

DEVELOPING A SOCIAL FRAMEWORK FOR THE TRANSPORTATION OF USED NUCLEAR FUEL

J. Facella, E. Mantagaris

Nuclear Waste Management Organization, Toronto, Ontario, Canada
emantagaris@nwmo.ca

Abstract

The safe and secure transportation of used nuclear fuel is an ongoing area of interest and conversation in dialogue with communities, interested individuals and groups about the long term management of used nuclear fuel. Communities involved in the Nuclear Waste Management Organization's (NWMO) project to site a deep geological repository to contain and isolate Canada's used nuclear fuel are interested in understanding how used fuel can be transported safely and securely. Through questions and active discussion interwoven throughout the broad dialogue about the project, communities, interested individuals and groups are exploring the basis for confidence in safety of the transportation of used nuclear fuel. The NWMO is learning about the questions which need to be addressed, the testing which needs to be performed, and the values, objectives and processes which need to guide planning of the transportation of used nuclear fuel as part of the project.

The paper outlines several key themes that the NWMO is hearing regarding the transportation of used nuclear fuel during its 2014 – 2015 dialogue and engagement activities. Face-to-face conversations, questions, comments and other engagement reflected an interest in knowing more about the project in general, especially health and safety aspects, and the transportation of radioactive material, including transportation routes, security, logistics and emergency preparation.

In order to advance conversations in these areas, and to begin to address these questions and concerns and build understanding, the NWMO continues to prepare and share a wide variety of printed and web based materials as well as displays and exhibits. To facilitate further reflection on transportation of used nuclear fuel, the NWMO will seek to advance dialogue through a public discussion document to understand the priorities of Canadians for the development of a social framework for transportation planning. This discussion document will be reviewed in the paper.

1. Introduction

Canada's plan for the long-term management of used nuclear fuel, known as Adaptive Phased Management (APM), emerged from a dialogue with Canadians [1]. Transportation of used nuclear fuel is an important element of this plan. In implementing this plan, the Nuclear Waste Management Organization (NWMO) has as one of its key objectives the development of a safe, secure and socially acceptable plan for transporting used nuclear fuel to the repository site which is ultimately selected.

Canada's plan for the long-term management of used nuclear fuel involves transporting used fuel from licensed facilities where it is currently stored on an interim basis to a deep geological repository where it will be contained and isolated from people and the environment for hundreds of thousands of years. The NWMO is working collaboratively with interested communities to identify a single site where Canada's used nuclear fuel can be safely and securely contained and isolated over the long term. A preferred site for the repository might be identified as early as 2023. Detailed characterization of that site would then be required over several years. Once that is complete, the site would become the subject of independent regulatory review before proceeding to construct the repository at the site. APM transportation is expected to take about 40 years to complete. It is not expected to begin before 2040.

The NWMO understands that planning for transportation of the used nuclear fuel requires the involvement of a broad range of citizens and technical specialists. Developing the plan through dialogue is designed to ensure APM transportation plans incorporate the best knowledge and expertise, and are guided by the values and priorities of Canadians to protect future generations.

To support the development of a framework that will guide future planning, the NWMO is leading a program of dialogue and learning. To encourage conversation, the NWMO has produced a discussion document with an invitation to Canadians to become involved and help guide decision-making on this important task.

2. Background

The safe and secure transportation of used nuclear fuel is an ongoing area of interest and conversation in dialogue with communities involved in the siting process, interested individuals and groups about the long term management of used nuclear fuel. Interest in understanding how used fuel can be transported safely and securely, and the importance of transportation in implementing the Adaptive Phased Management (APM) project, leads to questions and active discussion interwoven throughout the broad dialogue about the project. Through this dialogue communities, interested individuals and groups are exploring the basis for confidence in safety of the transportation of used nuclear fuel. The NWMO is learning about the questions which need to be addressed, the testing which needs to be performed, and the values, objectives and processes which need to guide planning of the transportation of used nuclear fuel as part of the APM project.

Since the initiation of the siting process in 2010, the NWMO has met and talked with communities and interested individuals and groups at meetings and briefings, interim storage facility tours, monthly meetings of community liaison committees (CLC), community open houses, and festivals, and events organized by communities and groups. Questions and comments are also expressed to the NWMO through its website or directed through CLC websites, municipal conferences, and public comment on websites, newspapers, and social media pages such as Facebook and Twitter. NWMO continues to broaden its outreach and engagement with activities beyond the communities which entered the site selection process, including First Nation and Metis communities and other neighbouring communities [2].

