Site Selection for Canada's National Repository for Used Nuclear Fuel – 14602

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ABSTRACT

The Nuclear Waste Management Organization (NWMO) provides an update on Canada's national program for the long-term management of used nuclear fuel, with an emphasis on the site selection process for the deep geological repository, now under way. In 2007, the Government of Canada selected Adaptive Phased Management as Canada's plan that provides for long-term management of Canada's used nuclear fuel in a deep geological repository, located in an informed and willing host community. NWMO is tasked through federal legislation to select the site, and develop and manage all aspects of Canada's plan. The process of site selection, currently in progress, is an important milestone for the Canadian program. In May 2010, NWMO published the site selection process that serves as the road map for decision-making on the location for the deep geological repository. Now after three years, 21 communities are currently involved in learning more about Canada's plan and the Adaptive Phased Management Project. NWMO is actively engaged with these communities to support them in the learning process and is currently undertaking preliminary assessments as part of a screening down process which involves technical and social studies and broad dialogue and engagement. The project is designed to be implemented through a long-term partnership involving the host community, the larger region in which it is located and NWMO. The paper provides an update on the advancement of the site selection process with a focus on community engagement and on how social, economic and cultural considerations are addressed in early preliminary assessment studies. NWMO shares its early observations and lessons learned to date from working with communities and those in the surrounding area over the course of early steps in the process. The approach, methods and criteria that are being used to conduct the geoscientific studies, which are an important safety related component of the studies, is discussed in a companion paper (Ben Belfadhel et al., 2013).

INTRODUCTION

Over the course of a three-year nationwide dialogue led by the NWMO (2002 – 2005), Canadians laid out a plan for the long-term management of Canada's used nuclear fuel. This plan, called Adaptive Phased Management (APM), includes a technical method and a management system. An important component of this plan is that Canada's long-term used fuel management facilities be sited in a safe location in a community that is informed and willing. The site selection process is laid out in the NWMO's document *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel, May 2010* (NWMO, 2010).

Through a collaborative process in 2008 and 2009, NWMO worked with interested Canadians to develop the decision-making framework for selecting a site for the Project. The site selection process is designed to ensure safety, security and protection of people and the environment. Reflecting the guidance provided by Canadians, the site selection process is built on a set of principles that reflects the values and priorities of Canadians on this issue. The process also contains a number of steps these Canadians told us need to be part of the decision-making

process to ensure it is an appropriate one for Canada. These steps are described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel*, *May 2010*.

A total of twenty-two communities entered the site selection process by expressing interest in learning more about Canada's plan for the long-term management of used nuclear fuel and the APM Project (Step 2) as part of an open invitation process. As communities expressed interest, the NWMO undertook an Initial Screening as part of Step 2 studies and began working with each community as they learned about the project and reflected upon their interest in it. The purpose of the Initial Screening was to determine whether, based on readily-available information and five screening criteria, there were any obvious conditions that would exclude the community from further consideration in the site selection process. The initial screenings identified that twenty-one of the communities contained geological formations that would be potentially suitable for hosting a deep geological repository.

Of the twenty-one communities that successfully completed an Initial Screening, twenty have entered into Step 3 (Preliminary Assessments) of the site selection process as of December 2013. The NWMO began working with these communities to conduct a Preliminary assessment to further assess their potential suitability. The ultimate objective of the Preliminary Assessment is to select one, possibly two, communities for detailed site characterizations (Step 4). The Step 3 Preliminary Assessment is a multidisciplinary desktop study integrating both technical and community well-being studies, including geoscientific suitability, engineering, transportation, environment and safety, as well as social, economic, and cultural considerations. Engagement with the interested community is also an important component to facilitate learning about the project, reflection on community interest, and to collaboratively complete key aspects of the assessment related to exploration of social, economic and cultural considerations. The Preliminary Assessment is designed to be conducted in two phases, with desktop study and a focus on engagement of the interested community a focus of Phase 1 and field investigations and more intensive engagement of Aboriginal peoples and surrounding communities a focus of the next phase of work, Phase 2. This phased approach provides an opportunity for stock-taking by the NWMO and the community at the end of each phase.

