
Hill + Knowlton Strategies
ABSTRACT

Title: NWMO Public Attitude Research and Dialogue – Public Dialogue Technical Report
Report No.: NWMO-SR-2017-03
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Abstract
The NWMO commissioned Hill + Knowlton Strategies to lead a series of focus groups, workshops and a public dialogue on transportation planning for the long-term care of Canada’s used nuclear fuel. Activities included 20 in-person focus groups (10 in Ontario, six in Quebec, and four in New Brunswick); a day-long public dialogue session; and two workshops with individuals involved in the site selection process in Ontario, one bringing together representatives from municipalities and indigenous communities.

These activities aimed to solicit participant input and engagement on five questions outlined in NWMO’s Planning Transportation for Adaptive Phased Management discussion document (2016) as follows:
1. What basic requirements or factors should form the starting foundation for the APM transportation plan?
2. Which objectives, principles and key questions should guide development of an APM transportation plan?
3. How can we ensure the design and implementation of the APM transportation plan is sufficiently inclusive to ensure good decisions are made?
4. What information will we need from technical specialists to develop the plan and support decision-making?
5. What factors should be considered in future decisions about modes and routes?

The NWMO Public Attitude Research and Dialogue: Public Dialogue Technical Report presents findings from a Public Dialogue session held in Toronto. This report, together with the three other reports listed below present the composite findings from the Hill and Knowlton Strategies research:

Research findings as well as ongoing conversations with communities involved in the siting process and others that are interested, will be used to develop the NWMO’s draft transportation planning framework for the APM process.
NWMO PUBLIC ATTITUDE RESEARCH AND DIALOGUE
PUBLIC DIALOGUE TECHNICAL REPORT

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1. OBJECTIVES AND METHODOLOGY

1.1. OBJECTIVES

The NWMO has made significant progress in developing its Adaptive Phase Management Plan (APM), with seven Ontario communities actively engaged in the site selection process. As noted in the Planning Transportation for APM Discussion Document (the Discussion Document) – while it will be many years before used nuclear fuel is transported to a community repository site, it is not too early to begin phased and iterative outreach to the public and other stakeholders to initiate a broader conversation about transportation planning.¹

The NWMO has therefore undertaken a qualitative research program to explore public attitudes and perceptions towards transportation planning for used nuclear fuel. In Ontario, this program included a series of focus groups, two workshops and one public dialogue session.

Feedback from the public dialogue will help the NWMO develop a draft transportation framework for APM. The broad objectives of the session included:

+ Educate participants on key aspects of APM and transportation planning;
+ Seek participant input on the five questions outlined in the Discussion Document;
+ Add to, and deepen, the NWMO’s understanding of key insights gathered during the Ontario focus groups; and
+ Assess the extent to which participants’ initial, uninformed reactions (as measured by a pre-session questionnaire) were influenced by information and discussion (as measured by a post-session questionnaire).

1.2. METHODOLOGY

The public dialogue was held on June 17, 2017, from 10 AM to 4 PM, at a community centre in North York. A total of 39 people participated in the full-day session. Conducted in English, the dialogue was designed as follows:

+ Participants were randomly selected members of the general public, recruited based on a number of socio-demographic and attitudinal screening criteria developed to represent the views of a wide cross-section of Ontarians;
+ Participants were randomly assigned to tables of 6-7 participants;
+ Following an introductory presentation and “Nuclear in Ontario” trivia exercise, participants were tasked with discussing the five broad questions outlined in the Discussion Document, including the basic requirements of a plan, guiding principles and objectives, ensuring inclusiveness, criteria for the selection of transportation modes and routes, and the science behind the plan;

¹ Planning Transportation for Adaptive Phased Management, September 2016, NWMO.
Each discussion began with a brief overview (provided using a combination of short context-setting presentations, informational videos, handouts and references to the Discussion Document), followed by a Q&A with NWMO officials; A facilitator from Hill+Knowlton Strategies then guided participants through a mix of individual reflection, table brainstorming exercises and plenary discussion; Each table nominated a note-taker to capture group discussions using a worksheet provided, as well as a speaker to report highlights to the larger group in a plenary session; At the end of each segment, individual notes and table worksheets were collected for analysis and reporting purposes (see Appendix A to C – Public Dialogue Presentation, Participant Handouts and Participant Worksheets); and Before leaving, participants completed a post-session questionnaire, designed to assess their views on the research subject matter, including trust in institutions, perceptions of nuclear power generation, and attitudes towards the transportation of used nuclear fuel (see Appendix D – Post-session Questionnaire).

