

DPRA Final Report

National Stakeholders and Regional Dialogue Sessions Regarding NWMO Discussion Document 1 “Asking the Right Questions”

DPRA Canada

Discussion Document 1: Asking the Right Questions? – What Canadians are Saying

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 1. Reports on these activities will be posted on the NWMO website. Your comment is invited and appreciated.

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NUCLEAR WASTE
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DES DÉCHETS
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DPRA FINAL REPORT – June 2004

Dialogue

National Stakeholders and Regional
Dialogue Sessions

REGARDING NWMO – DISCUSSION DOCUMENT #1
“ASKING THE RIGHT QUESTIONS”



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Nuclear Waste Management Organization National Stakeholder and Regional Dialogues

The Future Management of Canada's Used Nuclear Fuel

Discussion Document #1 – Asking the Right Questions?

- DPRA Final Report on the Dialogues -

1.0 Introduction

The Nuclear Waste Management Organization (NWMO) was created by Canada's major owners of used nuclear fuel to meet their obligations under the *Nuclear Fuel Waste Act, 2002*. The organization's mandate is to conduct a comprehensive study of approaches for the long-term management of used nuclear fuel, to recommend a preferred approach to the Government of Canada, and to implement the approach approved by the Government on the recommendation of the Minister of Natural Resources.

The NWMO has committed to “develop collaboratively with Canadians a management approach that is socially acceptable, technically sound, environmentally responsible and economically feasible.” The *Nuclear Fuel Waste Act* requires the organization to consider, at a minimum, three methods: deep geological disposal; storage at nuclear reactor sites; and centralized storage, either above or belowground. Individuals, organizations and communities of interests are being engaged in open and transparent dialogue with the NWMO throughout all phases of its study plan, as it seeks to identify a preferred approach for the long-term management of used nuclear fuel for Canada.

The first discussion document issued by the NWMO is entitled, ***Discussion Document 1: “Asking the Right Questions?”*** The document is an invitation for Canadians to reflect on the complex issues posed by used nuclear fuel and provide their perspectives on various methods and approaches for its long-term management and how those should be evaluated.

NWMO initiated a number of activities to engage Canadians in reviewing and commenting on its effort to develop an approach to manage Canada's used nuclear fuel. These activities include:

- opportunity for review, comment, deliberation and dialogue through the NWMO web-site (www.nwmo.ca)
- a national citizens' dialogue designed to identify core Canadian values;
- working with and learning from the experiences of communities with nuclear reactors;
- working collaboratively with aboriginal peoples, to establish dialogue processes consistent with their needs;

- a national stakeholder dialogue for organizations with an active interest in the management of used nuclear fuel and public policy matters; and
- regional dialogues, one for each of the three Provincial jurisdictions (Ontario, Quebec and New Brunswick) which currently use nuclear power.

The last two dialogues are the subject of this report.

2.0 National Stakeholder and Regional Dialogue Process

The National Stakeholder and Regional Dialogues engaged participants representing a variety of interests, including persons and organizations with a record of interest in Canada's work on the long-term management of nuclear fuel wastes and those with an interest in public policy matters.

These can be drawn from:

- (a) The Federal Environmental Assessment (EA) panel review of AECL's Environmental Assessment (the Seaborn panel);
- (b) Individuals and organizations involved in AECL's past Community Consultation process on the EA;
- (c) Individuals and organizations with a record of involvement with Ontario Power Generation on matters related to used nuclear fuel management;
- (d) Individuals and organizations involved in Hydro Quebec and New Brunswick Power, environmental assessments and consultations pertaining to nuclear energy issues;
- (e) Participants in previous attempts to establish nuclear waste management facilities, including those associated with Canada's Siting Task Force Process for establishing Low-Level Radioactive Waste Management Facilities; and
- (f) Individuals and organizations who have participated in or expressed interest in NWMO activities.

The dialogue was intended to provide opportunities for people and organizations to contribute their views and opinions on NWMO *Discussion Document #1 – "Asking the Right Questions?"* *Discussion Document #1* is the foundation of the NWMO study process and outlines key concepts and key questions that are intended to guide the development of a proposed approach for the long-term management of Canada's used nuclear fuel.

2.1 How was it determined who to Invite?

Several considerations influenced the identification and recruitment of participants for the dialogue sessions, including:

- 1) Ensuring participation by a wide and representative cross-section of societal interests, including environment, aboriginal, youth, science, education, energy, health, consumer, religious, labour, social/cultural, and business.
- 2) Ensuring a balance of geographic and interest participation.

DPRA, dialogue facilitators, established eleven categories of interest (*Appendix 6* provides the rationale for each participant category). The dialogue aimed to engage approximately 20 participants for each of the four-dialogue sessions representative of the following categories:

Participant Categories

- Local/Municipal Government
- Education/Academic
- Environment
- Health
- Social/Cultural and Faith Perspectives
- Industry/Economic
- Professional Societies
- Labour
- Youth
- Emergency Preparedness
- Consumer

2.2 Who were the Participants?

DPRA conducted web-based research and sought referrals from potential participants and others to help identify who may have an interest in participating in the dialogues.

Recruitment consisted of contact by telephone to personally invite participation. Once one or two participants representative of a category of interest confirmed their participation, no further attempt was made to recruit additional dialogue participants for that category.

Appendix 1 provides the list of dialogue participants for the national stakeholder dialogue and each of the three regional dialogues.

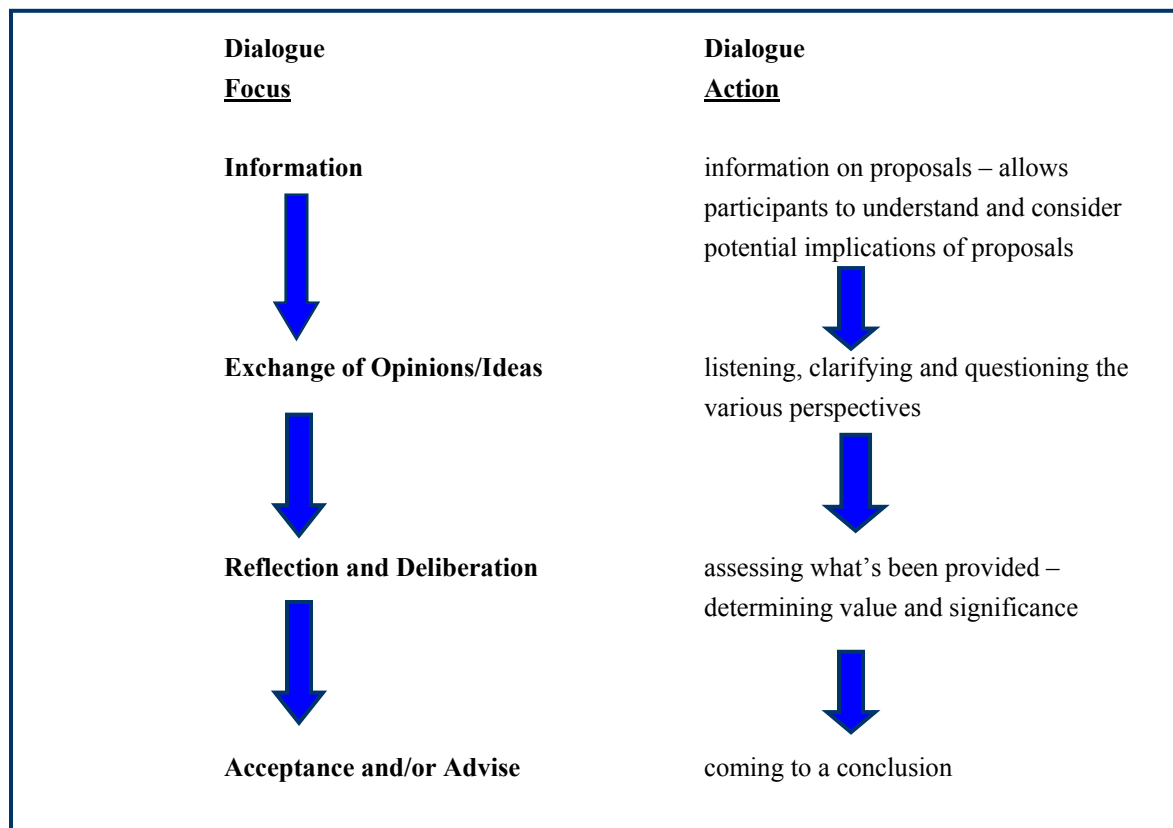
2.3 How the Dialogues Worked

A dialogue by definition is not a one point in time discussion. For a dialogue to be meaningful, it must pass through a sequence of interactions that include:

- providing information that allows a person to determine the nature of interest;
- reviewing and questioning of information for the purpose of clarification and ensuring understanding;
- providing an opportunity to express an opinion or idea on the information;
- reflecting or deliberating on a response to the opinions or ideas presented;
- providing a forum for an exchange of views and opinions with others; and,
- a conclusion either in the form of acceptance or advice.