In November 2013, NWMO completed Step 3 (Phase 1) Preliminary assessments for the first eight communities that entered into this step. Four of these communities were assessed as having strong potential to meet site selection requirements and were identified for further study; four communities were not selected for more detailed study. These findings do not affect work ongoing in 13 other communities that are involved in earlier stages of the process.

This paper provides an update on the site evaluation process and describes the approach and methods that are being used to conduct the social, economic and cultural Step 3 Preliminary Assessment. The geoscientific assessment is discussed in a companion paper (Ben Belfadhel et al., 2013).

STEP 3 PRELIMINARY ASSESSMENT

The NWMO has adopted an integrated approach to Preliminary Assessments. As outlined in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological*

Repository for Used Nuclear Fuel, May 2010 (NWMO, 2010), assessments focus on safety and community well-being, through study of many technical, scientific and social requirements for the project. Preliminary Assessments are an opportunity for both the community and the NWMO to explore four key questions, which are discussed in "*Preliminary Assessment of Potential Suitability – Feasibility Studies"* (NWMO, 2011):

> ***1.*** Safety, security and protection of people and the environment are central to the siting process. ***Is there potential to find a safe site?***
>
> ***2.*** The project will be implemented in a way that will foster long-term well-being of the community. ***Is there potential to foster the well-being of the community through implementation of the project, and what might need to be put in place (e.g., infrastructure, resources, planning initiatives) to ensure this outcome?***
>
> ***3.*** At a later step in the process, the community must demonstrate it is informed and willing
> to host the project. ***Is there potential for citizens in the community to continue to be interested in exploring this project through subsequent steps in the site selection process?***
>
> ***4.*** The project will be implemented in a way that will foster the long-term well-being of the surrounding area. ***Is there potential to foster the well-being of the surrounding area and to establish the foundation to move forward with the project?***

These broad questions are addressed through a series of multidisciplinary studies, including geoscienfic suitability, engineering, transportation, environment and safety, as well as social, economic and cultural considerations.

Any site that is selected to host the Adaptive Phased Management (APM) Project must be demonstrated to be able to safely contain and isolate used nuclear fuel, protecting humans and the environment over the very long term. The preferred site will need to address scientific and technical siting factors that acknowledge precaution and ensure protection for present and future generations. These requirements are fundamental, and no siting decision will be made that compromises safety.

Once confidence is established that safety requirements can be met, the potential for the project to help foster the well-being, or quality of life, of the local community and area in which it is implemented becomes an important consideration. At this stage of study, Preliminary Assessments in this area are designed to explore the potential for the project to align with the vision and objectives of the community, and potential to help the community to advance to the future it has set out for itself. It is understood that this project may not align with the vision and objectives of all communities. For this reason, Preliminary Assessment in this area is an important input to the siting decision. The ability of the community to benefit from the project, and the resources that would be required from the NWMO to support the community in achieving this benefit, would be a consideration in the selection of a site after all safety considerations have been satisfied. The project will only be implemented in an area in which well-being will be fostered.

Preliminary Assessments at this phase of work focus on the potential to foster well-being through the project in the community that has expressed interest and entered the site selection process. The next phase of work will begin to explore the potential for the project to also align with the vision and objectives of surrounding communities and of the Aboriginal peoples in the area, as well as their interest in implementing the project together.

Social, Economic and Cultural Preliminary Assessment Component

A number of factors beyond safety were identified for assessment of the potential for the project to foster the well-being of the interested community (NWMO, 2010). Phase 1 community wellbeing studies were focused on each community that expressed interest in learning about the project. For this reason, the studies addressed the subset of factors pertaining to the community. Phase 2 studies are designed to expand the assessment to consider factors related to the surrounding area, including surrounding communities and Aboriginal peoples.