This report summarizes the findings that emerged from the public dialogue session. These results will be synthesized in a final report that will include the results of all other research components of the study.
2. SUMMARY OF KEY FINDINGS

A total of 39 people participated in the public dialogue session. Participants were tasked with discussing the five broad questions outlined above, and as a whole, responded positively to the opportunity to provide input and were actively engaged in the subject matter. Overall, there was a great deal of consistency between participant feedback and the content of the Discussion Document. Key highlights of this feedback follow.

Basic Requirements of the APM Transportation Plan

When discussing what needs to be included or addressed in the APM transportation plan, safety emerged as an overarching principle guiding considerations related to route selection, mode of transportation, packaging design, operational training and regulatory oversight. Consistent with the plan’s use of a deep geological repository, participants repeatedly stressed that the plan needs to minimize public “interaction” with and “exposure” to used nuclear fuel, further suggesting that comprehensive risk mitigation strategies be developed for those transporting or living in the vicinity of used nuclear fuel and those living in communities along the selected route.

As part of this early discussion and over the course of the session, some participants recommended that a “separate rail or road system” be used for the transportation of used nuclear fuel; others emphasized a need for “dedicated” driver training and emergency personnel. Participants also highlighted the importance of a “Plan B” or access to alternative route options in case of an incident and/or closure, as well as adequate access for emergency response teams. Participants generally agreed that where used fuel is transported “matters more” than how (mode), reiterating that the selected route avoid densely populated areas. After viewing a video outlining the certification of package design for used nuclear fuel, participants widely reported a need for further container testing in more realistic scenarios for both road and rail modes of transport. They also called for greater clarity regarding oversight (who is responsible for what aspects of the APM transportation plan) and accountability, or rather who is ultimately responsible for the plan from beginning to end.

While discussions centred largely on safety, participants identified security as an equally important component of transportation planning (including the threat of attack or terrorist activity and local risks such as protests). Participants also emphasized public education, noting that local perspectives need to be considered when designing the plan and that appropriate resources should be in place to help communities educate residents about the route and associated risks. Finally, participants suggested that transportation planning should build on lessons learned from Canadian and international experience and best practices related to nuclear and the transportation of dangerous goods.
Guiding Principles and Objectives

Participants discussed at some length the principle of inclusiveness, highlighting the challenge of determining who should be involved in the process and how. A number of participants noted potential incompatibility between the principles of inclusiveness and Aboriginal rights, treaties and land claims, asking how the NWMO would address the views and needs of one group in cases where they diverge or conflict with that of another. Participants also agreed that environmental protection should be incorporated as a standalone principle with references to “wildlife” and “water,” and that the NWMO should recognize the role and importance of municipal officials in the development and review of the plan.

Regarding objectives, participants generally agreed with those proposed, though recommended a prioritized list for greater clarity. Many participants asked how these objectives will be monitored and measured, and who will be responsible for oversight. While participants held varying views on the relative importance of cost and economic viability, most emphasized the need for flexibility in the plan to accommodate change and innovation.

Ensuring We Are Inclusive

Participants considered who needs to be involved to ensure good decisions are made with respect to APM transportation. While initially referencing “all Canadians,” further discussion prompted participants to consider nuances such as proximity to the selected route, level of authority and/or responsibility to the public at large, and extent of information required. They consequently agreed that all Canadians should have some measure of awareness and understanding about Canada’s plan and that those who are more directly affected should have greater opportunity to understand the plan and its potential impacts, and to have their voices heard. They also agreed that the plan “can’t involve everyone,” noting that factors such as local knowledge, relevant industry expertise and authority to share best practices could help determine who should be involved in decisions affecting the design and development of the plan.

Considerations for the Selection of Modes and Routes

Participants were asked to provide feedback on the factors or criteria that should be considered in future decisions about transportation modes (“how we transport”) and routes (“where we transport”). With respect to modes, safety “of product, people, [and] environment” was again top of list, followed by security; amount of available “rail lines/roads”; the number, volume and timing of shipments; environmental and economic impacts; level of social and political acceptance; and adaptability to new technologies, to name a few. While some participants were inclined to favour one mode over the other (predominantly rail), others noted that a “door-to-door” transportation plan may require both road and rail.

Echoing earlier discussions, participants encouraged the NWMO to consider using dedicated infrastructure for the shipment of used nuclear fuel, a separate rail line in particular. Considerations for future decisions about routes were quite similar to those for transportation modes, especially with respect to safety and security. Participants also emphasized proximity to urban areas, length of route and condition of infrastructure, and number of potential intermodal transfers.
The Science Behind the Plan
Participants generally supported the NWMO’s proposed program components and provided the following additional suggestions: provisions for an “environmental response plan”; a communications plan to build awareness about transportation; an economic impact analysis for modes of transportation; a funding program for communities to support emergency preparedness and response; and a strategy to determine appropriate levels of community involvement.

