Future Management of Used Nuclear Fuel in Canada* to discuss the advantages and limitations of the management approaches and the implementation considerations for the future management of used nuclear fuel.

National Dialogue participants commented on how the three management options performed with respect to the objectives of fairness, public health and safety, worker health and safety, community well-being, security, environmental integrity, economic viability and adaptability. National Dialogue participants used their considerable public policy experience to advise the NWMO on what an implementation process and plan for the recommended management approach should consider. Finally, they were given the opportunity to discuss how the NWMO should take action while maintaining adaptability and whether or not the answer to long-term management of used nuclear fuel does indeed lie among the management approaches specified by the Nuclear Fuel Waste Act.

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### 2. The Dialogue Process

Representatives of National Stakeholder groups met in Toronto and closely examined the 2004 NWMO Discussion Document #2, *Understanding the Choices: The Future Management of Canada’s Used Nuclear Fuel*. In preparation for dialogue, they heard three presentations. The first, given by NWMO representative Pat Patton, was a background on used nuclear fuel and what the NWMO has heard to date. Pat outlined the assessment framework centred on citizen values, ethical principles and the eight objectives, as well as the advantages and limitations identified by the Assessment Team. The second, given by Dr. Lee Merkhofer addressed the Multi-Attribute Utility Analysis decision-making method and the conclusions drawn by the Assessment Team. The third, given by Assessment Team member Dr. William Leiss, was on the experience of the Assessment Team. It was clear to participants that the NWMO was not looking for a consensus opinion.

The “Fairness” objective was selected as a focus for dialogue in the National session. Dr. Leiss provided an overview of the “Fairness Objective,” the influences used to assess the management options against the goal of fairness, and instructions on how participants could complete their own assessment of the

management options from the perspective of fairness. Participants received a workbook providing all information that would support dialogue.

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### **3. The Assessment Framework**

Overall, National Dialogue participants accepted that the Assessment Framework was a useful tool for evaluating the management options based on the values and ethical principles seen to be important to Canadians. They confirmed that the Multiple-Attribute Utility Analysis was an evaluation tool that could help assessors to discriminate among the options. Furthermore, it was a transparent way for the presentation of judgments, opinions and underlying reasoning.

Nevertheless, National Dialogue participants had many comments on how the NWMO could improve its understanding of the objectives related to long-term used nuclear fuel management. They stated that the assessment framework was based on a specific understanding of Canadian values and ethical principles, and that other perspectives on values and ethics are valid. The NWMO needs to consider that the framing of the objectives may differ considerably across Canada, and between rural areas and for communities currently hosting nuclear waste. Over time, the interpretation of the management approaches may change as priorities and circumstances change for future generations.

While the NWMO has previously heard reference to the need to address the larger energy policy issue with respect to the future of nuclear energy and other energy options in Canada, some participants suggested that the weighting of management options may differ depending on how or whether these issues are addressed. For example, public health and safety may be a less important objective in relation to reactor site storage if there was a decline in the nuclear expertise in those communities due to energy policy resulting in a cessation of nuclear energy production. Centralized storage above or below ground could be a less adaptable option if a nuclear energy policy created a compelling demand for implementing a permanent disposal option in the near term.

National Dialogue participants suggested improving communications about the assessment framework in relation to how the assessment framework assists in making tradeoffs among the eight fundamental objectives important to Canadians. For some, the overarching objective could be better understood as the goal that each objective should strive to achieve. One participant noted that the preliminary findings of the Assessment Team confirmed conclusions about the deep geological disposal in the Canadian Shield option reached by others over 30 years ago.

With respect to completing the steps associated with evaluating the three approaches against a particular objective, the assessment methodology would benefit from a division in the colour scale of where there may be an “insignificant factor” and instances of an “inability to assess a factor” due to lack of data. Such considerations would be routine within environmental evaluation. While accepting the need for qualitative judgment associated with the evaluation of the eight objectives, some participants expected that the NWMO would also refer to the science underpinning its recommendations in a more robust manner. Furthermore, the colour code used by the Assessment Team could be better defined in their 2004 report to the NWMO.

There were several specific comments related to the objectives. National Dialogue participants described the “adaptability” objective as an attempt to combine two objectives centred on flexibility and robustness. Others felt that the objective of “responsibility” was also linked to adaptability. As a society, they asked, can we achieve the goal of being responsible for the waste if we also want to vigorously pursue the goal of having an adaptable approach? The weighting of the management approaches may be clearer to Canadians if adaptability was further defined.

National Dialogue participants examined how “fairness” could be achieved by each of the three approaches: storage at nuclear reactor sites, centralized storage above or below ground and deep geological disposal in the Canadian Shield. Perhaps indicative of future challenges of engaging Canadians in such a

dialogue, National Dialogue participants initially found it difficult to understand the concept of fairness. Yet, by the mid-point of the second day, it was evident that all of the participants had learned how to share their views about this concept.

While National Dialogue participants accepted most of the matters (influences) that define a fair management approach, there were several suggestions for additions and adaptations. For example, there is a broader opportunity to talk to Canadians about the distribution of benefits, whereas currently the objectives focus on the distribution of costs. Some suggested that responsibility, equity and equality could be considered as additional influences.

Some felt that several terms used in the assessment framework could be clarified and redefined. The concept of “polluter pays” tends to paint a negative picture of an industry that in actuality has an exceptionally high degree of control of its waste products. Perhaps “producer pays” would be more appropriate. If the NWMO is to use the term “willing host community” in future dialogues, the term needs to be defined. Participants also pointed out that distributional fairness had defined boundaries or end points, and at some point a decision will have to be made.

National Dialogue participants gave high importance to traditional Aboriginal knowledge and felt that it can be better integrated into the evaluation of the management approaches for many of the objectives. They also examined the weight that appears to be given to the opinions of concerned citizens over the impacts on affected residents. Specifically, there is a fairness issue if the opinions of concerned citizens from parts of Canada with no credible likelihood of being affected by any of the management options would prevail over the opinions of those who would be the primary recipients of the waste.

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#### **4. Strengths and Limitations of Each Management Approach**

The strengths and limitations of the management approaches were first discussed based on “fairness” and then based on all of the objectives. Consistent with the conclusions of Discussion Document #2, *Understanding the Choices: The Future Management of Canada’s Used Nuclear Fuel*, National Dialogue participants felt that all of the management options had strengths and limitations. For all the approaches, institutional controls, such as regulatory standards development, need to keep pace with the long-term requirements of nuclear waste management. While there were no outstanding strong choices, by the end of the session much of the discussion focused on the deep geological disposal in the Canadian Shield and two hybrid approaches developed by participants in the session. These hybrids include: centralized storage at a long-term geologically suitable location; and fully retrievable deep geological disposal (both discussed later in this report).

##### **Deep Geological Disposal in the Canadian Shield**

While consensus was not requested amongst the participants, there appeared to be a common view that the Deep Geological Disposal in the Canadian Shield option would have a higher rating in terms of most of the objectives, similar to the conclusions drawn by the Assessment Team. The site could be sufficiently distant from people and the waste would be removed from reactor site communities, so there could be higher achievement of health and safety objectives. Participants assumed that multiple barriers and upfront passive containment associated with deep geological disposal in the Canadian Shield would make it safer than storage at nuclear reactor sites. Less radiation risk over the long-term also means better achievement of the community well-being objective.

National Dialogue participants felt that deep geological disposal in the Canadian Shield imposed fewer obligations on future generations. There were several ways to address retrievability issues, from designing the facility to make the used nuclear fuel easily retrievable, to allowing future generations the option of permanently closing a deep geological repository at an appropriate time. Deep geological disposal in the Canadian Shield is less vulnerable with respect to security objectives. It also offers more protection from

accidental human intrusion than the other two management approaches, which rely on continuous storage of the fuel.

In addition, impacts to the natural environment were seen to be manageable, as the long-term management facility is assumed to be designed with multiple layers of protection. While there are concerns with respect to the community well-being objective, participants felt that impacted communities can have meaningful participation in site selection and facility design.

Compared to storage options, there was general acceptance that deep geological disposal would be more difficult to monitor and would be less flexible or adaptable. Others pointed out that adaptability could be incorporated in the design of the deep geological disposal facility. Like the other approaches, some pointed out that deep geological disposal in the Canadian Shield could provide for ongoing learning as a way to reduce uncertainty over the long-term. For some, knowledge uncertainties related to the geology of a deep facility is of less concern than the breakdown of institutional controls possibly associated with the other two storage management approaches.