For a dialogue to be successful it should follow this sequence of steps, leading to an informed and well-considered exchange of ideas and responses among participants. A key design consideration is to maintain the participation of dialogue members in a series of discussions for the purpose of establishing productive relationships among the participants, a common understanding of the various views and opinions and the underlying reasons why people hold those views.

Figure #1: The Dialogue Process



A dialogue is therefore structured to provide for on-going exchange, including a time for reflection and deliberation on the views of others and to consider the significance of these views and opinions before coming to a conclusion.

The NWMO national stakeholder and regional dialogue structure consisted of four main elements:

- The provision of background materials - Discussion Document #1 – Asking the Right Questions? - to all confirmed participants, which was used as foundational information for the dialogue.
- An initial, face-to-face meeting of participants, to introduce the participants to the dialogue process, each other, and the initial set of questions.
- An second, full day meeting, approximately 3 – 5 weeks later, to further the dialogues
- An electronic, web-based dialogue forum which allowed individuals to pursue their ideas, and to allow participants from all dialogues to meet each other. The electronic dialogue process allowed participants to: *share ideas; continue the discussion on matters of interest; and, exchange opinions on a Dialogue Message Board.*

The dates, times and locations of the dialogue sessions are included in *Appendix 2 and Appendix 3.*

2.4 Dialogue Content

The dialogue focused on an in-depth critique of NWMO's Discussion Document #1 – Asking the Right Questions? The foundation for the discussions rested on four key questions:

- 1) **The Nature of the Problem** – has the problem been correctly described? What else needs to be considered?
- 2) **Key Terms and Definitions** – are the key terms and definitions regarding the technical methods and management approach clear, understandable and appropriate?
- 3) **The Technical Methods** – is the characterization of the technical methods appropriate? Should other technical methods be considered in the study beyond the three required by legislation?
- 4) **The Analytical Framework** – does the framework identify the key issues? What changes should be considered?

The National Stakeholder and three regional dialogues each considered and responded to these four questions. Several participants provided additional comment and opinions through the electronic dialogue between the two sessions.

3.0 Summary of Dialogue Discussion

Following is a summary of the main comments put forward by individuals as they reflected on the different discussion areas and contribution via the electronic dialogue. No attempt was made during the dialogue to achieve a consensus or agreement on the various comments. Where agreement was evident, or where the facilitators felt that a preference emerged, it is noted. The summary of the dialogue is presented as follows:

- 3.1 The Nature of the Problem Facing Canada
- 3.2 Key Terms and Definitions
- 3.3 Basis for Determining Whether to Study Technical Methods
- 3.4 The Proposed Analytical Framework

The summary does not attribute comments to any particular dialogue unless a subject or perspective provided was unique to one of the four dialogues. DPRA as a facilitator has grouped, where appropriate, the themes and comments presented at each of the dialogue to reflect common opinion. Several of the conclusions presented in this summary reflect DPRA's interpretation of the dialogue discussions.

3.1 The Nature of the Problem Facing Canada

The first session of the national stakeholder and regional dialogues focussed on an examination of the nature of the problem facing Canada concerning the future management of used nuclear fuel. The question for discussion was the following:

Has the problem been correctly described? What else needs to be considered?

Participants viewed the problem from many different perspectives and see the problem as being multi-dimensional. This includes:

- 3.1.1 The Nature of the Hazard
- 3.1.2 The Volume of Used Nuclear Fuel
- 3.1.3 Determining the Role of Nuclear Energy as Part of the Energy Supply Mix –
The Implications for Waste Management
- 3.1.4 The Future Use of the Used Nuclear Fuel
- 3.1.5 Ethics – Doing What is Right
- 3.1.6 Engaging Canadians in the Process

3.1.1 The Nature of the Hazard

One of the significant problems that needs to be addressed within the management approach is to better understand the hazard associated with the used nuclear fuel and to ensure that the hazard is fully managed. While there was agreement on this premise, there were a number of views expressed regarding the significance of the long-term hazard presented by the used nuclear fuel.

It was agreed by all that radiation from the used nuclear fuel can represent a significant hazard or risk to human health and the environment and needs to be carefully managed for a long period of time. However, the nature of the hazard or risk, and the time-period over which it exists, is the subject of debate.

Several participants suggested that as time goes by, the nature of the hazard and the associated risks change. Some indicated that the risk from external exposure to radiation is initially large but it is the risk of internal radiation through ingestion that remains a major concern over time. Many participants suggested that at some point, the hazard and risks will become very low and the requirement for management will become less. Others remarked that there is no safe level of an exposure to radiation and high management standards will be required until monitoring results clearly indicate otherwise. Some suggested that even low-levels of radiation would cause low-levels of risks; of particular significance is the potential for human exposure through ingestion of contaminated water.

Some felt that since there is uncertainty as to the nature of the hazard over time, the NWMO is not in a position to determine which interpretation of the long-term hazard is correct. In this respect, it was suggested that the NWMO in formulating the problem that needs to be addressed, should assume that radiation exposure risk would be significant initially, with no certainty that the risk reduces over time. This concept of prudence or taking precaution should be reflected in developing, assessing and selecting the management approach. On-going monitoring and oversight of the management approach should be required until there is a clear certainty that the managed used fuel no longer represents a risk to human health and the natural environment.

Directly associated with understanding the nature of the long-term hazard of radiation from the used nuclear fuel is that the nature of the hazard needs to be presented in terms and ways that are understood and relevant to Canadians. In describing used nuclear fuel management, radiation exposure needs to be placed in a context with other voluntary and involuntary societal risks in order to better inform Canadians as to the nature of the risk. The majority of participants agreed with this proposal and several urged that the presentation of risk should not be restricted to used fuel management but the full nuclear energy production and use cycle.

There was agreement at the Ottawa dialogue that there would be value in establishing a set of agreed facts so that all dialogue participants and all Canadians would have the same base of knowledge and understanding as to the nature of the risks presented by used nuclear fuel. The process to establish this set of facts would need to involve participants, and appropriate reference materials. For example, in addition to relying on international consensus documents on exposures to low-level radiation, a panel of

experts acceptable by the different views could be established. It would be the responsibility of the panel to ensure that any agreed upon facts are presented in terms that are understood and relevant to Canadians. While there was support at the Ottawa dialogue for establishing a set of facts, a concern was expressed that while facts could be agreed upon, there may be disagreement on the interpretation of the significance of the facts. The panel would therefore need to arrive at a common understanding of not only the facts but also the interpretation of the significance of the facts. One participant submitted via the electronic dialogue a proposal that could be used as a starting point for establishing the facts. This proposal is found in *Appendix 4, page 4-9*.

Regardless of one's interpretation of the nature of the hazard, there was a clear and consistent message concerning the need to safely manage the used fuel. Several additional suggestions addressing matters related to the nature of the hazard were provided to help guide the selection of a management approach including:

- any selected waste management approach must ensure that the used nuclear fuel contaminant cannot be breached by people or nature, any facility must be secure – this is of paramount significance;
- the used nuclear fuel should be carefully handled to minimize or avoid the potential for radiation exposure through accident;
- the management of these wastes is an important decision that will have implications for thousands of years, a quick and/or final decision is not necessary in the sense that there is no immediate danger or risk. Interim storage at the reactors is both safe and secure, with a life expectancy of at least 30-40 years. This provides the NWMO with the time to take a phased or step-wise approach to decision-making, taking advantage of the research studies being undertaken by others and advancements in nuclear waste management technology; and
- the development of any management approach should be guided by the precautionary principle.

3.1.2 The Volume of Used Nuclear Fuel

There was widespread agreement among the participants that the 1.7 million bundles of used nuclear fuel currently in on-site storage and the additional 2.0 million bundles of used nuclear fuel anticipated to be generated over the remaining 20-30 year operating life of the existing fleet of nuclear reactors will need to be safely managed. This is the volume of wastes which currently exists and is likely to exist for which a long-term management approach is required.