With respect to program activities, participants focused largely on packaging for used nuclear fuel and the need for more exhaustive “real life scenario” testing. Participants also highlighted the need to identify best practices related to worker and operational safety and emphasized the importance of robust planning for emergency response and shipment security, suggesting that the NWMO consider “pilot projects” to test and strengthen response and security measures for road, rail and inter-modal transport.

Finally, participants recommended conducting research on “public awareness and readiness” to support planning and route selection, and suggested monitoring potential “[public] health impacts” in communities along the selected route.

Is the NWMO on the Right Track?
In closing, participants were asked to carefully consider everything they had heard and to indicate whether they felt the NWMO was on the right track. For the most part, participants indicated that they “learned a lot” and that the NWMO is heading in the right direction with respect to the development of the APM transportation plan. They also encouraged the NWMO to continue engaging Canadians, particularly those in communities involved in the site selection process, and reiterated the following considerations for the plan: safety and security are paramount; incorporate Canadian and international best practices; consider dedicated transportation infrastructure; ensure flexibility and adaptability to new technologies and future “social, political and environmental” risks; and inform communities “before and during” plan development, especially those along the selected route.

Pre- and Post-Session Survey Results
A comparison of the pre- and post-session survey results showed that the presentation, materials and discussion had a significant positive impact on participants’ views of nuclear energy and the transportation of used nuclear fuel.
3. DETAILED FINDINGS

3.1. INTRODUCTION – CANADA’S PLAN FOR USED NUCLEAR FUEL

While levels of awareness and knowledge about the use of nuclear energy in Ontario varied, few participants were familiar with the NWMO or had given much thought to how Canada deals with used nuclear fuel. Based on an introductory trivia exercise, participants were generally surprised about how much of Ontario’s electricity needs are produced using nuclear power and the percentage of used fuel residing in the province. One participant captured the sentiment in the room: “We don’t think about it…what’s behind our electricity.”

A NWMO representative then presented background and context pertaining to Canada’s plan for the long-term management of used nuclear fuel, including information about the nuclear fuel cycle in Canada; the size, shape and power contained in one fuel bundle; the interim storage process for used fuel; consultations and engagement to date; the plan to establish a deep geological repository; and the site selection process and participating communities. Participants also viewed a video outlining Canada’s plan, known as Adaptive Phased Management or APM.

Prior to continuing, participants posed several questions related to international best practices for the management of used nuclear fuel, site selection, the storage process and options to retrieve the material, and the cost of this plan.

3.2. BASIC REQUIREMENTS OF THE APM TRANSPORTATION PLAN

To inform this initial discussion, a NWMO representative reviewed the expected timeline for APM transportation and presented a brief overview of transportation standards and safety records, possible modes of transportation (i.e. rail and road) and corresponding average shipments per year needed to facilitate Canada’s plan.

Following a brief Q&A, participants were invited to brainstorm possible components of a transportation plan at their tables, before sharing their conclusions in plenary. More specifically, they were asked:

+ What do you think needs to be included or addressed in the APM transportation plan?
+ What kinds of questions and concerns need to be addressed in developing the plan?
+ What Canadian and international experience should be reviewed?

Participants were then provided with information regarding the regulation of radioactive materials and a video outlining the certification of package designs for the transportation of used nuclear fuel. The following themes and feedback emerged from table and group discussions about transportation planning for Canada’s used nuclear fuel.

Safety, Risk Mitigation and Emergency Response

Participants identified safety as a key component of APM transportation planning and one that should guide all others, most notably criteria and logistical considerations for route selection and mode of transportation. Participants repeatedly stressed that the plan needs to minimize public “interaction” with and “exposure” to used nuclear fuel, noting in particular that shipments should avoid more densely populated areas. Participants suggested that a “risk
mitigation strategy” should be developed for: those transporting used nuclear fuel (“What precautions will be taken to protect drivers/conductors?”); those living in the vicinity of the product (i.e. interim storage locations); and those living in communities along the selected route.

Participants also cited that “worst case” scenarios need to be examined, with one group inquiring about the frequency of safety “checkpoints” (“how far can the material be transported before it has to be checked for safety?”). In the event of an incident, participants called for a “spill management plan” (notwithstanding the fact that used nuclear fuel is a solid material) and recommended provisions for a dedicated emergency response team – “not just regular emergency response” – trained specifically in nuclear waste management.

Package Designs for the Transportation of Used Nuclear Fuel

While participants referenced packaging in group discussion (“If the train/truck derails, will the shipment stay intact...?”), the video outlining the certification of package designs provided an opportunity for more substantial feedback. Participants widely reported a need for “more intense,” “less visually appealing” tests involving the actual container in more realistic scenarios with varied terrain (e.g. “container will be less than perfect” and will not just hit “flat things”). Some participants did not seem to trust the tests depicted in the video: “Although none of the cargo was exposed, were the contents breached?” and “What if contents leak in container?”