Participants also identified weaknesses. For example, long-term monitoring will require highly trained professionals with nuclear expertise. Currently, much of the expertise resides in reactor site communities. The participants were split on whether less institutional control was a strength or a limitation. Several participants suggested that in comparison to other options requiring institutional control now provided by a professional workforce, over the long-term being out of sight or being remote leads to a decline in institutional vigilance.

On the other hand, deep geological disposal in the Canadian Shield was seen to be less vulnerable with respect to security objectives, although transportation security would need to be more closely examined. It also offers more protection from accidental human intrusion. However, there will be some effects to "community well-being" for remote communities and for communities along transportation routes. The approach can be designed to maximize local "community well-being" for both remote and transportation route communities. Several participants pointed out that the mining associated with the approach could also have both positive and negative effects for local communities. Others pointed out that Canada has good experience with mining. It was also noted that this management option would raise sovereignty issues for Aboriginal communities.

### **Centralized Storage Above or Below Ground**

Participants felt that centralized storage above or below ground had a number of strengths in relation to the objectives. In terms of public health, safety and community well-being, centralized storage above or below ground offers the potential for removing used nuclear fuel from the vicinity of large numbers of people. Being centralized also offers fewer security risks than storage at nuclear reactor sites. In terms of economic viability, it potentially appears to be a cheaper option. However on further reflection, participants pointed to a serious concern for passing on significant costs to future generations as a second (ultimate) long-term waste-management solution would still be required. Centralized storage above or below ground offers greater flexibility than the other approaches, thus providing intergenerational flexibility. While repackaging and retrieval would be designed into the concept, this was seen to be an important worker health and safety risk. Centralized storage above or below ground may still involve people in communities who oppose the location of the facility near their community, although with the appropriate stakeholder input and discussion, there may be accepting communities.

The weakness in this approach, according to National Stakeholder Dialogue participants, is it obligates future generations to find an additional long-term solution subsequent to storage. The siting decision may have to be made twice, therefore doubling any unfairness in the siting process. As with deep geological disposal in the Canadian Shield, it was also seen to be difficult to win consent for transportation route communities. For instance, could one community veto? Like deep geological disposal, this management approach would require the construction of a supportive infrastructure. There was a general acceptance that local community impacts could be managed.



### **Storage at Nuclear Reactor Sites**

Most of the participants felt that storage at nuclear reactor sites was considered least fair. In terms of strengths, over the near term, community well-being and public health and safety concerns appear to be low. The reactor site communities are seen to be knowledgeable and currently may be more accepting of the presence of used nuclear fuel. Also, long-term maintenance resources, security infrastructure and nuclear industry human resources are present at reactor sites and will continue to be there as long as there is continued production of nuclear-based electricity and stability of institutions. The management approach does not involve used nuclear fuel transportation or a search for the right geology. It provides more certainty in terms of knowledge, but the lack of passive safety over the long-term was a concern. On the other hand, local communities would continue to receive economic and job benefits. Surface options are also easier to monitor. This approach is also seen to be most flexible because the used nuclear fuel is easily accessible.

In terms of limitations, storage at nuclear reactor sites would require active maintenance over time. Participants also pointed to the proximity to large populations, airline flight paths and large water bodies. Thus, there was seen to be more environmental and public health and safety risks. In terms of procedural fairness, local communities were not asked if they wanted to host the used nuclear fuel for the longer term. National Stakeholder Dialogue participants asked how this management option would work if several of the current reactor site communities accepted the waste over the long-term, while several other reactor site communities decided not to accept the waste.

Storage at nuclear reactor sites could be a more expensive option over the long run, and by leaving costs to future generations this approach was seen to have significant negative intergenerational fairness issues. Participants also pointed out that this approach will require safety and security at many sites, and that over the long-term this could be a considerable limitation. Having the waste at one central location would offer safety and security advantages over storage at nuclear reactor sites at many locations.

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## **5. Other Management Approaches**

Participants were able to suggest other approaches for long-term management of used nuclear fuel, and were asked: If a solution doesn't lie among the three management approaches studied so far, where would it lie? After considerable discussion, participants presented the NWMO with two management approaches for consideration: 1) centralized storage at a long-term geologically suitable location; or 2) fully retrievable Deep Geological Disposal.

### *Centralized Storage at a Long-term Geologically Suitable Location*

This management approach involves consolidating the waste at one central location at the surface of a suitable pluton on the Canadian Shield. A small quantity of used nuclear fuel would be placed in containers and deposited in a geologic facility at a depth below ground, where its performance could be monitored and research could be conducted. The remaining used nuclear fuel would remain in storage at the surface. Continuing research could lead to a conclusion about the timing of permanent emplacement of the used nuclear fuel. It could involve at or near surface storage with ongoing underground investigations. The approach would offer adaptability and a phased approach toward ongoing research of permanent Deep Geological Disposal. National Stakeholder Dialogue participants suggested that in order to support local communities and provide ongoing public health and safety and environmental protection there would necessarily be a research centre associated with the long-term facility.

In terms of strengths and weaknesses, this option creates a knowledge base in support of a future decision. While there was some disagreement, participants felt there would be less potential for accidental human intrusion. One of the strengths of the approach is the opportunity for it to be combined with deep geological disposal or at least to not preclude deep geologic disposal.

### *Fully Retrievable Deep Geological Disposal*

This management approach involves consolidating and storing used nuclear fuel in a pluton on the Canadian Shield in a deep geological disposal facility. The initial commitment would be to undertake centralized storage 500 to 1,000 metres underground. The used nuclear fuel containers would be placed in the emplacement rooms and the access tunnels and shafts would be left open to facilitate monitoring. Some emplacement rooms would be backfilled and sealed as test sections to allow an examination of how the system is functioning over time. Future generations could decide later whether they want to make the management approach a permanent disposal site by backfilling and sealing the remaining used nuclear fuel emplacement rooms, plus the access tunnels and shafts.

This hybrid approach combines both passive and active safety. It would reduce the cost of a potential double environmental assessment and double siting process – assessment and siting of a centralized storage facility followed by the assessment and siting of a deep geological disposal facility by future generations. The approach offers ongoing learning and better worker health and safety benefits, as there would be minimal requirements for re-handling and repackaging the waste. Periodic safety assessment and Environmental Impact Statements could be an integral part of the management option.

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## **6. Implementation Considerations**

National Stakeholder Dialogue participants considered the type of agency or commission that would be empowered and entrusted to implement the selected management approach. There were several suggestions for an independent group that would have the broad trust of Canadians. Others felt that at the end of the day it would be hard for any agency to meet the expectations of all stakeholders. Some participants asked whether it would be appropriate for only one management approach to go forward for subsequent review or whether all approaches should be examined. It was clear to National Stakeholder Dialogue participants that an effective implementation plan must specify how political representatives at all levels will provide input to the decision. Some suggested that politicians should be brought into the decision-making process in such a way that they are able to be fully involved in understanding the issues and have ongoing input.

The NWMO will also have an up-hill climb in engaging Canadians on matters of science, although the NWMO is by no means the only organization facing this challenge. “Good science” builds credibility and trust, and science and risk issues related to fractures and certainty of the geology would need to be specifically addressed. In considering all of the management approaches, the participants stressed the importance of conveying scientific and technical information to the public without communicating overconfidence about certainty. In addition, participants saw “peer review” as an ingredient to building trust in a management approach, and noted that Canadian universities and colleges will be important participants in the peer review process. All disciplines should also be drawn into the discussion (e.g. health care workers, social scientists, etc.). Finally, participants noted that joint owners of the used nuclear fuel should continue to have ongoing responsibility for waste management.

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## **7. Other Participant Comments**

Some dialogue participants stated that the discussion of fairness, as a premise, should be linked to a commitment to limiting the amount of used nuclear fuel being produced. For some, the discussion of fairness is undermined if the selected management approach opens the door to the production of more used nuclear fuel. For others, used nuclear fuel exists today and must be addressed regardless of energy policy in Canada.

The point was also made that the human resources needed to address ongoing waste management are limited, and that there is seen to be an ongoing decline in expertise to provide for long-term health, safety and environmental monitoring, whatever management approach is selected.

Ultimately, if society believes that a situation is inherently dangerous, it will be difficult to find an acceptable solution. This applies to any factor and management approach.

## 4.2 New Brunswick Regional Dialogue Session

### NWMO New Brunswick Regional Dialogue Session

Thursday Feb. 3 and Friday Feb. 4, 2005

Lord Beaverbrook Hotel  
659 Queen Street  
Fredericton, New Brunswick

#### Summary Notes

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### 1. Introduction

The New Brunswick Regional Dialogue session occurred on February 3 and 4, 2005 in Fredericton with 12 participants in attendance. Participants ranged from environmental and municipal organizations to Aboriginal peoples representatives and nuclear energy workers, as well as others. The objective of the dialogue was to learn more about and experience the Assessment Team's evaluation of the management approaches as presented in the report, "*Assessing the Options: Future Management of Used Nuclear Fuel in Canada*," to discuss the advantages and limitations of the management approaches, and the implementation considerations for the future management of used nuclear fuel.