Many participants felt that it is this volume of wastes that defines the complete extent of the problem that the NWMO must address. Those holding this perspective strongly advocated that as the fleet of nuclear reactors expire, no new nuclear reactors would be built. Others stated that the 1.7 million bundles in storage and the anticipated additional 2.0 million bundles represent the known volume of used fuel that will require management. The volume however may be greater if additional nuclear reactors are built. If so, it would be the responsibility of the NWMO to also manage future quantities of used nuclear fuel.

It is clear from the discussions that the future of nuclear energy is important to most participants in order for them to be able to frame the nature of the size or volume of the waste management problem. If nuclear energy is to remain as part of the supply, greater volumes of wastes will need to be managed. In this respect, determining the future role of nuclear energy is important since the volume of the wastes requiring management may have a direct impact on the selection of the type, cost and requirements of a waste management approach.

In the absence of a clear position on the future role of nuclear energy, it was suggested that the NWMO could not confidently define the actual problem in terms of size or the amount of wastes that will need to be managed. It was suggested that the NWMO should therefore consider the use of different operating scenarios to guide its planning and assessment of management approaches. Three operating scenarios were suggested for consideration:

- Phase out/decrease nuclear energy
- Maintain a steady state (the current situation)
- Expand nuclear energy production

The selection of a preferred management approach, it was felt, may vary for each operating scenario. What may be the best solution for a nuclear energy phase out scenario may be quite different than the management approach that best meets the needs under a scenario that anticipates an expansion of nuclear energy production. A scenario approach could be a useful way of examining options and developing criteria for comparison of management approaches, in the absence of a firm understanding of the future used nuclear fuel quantities.

It was also clear that other nuclear wastes would require management and need to be included in the problem that needs to be addressed. It was suggested by several participants that the wastes from research and medical facilities should also be considered as part of the total volume of wastes to be managed by the NWMO.

Regarding the future decommissioning of nuclear reactors, it was suggested that any contaminated material should be managed by the NWMO and should be included as part of the problem.

There were questions raised whether the NWMO has responsibility for the management of low-level radioactive wastes and uranium mine tailings. These wastes are not considered to be part of the NWMO mandate, responsibility for their management and regulatory approvals fall to others in the federal and provincial governments and industry.

3.1.3 *Determining the Role of Nuclear Energy as Part of the Energy Supply Mix – The Implications for Waste Management*

The discussion of long-term management of used nuclear fuel raised a debate on the merits of nuclear energy and whether there should be a role for nuclear energy production as part of future energy supply. On this point, there was no agreement among participants and two strong opposing views were expressed.

For those in favour of phasing out or discontinuing the production of nuclear energy, the following concerns were expressed in support of their position:

- the real and perceived risks to human health and the environment caused by the production of nuclear energy;
- the potential for long-term radiation exposure from managed used nuclear fuel and uncertainty of the potential effects on human health and the environment for several hundreds of years into the future;
- the transferring of a management and financial burden to future generations to continue to manage wastes produced by our generation;
- the significant costs associated with establishing, operating and closing nuclear generation facilities and future waste management facilities;
- Canadians do not currently understand the full costs of nuclear energy production, once informed of the costs, Canadians will demand more cost-effective and environmentally friendly options; and
- the need to invest in energy conservation and development of environmentally acceptable and less costly energy alternatives, e.g. wind and solar.

Many participants held the opposite view and expressed several reasons in support of maintaining and expanding nuclear energy production:

- society has expressed a demand for reliable energy supply. For some provinces, nuclear energy represents a significant component of energy supply that will be very difficult to replace;
- nuclear energy production has been proven to be safe; reliable and environmentally acceptable;
- other government policies have an influence on the future energy supply. In particular, Canada's commitment to the Kyoto Protocol and the intent to phase out fossil fuel energy production will require a greater role for nuclear energy in order to address emerging climate change issues;
- alternate energy sources are either unproven or too expensive to meet Canada's needs;
- energy conservation is not a complete answer, demand for energy continue to grow; and

- the Federal government and three Provinces possessing nuclear reactors have had the debate on the issues and have determined that nuclear energy will continue to play a role in future energy supply.

The future of energy policy was acknowledged by most participants as being beyond the mandate of the NWMO. To this group of participants, the NWMO has no say or role in future energy supply; its responsibility is focused and limited to providing a long-term waste management solution. The NWMO mandate is to determine how to best manage nuclear wastes including all the wastes that currently exist and that will be produced in the next 20-30 years. If there is a decision to continue to use nuclear as part of the energy supply, the NWMO is required by its mandate to also manage these future wastes.

An opposing view, also held by many participants, was that while the NWMO does not have a say in future energy policy, it has an obligation to provide comments or observations that might influence the debate on this public policy issue. Those expressing this view advocated that the NWMO is in a position to make recommendations or observations to the energy producers and governments. At a minimum, it was suggested that the NWMO needs to acknowledge the differences of opinions that drive the debate on the future role of nuclear energy and fairly present the implications of this difference of opinion for the future management of the wastes.

3.1.4 Future Uses of the Used Nuclear Fuel

There was a wide range or a spectrum of views expressed by participants concerning the potential future use of the used nuclear fuel.

At one end of the spectrum were suggestions that there should be no future use of the used nuclear fuel regardless of the advancements in research and technology. The material should be viewed as a waste and it should be disposed or isolated in such a way that it cannot be retrieved and not used for any purpose.

Others suggested that regardless of the management approach selected, the used nuclear fuel should be accessible and retrievable but only for the purpose of neutralizing or reducing the toxicity of the used fuel. In support of this view, it was suggested that Canada should not consider the reprocessing of the used nuclear fuel as a source of future energy. Several reasons were provided:

- the risk associated with the handling and transport of these wastes for reprocessing are likely to be significant;
- the costs associated with the reprocessing of wastes are likely to be significant. The money that might be invested in research and development of reprocessing would be better allocated to research and development of alternate energy sources including wind power, solar power and other renewable technologies and energy conservation; and
- the reprocessing of the used nuclear fuel may increase opportunities for the material to be acquired and used for undesirable use, i.e., acts of terrorism or war.

While those expressing this view clearly did not support the reprocessing of used nuclear fuel as an energy source, it should not be interpreted as opposition to the potential retrieval of wastes for future management. For this group, the concept of future retrievability should be maintained but only for the possible purpose of applying technology to reduce wastes toxicity and not for future energy use.

There was support for the concept of the future use of used nuclear fuel as a potential source for future energy production. While it was generally acknowledged that the availability and current cost of uranium in Canada would make reprocessing of the used fuel unlikely for many years, Canada should keep an open mind on this option as a possibility for the future. For those who felt that this waste material should be considered as a potential energy resource, it was suggested that it would be irresponsible and therefore unethical for Canada to make this resource unavailable for future generations. In this regard, the problem that needs to be addressed is related to the decision determining the future fate of the used nuclear fuel. It was suggested by those supporting the possibility of future use of the used fuel that the selected waste management approach should include or allow for the access to and the ability to retrieve the used fuel.

It was noted by some participants that AECL has in the past participated in research efforts to develop and assess reprocessing technology. It is suggested that some of the energy producers are also currently conducting on-going research. It was suggested that Canada could play a leadership role in research and development of emerging technologies to make use of the remaining energy in the used fuel bundles. It was noted by one participant that the Organization for Economic Development (OECD) is leading research that examines six methods of reducing the radioactivity of the wastes and using the energy that remains in the used fuel. Almost 20 countries were participating in this research effort; however, it was unknown whether Canada was an active participant. Canada, it was suggested, should not only participate in this type of research but should assume a leadership role.

There was considerable discussion as to the merits of transmutation. There was concern expressed over the feasibility of transmutation in that, as a first step, the used fuel must be reprocessed and the uranium separated before the remaining radionuclides can be subjected to transmuting radiation. Reprocessing, it was noted, is costly and difficult raising the possibility of radionuclides being released in the environment. Further, there is little evidence to suggest the process will be able to greatly reduce the toxicity of the used fuel.

A recurring message that represents a view expressed by many participants was that while current technology might not be sufficiently advanced to allow for the cost-effective re-use of the remaining energy or the reduction of the toxicity of the used fuel at this time, the potential does exist for the future. It was suggested that the NWMO should consider an adaptive management approach for management of the used fuel. Part of the problem that the NWMO needs to address therefore is to anticipate and assess the possibilities for the future and that whatever the management actions taken today by Canada should not preclude the possible future use or treatment of the used nuclear fuel.