In addition, the video prompted the following questions, concerns and considerations related to APM transportation planning.

- Oversight and accountability – Responsibility “has to [remain with a] public interest organization.”
- Quality of international standards and regulations – “How stringent are they?” and “Are they a license to pollute?”
- Risks associated with modes of transportation – Some participants were inclined to favour one mode over another after viewing the video, while others noted that a “door-to-door” transportation plan may require both “road and rail.”
- Emergency response time in rural or remote areas – “If [a container of used nuclear fuel] is on fire in [Northern Ontario], how long would it take for [the] fire department to respond?”
- Potential impacts to people and the surrounding environment in densely populated areas – “What would a spill like this on [Hwy] 401 mean for the City [of Toronto]?”
- The need for public education – “What is the planned public education piece that [accompanies] this 40-year [plan] so that we do not have preconceived notions muddying the waters?”

Route Selection

As part of initial discussions on basic requirements for transportation planning, participants widely reported that used nuclear fuel should be transported on a “separate” or dedicated route (“rail or road system”) to “avoid any incidents with other people, trucks and trains.” As participants learned about the robustness of the package, however, the
perceived need for a dedicated route was reduced. Other criteria for a transportation route included access for emergency response and equally important, access to alternative routing options in case of an incident and/or closure. The need for a “Plan B” prompted further questions related to safety (“If the route closes, are you going to run through populated areas?”); inter-modal transfers (“If there are problems on roads, will there be rail options?”); and the extent of alternative options (“How many rail lines/roads are available for transportation year-round?”). Participants noted that in some rural or remote locations existing transportation routes are limited and alternatives would be few or perhaps not available at all. In this case, how would the NWMO approach “contingency” planning in areas with only “one road” or where the only operating rail line could be “washed out?”

Furthermore, participants called for “strong management of infrastructure” and asked that the APM transportation plan include maintenance requirements for new or existing roads and railways. With respect to mitigating impacts to local infrastructure, participants noted that the plan should address environmental factors such as terrain (the “dangers” of terrain), climate and extreme weather, and natural disasters (e.g. earthquakes).

Mode of Transportation

Participants generally agreed that where used nuclear fuel is transported “matters more” than how, reiterating the perceived need to avoid larger population centres, i.e. “If train runs through populated area, then go truck.” That said, other participants focused largely on the issue of “road vs. rail” and “questioning the science” behind mode selection. These participants expected plan designers to consider the “pros and cons” of various modes of transportation, mainly road and rail, and indicated that the plan should include an analysis of various options including those currently used to transport radioactive material.

A number of participants identified a preferred mode of transportation, basing their decisions on risk of accident (“Which poses greatest risk? Rail or road?”), and more specifically on the advantages and disadvantages of fewer trips with larger loads versus more frequent trips with smaller loads (e.g. “If truck has accident there is less material spilled, but more trucks needed on the road,” meaning there is “more room for error,” or “train accidents are more destructive.”). In general, participants indicated that “road is a less controlled environment” and that “drivers are more vulnerable to errors than conductors.”

As noted above, participants stressed the need for dedicated infrastructure for the shipment of used nuclear fuel, referencing rail in particular, and if not the case, asked “how many rail lines will be available?” Some participants suggested that the plan should consider a “new rail line” that could be “built through wilderness,” stating that this option could help ease safety concerns related to route selection by “eliminating” transit through populated areas.

Finally, participants called for “flexibility in the plan,” pointing to the need to “accommodate for innovation,” especially with respect to “new modes of transport,” (i.e. self-driving vehicles, drones, hyperloop), and noting, for example, that “if road transportation becomes much safer due to [these] developments, the plan should be able to adjust...” accordingly.
Security

Many participants reported that security is equally important as safety in terms of transportation planning for used nuclear fuel; though discussions centred largely on the latter and security was often addressed in relation to safety. Security issues included both the threat of “outside attack” or terrorist activity (“What kind of security will be in place to keep the material safe from attack?”) and local risks (e.g. protesters). In general, participants indicated that analysis and decisions regarding mode of transportation should consider “vulnerability to attack,” and that “precautions” need to be taken to “protect drivers/conductors.” They also noted that security protocols should reflect route selection, i.e. the location of the route and whether it is a shared or dedicated transit way.

In addition, participants engaged in a brief debate about “public” versus “secret” security protocols, with some encouraging the NWMO to use military escorts and others suggesting to “keep [transportation plans] quiet.” At the same time, they pointed to the challenge of finding a balance between transparency and information sharing (“people [along the route] should be aware”) and the need to mitigate security risks (e.g. “protests could be an issue”).