New Brunswick Regional Dialogue participants commented on how the three management approaches performed with respect to the objectives of fairness, public health and safety, worker health and safety, community well-being, security, environmental integrity, economic viability and adaptability. They also advised the NWMO on what an implementation process and plan for the recommended management approach should consider.

Consistent with other sessions, several additional questions important to the NWMO were addressed. These included the question of how to take action while maintaining adaptability, and what options should be considered if the answer to long-term management of used nuclear fuel does not lie among the management approaches specified by the *Nuclear Fuel Waste Act*.

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### 2. The Dialogue Process

Overall, participants were pleased with the information presented and felt that there had been a full discussion of the issues. The New Brunswick agenda was similar to the National Stakeholder and other Regional Sessions, however in this case the participants made a more complete examination of the objective of "Community Well-being."

In preparation for dialogue, participants heard two presentations. The first, given by the NWMO's Pat Patton, was a backgrounder on used nuclear fuel and what the NWMO has heard to date. Pat outlined the assessment framework centred on citizen values, ethical principles and the eight objectives, as well as the advantages and limitations identified by the Assessment Team. She also presented the implementation considerations that the NWMO has heard to date. The second presentation, given by Assessment Team member Dr. William Leiss, addressed the Multi-Attribute Utility Analysis decision-making method and the conclusions drawn by the Assessment Team.

Dr. Leiss provided an overview of "Community Well-being" and the influences identified by the Assessment Team to assess the management approaches against the objective of community well-being. He

then instructed participants on how to complete their own assessment of the management approaches from the perspective of community well-being. To this end, participants received a workbook providing all information that would support dialogue. It was clear to participants that the exercise was of an individual nature, and that the NWMO was not looking for a consensus opinion.

Several unique themes emerged from the dialogue with New Brunswick participants. First, there was a focus on the economic aspects of long-term nuclear waste management. Several times throughout the dialogue participants returned to the discussion of the economic benefits that a management approach would bring to a region or local community. Participants also considered how reactor site storage would function at Point Lepreau in terms of community costs and benefits. In particular, storage at nuclear reactor sites would result in employment and economic benefits of a skilled and well-paid workforce, local purchasing of materials and the ability to export technologically advanced expertise to others interested in long-term used nuclear fuel management.

Also apparent was the theme of “getting on with it” in terms of making a decision about long-term waste management. Some participants considered that Canada has spent considerable time studying and reviewing this issue and that it is time to make a decision. They felt that a decision needs to be made on the NWMO recommendation as it would not be productive to have additional independent commissions reviewing the work of past commissions. Some felt that while the NWMO process is useful, a more direct approach would be the advancement of environmental assessment studies on one or more of the approaches or any hybrids identified, followed by a Canadian Nuclear Safety Commission Hearing or Parliamentary Hearings. Several participants felt that any potential uncertainties about the science should not override the need to make a political choice. Given the substantial amount of information available on how to manage the wastes, any additional learning about areas of uncertainty could occur in the monitoring phase and that this should be encouraged.

Further exploring this theme, some New Brunswick participants suggested that if the decision on which management approach to select is delayed much beyond 10 years, there would be a lost window of opportunity. Within this time-frame, there is an opportunity to utilize existing nuclear waste management skills and knowledge associated with the ongoing nuclear energy program, and a possible willingness to make a financial commitment necessary to fund the management of used nuclear fuel. Thus, they concluded, there is not much difference in delaying the decision about the long-term management of the waste either 30 years or 400 years, as the technical resources and financial commitments may no longer be available in either period.

As a third theme, New Brunswick participants engaged in an in-depth dialogue about the notion of retrievability pertaining to deep geological disposal in the Canadian Shield. While the NWMO has previously heard reference to the need to address energy policy with respect to nuclear energy and other energy options, some participants suggested that reprocessing policy should also be discussed in more depth in relation to retrievability.

Participants felt that used nuclear fuel would be retrievable for one of two reasons. First, because there is a need to repackage the used nuclear fuel or the possibility that more advanced knowledge of disposal methods becomes available. Or second, society cannot completely trust the science. For some participants, the science is not well enough advanced; therefore the socially responsible choice would be to select storage at nuclear reactor sites. In addition, some participants argued strongly in favour of storage at nuclear reactor sites on its own merits, saying that the wastes could be safely stored in this manner for long periods, and that there would be economic benefits to New Brunswick, as well as the benefits of assuring a trained and knowledgeable workforce in the region.

Alternatively, the need to confirm the science would involve disposing the waste using the deep geological disposal in the Canadian Shield approach, provide for long-term monitoring, and then allow future generations the choice of making it irretrievable.

Another reason for retrieving the waste would be because society intends to recover used nuclear fuel at some time in the future for reprocessing. If reprocessing were to occur, it would be imprudent now to choose deep geological disposal in the Canadian Shield. However, participants recognized that reprocessing would mean that successive generations would have to face the compound problem of having to address the disposal of used nuclear fuel as well as the disposal of reprocessing waste.

Overall, they stated that the main goal of used nuclear fuel management policy should be to protect health, safety and the environment. Some of the participants felt it would not be wise public policy to create more reprocessing wastes. Thus, they defined deep geological disposal in the Canadian Shield as a permanent disposal solution, as opposed to a disposal solution associated with retrievability.

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### 3. The Assessment Framework

New Brunswick participants accepted most of the influences among the community well-being objective. However, New Brunswick participants also felt that the viewpoints of people on this objective might differ depending on where they live. For example, people living near the reactor sites in Ontario might feel differently than those living near Point Lepreau. Some suggested that, to correctly weigh the objectives there is the need for an assessment at each reactor site community. For instance, "property values" in some areas of Ontario that have larger populations may be less of a problem than in an unincorporated area with a small population, such as near Point Lepreau.

There were several gaps among the community well-being influences. First, participants noted that the influences include "Aboriginal peoples." However, they said, a simple listing of Aboriginal peoples as an influence greatly understates the need to consult Aboriginal peoples, to take the appropriate amount of time to consult and to recognize the diversity of interest that Aboriginal peoples have in rural and remote areas. As an example, the influence "*Other private/public property values*" overlooks Aboriginal lands being communally owned.

Secondly, participants discussed the potential problems in defining who could represent the "community" relevant to storage at nuclear reactor sites. They asked, for example, "How do you obtain input from communities that do not have decision-making ability?" For instance, the isolated situation of Point Lepreau means that there is no local community to engage in dialogue. So for deep geological disposal and centralized storage there may not be relevant communities in isolated parts of Canada. As a variation on this theme, participants pointed to 70 to 80 per cent of New Brunswick's land mass directly owned by the province. In this case the "local community" is effectively the Province. The characteristics of the governmental structure in New Brunswick mean that many rural individuals do not have organized municipalities to represent them.

New Brunswick participants further stated that the influences of "*privacy*" and "*freedoms*" are linked to community well-being. They also felt that the "community well-being" and "security" objectives are linked. In addition, participants felt that the "economic viability" objective could benefit from a fuller examination of costs. To inform the discussion, participants felt that the NWMO should assess each management approach separately to identify upfront the full long-term costs and net present value. As stated above, if retrieval is part of the definition of a concept, it should be part of the comparative cost estimation for the three management approaches.

Storage at nuclear reactor sites would possibly have an ongoing positive community economic benefit related to Point Lepreau. However, it would be better if storage at nuclear reactor sites would also be associated with a laboratory, to ensure capacity for research and a skilled workforce. In contrast, shutting down the plant and moving the waste to a centralized storage or deep geological disposal site would have an impact on the local economy. Participants felt this comment might be particular to New Brunswick. Whether there are community economic impacts elsewhere will depend on the circumstances particular to the other reactor sites. New Brunswick participants felt that Pickering, Ontario's economic costs and

benefits, for example, would not be as significant as Point Lepreau’s because of Pickering’s location in the Greater Toronto Area.

Participants felt that “existing” and “future” communities should be regarded differently, and they agree with the assessment methodology of considering this objective in terms of the first 175 years and then a period greater than 175 years. While the socio-economic effects to existing communities can be observed, effects to future new communities will need to be determined and controlled by an ongoing implementing organization. Participants felt that there could be considerable benefits arising for communities near a long-term management facility. With respect to community benefits, participants felt that the concept of “*knowledge creation*” should be added. This is an influence that enables people in communities close to a long-term management facility to obtain specialized knowledge that ultimately becomes marketable to international interests, or to other industries.