3.1.5 Ethics – Doing What is Right

Much of the discussions concerning the definition of the problem touched on many of the ethical issues surrounding the future management of used nuclear fuel. There was general recognition across all dialogues that there is a need to articulate an ethical framework at the outset to guide the NWMO planning and decision-making process as well as the implementation of the selected management approach. This framework, potentially supported by a set of principles, should consider the following challenges:

- How can we predict what society will be like in the future and how it might respond to the need to continue to manage wastes? What are the implications of alternate futures for long-term waste management?
- Is this a problem that we can or should leave for future generations to solve?
- We have derived the benefits of nuclear energy, what are our responsibilities to solve the problem? Do we have the right to make a final decision as to the fate of these wastes? Do we have an obligation to do so?
- Dealing ethically with future generations must first be rooted in the ethical principles that are applied in the current process.

It was suggested by many participants that these and other important questions need to be considered in defining the nature and scope of the problem that needs to be resolved. It was also suggested that the NWMO panel of ethics experts should be expanded to reflect a wide cross-section of Canadian interests. In addition to the work of NWMO's ethics experts, consideration should be given to identifying and assessing the generally accepted international principles regarding ethics for potential application by the NWMO. These may be used in part to help guide the selection of the preferred management approach.

There was much discussion as to how NWMO would determine an ethical framework. In particular given Canada's multi-cultural pluralistic society, the question was asked how does the NWMO decide whose ethics to apply and who should be involved. In this regard, it was suggested that the NWMO ensure that the range of ethics experts be truly representative of the different social, cultural and religious interests of Canada.

3.1.6 Engaging Canadians in the Process

Many participants felt that in defining the problem that needs to be addressed, the NWMO needs to select a management approach that is socially acceptable. It was suggested that this was a clear direction of the Seaborn Panel recommendation on AECL's Environmental Assessment for the deep geologic disposal concept.

Many participants felt that the NWMO needs to provide a definition or explanation of what would constitute a management approach being socially acceptable. Several participants felt that this was not evident from *Discussion Document #1 – Asking the Right Questions*. Many suggested that part of the test

for a management approach being socially acceptable is the effective engagement of Canadians in the planning, development and oversight of the management approach.

In relation to this, participants provided many proposals for consideration:

- The need to inform all Canadians on the full benefits and costs associated with nuclear energy production, use and management. NWMO, it was suggested, should develop and implement a broad public communications and awareness program that will better inform Canadians on used nuclear fuel and allow them to make considered decisions on whether to engage in the NWMO planning process.
- All communications (written, television, video, etc.) needs to be developed and presented in language that is understood by all Canadians. All concepts regarding risks, benefits and costs must be presented in ways that are relevant to the layman. All information should be accessible by any interested Canadians. A range of opportunities to access information should be considered.
- In developing information for distribution to the public, care needs to be taken to provide information on all different perspectives and views. All information presented must be balanced to allow Canadians to understand and assess the different points of view.
- Opportunities for citizen engagement by any interested Canadian must be provided. A wide range of consultation methods should be assessed and methods should be implemented to meet the needs of Canadians for involvement in this planning and decision-making process.
- Those most directly affected by a management approach must have a voice in determining the acceptability of the proposals from both an individual and community perspective.

It was stressed by the participants providing this advice that these proposals are but part of the determination of socially acceptable. It was felt that the burden rests with the NWMO to provide further details on how it will determine social acceptability.

3.2 Discussion on Key Terms and Definitions

Prior to an in depth discussion of alternative methods, dialogue participants were asked to consider some key terms and definitions. These included:

- > Technical Method
- > Disposal
- > Storage
- > Treatment
- > Management Approach

Participants were asked to provide advice whether the definitions presented are appropriate and clear. The following is a summary of the comments provided on each term.

(a) Key Term – Technical Method

Definition: *A method is defined to be a technology, technique, technical process or procedure for handling used nuclear fuel.*

Generally, the participants of all four-dialogue sessions felt that the definition for the term technical method was complete and understandable. There were no proposals or suggestions for modification or further explanation of the term.

(b) Key Term - Disposal

Definition: *A method of isolating used nuclear fuel from humanity and the environment; the method must be conclusive and without the intention of retrieval or reuse.*

At all four dialogue sessions, there was considerable discussion and debate on the definition of disposal. Several perspectives emerged.

The first is that the proposed definition is both acceptable and appropriate. Disposal means that the method is indeed conclusive and that there is no intention of retrieval or reuse of the used nuclear fuel. Several participants felt that this definition is easily understood by the public and is consistent with the public's understanding of disposal as used in other waste management contexts particularly solid wastes management. Disposal of the waste material means it is gone, there is no future use, and the material has reached its final fate.

Some of the participants who expressed this view suggested that disposal does not or should not mean that there is no commitment to oversight and monitoring of the disposal method. Depending on the disposal method selected, the commitment to monitoring the effectiveness of the method would need to be determined. There was a strong view expressed that the definition of disposal as currently presented left the impression that there would be no oversight and no monitoring. It was suggested that the definition needs to be amended to make clear that oversight and monitoring activities would apply to any disposal method. The disposal method would therefore be "actively" managed at least for a period of time until the monitoring would indicate otherwise.

At the national stakeholder's dialogue, one participant noted that the definition of disposal proposed by the NWMO was not identical with that used internationally, e.g. as set out by the International Atomic Energy Agency (IAEA). It was also noted that throughout the Seaborn Panel hearings, AECL made the point several times, that, the deep geological disposal concept did not preclude the possibility of retrieving the wastes. Retrievability during the operational phase was in fact a regulatory requirement and retrieval would be possible even after closure of the facility, if necessary. It was suggested that since

deep geologic disposal is one method that must be studied, that the definition of this disposal method be clarified by noting that deep geologic disposal method is designed to be “passively safe”. This means that there is no need to retrieve for safety purposes and monitoring could stop after a period of time. This, however, would not preclude retrieval for other purposes if future conditions dictate. It was suggested that this notion of future access and retrieval, if necessary, should be reflected in the definition for disposal.

The second view proposes a more dramatic change to the definition. In the Ontario dialogue, some participants proposed that the term disposal be replaced by the term placement or that placement be added as an additional term. If it is accepted that disposal means the final fate of the wastes with no opportunity for retrieval, then other methods need to be considered that will allow for future retrieval, if necessary. The term placement could include many of the currently described disposal methods but modified to allow for future retrieval. In this way, deep geologic placement would differ from deep geologic disposal in that the former allows for retrieval and the latter does not. Placement would be defined as “the placement of wastes whether at reactor sites, central location or in deep geologic settings”. The key distinction is that the definition would not imply that any placement method would be conclusive or a final fate, the potential for future retrieval would be maintained, even if not initially intended. Underlying this proposal was the perspective that this generation cannot know the long-term effectiveness of any method from a human health and environmental risk perspective. Further, the potential for future technological advancement is also unknown, which may allow for the future use of the waste material as a resource or allowing for a reduction in toxicity. It was felt that the term placement offers clarity regarding future management flexibility that is not currently provided in the definition of disposal.

Regarding the definition of the term disposal, three general recommendations seemed to emerge and they are not necessarily consistent. The first is to continue to use the definition of disposal as “being conclusive and without the intention of retrieval” – disposal is the wastes’ final fate. The second is to modify the definition of disposal to include a commitment to monitoring and oversight. Third, add another term that being placement. This new term would be defined to ensure that no disposal method is considered conclusive or the final fate. The intent would be to commit to actively managing the wastes and to allow for retrieval even if the current intent is not to retrieve.

While this discussion was meant to provide clarification of the term and to provide a common language, it provoked a significant discussion. This may reflect participants’ interest in identifying and assessing the merits of the concept of disposal within the management approach more than the definition of the term.

(c) Key Term - Storage

Definition: *A method of maintaining used nuclear fuel in a manner that allows access, under controlled conditions, for retrieval or future activities.*

All four-dialogue sessions found the definition for storage to be appropriate. In light of the comments provided under disposal, it was proposed that the definition of storage be amended to clearly state that

with these methods there is “the intention to retrieve” the wastes. While the current definition speaks to “allowing access”, the proposal is to make clear that storage presumes that other activity (e.g. research) is being conducted that will result in the need to access the used fuel. In this sense storage can be considered as an interim management method (either for a short period or a significantly long period). This implies that a step-wise approach to management would be used dependent upon future societal needs and technical knowledge.