As dialogue broadens and deepens, interest has continued to grow in understanding the specifics of project implementation, scheduling, how NWMO will put needed capacities and safeguards in place, and the expected outcomes for communities and their surrounding areas. NWMO brochures such as *Safe and Secure Transportation of Canada's Used Nuclear Fuel*[3], and *Safe and Secure Transportation of Canada's Used Nuclear Fuel – Questions and Answers*[4], provide additional information which have helped further fuel discussion. The NWMO's strategic plan, *Implementing Adaptive Phased Management 2016 – 2020*, provides further information [5]. The safe and secure transportation of used nuclear fuel is one of the eight NWMO strategic objectives outlined in the plan. As community members not previously involved begin to become aware of and learn about the project, conversations also continue on the nature of used nuclear fuel, the details of the APM project, how the siting process works, and how decisions will be made.

The discussion which follows outlines highlights of what we heard about transportation of used nuclear fuel as part of ongoing dialogue and engagement activities conducted in 2014 and 2015. This discussion is organized in two sections: the first outlining the key transportation themes from conversations with the public and the second a general context setting discussion and reflection on how the dialogue may evolve into the future.

3. Key Transportation Themes

As discussions broaden and deepen, and new communities, individuals and groups join in, there appears to be a common set of questions and concerns which need to be addressed in transportation planning.

This set of questions and concerns are important irrespective of the particular community, individual or group. This provides a strong framework from which to begin to develop transportation plans which will meet the requirements of citizens.

Over the course of 2014 and 2015, questions and concerns focused on three key themes: health and safety, transportation as a component of Canada's plan, and role of transportation in site selection.

3.1 Health and Safety

With respect to health and safety, there is interest in: 1) plans to ensure the safety of people and the environment during transportation; 2) the Used Fuel Transportation Package; 3) safety en route, emergency response plans, and scenarios; 4) protecting water along the route; 5) understanding transportation logistics; and 5) understanding radiation.

There is a high level of interest in learning more about NWMO's plans to protect the safety of people and the environment during transportation and how the integrity of the used fuel containers will be ensured. People are interested in how safe transportation of used nuclear fuel would be ensured for the communities, land, and water alongside the route, as well as for staff, including truck drivers and loading and unloading personnel. People also look for information about the safety track record.

Many questions focus on the design of the Used Fuel Transportation Package, such as choice of container shape and fabricating material, the purpose of the impact limiter, and the integrity of the container in the case of an accident involving water, fire, or terrorist attack. Underlying these questions is a strongly held view that people and the environment, including land, potable water, and water bodies must be protected during transportation.

Many want information on how the NWMO will deal with emergency planning, what security measures might look like, and what the program will look like on the ground in their community. There is interest in the radiation risks to workers, the public, and the environment during transport, and during the extremely unlikely event of a breach to the package as a result of an accident. People probe to better understand the hazard and how it might be practically managed during a variety of hypothetical worst-case accident scenario. Often the questions reflect misunderstandings that the used fuel is a liquid and can “spill” and contaminate land and water. The importance of communicating with first responder agencies about when the package is likely to pass through their boundaries is raised. The security of shipments and how loads would be secured from malicious threats, including terrorism incidents and theft, are also of interest.

Ensuring water quality and protecting water bodies and lands of economic importance are top of mind subjects for many, and the focus of concern has been split between the environment near the repository and along the transportation route. People want to understand the potential for the APM project to endanger local water sources, particularly in the case of a transportation accident en route, and want to understand details about how the NWMO would maintain the safety of water, especially the Great Lakes and local sources of drinking water.

People are interested in how the waste would be moved from its current location to the repository. They wonder where the waste is currently located, and want to know how it would be loaded onto and unloaded from the truck. Questions also include the routes and its modes (e.g., road, rail, or ship) that are being considered and whether the NWMO has selected preferred routes and modes yet.

A desire to learn more about and understand radiation often underlies discussions about transportation. There is an interest in understanding radiation better, including what is known about the radiation hazard associated with transporting used fuel to the repository, the health effects of exposure, the ways in which we can measure this exposure and protect humans, animals, and the environment from unnecessary exposure, and the emergency response measures that would be used in the unlikely case of radiation release [2].

3.2 Transportation as a component of Canada's plan

With respect to transportation as a component of Canada's plan, there is interest in: 1) the nature of used nuclear fuel; 2) how costs will be covered; and 3) oversight.