Dialogue participants also noted that Aboriginal traditional knowledge and traditional values should be included in the Community Well-being Influence Diagram.

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#### **4. Strengths and Weaknesses of Each Management Approach**

The strengths and limitations of the management approaches were first discussed based on “community well-being” and then based on all of the objectives. Consistent with the conclusions of Discussion Document #2, *Understanding the Choices*, New Brunswick Regional Dialogue participants felt that all of the management options had strengths and limitations.

Overall, New Brunswick participants were split on which management approach better addresses community well-being. Storage at nuclear reactor sites and deep geological disposal in the Canadian Shield drew the most attention of participants. Centralized storage above or below ground was seen to be less desirable as it would be less easy for transportation route communities to accept moving used nuclear fuel from New Brunswick, if only for the purposes of long-term storage. They suggested either leaving it where it is, or to pursue an ultimate solution.

The discussion of storage at nuclear reactor sites focused on the situation of Point Lepreau. While there were mixed opinions about the need for future production of electricity at the Point Lepreau plant, most understood that a decision about ongoing management of used nuclear fuel using reactor site storage at the plant would have either positive or negative implications for the area’s economy. Participants reviewed local economic benefits under the scenario of either Canada or New Brunswick Power funding storage at nuclear reactor site. They felt that a case could be made for reactor site storage in New Brunswick and a different management approach for wastes residing in other parts of Canada.

##### **Deep Geological Disposal in the Canadian Shield**

Participants felt that deep geological disposal in the Canadian Shield could be designed to provide benefits to a community. For example, new required infrastructure, such as road construction, may have benefits leading to new locations for communities or resources. Others felt that monitoring would be more difficult underground, although it offered better public health and safety benefits than the other two approaches. Deep geological disposal is also seen to have higher upfront security and transportation costs, although the underground location was seen to have superior security arrangements. Participants felt that deep geological disposal was less likely to impact the environment, as the probability for accidents was seen to be moderate. Participants agreed, however, that site selection would be a challenge, and that residents living along transportation routes may not be supportive.

In terms of fairness, deep geological disposal in the Canadian Shield is seen to be an acceptable option. Future generations would be looked after, and while upfront costs could be large, more so than storage at nuclear reactor sites, longer-term monitoring costs may be much less onerous than Canadians expect.

### **Centralized Storage above or below ground**

New Brunswick participants felt that centralized storage above or below ground has identical problems to deep geological disposal in the Canadian Shield except that centralized storage brings with it more risk of property damage and greater likelihood of leakage due to shallow depth of waste. Both have significant transportation costs, while transportation risks are the same as for deep geological disposal.

Both approaches will affect the Aboriginal people in communities around the site and the natural environment. Both approaches also have problems from the Aboriginal perspective, because it shifts problems to people who are not associated with the production of the waste.

New Brunswick participants looked closely at the benefits and costs of centralized storage above or below ground. In general, centralized storage is seen as an interim step. Rather than storing used nuclear fuel onsite for 400 years, then move towards deep geological disposal, it may be more prudent to skip the interim step and move towards deep geological disposal. Others disagreed and felt that this should be a "next generation" decision. They stated that if we move towards deep geological disposal in a manner that is not retrievable, there would be an impact to future generations. Instead, they said we should leave it to the future generation and their knowledge and technology to decide what they will do with the energy source.

In terms of benefits, centralized storage is easier to monitor as the used nuclear fuel is all at one site. The waste would be retrievable and could be reprocessed. Upfront costs are also lower, as are construction costs. However, participants are looking for better information on the costs of centralized storage. The option allows flexibility and adaptability, and the centralized storage facility could be built over time to allow for updated technology. Similar to deep geological disposal, this approach could provide local economic benefits.

### **Storage at Nuclear Reactor Sites**

New Brunswick participants noted that storage at nuclear reactor sites will occur as long as there is nuclear energy production. The advantage of this approach is that it minimizes the movement of waste. Participants also felt it important to point out that there are already reactor site storage sites, meaning that the controversy of a site selection process could be avoided. In contrast, other management approaches are more positive because they offer the implementing agency the opportunity to choose the location.

Storage at nuclear reactor sites was seen to be cheaper in the short term, but possibly more costly over the longer term. Participants noted that most of the current reactor sites are located near water, which is a concern. Existing sites may also not be the best option over the long-term due to matters such as future climate change and earthquakes. However, due to multiple sites there would be an increased cost. Some felt that storage at nuclear reactor sites should continue until the decision is made to not produce more waste.

A significant limitation of storage at nuclear reactor sites revolves around the risks that there would not be future financing or political will for ongoing monitoring and management of the waste. There would also be future security issues and loss of freedoms due to the need for stronger security at sites that had no geological protective barriers. Participants also suggested that there could be more natural environment, public health and safety risk and human health impacts. There was no consensus on this point. There would still be issues of community acceptability, however, if there was onsite acceptance there could be economic spin-offs. Finally, while noting that there is expertise and knowledge at reactor sites, if the choice was to store waste onsite it is possible that not all current reactor site communities in Canada would be accepting.



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## 5. Other Management Approaches

### *Deep Disposal "B" Option*

New Brunswick Regional Dialogue participants suggested an alternate management concept of a retrievable design defined as Deep Geological Disposal "B" option. This would be characterized by a period in which it will be relatively easy to retrieve the waste. The option would involve a second stage where sealing could be completed in a permanent manner. Future generations should be able to have access to the material up to a point in time, should they desire. Future generations would then decide to make deep geological disposal a permanent option.

### *Hybrid: Reactor Site Storage at Point Lepreau*

Because of the geography at Lepreau, some participants suggested that it makes more sense to leave the used nuclear fuel at Point Lepreau, when compared to the geography of other reactor sites. In this regard they suggested that there could be a variation in implementation among the management approaches – one approach could be appropriate for one site or province, and another approach for other sites and provinces.

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## 6. Implementation Considerations

Participants felt that assumptions about the stability of monitoring institutions needed to be examined. If these institutions are weak there may need to be an earlier date for action on used nuclear fuel management. One participant proposed that a plan containing all detailed design and implementation information be completed and presented to the public by 2010. The plan would involve a CEEA Comprehensive Study Process examining all sites. Some participants suggested the need to have Parliamentary Hearings, with Parliament having accountability and audit responsibilities, but allowing the public the opportunity to cross-examine witnesses. They also suggested that there be intervener funding for non-government organizations. And, they said, the role of the CNSC in relation to long-term waste management needs to be better understood, particularly when it comes to asking if they have enough power to promote public safety.

There also needs to be a communication and consultation strategy and plan, with future organizations encouraged to continue to engage and educate Canadians. They also noted that there should be extensive consultation with affected communities, asking, for example, "Will communities have an opportunity to refuse the waste?"

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## 7. Other Participant Comments

Participants felt that third party external design review will be important. They also noted that strict legislation will be required to maintain the financial investment, and that it will be important to properly choose a body to oversee the finances.

In addition, some participants suggested that the NWMO explore the possibility of exporting the waste to Yucca Mountain. In this regard there may be a North American solution.

Finally, one participant stated that the NWMO consultation process has not provided for adequate and proper good faith consultations with Aboriginal groups in developing a study across Canada, and particularly in New Brunswick, and that more work needs to be done in this regard.

## 4.3 Ontario Regional Dialogue Session

### NWMO Ontario Regional Dialogue Session

Thursday Feb. 10 and Friday Feb. 11, 2005  
Wyndham Bristol Place Hotel  
950 Dixon Road  
Toronto, Ontario

#### Summary Notes

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### 1. Introduction

The Ontario Regional Dialogue session took place February 10 and 11, 2005 in Mississauga, Ontario, with 19 participants in attendance. Several participants were new to the NWMO dialogues. Notable were four Aboriginal participants from Fort Hope, located about 400 kilometres north of Thunder Bay, Ontario. Participants ranged from environmental and municipal organizations and nuclear energy workers, as well as others. The objective of the Dialogue was to learn more about and experience the Assessment Team's evaluation of the management approaches as presented in the report "*Assessing the Options: Future Management of Used Nuclear Fuel in Canada*", to discuss the advantages and limitations of each of the management approaches, and the implementation considerations for the future management of used nuclear fuel.

Ontario Regional Dialogue participants commented on how the three management approaches performed with respect to the objectives of fairness, public health and safety, worker health and safety, community well-being, security, environmental integrity, economic viability and adaptability. They also advised the NWMO on what an implementation process and plan for the recommended management approach should consider.