Oversight, Training and Regulations

Public dialogue participants widely agreed on the need for an “end-to-end transportation plan,” and referencing the Lac Mégantic incident, asked that one entity be responsible for the entirety of the plan. In keeping, several participants indicated that “ownership,” operations and “accountability” should reside solely with the NWMO, stating at one point: “[We] want NWMO on the truck.” Others discussed the potential ramifications of a publicly versus privately operated project (e.g. “striking workers,” etc.), noting that plan designers should consider “criteria” for “select[ing] the transportation company” and “essential service” regulation.

Some participants believed that the transportation industry does not have a “good history of safety” and that “trucking regulations may not [be] stringent [enough].” In general, participants indicated that current regulations for the transportation of dangerous goods need to be reviewed and strengthened as part of plan development, particularly with respect to the amount of “material [that] can be transported at one time.” More broadly: “How can regulations be made more robust to ensure no incidents/accidents.”

Similar to recommendations for emergency personnel, participants asked that the plan include “dedicated training” for those transporting used nuclear fuel. They insisted that this training be “extensive” and “ongoing” and accompanied with “monitoring for drivers/conductors” and “strict” regulatory oversight.

Engagement and Resourcing for Public Education

While discussed briefly, participants identified engagement and public education as an important component of an “inclusive” APM transportation plan. Based on Canada’s history and relationship with Indigenous peoples and the likelihood that a number of Indigenous communities will be affected by this project, participants indicated that the plan should include parameters to ensure that these communities are appropriately informed and “understand the route in full,” specifically in terms of “security” and “Indigenous rights.” More generally, participants noted that local realities and perspectives need to be considered when designing the plan and that appropriate resources should be in
place to help communities (rural and remote, in particular) educate residents about the transportation route and associated risks versus potential community “benefits.”

**Other Considerations for APM Transportation Planning**

When discussing what needs to be included or addressed in the APM transportation plan, public dialogue participants also mentioned the following: transportation logistics (e.g. timing, frequency and distribution of shipments); “environmental impacts” of the route; long-term costs (“for storage”) and potential budget for dedicated infrastructure; funding management (oversight and enforcement); and protection from political interference.

Participants also shared the following with respect to the development of the plan:

- “How will future political/social/environmental factors influence the plan?”
- “How can Canada efficiently transport [nuclear waste] from other provinces to the [selected] site?”
- “How do we ensure all provinces share in the burden? Economically? Physically?”

**Canadian and International Experience**

When asked what Canadian and international experience should be reviewed in terms of APM transportation planning, participants cited the following.

- The causes and impacts of past incidents related to nuclear and the transportation of dangerous goods, such as:
  - Lac Mégantic
  - Fukushima
  - Chernobyl
  - Three Mile Island

- A review of Canadian and international best practices regarding:
  - Current transportation of used nuclear fuel by various modes, predominantly road and rail;
  - Transportation of other dangerous goods, e.g. oil;
  - Package design and certification for radioactive materials; and
  - Risk mitigation, emergency preparedness and emergency response.

Referencing events in the United States and public debate in Germany following the Fukushima accident, participants also highlighted a need to “protect [the process] from politics.” Participants encouraged all efforts to “de-politicize” the plan, recommending that the NWMO “get buy-in from all parties to prevent political interference.”
3.3. GUIDING PRINCIPLES AND OBJECTIVES

The second topic of discussion centered on the principles and objectives that will guide the development of the APM transportation plan.

Participants were provided with an overview and handout of the guiding principles and objectives that the NWMO has developed in conversation with Canadians. Following individual review and comment and before sharing in plenary, participants were asked to brainstorm “what guiding principles and objectives must inform the development of the APM transportation plan.” Participants were encouraged to consider:

+ Whether these are the right principles and objectives to guide the development of the plan;
+ Whether anything should be added, changed, clarified or removed; and
+ Which principles and objectives are most important?

As a whole, participants focused more so on principles than objectives, in some cases conflating the two, and voiced high level comfort with both. The following considerations for principles emerged through individual reflection, table discussion and plenary.

Safety and security: The vast majority of participants viewed safety as paramount to the development of the APM transportation plan and often addressed security in terms of safety. With respect to both, participants widely reported that greater reference should be made to the origin and destination community, and similar to earlier discussions, suggested that a “dedicated team” manage and protect transports of used nuclear fuel.

Regulatory requirements and oversight: Most participants believed that the NWMO “should try to exceed, not just meet regulatory requirements,” indicating that they are equally important for the transportation of used nuclear fuel in terms of “safety,” “health” and “environmental integrity.” However, this prompted a series of questions regarding monitoring and “quality control,” with some participants asking for more information about the entity ultimately responsible for oversight and enforcement.