Building knowledge and a deeper understanding of other aspects of the project is important context for transportation discussions. This includes the design and radioactive characteristics of the used fuel bundles, the history of nuclear power in Canada, the NWMO's mandate, and how waste is currently safely managed on an interim basis at Canada's nuclear power plants. In relation to transportation specifically, there is interest in knowing more about radiation safety related to the used fuel bundles when they are ready to be transported to the repository.

People have an interest in how transportation will be funded. For example, they are interested in understanding the cost of the transportation vehicles and the used fuel transportation packages. They are interested in understanding how the cost of transportation to a particular potential site will be factored into decision-making on a preferred site. There is interest in knowing how funding will be assured over the very long term.

There is also a strong interest in understanding the checks and balances that are in place to ensure safety. Interest areas include who will oversee transportation of used nuclear fuel, and what regulations are in place. [2].

3.3 Role of Transportation in site selection

With respect to transportation and its role in site selection, there is interest in: 1) transportation route selection and planning; and, 2) involvement of transportation route and regional communities in the conversation.

There is interest in learning more about the factors which will be considered in choosing routes. Included in this is interest in understanding the relationship between transportation distance and safety.

There is broad appreciation that the transportation of used nuclear fuel as required by APM is likely to encounter controversy and challenges as communities along a transportation route with little information first become involved in the siting process. In anticipating this future phase of the siting process, there is already much discussion among communities involved in the siting process about how to ensure the involvement of those along the transportation route, and importantly how to build learning and understanding and to advance the project on behalf of future generations [2].

4. Discussion

Through ongoing conversations with NWMO staff, people living in and around communities involved in the siting process have told us they have been able to explore these transportation themes in more depth, building on previous understanding and formulating a more detailed picture of how NWMO might transport Canada's used nuclear fuel to a repository site.

In 2014-2015, NWMO engaged in dialogue with people living in and around potential siting communities as part of our ongoing preliminary assessment studies. Many hundreds of thoughtful discussions took place in community offices, at open house events at local community centres, and through resident interviews with third-party consultants hired to conduct well-being assessment studies. Community Liaison Committees and other discussion groups set up in communities also forwarded their community's questions and comments to the NWMO for public response on CLC websites.

In addition, NWMO continued to build relationships and the opportunity for dialogue with local emergency management authorities, and at higher levels of government through meetings with ministries and departments responsible for transportation safety. To ensure we are taking a broad and inclusive approach to understanding public perspectives, NWMO also scanned traditional and social media channels for substantive public input and to be aware of and consider the perspectives of local, provincial and national environmental and non-governmental organizations.

We observe that questions and concerns about transportation are very consistent among different communities, groups and individuals. However, NWMO has also observed that conversations have evolved and become more specialized and detailed, especially when talking with people who have maintained an ongoing interest and participation in this topic.

For example, public interest in the associated Used Fuel Transportation Package exhibit trailer, which has accompanied NWMO Open Houses in interested communities, is high and a focus of attention in communities it visits. Repeat visitors to NWMO events have found the trailer display helpful in contextualizing current and planned transportation methods, and the ability for visitors to see and touch an actual transportation container has allowed for a more comprehensive discussion of emergency planning and response. Dedicated NWMO transportation specialists have had many conversations with those interested in physically inspecting a real transportation package, and people continue to consistently note the size and robustness of the 30 tonne steel package. Many people tell us that following their visit to the UFTP they had a greater understanding of how the package is designed to keep used fuel safe while being transported. This exhibit has now visited many of the communities involved in the siting process more than once, allowing the conversation and engagement to continue to develop in those communities.

Continuing dialogue has also allowed the NWMO to listen, learn, and build a stronger understanding of key concepts surrounding transportation safety from the public perspective, and clarify potential misconceptions about NWMO plans.

At the local level, as conversations have advanced over the course of the siting process, concerns about how transporting used nuclear fuel might impact waterways along

transportation routes have grown in prominence. NWMO has engaged in many conversations with residents about risk and management strategies, and discussed the overall potential effects of hosting a long-term management facility for used nuclear fuel on waterways, and people are eager to explore this in depth.

Many have spoken with the NWMO about their own knowledge and experience in moving commodities along long stretches of rural highway, or by railroads that traverse isolated natural environments that can experience intense weather. This often includes discussion of transportation incidents involving other commodities that have happened in the area. With this experience as a backdrop, there is strong interest in knowing more about transportation planning, as well as the potential effects of an accident on the local environment including creeks, rivers or lakes. Concerns about the effect on the Great Lakes, and similar concerns about water safety (especially in the Great Lakes Basin) have also been the recent focus of some environmental and non-governmental organizations. This includes groups and individuals opposed to building any repository for nuclear materials who have drawn the attention of the public and lawmakers through protests, letter-writing and social media campaigns, as well as petitions circulated around the world via social media [2].