(d) Key Term - Treatment

Definition: *Processes applied to Used Fuel that Changes its Characteristics.*

The definition was found to be acceptable. One expressed view was that for greater clarity, it was suggested that the definition might be expanded to include, as an addition after the word characteristics, “by reducing volume and reducing toxicity”. It was felt that this definition would help to specify that the intent of any treatment would be to manage the wastes and not process the material for reuse. Others suggested that the definition should not be constrained in this way, that flexibility to meet future needs should be maintained.

(e) Key Term – Management Approach

Definition: *Consistent with the Nuclear Fuel Waste Act, and building upon preliminary discussions with Canadians, the NWMO interprets the concept of a management approach to be broad, encompassing the following components:*

- *a suggested technical method (or sequence of methods) for storage or disposal;*
- *the related infrastructure and support systems, including transportation; and*
- *an implementation plan that sets out such things as:*
 - *long-term administrative, legal and financial arrangements;*
 - *key characteristics of the implementing organization;*
 - *details of an independent review mechanism;*
 - *an implementation strategy that will include a timetable for action and the identification of specific tasks and responsible parties;*
 - *principles of site selection;*
 - *how to avoid, or minimize, significant negative socio-economic effects on a community’s way of life or on its social, cultural or economic aspirations; and*
 - *a program for public consultation consistent with that approach.*

Participants provided few comments on the definition of the term management approach. Generally, the definition was accepted as being appropriate. Some participants suggested that a clear description of the

intent and application of the management approach be provided. The current wording was viewed by some as so general, it lacks meaning. The following enhancements or additions were proposed:

- The management approach should recognize and anticipate a step-wise or an adaptive management approach to managing the wastes. This would mean no final commitment. As new information and knowledge becomes available, the NWMO would re-evaluate and establish new directions for the management of the used fuel, if warranted.
- The definition should include a commitment to research emerging technical methods.
- The definition should include a specific reference to ethical considerations as guiding principles for the management approach.
- Communications and awareness building should be identified as components of the management approach.
- The management approach should provide a description of the NWMO and government decision-making process.

3.3 Basis for Determining Whether to Study Technical Methods

Participants were asked to consider the range of technical methods presented in *Discussion Document #1 – Chapter 4*, and to provide advice on whether a rationale existed for the NWMO to study technical methods, other than the three methods required by the Nuclear Fuel Waste Act (NFWA) – deep geological disposal in the Canadian Shield; storage at nuclear reactor sites; and centralized storage (either above or below ground).

Regarding the technical methods, the NWMO was interested in knowing the following:

- ***Is the characterization of the technical methods appropriate?***
- ***Should other technical methods be considered in the study beyond the three required by legislation? On what basis should that determination be made?***

(a) Technical Methods of Limited Interest

Discussion Document #1 identifies eight technical methods of limited interest. These are methods that have been studied at some point in the past 40-years, but none have been implemented, nor are they a focus of a major research effort. The eight methods are described on p. 68-70 of Discussion Document #1. The eight methods presented are:

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- | | |
|-----------------------|--------------------------------|
| – Direct Injection | – Disposal in Ice Sheets |
| – Rock Melting | – Disposal in Subduction Zones |
| – Sub-seabed Disposal | – Disposal in Space |
| – Disposal at Sea | – Dilution and Dispersion |

The dialogue participants were asked whether there was a basis or a rationale for the NWMO studying any of these methods.

There was widespread agreement at all four dialogue sessions that these eight methods ought not to be studied. The reasons provided include:

- The fact that almost no country is studying or researching these methods suggests that the methods have little merit either from a feasibility or a risk/consequences perspective. Since no other country is pursuing these methods, it would be unreasonable for NWMO to study/consider these methods.
- Some methods are clearly unacceptable – **dilution and dispersion** would be an irresponsible method for Canada to select. The lack of commitment to management and the potential to cause human health and environmental harm are significant reasons for not considering this method.
- **Space disposal** was described as being too expensive. Not only would considerable re-processing of the wastes be required, the risk associated with an accident would be too great.
- Several of the methods would contravene international agreements, treaties and conventions. This applies to **disposal at sea**, **sub-seabed disposal** and possibly **disposal in ice-sheets**. Canada, as a signatory to such documents, cannot propose actions that would violate the spirit and intent of these agreements.
- Any technical method to be considered must be supported by valid scientific evidence. Since these methods have not been sufficiently studied, there is little scientific evidence to warrant further consideration.
- Some participants suggested that any method that closes the door (is conclusive) on the potential to retrieve wastes for possible future treatment or use should not be considered. The future is indeterminate and therefore the selected management approach needs to be versatile – many of these methods lack versatility.
- Many of these methods would be too costly to implement.
- Methods should not be studied if there is a loss of control of the material, and/or inability to predict the consequence/fate of the radioactivity.

One participant in the Ontario dialogue urged that some methods should not be prematurely rejected. In particular, it was suggested that not enough information on the characteristics of the methods, their

advantages and disadvantages, were provided to allow the exclusion of some of the methods from further consideration. One method, **sub-seabed disposal**, was described as potentially having merit. It was suggested that through careful placement of the wastes in the sub-seabed, the toxicity of the wastes could be contained and would dissipate over time as the wastes migrate through ocean floor sediments. This suggestion was challenged by other participants as dangerous, expressing concern over the potential to significantly damage ocean ecosystems.

It was suggested that the burden to study or not study a particular method rested with the NWMO. The NWMO should be satisfied and able to demonstrate, in response to any question, that it has sufficient rationale to exclude technical methods from further consideration.

Last, several participants suggested that as research is conducted on any of these methods, the NWMO should be monitoring and assessing the results and evaluating the potential influence of research findings on the long-term management approach.

(b) Technical Methods Receiving International Attention

Discussion Document #1 also presents several methods that are currently being considered in some national programs around the world, and methods that are likely to receive attention in the future. These methods are described on pages 66 and 67 of Discussion Document #1. They are:

- (i) Reprocessing, Partitioning or Transmutation
- (ii) Storage or Disposal at an International Repository
- (iii) Emplacement in Deep Boreholes

Specific comments were provided on each method in this category.

(i) Reprocessing, Partitioning and Transmutation

It was suggested that these processes should be presented and described as separate methods; they may or may not be linked within a possible management approach. It was understood that transmutation cannot take place without reprocessing, but reprocessing need not imply transmutation. Reprocessing can be carried out to recover fissile material for potential reuse of the energy. However, transmutation can only occur after reprocessing, followed by the recovery of the materials (partitioning) and then the transmutation. It was felt that the presentation of these methods as methods in a common grouping in *Discussion Document #1* was confusing. Separating the methods would improve understanding of the relative merits of each method and their potential role within a possible management approach.

Several participants felt that the NWMO should study and monitor research on the potential for reprocessing, partitioning and transmutation as possible future options for Canada. It was generally agreed that these methods are not practical options today. Reasons cited include:

- The methods are likely not cost-effective given the availability and relative cost advantage of uranium in Canada;

- The methods are challenging from a technological perspective, raising questions of increased risks as a result of transport and handling of the used fuel;
- Reprocessing poses an additional risk, in that enriched uranium could fall into the wrong hands and could be used for the development of weapons.

It was acknowledged by many participants that as a result of future research and technological advancements, reprocessing and/or transmutation may over time become more attractive. In this regard, it was proposed that Canada should maintain a ‘watching brief’ on research and technological advancements and periodically re-evaluate its management approach as new information becomes available. This was expressed as being an essential component of a long-term step-wise decision-making approach for management of used nuclear fuel.

(ii) International Repositories

Participants expressed a range of opinions as to whether Canada should even consider international repositories (disposal or storage) as a technical method. Several concerns were expressed over storage/disposal of Canada’s used nuclear fuel at an international repository. From an environmental stewardship perspective, it was suggested that it is preferable for Canada to be able to manage its own wastes. Good stewardship means that wastes should be managed where produced, therefore no import or export. It was suggested that this is a principle that is often applied in waste management programs.

Other participants expressed reservations over potential political interference disrupting or undermining the effectiveness of a management approach. It was noted that relationships between countries change over time. Relying or depending on someone else to satisfy one’s waste management needs means uncertainty. The potential closing of a border to another country’s wastes will leave that country with no effective management approach. The potential closing of the U.S. border to the City of Toronto’s solid wastes was cited as an example of a jurisdiction losing control over waste management systems that are controlled by others. It was suggested that once Canada exports its used nuclear fuel to another country, it would lose control over the eventual fate, with the potential for the used nuclear fuel to be reprocessed for undesirable uses.

Some participants felt that there might be advantages using an international repository including: early availability, economies of scale, greater security and monitoring. These potential advantages suggest that this technical method may be worthy of study; although it was acknowledged that this option was likely to be, in most instances, politically and socially unacceptable to the host country.