Consistent with other sessions, several additional questions also important to the NWMO were addressed. These included the question of how to take action now, while maintaining adaptability, and if the answer to long-term management of used nuclear fuel does not lie among the management approaches specified by the *Nuclear Fuel Waste Act*, what other options should be considered.

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### 2. The Dialogue Process

Participants were pleased with the information presented and felt that there had been a full discussion of the issues. They generally commended the NWMO process as being integrative and holistic. The active involvement of Aboriginal participants was seen to be an important part of the dialogue.

In preparation for dialogue, participants heard two presentations. The first presentation, given by Pat Patton of the NWMO, was a backgrounder on used nuclear fuel and what the NWMO has heard to date. Pat outlined the assessment framework centred on citizen values, ethical principles and the eight objectives, as well as the advantages and limitations identified by the Assessment Team. She also presented the implementation considerations that the NWMO has heard to date. The second presentation, given by Dr. William Leiss of the NWMO Assessment Team, addressed the Multi-Attribute Utility Analysis decision-making method and the preliminary conclusions drawn by the Assessment Team.

Dr. Leiss provided an overview of the "Community Well-being" objective and the influences identified by the Assessment Team to assess the management approaches against this objective. He instructed

participants on how to complete their own assessment of the management approaches from the perspective of community well-being. Participants then received a workbook providing all information that would support dialogue. It was clear to participants that the exercise was of an individual nature and that the NWMO was not looking for a consensus opinion.

Several unique themes emerged from the dialogue with Ontario participants. First, participants pointed to deep geological disposal in the Canadian Shield, or a possible hybrid, as the preferred management option. The hybrid is discussed later. They stated that many of the technical implications are known, and from a social and ethical perspective, this management approach is superior. To this end, most Ontario Regional Dialogue session participants stated that the ethical choice was for this generation to move ahead with the approval and implementation of deep geological disposal in the Canadian Shield. The current generation should take responsibility for resolving the nuclear waste issue and for paying for it.

The second theme revolved around the need to more fully engage in dialogue with Aboriginal communities. It was stated that Aboriginal people see remote areas differently than southern Ontario communities. It also became clear that Aboriginal communities can bring a long-term perspective to an issue with a long time horizon.

The third theme arose many times throughout the Ontario Regional Dialogue session as participants shared opinions about whether an adaptable and staged approach should be a central consideration of long-term waste management. In general, the participants felt that adaptability and staging was primarily needed only if there were strong reasons for retrievability. They acknowledged that their opinions may differ from the lay public regarding the need to keep choices open. Some expressed the concern that the need for adaptability adds costs, delays decisions and could be a distraction from making a clear choice. Even worse, the need for adaptability could be seen as the cause of a non-decision. Participants also pointed out that Canada does not have a reprocessing policy, and that there are adequate Canadian and international supplies of uranium. Thus, it will be easier and much cheaper to mine uranium than to retrieve and reprocess the used nuclear fuel.

Dialogue participants discussed the concept of ongoing learning and keeping options open for new technologies, stating that it is common sense to learn and implement new waste management technologies as they come along. All of the proposed management approaches allow for learning. However, any decision to consider deep geological disposal as unworthy of immediate recommendation as a final solution because new technologies might be around the corner was seen to be a weak and insufficient reason to burden future generations with the ongoing costs, safety and security risks of leaving the used nuclear fuel above ground or unsealed.

Furthermore, several participants observed that the international nuclear waste management community may be generations away from beginning research on better forms of burial or better waste management technologies. Retrievability research could feasibly be a program that would begin hundreds of years in the future. Rather than leave options open to address uncertainties, participants suggested that it would be better for the NWMO to do the work to get the right answer.

The fourth theme arising during the Dialogue involved the discussion of “urgency” in terms of “importance.” Many participants felt that there had been considerable procrastination on behalf of Canada on the matter of selecting a management approach. As a result, some felt that the intergenerational transfer of information and knowledge about managing used nuclear fuel is simply not occurring. They observed that the current generation of youth is not particularly interested in nuclear waste management issues.

As a unique perspective on the matter of urgency, one participant felt that Canada can be the world leader in nuclear waste management. If average Canadians feel more secure when international supplies of nuclear material are sealed away from terrorists, then Canada can play a leadership role by solving its domestic nuclear waste challenges in a manner that secures the waste. It was suggested that other countries would better manage their nuclear wastes if they follow Canada's lead.

The final theme involved licensing. Several of the participants felt that there was a practical matter of Canadian Nuclear Safety Commission (CNSC) licensing being difficult for any management approach involving above-ground storage. They felt that the CNSC would be concerned about the long-term implications of climate change, including glaciation. Participants felt that licensing renewals would also be more certain for a deep geological disposal facility requiring long-term monitoring than a central storage or reactor site storage facility requiring continual maintenance and re-licensing. More dialogue about the licensing process is required.

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### 3. The Assessment Framework

Participants were then asked to consider the Assessment Framework, and whether or not they believed it to be comprehensive and balanced. They were also asked to consider if there were gaps in the framework, and if so, what the NWMO must add.

In general, participants found it difficult to understand the assessment process initially. But as Ontario Regional Dialogue participants became more familiar with the objectives and influences, most felt that the process was sound. Even so, there were several suggestions for improvement and adaptation. Several participants felt that the framework needs to be presented in plain language to communities, school groups and others. Others felt that it could be supplemented with other evaluation tools such as cost benefit analysis and “fuzzy logic” statistical systems. Some felt that the assessment framework was weakened considerably by the lack of a technical underpinning to the judgments made by the Assessment Team. For example, adequate geology, for any of the management approaches, was seen to have an important role to play in the selection of a socially responsible option.

In terms of the influences, several participants felt that there could be a stronger role for positive influences of nuclear waste management. Worker health and safety and adaptability objectives were referred to least. Many participants felt that the former would be adequately addressed through occupational safety regulations, while the latter was addressed as a part of the overall discussion of institutions, resources and retrievability.

Participants first commented on “community well-being,” as this objective was the focus of their exercise. Some felt that deep geological disposal would maximize community well-being by presenting an approach that solved a social problem and therefore supported community health.

In relation to the “*indirectly generated jobs*” and “*approach related jobs*” participants had low expectations for community job benefits, as many of the jobs would be high tech, drawing workers from other parts of Canada and the world. However, the ability to obtain jobs was seen differently in communities with 90 per cent unemployment for example, as in many remote aboriginal communities.

Participants discussed the influences of public health and safety and environmental integrity as “deal breakers.” Deep geological disposal in the Canadian Shield was seen to be the safest and most secure of the management approaches. Some participants felt that storage at nuclear reactor sites would require additional policing for security. In comparison, the objectives of adaptability and security were seen to be divisive objectives for Canadians. Security, community well-being, public health and safety and environmental integrity were seen to be more important than adaptability.

Some participants felt that it would be unfair to leave the used nuclear fuel at reactor sites. They pointed to climate change and the decline of social stability as reasons to move the used nuclear fuel away from local communities and large population centres. They stated that “ethics” considerations should be separate considerations.

#### **4. Strengths and Limitations of Each Management Approach**

The strengths and limitations of the management approaches were first discussed based on “community well-being” and then based on all of the objectives. The conclusions drawn by Ontario Regional Dialogue participants were considerably stronger in support of deep geological disposal than the other management approaches.

##### **Deep Geological Disposal in the Canadian Shield**

Overall, deep geological disposal in the Canadian Shield was seen to offer a robust natural system of engineered and natural barriers to protect humans and the environment. While participants felt that the approach still had environmental concerns, there were fewer environmental risks involved.

Participants pointed out however that the siting process would be difficult, although the ability to choose a new site was superior to accepting the strengths and limitations of existing sites. The deep geological disposal site doesn’t have to be near a community, as for many mines today the actual site is some distance from the nearest local community. They also noted that the economic spin-offs would occur regionally. And while they thought social aspects of transportation could be a problem, licensing was thought to be easier than the other approaches.

##### **Centralized Storage Above or Below Ground**

Centralized storage above or below ground was seen to have some economic benefits for a host community. The waste would be easy to retrieve and easily monitored. It also has advantageous security characteristics over storage at nuclear reactor sites as the waste would be removed from many communities and put into one place.

Participants noted that this approach has some similar characteristics as deep geological disposal with respect to community well-being and the challenges posed by transportation. The need for re-transportation from a central storage site to a deep geological repository site was seen to be a drawback if a future society concluded that central storage of used nuclear fuel did not provide a long-term solution.