A number of factors beyond safety were identified as minimum criteria to consider in the multi-year process of study to assess the potential to foster well-being (NWMO, 2010a):

- Potential social, economic and cultural effects during the implementation phase of the project.
- Potential for enhancement of the community's and the region's long-term sustainability through implementation of the project.
- Potential to avoid ecologically sensitive areas and locally significant features.
- Potential for physical and social infrastructure to adapt to changes resulting from the project.
- Potential to avoid or minimize effects of the transportation of used nuclear fuel from existing storage facilities to the repository site.

Factors identified by Aboriginal Traditional Knowledge are intended to help inform this assessment as work proceeds.

In order to ensure a broad, inclusive and holistic approach to assessment in these areas, a community well-being framework was identified to help understand and assess the potential effects of the APM Project. This framework was used to help explore the project, understand how communities and the surrounding area may be affected should the project be implemented in the area, and identify opportunities to leverage the project to achieve other objective important to people in the area. In the future, broadened engagement may expand the framework through, for instance, insight from Indigenous science, ways of life and spiritual considerations.

The framework encourages exploration of the project through five different "lenses":

- ***People or Human Assets*** – How might the implementation of the project affect people?
- ***Economics or Economic Assets*** – How might the implementation of the project affect economic activity and financial health of the area?
- ***Infrastructure or Physical Assets*** – How might the implementation of the project affect infrastructure and the physical structures that the community has established?

- ***Society and Culture or Social Assets*** – How might the implementation of the project affect the sense of belonging within the community and among residents, and the services and network of activities created to serve the needs of community members?
- ***Natural Environment or Natural Assets*** – How might the implementation of the project affect the natural environment and the community's relationship with it?

Dialogue with interested communities and those in the surrounding area was used to begin to identify and reflect upon the broad range of effects that the implementation of the project may bring. In concert with the community, the NWMO worked to develop an understanding of the community today, and its goals and aspirations for the future. To this end, information was assembled and studied through a variety of means, including strategic planning activities, engagement activities, community visits and tours, briefings, one-on-one discussions, consultant observations, Community Liaison Committee meetings, open houses, and the development of a community profile. Over the course of the work, the NWMO and community developed a community profile to serve as the foundation for the assessment, and a community well-being assessment as input to the integrated assessment.

FINDINGS: STEP 3 (PHASE 1) SOCIAL, ECONOMIC AND CULTURAL ASSESSMENT FOR THE EIGHT INITIAL COMMUNITIES

Phase 1 Preliminary Assessments have concluded for the first eight communities that entered the site selection process. Potential suitability was studied for each interested community, exploring the areas of safety and community well-being as described in the previous section. For each community, findings were presented in a series of assessment reports focusing on individual aspects of the studies and were summarized in a *Preliminary Assessment Report* that brings findings from individual studies together in a single document. Findings from these assessments are briefly summarized in the discussion that follows.

In all eight communities, studies found potential to meet project requirements in the safety-related areas of engineering, transportation, and environment and safety. Studies also found some potential in all eight communities to address project requirements related to geoscientific suitability (a key safety requirement), and social, economic and cultural considerations. However, important differences among communities were noted which influenced NWMO decision-making on where best to focus more detailed studies.

Differences were noted in the geoscientific characteristics of the communities and area, including geological settings and geologic structural histories, and associated complexities and uncertainties. Areas with greater geoscientific uncertainties and complexities were considered to have less potential to meet project requirements as it would be more difficult and challenging to assemble a robust safety case.

Differences were also noted in the potential for the APM Project to align with priorities and objectives of the community, and for the community to sustain interest in learning about the project. It is understood that sustained interest would be needed for a future demonstration of informed willingness. Alignment of the project in terms of fostering well-being and the potential for sustained interest are considered important considerations once all safety requirements are met. Where there is not a strong alignment with community aspirations or where this alignment is unclear, and where the ability to sustain interest is weak or uncertain, the NWMO considered the potential for informed willingness at a later stage of work to be less.

The assessments suggested that each of the communities has the potential to benefit from the implementation of the APM Project. However, there were differences in the degree to which the project appears to align with longer-term aspirations and priorities of the community *taken as a whole*. In some cases, the project appears to align well with the most important objectives of a community, and in other cases, it aligns with only some, but not all the important objectives. In communities that fall into the second group, the project challenges the community to make difficult choices among these priorities and objectives. For this reason, there is a greater potential for divergence around the project and for a negative effect on community cohesion. In these circumstances, the NWMO judged the potential for the project to foster community well-being to be less.