There was discussion on whether Canada has a responsibility to repatriate wastes from exported CANDU reactors. Some expressed opposition to this citing the stewardship principle that the used fuel should be managed where produced. Others felt that Canada might have an ethical responsibility to client countries to help manage their used fuel and on this basis, Canada should assume responsibility for the management of these wastes. Regarding the export of nuclear technology and repatriation of the used fuel, it was noted that not all exported reactors were supplied by AECL. Further, not all of the reactors used fuel bundles

made in Canada from uranium were supplied by Canada. Determining which used fuel was produced from Canadian involvement will be difficult.

(iii) Emplacement in Deep Boreholes

Few comments were provided on emplacement in deep boreholes. Some suggested that this method was a variation of deep geologic disposal method and should only be considered as such. A few suggested that this method might be attractive from a risk perspective. Placement of small quantities of wastes in deep boreholes at the reactor sites might distribute a smaller risk over a great area than deep geologic disposal and therefore may warrant further study.

3.4 General Comments on Technical Methods

Two general suggestions were provided concerning the scope and presentation of the technical methods in the Discussion Document #1. These are:

- The lists of technical methods are incomplete in that avoiding the production of the wastes in the first place is missing as a possible method – another way of looking at this is that the NWMO has chosen to look at alternatives technologies – if the NWMO broadened its view – it could consider reduction as an alternative method.
- More information should be provided on each technical method to better inform participants of the merits of each method.

Some of the participants indicated that they did not know enough about these technical methods to offer an informed opinion as to whether the methods should be studied or not. One proposal was that all technical methods should be subject to an environmental assessment with a full disclosure of the advantages and disadvantages of each method, this would inform and allow participants to provide better opinion and advice. This, in effect, suggests that all of the identified technical methods should be considered in the NWMO study.

A specific recommendation was made to commission AECL to conduct a comprehensive study on the potential for transmutation to inform on both the feasibility and merits of the method.

Another suggestion was as a guiding principle, that if any of the methods result in the creation of additional wastes or requires an investment that commits Canada to a nuclear energy future, that method should not be studied by the NWMO.

3.5 The Proposed Analytical Framework

Asking the Right Questions? proposes an Analytical Framework that will be used to guide NWMO's assessment of alternative management approaches. The draft Analytical Framework was built from input received by the NWMO from a broad range of communities of interests. The Analytical Framework consists of:

- a series of key questions to be asked and answered for each management approach; and
- a process for undertaking a comparative assessment of alternative management approaches.

The Analytical Framework was presented to the four dialogue sessions to obtain comment and feedback. Participants were asked to consider the following:

- **Are the proposed key questions clear and understandable?**
- **Is the list of key questions complete? Does it capture the key issues and considerations?**
- **What changes should be considered?**

The following is a synthesis of the comments provided.

3.5.1 General Comments on the Framework

Participants were generally satisfied that the 10 key questions were both comprehensive and appropriate and represent the important matters that need to be considered when developing and comparing long-term management approaches for Canada's Used Nuclear Fuel. One participant felt that the NWMO in considering and answering these questions would set a new standard for technical studies, unlike any other undertaken by industry. Others felt that more information is needed describing how the Analytical Framework will be applied. No participant suggested that any of the 10 key questions should be removed from consideration.

3.5.2 Adding to the Framework

Some participants felt that additional key questions should be considered as part of the framework. These are:

- Education, Communications and Awareness Building
- Research
- Trust

The proposed rationale for each is provided.

Education, Communications and Awareness Building – while several of the Aspects and Key Questions address and identify considerations related to Education, Communications and Awareness Building, there was a strong feeling that this should be highlighted as a specific key question. The need

to provide the public with clear, simple and understandable information on nuclear energy and the risks and benefits of the management of nuclear wastes was viewed as one of the highest priorities.

The need to fully and fairly describe and communicate the risks and benefits associated with waste management approaches is crucial to building understanding of the challenge facing Canada, and establishing effective citizen engagement in the future management of these wastes.

Research – while much is known about the nature of the hazards associated with nuclear wastes and the methods available to manage these wastes, there is still much to learn. With the long time frame associated with the development and implementation of a long-term waste management approach and the potential for technological advancement in the methods for managing the waste, the Analytical Framework should specifically identify Canada’s commitment to conducting research and assessing the findings of research and evaluating the potential for enhancing or modifying Canada’s long-term waste management approach.

Trust – for the Analytical Framework to be accepted as credible, the public and stakeholders with an interest in the future management of used nuclear fuel, need to have confidence that all the work that is undertaken and the commitments made regarding future actions will occur in a way that meets both the spirit and intent of the Analytical Framework. This confidence can only be obtained if the public has a sense of trust that the NWMO will do what it says it will do. Establishing trust in the NWMO and earning the respect of the public should be identified as an essential and overarching aspect of the Analytical Framework.

3.5.3 Understanding the Framework

While there was considerable agreement that the Analytical Framework addresses the important key questions, there were several comments regarding the development and application of the framework. These include:

- Several participants noted that the purpose and role of the Analytical Framework was not clear. Participants requested that additional information be provided as to how the key questions and considerations would be applied in the development and comparison of alternative waste management approaches.
- Many of the terms presented in the framework were considered to be unclear as to meaning and application. Many of the words and terms sound good as one participant stated but what do the words mean? As one example *Q#4*, presents as one consideration “ensuring a fair sharing of costs, benefits, risks and responsibilities” How it would be determined? How it would be applied? It was requested that additional information in the form of definition and explanation of the application of the components of the framework should be provided that allows for greater understanding.
- There was considerable discussion on whether some of the overarching aspects (*Key Questions #1-5*) were more significant than others. Several participants suggested that the Ethical

Considerations (*Q4*) were of primary significance and not only sets a context but also guides the development and implementation of the other overarching aspects. For example, ethics could influence how (*Q2*) engagement and participation in decision-making considerations are developed and applied. Not all participants agreed with this proposal and felt that no priority existed among the overarching aspects – all are important and all need to be considered in developing and selecting a management approach.

- In all four-dialogue sessions, there was discussion concerning the relationship between (*Q3*) Aboriginal Values and (*Q4*) Ethical Considerations. It was suggested that the Analytical Framework should include a clear link between the two. The consideration of Aboriginal values will help inform and help shape the development of the ethical considerations.
- Several comments were provided on the consideration of risk within the Analytical Framework. In addition to the characterization of risk from a human health exposure perspective, there is an equal need to consider risk from a societal acceptance perspective. The potential for ‘public outrage’ related to the fairness of the planning and decision-making process needs to be a consideration reflected in the Analytical Framework.
- Several participants noted that social acceptability is not explicitly presented within the Analytical Framework. Given that social acceptability was an important consideration in the Seaborn Panel report, it was suggested that the Analytical Framework include, as a consideration, the determination of social acceptability.

The dialogue sessions provided specific comments for each of the ten key questions and supporting considerations. Comments on each are provided.

Q1 – Institutions and Governance

Participants generally felt that this overarching aspect was of great significance - ensuring that laws, regulations and oversight of the future management approach were identified as important mechanism for ensuring that the used nuclear fuel will be safely managed. A common theme at all of the dialogues was that provision needs to be made for a neutral third party to oversee the development and implementation of the management approach. This third party oversight is necessary to establish public trust and confidence. Oversight might be provided by any affected community or through a panel of independent experts. As indicated in the New Brunswick dialogue, any third party oversight needs to have “teeth” and must be empowered to take action.

A second point of discussion found was that the considerations that make up this overarching aspect needs to be applied not just at the operational phase or implementation of the management approach but equally in the development and assessment of the alternate management approaches.

Specific comments and suggestions for Institutions and Governance includes the following:

- Accountabilities, roles/responsibilities need to be clearly identified, including roles of various government departments, and clarification of who has the liability and where does it ultimately fall – some suggested that the liability should not fall to the Provinces. The Federal government should assume any liability since this is a matter of national interest.
- Timeframes necessary for management should be identified and justified. What is meant by “for many years to come”? Does it mean 50-years or in perpetuity?
- Laws/regulations/standards – some are in place, some need to be developed; all are dynamic, the aspect needs to reflect this reality.
- There are significant constitutional matters regarding the rights, responsibilities and the roles of the Federal and Provincial governments that need to be reflected.
- Add the Precautionary Approach as described in CEPA – NWMO should adopt the same definition as a consideration within this aspect.
- There is a need to recognize the international context and the convergence of regulatory framework - commitments to international treaties; implications of bilateral treaties and agreements like NAFTA need to be noted, understood and reflected.
- Need to identify a public body or independent third party with a role for oversight/monitoring activities (in part, due to lack of trust in current institutions).
- The NWMO governance needs to be representative of Canadian society.
- What is meant by Voluntary Programs, what role do they play? What is meant by cultural norms? – Define these terms.
- Add a commitment to flexibility – define as an ability for a mid-course change in the management approach if new information dictates.