The negative aspects of central storage are the difficulty in sealing the used nuclear fuel, leading to the need for a final permanent option, the high handling costs, environmental groundwater problems and the need for ongoing maintenance.

##### **Storage at Nuclear Reactor Sites**

Storage at nuclear reactor sites was seen to be the easiest political choice by some participants. The environmental characteristics of the existing sites are well known, and some participants felt that the wastes could be consolidated at several reactor sites, although some sites may have groundwater problems. A positive feature is reduced need for used nuclear fuel transportation related to this approach.

Storage at nuclear reactor sites was seen to be least preferable over the long-term. Several participants asked “How would you get all communities to agree to manage their waste over the long-term?” They felt that gaining community acceptance was easier because communities are familiar with the wastes, but that opinions will change. The key issue for these communities will be whether the waste is at the reactor beyond the life of the reactor. Other participants felt that storage at nuclear reactor sites constituted a breach of trust for local communities, with one participant observing the problems being created for future generations through storage at nuclear reactor sites, and referred to the term “intergenerational remote terrorism.” As well as having potential licensing problems, the sites are also seen to be security risks.

Elaborating on security, one participant suggested that a more robust method of housing the used nuclear fuel would be required. Storage at nuclear reactor sites over the long-term would not be a simple above-ground storage solution. A “hardened” storage building/facility may be required, as future human

institutions may not be robust enough to be dependable over the very long-term. Compared to the monitoring for deep geological disposal, storage at nuclear reactor sites was seen to require constant maintenance activities and cost.

## 5. Other Management Approaches

### *Hybrid option*

Some participants suggested a convertible geological storage option. The option would involve underground storage at a centralized site for 30 years. The centralized storage site would be located at a deep geological repository site. After 30 years the used nuclear fuel would be repacked far below ground in proper format for deep geological disposal. Other participants suggested that straight deep geological disposal, without centralized storage, would instead be preferred. For both options, the decision of when to close the deep geological facility would pass from this generation to future generations.

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## 6. Implementation Considerations

Many of the participants pointed to the need for a strong recommendation coming out of the work of the NWMO. They supported the NWMO in making a responsible recommendation, even if it is unpopular. They noted that the NWMO must resolve the conflicting opinions. They also observed that good decisions are often difficult to make. A presentation to the new federal Inter-Ministerial Cabinet Committee on Sustainable Development, as well as to the Minister of Natural Resources per the *Nuclear Fuel Waste Act*, was suggested.

In terms of future institutional and governance structures, participants felt that an implementing organization must have a clear mandate and accountability. It must be able to receive a "Good Housekeeping Seal of Approval" for its recommendation, and be able to apply this with confidence to future waste management activities. It would be wise to broaden the base of the board of directors of the NWMO to draw in people from other interest groups to provide a wider diversity of representation. Further, they agreed that implementation activities must be transparent.

Participants felt that an implementation plan must have a strong communications focus. They acknowledged that society still has much work to do in terms of risk communications research. In this regard, it will be important to involve local politicians and people who are "influencers." Consultation will be essential even if a site is remote. Overall, the NWMO's engagement process was seen to be good and should continue. There will be a need to focus on the non-scientific population and youth, as the dialogue is currently among groups who are expert or well-informed in the issue. There will also need to be ongoing dialogue between northern and southern Ontario residents, between Aboriginal and non-aboriginal communities and urban and rural Aboriginal communities.

Participants felt that various levels of communications will be needed, noting that the general level of public paranoia about technology and science will first need to be addressed, followed by more in-depth dialogue and communication methods on issues involving used nuclear fuel management.

In addition, participants stated that the voluntary siting model will need careful scrutiny. In particular, they asked if reactor site communities have the opportunity to decide whether they want to volunteer, if the voluntary approach includes a veto, and if the veto would be given to reactor site communities.

Finally, Dialogue participants noted that the work the NWMO has been doing to engage Aboriginal participants and youth is good and should continue. Future work should have an even stronger emphasis on these groups. It was particularly noted that young people will be the ones who will implement the management approach chosen and that they need to be actively involved in the dialogue and decision-making process. There also needs to be broader discussions with people of Aboriginal communities, with the emphasis on having the opportunity to learn more in order to make sound judgments. Participants also noted the need to engage the chiefs and elders.

## 7. Other Participant Comments

The following are a range of ideas and opinions of participants:

There needs to be a scenario completed by the Assessment Team that assumes the ongoing production of nuclear energy in Canada. Long-term discussion on energy policy would be helpful to address some concerns associated with the nuclear waste issue. People need to continue to understand the connection between their energy uses and the waste created.

A few individuals suggested that the mandate of the NWMO needs to be more clearly defined. Some participants felt that the NWMO should exceed its mandate, in regard to issues around continuing use of nuclear energy, in making its recommendation. Others felt that the NWMO may already be exceeding its mandate and should return to what was specified in the *Nuclear Fuel Waste Act*.

One individual expressed the personal view that the NWMO was posting erroneous information on its website by accepting all submissions from individuals. Therefore, it was suggested that the NWMO should challenge the information it receives in order to reduce any misinformation on its website.

## 4. 4 Quebec Regional Dialogue Session

### NWMO Quebec Regional Dialogue Session

Friday, Feb. 25 and Saturday Feb. 26, 2005

Le Centre Sheraton  
1201, boul. Rene-Levesque  
Montreal, Quebec

#### Summary Notes

### 1. Introduction

The Quebec Regional Dialogue occurred on February 25 and 26<sup>th</sup> 2005 in Montreal. Nine participants attended representing interests in the fields of Aboriginal peoples, youth, education, communications, environmental, unionized nuclear workers and business.

The objective of the Quebec Regional Dialogue was to have participants learn more about and experience the Assessment Team's evaluation of the management approaches as presented in the report, "*Assessing the Options: Future Management of Used Nuclear Fuel in Canada*", to discuss the advantages and limitations of the management approaches and the implementation considerations for the future management of used nuclear fuel.

Quebec Regional Dialogue participants commented on how the three management approaches performed with respect to the objectives of: fairness, public health and safety, worker health and safety, community well being, security, environmental integrity, economic viability and adaptability. They also advised the NWMO on what an implementation process and plan for the recommended management approach should consider.

Several additional questions also important to the NWMO were addressed: How would we take action now, while maintaining adaptability? What particular advantages and limitations would be apparent for each management approach? If the answer to long-term management of used nuclear fuel does not lie among the management approaches specified by the Nuclear Fuel Waste Act, what other options should be considered? What are the elements of an implementation plan for each management approach?

### 2. The Dialogue Process

Quebec Regional Dialogue participants were pleased with the information presented at the workshop and felt that there had been a full discussion of the issues.

In preparation for dialogue, they heard two presentations. The first presentation, given by Pat Patton of the NWMO, was a backgrounder on used nuclear fuel and what the NWMO has heard to date. Pat outlined the assessment framework centred on citizen values, ethical principles and the eight objectives as well as the advantages and limitations identified by the Assessment Team. She also presented the implementation considerations that the NWMO has heard to date. The second presentation, given by Dr. William Leiss of the NWMO Assessment Team, addressed the multi-attribute utility analysis decision-making method and the preliminary conclusions drawn by the Assessment Team.

Dr. Leiss provided an overview of the 'Environmental Integrity' objective, the influences identified by the Assessment Team to assess the management approaches against this objective and the scoring process. Participants were then given the opportunity to complete their own scoring of the Environmental Integrity objective against each of the management approaches first in the 0 to 175 year time horizon and then in the



175 year plus time horizon. Participants applied their scores on a master graph (“Environmental Integrity Performance Value Score Graph”) and the range of scores for each management approach in each time-frame. The reasons for individual scores were then discussed.

Participants received a workbook providing all information that would support dialogue. It was clear to participants that the exercise was of an individual nature and that the NWMO was not looking for a consensus opinion.

### 3. Themes

Several themes emerged from the dialogue with Quebec Regional Workshop participants.

First, they felt that a management approach should be *safe and, provide a permanent solution while at the same time allow retrievability of the used nuclear fuel*. In this context, *retrievability* means do not make the used nuclear fuel facility impregnable. A management approach that was technically feasible, and provides for public health and safety would be considered socially responsible. To this end, while there was not a consensus, participants felt that Deep Geological Disposal in the Canadian Shield or Centralized Storage based on underground storage would be better choices for the management approach.

Second, participants discussed the matter of ‘finality’ and ‘permanency’ in terms of the decision to seal a Deep Geological Disposal facility. Participants felt that today’s generation doesn’t have enough information to make the final decision on when and how to seal the Deep Geological Disposal facility. Yet, they felt that the decision could reasonably be made over the next 30 to 50 years. Over that time period, Canadians will have better information on the future of Canada’s domestic nuclear energy program, they would know whether Canada would consider reprocessing of used fuel to have value and there would be more information about international demands for used nuclear fuel disposal facilities.