5. Continuing Dialogue

Over the course of 2014 and 2015, and as dialogue continues on this important topic, NWMO has observed that bringing accurate and balanced information in to the discussion is appreciated by those involved as there is substantial misunderstanding and misinformation on this topic. It also invites deeper conversation and greater reflection on the choices which face us as a society in how we will ensure safety at every point in the long term management of used nuclear fuel.

NWMO has also observed that as conversations continue, and more communities, individuals and groups become involved, there is substantial agreement on the themes and questions that need to guide and be addressed in transportation planning.

Looking forward, it is apparent that learning and dialogue about transportation planning will need to advance in a dynamic social environment. Discussion about transportation may well be influenced and even aided by broader discussions on matters such as evolving approaches to ecosystem health and well-being with respect to implementation of large projects, and how respect should be shown for Indigenous rights and the role of First Nations and Métis communities in decision-making [2].

6. Discussion Document: Planning Transportation

In order to advance dialogue, the NWMO has developed a discussion document to encourage conversation on the objectives, the issues that will need to be addressed, the factors to consider in making decisions, and the means we should use to ensure the APM transportation plan includes best knowledge and experience, as well as the values and priorities of citizens.

This discussion document invites Canadians to become involved and help shape the development of the plan for APM transportation.

To get the conversation started, the NWMO has suggested beginning with the following five questions with an invitation to add to these questions over the course of the dialogue [6].

Question 1: What basic requirements or factors should form the starting foundation for the APM transportation plan?

Question 2: Which objectives, principles and key questions should guide development of an APM transportation plan?

Question 3: How can we ensure the design and implementation of the APM transportation plan is sufficiently inclusive to ensure good decisions are made?

Question 4: What information will we need from technical specialists to develop the plan and support decision making?

Question 5: What factors should be considered in future decisions about modes and routes?

Plans for engagement and outreach include discussion with Community Liaison Committees and others in communities involved in the siting process and individuals and groups in Aboriginal communities; feedback from presentations at conferences, comments and submissions shared on the NWMO website, and public attitude research. NWMO expects to prepare a report on *What We Heard*, and a *draft framework emerging from the dialogue* in 2018. These reports are expected to be the focus of further discussion in the future to confirm the framework.

7. Conclusion

As the NWMO collaboratively implements Canada's plan for the long term management of used nuclear fuel, we will continue to seek the participation of interested Canadians. The NWMO has as its objective the establishment of a safe, secure and socially acceptable plan for transporting used nuclear fuel. In support of this objective, the NWMO has committed to ongoing dialogue and engagement of citizens to inform the development of a planning framework.

This paper has outlined key themes that the NWMO has heard regarding the transportation of used nuclear fuel initi engagement activities to date. To advance the planning around transportation, NWMO has developed a discussion document to begin a multi-year dialogue to understand the questions and concerns citizens have about transportation and identify the common ground for a socially acceptable transportation plan. With the support of citizens and

technical specialists, the NWMO is working to develop the framework for a transportation plan which will lay out clear objectives, the issues that need to be addressed, the factors to consider in making decisions, and the means we will use to ensure the plan includes best knowledge and experience, as well as the values and priorities of citizens.

8. References

- [1] Nuclear Waste Management Organization, “Choosing a Way Forward – The Future Management of Canada’s Used Nuclear Fuel – Final Study”, Toronto, Ontario, Canada, 2005.
- [2] Nuclear Waste Management Organization, “Transportation Themes 2014-2015: What We Heard about Transportation Planning from Working with Communities”, Toronto, Ontario, Canada, 2015.
- [3] Nuclear Waste Management Organization, “Safe and Secure Transportation of Canada’s Used Nuclear Fuel”, Toronto, Ontario, Canada, 2015 May.
- [4] Nuclear Waste Management Organization, “Safe and Secure Transportation of Canada’s Used Nuclear Fuel – Questions and Answers”, Toronto, Ontario, Canada, 2015 May.
- [5] Nuclear Waste Management Organization, “Implementing Adaptive Phased Management 2016 to 2020”, Toronto, Ontario, Canada, 2016 March.
- [6] Nuclear Waste Management Organization, “Planning Transportation for Adaptive Phased Management: Draft Discussion Document”, Toronto, Ontario, Canada, 2016 April.