Q2 – Engagement and Participation in Decision-Making

This overarching aspect was viewed by many participants as being crucial to the success of the NWMO study. At the root of the many comments and suggestions was the view that trust, and confidence in the NWMO, particularly with respect to its ability to fairly implement its planning process and fully manage used nuclear fuel, was of great importance. The NWMO, through its actions, has to demonstrate that it has meaningfully engaged Canadians in the planning process and has objectively considered all comment and advice provided.

A dominant theme was that there is a need to develop effective mechanisms to inform and educate Canadians on the used nuclear fuel issue, build awareness of the efforts to properly manage the used fuel, design and make available a range of engagement processes that are inclusive and responsive to the needs

of Canadians and to be open and transparent in carrying out the process by clearly describing how public input was considered in the planning and how it influenced the decision-making process.

Other specific suggestions and comments include:

- Add a commitment to public education to inform people and to facilitate opportunities for meaningful involvement by the public in the process and throughout the life of the management approach.
- This key aspect should apply/be considered through all phases of the management approach development including the current work of the NWMO, not just during implementation.
- Information needs to be balanced; reflect all perspectives regarding nuclear waste management – consider mechanisms to level the playing field – funding mechanisms, independent peer review, clear and understandable information, access to technical expertise by communities, and access to all research findings.
- Transparency is critical – full disclosure is necessary including full disclosure of known risks and any uncertainties.
- Terms are not clear - voluntary consent –what does this mean? Does it mean that affected communities will have a veto? What is a community, how will it be defined?
- Include methods to assess changes in public attitude and opinion over time.

Q3 – Aboriginal Values

There were several suggestions to enhance the presentation of the considerations embraced by this overarching aspect. In particular, there were suggestions to make the considerations more specific through a clear reference acknowledging Aboriginal and treaty rights and Aboriginal traditional land uses. These are unique to Aboriginal peoples and warrant full and explicit consideration.

There was discussion at all four dialogue sessions as to whether there was a benefit to distinguish Aboriginal values from broader Canadian values. Many participants felt that the values assigned as Aboriginal are equally shared by all Canadians and should be reflected as such. There were some discussions as to whether Aboriginal values would or should get the same weight if wastes stayed at current storage sites as opposed to any new siting initiative. Several participants suggested that the list of considerations within this aspect are strongly linked to *Q#4 – Ethical Considerations* - this linkage should be made explicitly within the Analytical Framework.

The specific comments and suggestions with respect to this overarching aspect are:

- Recognize and explicitly acknowledge Aboriginal and treaty rights and land uses.

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- Consider whether the aspect should be presented broadly as being Canadian Values - unclear why specify these values as Aboriginal since many people share these values.
 - Aboriginal interests/perspectives are much broader, Aboriginal interests should also influence governance and ethics, environment and economics aspects – not just stewardship/relationship to the land consideration.
 - Need to explicitly recognize and commit to engagement processes with Aboriginal peoples.
 - Clarify the role of Aboriginal values within the framework if a management approach is not on or near traditional Aboriginal lands – how will this be applied?

Q4 – Ethical Considerations

A dominant theme in all dialogue sessions was the importance of ethics in the development, assessment and implementation of the management approach. In addition to posing a number of ethical questions to be considered within this planning process, there was equal interest by the participants in knowing how ethics are to be applied. Advice included the need to ensure that those that develop and apply the ethics reflect the wide spectrum of Canadian society. Key questions posed within the dialogue include: whose ethics do you use? who selects? and who applies?. This is a challenge that faces the NWMO. There were requests that further explanation on the development and application of an ethics framework be presented.

Specific proposals and suggestions for the Ethical Considerations include the following:

- Enunciate the various ethical and value considerations already embedded in the NWMO work – make this clear for all to understand.
- Consider ethics from a historical perspective, learn from the past to assess the future.
- Need to clearly articulate the ethical framework that will be used, both in terms of process (for selecting, assessing and implementing the management approach) and outcome (the management approach itself), and the ethical principles that should be applied – this will allow participants to review/comment, and seek agreement.
- The ethical consideration may be an organizing framework that guides the whole study.
- A key challenge will be selecting the ethical principles. In a country like Canada with a significant multi-cultural population and various religious beliefs, whose ethics do you select? How will this be decided? Who will decide? CNSC, the public?
- A focus on fairness and equity may not be appropriate, fails to address key issues of responsibility.
- Specific suggestions regarding ethical principles included the following:
 - Liabilities should be considered when undertaking new projects.

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- Those who generate the waste should take responsibility.
 - Manage the wastes in a way that provides future generations at least the same level of safety as is provided today.
 - To the extent possible, decisions made today should not restrict future generations from taking a different decision.
 - Should minimize the burden that we pass on to future generations.
 - We have an obligation of selecting what we believe is the best approach, and to do what we can to develop, demonstrate.
 - Should allow future generations to have access to the used fuel, not close the door to possible future uses.
 - Should aim at bequeathing a passively safe situation which places no reliance on active institutional controls.
 - We do not meet our ethical responsibilities by simply maintaining interim storage with the hope that sometime some new technology will be developed.
 - How do you reconcile the basic Aboriginal views that humanity is part of nature, while in Genesis, it is stated that man shall have dominion over nature. How will the framework accommodate these different views?
 - Include transparency of process as an ethical consideration – this is a cornerstone of democracy, which is a Canadian value.

Q5 – Synthesis and Continuous Learning

The key message from the participants regarding Synthesis and Continuous Learning is that not only is the aspect important, it should be expanded. Linked to the theme of information and continuous learning is the desire for on-going education of Canadians on matters related to used fuel management. Reporting on results of research initiatives and updating Canadians on the risks and benefits associated with the waste management approach are important considerations to add to this aspect.

Many of the comments provided stressed the value of establishing an adaptive management or step-wise decision-making approach for the management of used nuclear fuel. As new information becomes available, evaluation should be undertaken to understand the potential implications for future waste management and to re-direct or adapt the approach to reflect the new information.

Other proposals regarding this aspect include:

- Learn from the past. Include references to historical perspectives as a consideration – we learn from our past to help inform on our future.
- Continuing education and teaching are equally important – add as a consideration.
- Revise the reference from periodic assessment to periodic evaluation – evaluation more clearly implies the commitment to take a different direction, if new information suggests a new direction for the management approach makes sense.

- Make clear that there is potential for phased decision-making within the management approach.

Q6 – Human Health, Safety and Well-Being

From the discussions, it became clear that ensuring the safety of people and the environment was of paramount interest to the participants. Risk to human health was described as being at the heart of social safety and therefore, the need to clarify who will determine what is an acceptable risk and how this is to be determined. Strong advice was provided that the public must have a role in determining acceptable risk; a public process was proposed to provide opportunity for Canadians to provide advice. A few suggested that determining acceptable risk was the key to determining social acceptance of the management approach.

Specific suggestions for the Human Health, Safety and Well-Being aspect include:

- Risk is at the heart of social safety; need to clarify who will determine what an acceptable risk is, and how it will be determined (through CNSC?) – the public must have a role in this; all segments of Canadian population must be allowed to participate in a public process to determine acceptable risk.
- Risks need to be presented in a manner that is understandable and relevant to the layperson – provide all waste management risks into context and compare to other societal risks. Demonstrate how the risks associated with used nuclear fuel compare to other energy risks to which we are exposed.
- Consider health and stress effects from all perspectives, including psycho-social health; community mental health; and related social aspects.
- Consider ways to mitigate social well being impacts, perhaps through a community fund that residents can access.
- Should include full cycle assessment of human health, safety and social well being considerations associated with the management approach and compare to other energy options.
- Should not assume a stable societal structure in developing and selecting a management approach.
- Clarify what is meant by the term ‘equity’.
- Describe how social acceptability will be determined.