Participants also discussed whether leaving the waste unsealed would be a risk and cost burden on future generations. They felt that the current generation should bear the greatest responsibility for finding an appropriate solution for managing the waste. Delaying the decision to seal the Deep Geological Disposal facility, and thus leaving it open, flexible and adaptable is now the morally responsible choice. Although, the facility should not be so open, flexible and adaptable as to risk the release of radioactive material to the biosphere.

They felt that this generation has accepted the responsibility for managing the used nuclear fuel when it is most hazardous. Successive generations will continue to accept responsibility and in the short term, will decide when the used fuel is safe enough to transport to a storage facility or repository. Subsequent generations can decide when to close the facility and to stop monitoring. They asked, under this scenario, how much risk are we really passing on to the future? Some felt that the risks of transportation would be reduced, as would be the risks of the used nuclear fuel entering the biosphere.

Third, participants focused on the issue of security. While important, participants felt that the need to find a secure management approach should not override more important objectives. The objectives of public health and safety and adaptability are more important than security. In terms of economic viability, effective lower cost security options would be acceptable. In 20 years, we may or may not be as concerned about terrorism as today. It is seen appropriate to make public policy choices on the basis of normal events rather than disaster scenarios. That said, deep geological disposal in the Canadian Shield was seen to be the most secure management approach.

Fourth, Quebec Regional Dialogue participants suggested that about 30 to 50 years from now there may be a considerable shift in how we think about the long-term management of used nuclear fuel. Then, if there is no longer energy production and there is decommissioning of nuclear reactors, our focus will shift from the viability of a nuclear energy program to the viability of political institutions. Rather than receive support from the domestic nuclear program, Canadians will then begin to rely on political institutions to

insure adequate monitoring, safeguards, funding and a skilled workforce. Federal, Provincial and municipal cooperation on the matter of long-term used-fuel management will be important.

#### 4. The Assessment Framework

Participants understood and were comfortable with the methodology used by the Assessment Team. Nevertheless, they had comments on the Environmental Integrity Objective and other Objectives.

*Number/sensitivity elements of ecosystems potentially impacted* and related influences are seen to be the most important determinants of environmental integrity. Participants were concerned with several of the influences that defined environmental components as *resources*. They stated that ecosystems are not resources. They felt that *water* is the most important environmental integrity influence as addressed by *surface water* and *ground water*. The influence, *wastes produced by approach*, could be better defined as *reduces the volume of waste*. The *impact on biodiversity* and *seriousness of possible consequences to impact resources* could be added to the influence diagram.

With respect to other Objectives, participants offered the following observations and comments: Can *adaptability* be related to Deep Geological Disposal when the management approach is inherently not adaptable? An explanation was provided that the reason it was scored so highly is that the Assessment Team was using the ecological concept of adaptability, which is defined as “adjustment to environmental conditions.” Following this definition, the Team rated Deep Geological Disposal in the Canadian Shield as “highly adaptable” because it is, arguably, robust across a very wide spectrum of possible future environmental conditions, both “normal” and “abnormal” (climate change, earthquakes, new ice age, etc.) in nature. Quebec Regional Dialogue participants also suggested the addition of *political viability* as an objective. As an objective, it would address matters such as how the management approach would score in relation to: the need for inter-provincial cooperation; the need for Aboriginal peoples and other government cooperation; municipal acceptance; the ability to create partnerships.

#### 5. Strengths and Limitations of Each Management Approach

The strengths and limitations of the management approaches were first discussed based on ‘environmental integrity’ and then based on all of the objectives. Overall, the objective of *worker health and safety* was seen to be similar for all of the management approaches as participants assumed that the workers would meet occupational health and safety regulations. Participants discussed the need for an acceptable management approach to be highly safe, provide a permanent solution and allow the used fuel to be retrievable. While there was not a consensus, Quebec Regional Dialogue participants gave considerably stronger support to deep geological disposal than the other management approaches.

##### Deep Geological Disposal in the Canadian Shield

As an overview comment, some participants felt that social acceptability means the absence of a problem, and to this end, deep geological disposal in the Canadian Shield minimizes many of the problems associated with the other management approaches. A proponent can choose a site that would maximize economic and human benefits. Adaptability can be achieved if the used nuclear fuel can be accessible until a decision is made to seal the repository. In terms of economic viability, the cost may be high, but the costs could be amortized. The management approach removes the waste from the biosphere thereby achieving public health and safety, community well being and environmental integrity objectives.

Limitations of deep geologic disposal include the potential for economic unfairness for some northern communities, although this could be addressed through mitigation measures and community benefits. They also stated that they understand that the economic reality of many northern communities must be linked to their livelihood but that siting the deep geological repository in the north would mean putting the used fuel in “someone else’s back yard.” Although, most felt this could be a situation where majority interests are more important. On the other hand, while there was uncertainty over whether a deep geological repository

could be located in the vicinity of a Quebec community participants recognized that Quebec has had the advantage of investing in the nuclear industry and of using nuclear energy and there is the potential that this could happen.

Quebec Regional Dialogue participants discussed the need for the management approach to consider potential long-term economic spin offs. There are different ways of pursuing deep geological disposal and these sub-concepts would have both positive and negative impacts. If we look to how Canada’s mines are currently operated as a model, we see extensive adoption of community partnerships and benefit packages.

Quebec Regional Dialogue participants felt that a limitation of deep geological disposal would be the potential for water contamination and the difficulty of access to the used fuel in the event of a problem, although the likelihood for this was seen to be significantly lower compared to the other management approaches. Participants suggested that for a monitored site, this option offered more time to detect a problem and complete remedial action compared to the other management approaches requiring a more rapid response. In contrast, some participants thought that there may be less incentive to monitor deep geological disposal in the Canadian Shield for a very long time. One participant stated, “You see what is close to the heart and forget what you hide.”

### **Centralized Storage Above or Below Ground**

The opinion of Quebec Regional Dialogue participants was highly divided over the acceptability of centralized storage over the long-term. Some of the difference in opinion was due to different views of what Canada would look like in 175 years. If you look back 175 years, Canada didn’t exist. What institutional challenges will we be facing 175 years from now? Over the short term, most participants agreed that Centralized Storage could perform about the same as Deep Geological Disposal. If designed to be an underground facility it could have the advantage of allowing for short and long-term monitoring. They expect that Canadians would not see much difference between 50 meters or 1000 meters below ground. And, with only one site to monitor, the waste would be easier to protect than Reactor Site Storage.

For both the short and long-term, the need to transport the waste was seen to be a limitation. Many communities along a transportation route could be impacted. Over the long-term, the centralized storage approach is seen to be non-durable – particularly if above ground. There was seen to be an increased likelihood of a security breach due to human intervention. The need to repackage and rebuild a permanent facility at some later date is also a limitation. Some participants felt that Centralized Storage might also be an out of site – out of mind solution.

### **Storage at Nuclear Reactor Sites**

Quebec Regional Dialogue participants acknowledged that storage at nuclear reactor sites offers better access in the event of a future decision to repackage or reprocess the used fuel. Also, storage at nuclear reactor sites would not involve used fuel transportation risks. Reactor site storage doesn’t put all eggs in one basket if there is an environmental problem. It would be easier to fix one site. Thus, it is seen to achieve the objective of adaptability.

Participants felt that for the next few decades it should be acceptable for the used nuclear fuel to be on surface at reactor sites. There is expertise on site and the storage methods are proven. In the short term the radioactivity is high so there is a good reason to monitor and address any problems on-site.

However, because all of the nuclear power plants are close to water, and because the water is consumed by large populations, storage at nuclear reactor sites was seen to have serious limitations in terms of public health and safety, community well being, security and environmental integrity. In addition, reactor sites were not chosen as long term storage facilities for such a high concentration of used nuclear fuel. Storage at nuclear reactor sites has risks due to climate change. Participants cited issues related to glaciation, or alternatively, rising levels of water due to the melting of glaciers.

Water contamination resulting from failed reactor site storage at Gentilly could possibly affect the whole Gulf of St. Lawrence. Two of the long-term waste management sites would also be in the Greater Toronto Area. This was seen to be unacceptable. There are limitations in terms of fairness because people in reactor site communities were not initially consulted about long-term storage at the nuclear reactor site in their community; and some local residents have historically opposed the nuclear power plants. In terms of economic viability, the need to repackage the used fuel every 100 years was seen to be costly.