Inclusiveness: Participants viewed the principle of inclusiveness as key to APM transportation planning, posing questions ranging from “How do you determine who is most likely to be affected?” to who should be included and how. Participants also mentioned that there are “different ways of communicating to reach different demographics more effectively,” noting “town halls” as an example of one forum for public engagement. This discussion sparked a brief, but broader debate about addressing the views or needs of one group when they may diverge or conflict with that of another. Participants also pointed to nimbyism (“no one would want it going through their community”) and the issue of “vetoes,” or rather, if any group or individual would have the authority or power to reject outright aspects of the plan. Several participants thus noted potential incompatibility between the principles of inclusiveness and Aboriginal rights, treaties and land claims, stating that in some cases, “stakeholders as a whole may disagree with Aboriginal desires.”
Environment: Participants generally agreed that environmental protection was “not addressed enough” and needed to be incorporated as a standalone principle. In particular, participants suggested adding references to “wildlife” and “water.”

The following table summarizes key feedback from participants for each guiding principle.

### Table 3.3.1 – Guiding Principles: Participant Feedback

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<tr>
<th>Guiding Principles</th>
<th>Comments</th>
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<tbody>
<tr>
<td><strong>Safety is the overarching principle guiding all APM planning and activities:</strong> Safety, security, and protection of people and the environment are central and must not be compromised by other considerations.</td>
<td>+ Safety and security are paramount and “should not be compromised.”&lt;br&gt; + Define or clarify differences between “safety,” “security,” and “protection.”&lt;br&gt; + Environment should be a separate principal with its own “guidelines,” including the “ongoing measurements of environmental impact.”</td>
</tr>
<tr>
<td><strong>Meet or exceed regulatory requirements:</strong> The plan must meet, and if possible, exceed all applicable regulatory standards and requirements for protecting the health, safety, and security of humans and the environment, and respect Canada’s international commitments on the peaceful use of nuclear energy.</td>
<td>+ All efforts should be made to exceed regulatory standards.&lt;br&gt; + Clarify regulatory standards: “federal or international?”&lt;br&gt; + Clarify if standards include protection of “wildlife.”&lt;br&gt; + NWMO should note that standards are the best available standards.&lt;br&gt; + Include reference to body responsible for monitoring and oversight (“quality control”).</td>
</tr>
<tr>
<td><strong>Aboriginal rights, treaties and land claims:</strong> The plan must respect Aboriginal rights and treaties, and take into account that there may be unresolved claims between Aboriginal peoples and the Crown.</td>
<td>+ Change “Aboriginal” to “Indigenous.”&lt;br&gt; + Change “that there may be” to “the.”&lt;br&gt; + Define “respect” or change to be “more specific.” (“What does respect mean? Who defines respect?”).&lt;br&gt; + Consider “property rights” of non-Indigenous land owners.</td>
</tr>
</tbody>
</table>
**Inclusiveness:** The plan must respond to and address, where appropriate, the views of those who are most likely to be affected by the plan.

  - Clarify that “inclusiveness” does not entail veto power.
  - Should specifically reference both the community of origin and the new site community.

**Informing the process:** The plan must be informed by the best relevant available knowledge, including science, social science, Indigenous Knowledge, and ethics. This information used to develop the plan must also be made public.

  - Define “Indigenous Knowledge.”
  - The information used to inform the plan should “change with science but not with government values.”
  - “Traditional knowledge” may not always concur with science and technological advances.

**Ongoing engagement of governments:** The NWMO must involve all potentially affected provincial governments in the development and review of the plan.

  - Recognize the role and importance of municipal governments (“ongoing municipal and council involvement”) and of the federal government.
  - Highlight importance of collaboration and coordination across all three levels of government.
  - Change “provincial governments” to “stakeholders” – “there are many groups of people potentially affected.”

As noted above, participants generally agreed with the proposed objectives for the APM transportation plan, though recommended prioritizing them to provide greater “clarification.” In addition, a significant number of participants expressed concern about how these objectives will be monitored and measured: “How will these objectives be achieved? Through what processes and mechanisms and standards...?” To this end, participants suggested incorporating “a document to show how all objectives and principles will be met.” With respect to oversight, participants also asked, “Who’s enforcing?” and “Who’s accountable?” pointing to government, the NWMO or an “arms-length body” as possible options.

Furthermore, participants had diverging views about the relative importance of cost and economic viability of the used nuclear fuel management system. Some were adamant that costs and viability should be of least concern, stating that “it is not about cutting costs, it should be about finding the funds to ensure safety, health and environmental integrity remain a top priority.” Others insisted that “costs should be a big factor” and should be monitored carefully.