Q7 – Security

The issue of security was linked by many participants to human health, safety and well-being. Any selected waste management approach should ensure the security of the nuclear fuel so that it cannot be breached by either man or the environment over time. Security applies not only to any management facilities but must also apply to handling and transportation of the used nuclear fuel. As part of the assessment of management approaches full risk assessment of scenarios should be completed and fully

shared with all interested parties. Considerable discussion focussed on terrorism as a significant security threat that needs to be fully considered. While there was general support across the dialogues for the consideration of terrorism activity, some felt that it should not dominate the thinking regarding security considerations.

Specific comments provided are:

- Good, relevant question, but tough to answer.
- Difficult to determine if focus on terrorism is in response to 9/11 – be cautious – don't over react to recent events – think long-term – acknowledge terrorism as one of several security concerns.
- Need full risk assessment of possible security scenarios, including transportation of waste.
- Need community involvement in determination of risks.
- Need to be mindful of relationship between security and human rights, cannot use security to infringe on human rights.
- Change the key questions to emphasize establishing secure facilities and the security of the methods and management approach rather than “reducing access to facilities”.

Q8 – Environmental Integrity

Participants expressed general support for the range of considerations proposed for the aspect. There were suggestions that some of the terms used should be presented in plain language and defined. Some expressed caution regarding the environmental considerations. At the Quebec session, it was urged that the potential for environmental impact associated with the management approach needs to be placed into both context and perspective. For example, the environmental footprint of the selected technical method is likely to be significantly less than that associated with other energy development and waste management program, this needs to be kept in mind.

It was suggested by some participants that specific reference to incorporating Aboriginal traditional and ecological knowledge be incorporated as a consideration within the aspect.

Specific comments provided are:

- Generally comprehensive, but terminology difficult to follow, need to define specific terms.
- Take into account Aboriginal traditional ecological knowledge.
- Include a reference to empowering community watchdogs – with teeth.

Q9 – Economic Viability

Several proposals were made to strengthen the list of considerations supporting this aspect. A recurring theme related to the relationship of economic benefits or incentives associated with a management

approach and community acceptance. Two points were made in this regard. First, there seemed to be a general acceptance that any community that possesses used nuclear fuel management facilities ought to receive economic benefits. The point relates to equity in the sense that those that accept the burdens associated with used nuclear fuel should also receive benefits. Care needs to be taken to ensure that the economic benefits are not used to coerce communities to accept wastes.

The second point relates to the obligation of our generation not to leave a financial burden for future generations. Since we currently derive the benefits of nuclear energy, we need to ensure that sufficient funding is set aside today to ensure the future safe management of these wastes.

Specific comments include:

- Include the full costs of all aspects – environmental, health, social and educational.
- Build in safeguards that ensure economic incentives are not seen to coerce communities to accept wastes – any decision is made with full understanding of all risks and impacts.
- How is community defined? Does it include regional areas, transportation routes?
- Socio-economic impacts – communities should do the studies themselves.
- Need to acknowledge benefits for communities accepting the wastes – in addition to local employment benefits and other community benefits, these communities need to be compensated.
- Need good financial analysis – how is economic viability defined?

Q10 – Technical Adequacy

Many participants felt that the definition of technical adequacy needs to be better defined - some suggested it needs to be changed. The specific criteria that help characterize what is meant by technical adequacy should be presented. Some suggested that use of the word “adequacy” was too limiting. It implies to some that it is just merely acceptable. The NWMO, it was suggested, should strive for a higher standard and emphasize technical best practices and best proven technology. A key message that was constantly delivered at all four dialogues was that the characterization of the technical aspect of the management approach should be based on agreed upon scientific fact.

Other comments included:

- Adequacy should be determined by assessing technology that is currently available. We should not assume major technological advances as providing a better solution.
- Define what is meant by technical adequacy – what criteria are used?
- Change Technical Adequacy – implies the meeting of a minimum and not maximizing – consider using “based on scientific facts”.

- Keep in mind that what is technically adequate today may not be economically viable; but may become so in the future – this should be considered in the management approach.
- Expand the last consideration to include an acknowledgement of responsibility.

4.0 Summary of Key Dialogue Messages

The following summarizes the key messages heard during the four dialogues.

4.1 The Nature of the Problem Facing Canada

The nature of the problem is multi-faceted or multi-dimensional, and needs to include the following considerations:

- There is agreement that the used nuclear fuel is toxic and represents significant risk to human health and the environment, and needs to be carefully managed for a long period of time. There is uncertainty as to the nature of the hazard in the long term, while some believe that radiation levels will be low not all agree and recommend prudence and caution. Consideration should be given to establishing a common set of facts.
- The volume of wastes or the size of the problem consists of the 1.7 million bundles of used nuclear fuel currently in on-site storage, the anticipated 2.0 million bundles to be produced over the remaining operating lives of the nuclear reactors, research and medical nuclear wastes and any contaminated material resulting from the decommissioning and closure of nuclear reactors.
- Due to the uncertainty over the future of nuclear energy production, the NWMO cannot determine with confidence the volume of wastes that will require future management. The NWMO should therefore consider the use of different operating scenarios to guide its planning and assessment of management approaches.
- While the NWMO may not have the mandate to determine the future role of nuclear energy production in the supply of energy, it must acknowledge the difference of opinion that drives the debate on the role of nuclear energy and present the implications for future waste management.
- Given the long time frames involved the NWMO should recognize the potential of technological advancements and consider the potential for future access and the ability to retrieve the used fuel either for re-use as a source for energy or to reduce the toxicity of the waste material. While some support the potential re-use of the used fuel not all are in agreement.
- Communicating risk to Canadians is an important part of the problem facing NWMO. Risks need to be placed into context with other societal risks and need to be presented in terms that are clear and relevant to all Canadians. In presenting risks, all perspectives need to be presented to fully inform.

- Ethics associated with the management of these wastes is of critical importance. The development and application of an ethical framework, which makes the ethical considerations explicit, should be considered to help guide the NWMO planning and decision-making process.
- Ultimately the management approach for Canada must be socially acceptable, and the onus is on the NWMO to articulate how social acceptability will be achieved. At the very least Canadians must be engaged in the NWMO process, opportunities for involvement should be provided that would allow any interested Canadian to participate in the process.

4.2 Key Terms and Definitions

- The proposed definitions for: technical methods; storage; treatment and management approach are generally acceptable. Several suggestions were provided to clarify or add to the definitions.
- Participants provided considerable comment on the proposed definition for disposal. Three general recommendations came forward:
 - use the proposed definition – “disposal is conclusive and without any intention of retrieval – it is a final fate”
 - modify the definition to include monitoring and oversight
 - add another term placement – placement what would allow for the “possibility of retrieval even if there is no current intent to retrieve”
- The significant discussion around the term ‘disposal’ suggests there may be societal discomfort with the concept or notion of disposal as currently understood – this may require further investigation
- NWMO should consider following a step-wise or adaptive management approach to used fuel management. Time is not of the essence, on-site storage is safe and secure, the time can be used to conduct and assess research findings. The adaptive approach provides NWMO with flexibility. As new information becomes available, the management approach should be re-evaluated and new directions taken as warranted.

4.3 Determining Whether to Study Technical Methods

- There was general agreement that the technical methods of limited interest should not be studied by the NWMO – several reasons were provided including the absence of scientific study on the effectiveness of the methods, cost, risks and contravention of treaties, conventions and laws.
- Not enough is known about reprocessing, partitioning and transmutation, more study and more information is required to determine the potential for these methods.
- Canada should assume responsibility for managing its own wastes and should not export wastes to an international repository. Importing wastes from other countries to Canada was viewed as being politically unacceptable.
- Further study of Emplacement in Deep Boreholes might have merit, as an alternative to geological disposal.
- The NWMO has the burden to determine whether a method has merit and must provide the rationale for the inclusion or exclusion of various technical methods.
- A minority view was that all considerations should be given to undertaking a complete environmental assessment or comprehensive assessment of all methods to determine the relative advantages and disadvantages.

4.4 The Proposed Analytical Framework

- Generally, the ten aspects, key questions and associated considerations were deemed to be appropriate and reflective of important matters that need to be considered when developing and comparing long-term management approaches for Canada's Used Nuclear Fuel. Participants identified a number of additions/modifications for each of the ten key questions. None should be eliminated.
- Consideration should be given to adding three additional areas:
 - Education, Communications and Awareness
 - Research
 - Trust
- There is uncertainty over the actual meaning of the questions and consideration, and scepticism around how the Analytical Framework will actually be applied in decision-making.

- There was no agreement on priorities – in particular some felt that the ethical considerations are of paramount importance, while others felt that no priority should be established, all aspects are of equal importance.