All eight communities saw potential to harness the APM Project to achieve important community goals. This is because, to a greater or lesser extent, all eight communities were interested in economic development to enhance their sustainability. In this regard, the project would contribute to the well-being of each of the communities. Similar to other large projects, the APM Project would bring direct, indirect and induced jobs to a community and area. This would help a community retain population, grow population and develop economically. The increased population would be a boost to the community and a catalyst for spinoff growth and development in many areas identified as important by communities. Since the APM Project will be implemented over many decades, it would contribute to community sustainability over this extended period.

The preliminary assessments suggested the population and economic activity that would come with the project has the potential to benefit communities seeking to build out existing community infrastructure, enhance services and expand population. It also has the potential to benefit communities that would prefer the project to be located away from the community using a more remote site model, with the community providing key personnel, services and other support. However, within some communities, there is ongoing debate and division about the amount and type of growth desired over the long term, and the studies suggested that the project has the potential to reinforce these divisions in some communities. If the project divides along the same lines as an ongoing and divisive conversation about the community's long-term vision, the NWMO judged the potential to align the project with the vision will be diminished, and continuing discussion may negatively affect community cohesion.

A project of this scope and scale has the potential to be transformational to a community and area in many ways. Communities have helped the NWMO understand that the potential effect of the project on other aspects of community life need to be considered, such as: connection with the land and with other community members; ability to pursue activities such as hunting, fishing, gathering, and trapping, which may be of spiritual, cultural or personal importance; sense of responsibility for protection of the Earth, future generations, and respect for all Creation; and other aspects important to the way of life of a community. The extent to which the project has the potential to align with community well-being in these important areas is considered a matter for the community to reflect upon and decide. Where community reflection and discussion has suggested there is potential for fundamental conflict between the project and these aspects of community well-being, or where alignment is uncertain, the NWMO judged that the potential to foster the overall well-being of the community was lessened.

The assessments suggest that each of the communities has at least some potential to

sustain interest in the project to support learning over an extended period. However, the communities differ in the magnitude of the challenge involved in sustaining interest, reflecting the unique social and political dynamics and interest in each of them. These included pre-existing divisions within some communities (related to, for example, community priorities), or negative experiences with other industries of initiatives that breed apprehension of mistrust in the APM Project. Where there are fundamental differences within a community about its future direction, the NWMO has observed less overall interest in learnng about the project. As well, where division in the community about this project falls along the same lines as historical divisions or divisions on other long-standing matters, the NWMO also observed lower levels of interest in learning. In communities where there are large challenges to be addressed in order to sustain interest, the NWMO judged there is less potential for continued learning and ultimately informed willingness within the planning horizon of the project.

The APM Project requires establishing a long-term partnership that first begins with the interested community, and only then seeks to extend out to involve surrounding communities and Aboriginal peoples. Engagement of surrounding communities and Aboriginal peoples is at a very early stage, and will be a focus of Phase 2 assessments for the smaller number of communities identified for more detailed study. Alignment of the project with the values, priorities and objectives of surrounding communities and Aboriginal peoples, together with their level of interest in learning, will ultimately be a critical consideration in assessing the suitability of any particular site. This project will only proceed with the involvement of the interested community, surrounding communities, and Aboriginal peoples working together to implement it.

A number of uncertainties were identified with the analysis due to the preliminary nature of the work at this stage which will need to be addressed in subsequent phases of work. These uncertainties and challenges include the following:

- Specific land areas that are socially acceptable need to be identified.
- Project implementation (including engineering, logistics and/or community well-being) must align with specific community aspirations.
- Interest in the community for further learning about the project needs to be sustained.
- Transportation routes and mode(s) need to be designed and configured taking into account social values.
- Environment and safety evaluations need to be aligned with community input.

Many more years of study and engagement will be required before a preferred site can be identified and a community can decide whether it is willing to host the facility.