Similar to earlier discussions, participants highlighted the need for flexibility in the plan to accommodate change: “How does the plan take into account future interests – future [generations], future regulatory changes, future development, and climate change?” Participants felt that the phrase “capacity to adapt” was insufficient and suggested “framework to adapt” or “willingness to adapt” instead.
The following table summarizes additional considerations related to proposed objectives.

**Table 3.3.2 – Objectives: Participant Feedback**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect public health and safety from the risk of exposure to radioactive or other hazardous materials, and from the threat of injuries or deaths due to accidents.</td>
<td>+ General agreement.</td>
</tr>
<tr>
<td>Protect workers from and minimize hazards associated with managing used nuclear fuel.</td>
<td>+ General agreement.</td>
</tr>
</tbody>
</table>
| Ensure fairness in the distribution of costs, benefits, risks, and responsibilities. | + Define “fairness.”
|                                                                             | + Clarify “who decides” and who this includes.                            |
| Ensure the well-being of all communities with a shared interest.          | + Generally unclear.                                                     |
|                                                                             | + Clarify if “well-being” also includes “the economic well-being of communities.” |
| Ensure the security of facilities, materials and infrastructure.          | + Reference and emphasize security at origin and destination sites.      |
| Ensure that environmental integrity is maintained over the long term.     | + “How can ‘environmental integrity’ be maintained with climate change/global warming?” |
| Ensure economic viability of the used nuclear fuel management system.     | + Clarify whether this includes protecting funds for legal challenges.   |
| Ensure a capacity to adapt to changing knowledge and conditions over time. | + Change to: “Ensure the APM adapts to changing knowledge and conditions over time.”
|                                                                             | + Include notion of “willingness to adapt.” (“Having the capacity to adapt does not mean there is a willingness to adapt.”). |
|                                                                             | + Change “capacity” to “framework.”                                     |
3.4. ENSURING WE ARE INCLUSIVE

Public dialogue participants considered who needs to be involved to ensure good decisions are made with respect to APM transportation, and were asked to make a distinction between those who need to be informed versus those who should play a more active role in decision-making.

From the onset, participants reported a lack of consensus regarding the meaning of inform versus involve, and requested that the terms be more clearly defined. Some participants decided that “anyone who could be impacted should be involved,” while others differentiated the terms based on choice: “[If] you have a choice not to be impacted, you should be informed. If you [do not] have a choice, [you] should be involved.”

Regardless, there appeared to be an equal lack of consensus about who exactly should be informed, ranging from “everyone,” to those transporting used nuclear fuel, to “experts in environment, nuclear, geology, [and] transportation across Canada.” However, as the discussion progressed, participants began to consider nuances such as proximity to the selected route, level of authority and/or responsibility to the public and extent of information required, and generally agreed that the plan should:

+ Ensure that all Canadians have some measure of awareness and understanding of Canada’s plan (“people should know [about the plan]...and who to contact for questions and concerns”); and
+ Ensure that those who are more directly affected by transportation have greater opportunity to understand the plan and its potential impacts, and to have their voices heard, e.g. officials from communities along the route need “more information [and a] higher level of understanding” as they are responsible for informing and accountable to local residents.

Participants also agreed that the plan “can’t involve everyone,” noting the nature and scope of this project and the issue of consensus. Instead, an informal set of parameters emerged as participants suggested why certain individuals or groups should be involved in decision-making. These included the authority to share best practices, local knowledge, or relevant industry expertise pertaining to key aspects of APM transportation planning – safety, security and emergency response in particular. Participants also pointed to relevant federal and provincial policy-makers and regulators, those accountable to the “public/electorate,” and those directly affected by the selected route.

More specifically, participants indicated that the following groups and individuals should be involved:

+ Municipalities along the route, especially site community, including elected officials and senior municipal administrators
+ Indigenous communities along the route
+ Directly affected landowners
+ Relevant federal and provincial ministries, including Transport Canada, Environment Canada, Ministry of Transportation (MTO), Ministry of the Environment and Climate Change, and Ministry of Health and Long-Term Care
Canadian Nuclear Safety Commission (CNSC)

CSIS and the RCMP

First responders

Municipal authorities

Ontario Power Generation (OPG), NB Hydro, Hydro Québec and Atomic Energy of Canada Limited

Environmental groups (“concerns will be recorded and addressed” / “opportunity to be part of the solution”)

Transport company involved in Canada’s plan, “including workers”

Those living and working adjacent to the route (e.g. within a “5 km” or “20 km” radius)

Other countries planning and implementing similar projects

“Scientific experts,” “geologists” and other “technical professionals.”

Additionally, some participants suggested that a “committee of communities along [the] route” and a “technical council” of nuclear physicists and engineers, etc. could inform decision-making for the transportation of used nuclear fuel.