Short-term storage is acceptable because all of the public health and safety provisions of the working power reactors are present. Over the long-term there would be increased security threats and safety issues. In 40 years there is a possibility that the nuclear power reactors would not be functioning and long-term technical, financial and human resources support would be left to political institutions. Canada would then be left with "orphan" sites. Some participants felt that storage at nuclear reactor sites was equivalent to a 'do nothing' option.

## **6. Implementation Considerations**

Participants accepted that there would be a Cabinet decision, an environmental assessment and then a regulatory review and CNSC approval and licensing. Other suggestions for an implementation plan follow.

Effective communications is seen to be a primary requirement for effective implementation. And, all participants praised the NWMO for its ability to speak clearly about a highly complex subject. They pointed out the importance of communications strategies, education programs and the creation of materials that are understandable to Canadians.

However, the fundamental requirement is for 'coherency' and 'justification' as the policy underpinning of all communications. Canadians will want to know, how the management approach relates to energy policy and other policy issues. People across the country must see and understand the fundamental logic of the choice of management approach. A citizens committee or group of respected Canadians should be enlisted to engage in dialogue with Canadians.

There will also need to be consciousness raising and better communication about hazardous waste management. Quebec Regional Dialogue participants felt that people would have a different perception of used nuclear fuel transportation risk if they were aware of other dangerous goods that are currently transported safely through their communities. From another perspective, people tend to think about the management of used nuclear fuel as they do about the management of household waste. Participants suggested that the ideals of reducing, reusing and recycling may not be sensible for used nuclear fuel.

Partnerships will be an important element of a future implementation plan. Several participants suggested the inevitability of working with Aboriginal peoples and local communities. They pointed out; even reactor site storage will involve land claims issues. Citing Canada's current standard practices for mining, forestry and resource extraction, participants suggested that the management approach could be viewed as a partnership between Aboriginal peoples and local communities/ municipalities as co-proponents with the NWMO. Local communities will need to feel ownership of the management approach. As many remote communities are in decline, there will need to be economic development incentives. The NWMO will need to understand that aboriginal communities are diverse and have a complex decision making process.

Quebec Regional Dialogue participants suggested that a staged approach would be acceptable, but within a defined management approach. They asked do we want to spend the money to go down one route only to find that we have made a mistake? An implementation process is needed that tells us if we are making errors along the way. Confirm the geology, security and technical issues first and then look for a suitable site. They expect the implementation process to be accompanied by research and development. It will be important to identify risks that could result in negative effects for future generations.

As stated earlier, participants found the eight objectives used by the assessment team to be sound.

### Underground Centralized Storage or Centralized Storage at a Deep Geological Disposal Site

Participants suggested a fourth option of centralized storage in an underground or deep underground location. The option could involve sealing the chambers but leaving the access tunnels open, thereby allowing future generations to decide if and when they want to close the facility. And, it would allow for verification and adjustment at various stages over time. They also discussed some of the components of reprocessing and suggested that high level waste can be solidified through vitrification and this vitrified waste can be placed in long lived containers and isolated in a deep repository.

Future generations can decide when they want to stop monitoring the used fuel and close the facility. R&D and international partnerships would be important.

## 7. Other Participant Comments

Some participants defined used nuclear fuel management policy more broadly than the *Nuclear Fuel Waste Act*. Radioactive waste quantities may expand as Canada may some day be faced with having to find a repository for the decommissioned waste from reactors. In this regard, participants wondered if Canada would need to pursue a second management approach for this decommissioned waste. They also asked if it will be practical for the management approach to accept university reactor waste.

Others saw the future used nuclear fuel management facility as a financial asset. They noted how Quebec now assists the north-east U.S. to meet their green house gas emission responsibilities by providing hydro-electric power. They asked, could Canada offer to accept U.S. and international wastes in a future facility as a way of paying for the costs of proper long-term waste management? Should we be allowing other countries to store waste in Canada? Some participants felt that the management approach could be redefined to offer a financial return. Others felt that Canada must focus on solving its own domestic used nuclear fuel management challenges as a primary focus.

An individual asked why we are making decisions for Canada now when international waste management solutions may be available. Others responded that we must not rely on other countries. We must begin by solving our own problems first.

Finally, an individual thought that we should be finding ways to reduce the amount of waste as part of the domestic nuclear program.

## 5.0 List of Dialogue Participants

### 5.1 National Stakeholder Dialogue Session

The following were in attendance at the National Stakeholder Dialogue Session, January 31 and February 1, 2005 at the Courtyard Marriott Toronto hotel in Toronto.

<b>NAME</b>	<b>ORGANIZATION</b>
Dr. Robert Donahue	Canadian Geotechnical Society
Kealan Gell	Sierra Youth Coalition
Michael Earle	Power Workers’ Union
Murray Elston	Canadian Nuclear Association
Pat Harkness	Canadian Emergency Preparedness Association
Anna Stanley	Trudeau Foundation
Bob Maharaj	Young Generation in Nuclear
Chris Fay	Youth Round Table on the Environment
Dr. Colin Allan	Canadian Academy of Engineering, The Royal Society of Canada
Dr. Don Wiles	Chemical Institute of Canada
Dr. Mary Lou Harley	United Church of Canada
Dr. Pieter Van Vliet	Van Vliet Consulting
Ray Clark	Transport Canada
Ted Shin	Canadian Standards Association
Terry Bryan	Canadian Nuclear Workers Council
Gracia Janes	National Council of Women of Canada
Ken Smith	Canadian Nuclear Society
Shawn-Patrick Stensil	Sierra Club of Canada

## 5.2 New Brunswick Regional Dialogue Sessions

The following were in attendance at the New Brunswick Dialogue Session, Feb. 3 and 4, at the Lord Beaverbrook Hotel in Fredericton, N.B.

<b>NAME</b>	<b>ORGANIZATION</b>
Anna Girouard	PODIUM
Bill Artiss	Enterprise St. John
David Thompson	Conservation Council of New Brunswick
Gordon Dalzell	Citizens Coalition for Clean Air
Mike Mersereau	Canadian Nuclear Workers Council, New Brunswick
Neil Craik	Canadian Nuclear Society
Norville Getty	Union of New Brunswick Indians
Raymond Murphy	Union of Municipalities of New Brunswick
Susan Farquarson	Eastern Charlotte Waterways Inc.
Roger Steed	Canadian Nuclear Society
Cheryl Knockwood	Atlantic Policy Congress
Joy Milliea	Atlantic Policy Congress

### 5.3 Ontario Regional Dialogue Sessions

The following were in attendance at the National Stakeholder Dialogue Session, Feb. 10 and 11 at the Wyndham Bristol Place hotel in Mississauga, Ont.

<b>NAME</b>	<b>ORGANIZATION</b>
John Coupland	Thunder Bay Emergency Measures Office
Graham Strickert	Lakehead University Student Union
Linda Cunningham	Federation of Northern Ontario Municipalities
Shirley Farlinger	International Institute of Concern for Public Health
Steven Rowe	Ontario Society for Environmental Management
Chris Heysel	McMaster University, Nuclear Operations and Facilities
Dr. Derek Paul	University of Toronto, Department of Physics, Professor Emeritus, Vice President, Science for Peace, Executive Member, Pugwash
Gary Scripnick	Timmins Economic Development Corporation
Jack Falkins	Ontario Metis Aboriginal Association
Bill Limerick	Northwestern Health Unit
Peter Stevens-Guille	Canadian Nuclear Society
Dr. Grant Sheng	York University, Faculty of Environmental Studies
Temius Nate	Eaabametoong First Nation
John Boyce	Eaabametoong First Nation
Madeline Meeseetaweegesic	Eaabametoong First Nation
Cynthia Jourdain	Matawa First Nations Management
Dr. David Bell	York University, Faculty of Environmental Studies, retired and member, National Roundtable on Environment and the Economy
Dr. Archie Robertson	Nuclear Scientist, retired
Paul Heighington	Métis Nation of Ontario



#### 5.4 Quebec Regional Stakeholder Dialogue Sessions

The following were in attendance at the Quebec Regional Dialogue Session, February 25 and 26, at the Hyatt Regency hotel in Montreal.

<b>NAME</b>	<b>ORGANIZATION</b>
Guy Arbour	Securad
Roger Bélanger	Securad
Michel Bergeron	Chantier Jeunesse
Stéphane Bousquet	Canadian Nuclear Workers Council
Louis-René Dessureault	Sirsi Canada
Vincent Drieu	ENJEU
Martin Frankland	UNIVERTCITE
Alan Penn	Administration de Regional Cree
Colette Tardif	Independent Filmmaker