REFLECTION ON LEARNING TO DATE

The Importance of a Regional Approach

Over the course of initial studies, the NWMO has learned a great deal from communities about working together to envision the project and how best to implement it in collaboration with those potentially affected. Preliminary assessments have underlined the need to involve those in the surrounding area very early in the site selection process and for the NWMO to advance this involvement earlier in the site selection process than had been originally envisioned.

The involvement of surrounding communities and Aboriginal peoples is critical to advancing the site selection process for several reasons. First, and as outlined in assessment reports, initial studies have demonstrated it is possible to find land areas in the communities studied that have the potential to satisfy required geoscientific factors and enable the project to be implemented in a way that is respectful of people and the natural environment. These potentially suitable areas include areas in the vicinity of the community on Crown land, and in territory for which Aboriginal peoples have a claim. The NWMO is committed to respecting the Aboriginal rights and treaties of Aboriginal peoples.

As well, the size and scale of APM is such that its implementation will not only have an effect on the local area in which it is sited, it will also have an effect on those in the surrounding area. It is understood that surrounding communities and Aboriginal peoples need to be involved in decision-making about the project and planning for its implementation if it were to proceed in the area. Only through working together can the project be harnessed to maximize benefits to the area, manage any negative effects that may result, and ensure it fosters long-term well-being and sustainability in a way that is consistent with the area's vision for the future.

Although the focus of the first phase of study is on communities that initiated engagement in the APM site selection process, it is understood that a broader partnership involving surrounding communities and Aboriginal peoples will be needed for the project to proceed. Through work so far with communities involved in the site selection process and initial outreach with surrounding communities and Aboriginal peoples, the nature and shape of the partnerships required to implement APM is beginning to emerge. Looking forward, this project will only proceed with involvement of the interested community, surrounding communities and potentially affected Aboriginal peoples working in partnership to implement the project.

Managing Uncertainty

A second learning from the studies conducted to date is the challenge associated with taking into account in the siting decision. Through Phase 1 studies, the NWMO has developed a preliminary understanding of the potential for communities to meet the requirements of the project. In conducting these early studies, questions have been raised and uncertainties identified. These questions and uncertainties vary across communities and add to the complexity of decision-making at this point.

Given the preliminary phase of work along with the questions and uncertainties still to be addressed in the future to enhance understanding of suitability, the NWMO acknowledged the value of building diversity into the selection of communities and areas for future study. In light of the learning from Preliminary Assessment studies, the NWMO judged there to be value in deliberately selecting areas with different geological settings, as well as different social, economic and cultural characteristics. This is intended to help ensure that the NWMO actively explores the potential to ensure safety through study of a variety of geological conditions. This is also intended to ensure the potential to foster community well-being and to develop the kinds of partnerships that will be required with communities, surrounding communities and Aboriginal peoples can be investigated through the divergent interests and values of a range of communities. This is intended to allow for flexibility to readjust focus if further studies in a particular area yield unexpected developments. This flexibility will help ensure the ability to adapt the siting process in response to new learning from these studies. By ensuring a diversity

of areas for future studyand flexibility to respond to the learning that will emerge, the foundation for a future, robust siting decision can be further built upon.

Early Phase of Study

Although four communities were identified for further study in Phase 2, these communities have *not* been confirmed as suitable for hosting the APM Project. Also, no community has confirmed its willingness to host the project.

Regarding safety, several more years of field studies and detailed site evaluations are required before the NWMO, the community and the regulator could be satisfied on the safety of the site. In the interim, there is much more information to be gathered, data to be analyzed, questions to be answered, and uncertainties to be explored in collaboration with communities to better understand the potential of sites to meet requirements. Further research questions will be carried forward to Phase 2 to explore in greater depth the range of important geoscientific, environmental, transportation and engineering considerations key to assessing suitability and ensuring safety.

At this early phase of the process, communities are still learning and engaging in a dialogue within the community and with neighbours. More time and reflection will be required before they can arrive at informed decisions as to whether the APM Project would make a positive contribution to the long-term well-being of the area and that they are willing to host it.

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