3.5. CONSIDERATIONS FOR THE SELECTION OF MODES AND ROUTES

For this portion of the dialogue session, participants were provided with information pertaining to modes (“how we transport”) and routes (“where we transport”), including distances between interim storage locations and potential siting communities, estimated frequency of shipments by mode (rail and road), and the expected timeline for APM transportation. Participants also viewed a video outlining the current amount of used nuclear fuel in Canada, various modes of transportation and corresponding safety records. They were reminded that the number of shipments will be determined by the location of the site, which in turn, will influence route and mode selection. Before discussing in plenary, participants were asked to reflect and record individually the factors or criteria that should be considered in future decisions about modes and routes.

Modes

The vast majority of participants focused on rail and road as potential modes of transportation for used nuclear fuel, highlighting considerations for future decision-making, as well as their preferred option for Canada’s plan.

According to participants, the following factors and criteria should be considered for transportation modes:

+ Safety (“of product, people, [and] environment”) - “should supersede monetary concerns”;
+ Operational history and risk analysis to determine propensity and magnitude of potential accidents and impacts on people and communities (including “commuter transport”);
+ Local security (options for “dedicated escort”) and the “susceptibility to targeted attacked”;

Additionally, some participants suggested that a “committee of communities along [the] route” and a “technical council” of nuclear physicists and engineers, etc. could inform decision-making for the transportation of used nuclear fuel.

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+ Safety (“of product, people, [and] environment”) - “should supersede monetary concerns”;
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+ Local security (options for “dedicated escort”) and the “susceptibility to targeted attacked”;

Additionally, some participants suggested that a “committee of communities along [the] route” and a “technical council” of nuclear physicists and engineers, etc. could inform decision-making for the transportation of used nuclear fuel.
Environmental impacts (e.g. on wildlife and surrounding terrain);
Weather and the ability to adapt to seasonal changes (e.g. snow, ice, rain and floods);
Accessibility for emergency services and emergency response time;
Available infrastructure (i.e. number of “rail lines/roads”), “potential for delay” and “ability to reroute”;
Transportation logistics, including speed of transport and number, volume and timing of shipments (“should travel when less people travel, but also not when there is higher risk such as at night [or in inclement weather]”);
Maintenance and repairs;
Gas prices and fuel efficiency;
Economic impacts and “job creation”;
Ownership and training requirements;
Current best practices for the transportation of dangerous goods;
“Political” and “public” perceptions and level of acceptance; and
Adaptability to new technology.

Additionally, some participants noted that a “combination of road and rail” may be required to facilitate the transportation of Canada’s used nuclear fuel. In fact, one participant encouraged the NWMO to “consider a multi-modal approach to maximize safety, cost and job creation.” Most participants, however, specified a preferred mode – often rail – based on the advantages and disadvantages outlined on the next page.
### Table 3.5.1 – Transportation Modes: Participant Feedback

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Rail</th>
<th>Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Faster and more reliable</td>
<td></td>
<td>+ 24 hour/day flexibility</td>
</tr>
<tr>
<td>+ Less affected by weather</td>
<td></td>
<td>+ More “practical”</td>
</tr>
<tr>
<td>+ Not hindered by traffic</td>
<td></td>
<td>+ Availability of established, more accessible routes</td>
</tr>
<tr>
<td>+ More economical – can carry larger volumes over greater distances</td>
<td></td>
<td>+ Limits magnitude of potential incident</td>
</tr>
<tr>
<td>+ Fewer shipments means less room for error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Less environmental impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Less exposure to general population</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Disadvantages                           |                                                                      |                                                                      |
|-----------------------------------------|                                                                      |                                                                      |
| + Lacks flexibility – “fixed route”     |                                                                      | + Less controlled environment with more potential hazards           |
| + Cannot facilitate “door-to-door”     |                                                                      | + Greater number of shipments means more room for error             |
|   shipment                               |                                                                      | + Drivers more vulnerable to error                                  |
| + Magnitude of potential incident       |                                                                      | + Delay due to traffic congestion                                   |
|                                         |                                                                      | + Greater environmental impact                                      |
|                                         |                                                                      | + More exposure to general population                               |
|                                         |                                                                      | + Perceived to be a greater risk and number required may provoke    |
|                                         |                                                                      |   “unnecessary fear”                                                |
Routes

As noted in Section 3.2, participants widely reported that the APM transportation plan should consider dedicated infrastructure for the shipment of used nuclear fuel. While many referenced a separate rail line, one participant suggested that the mode be determined by “national survey.” Another participant asked: “If [a] new [transportation system were built], would land be expropriated?”

The following provides an overview of feedback regarding factors and criteria for future decision-making about routes, with marked similarities to that provided for modes of transportation. Participants highlighted:

- Safety and risk analysis;
- Security (“ability to protect the route” and “susceptibility to targeted attack”);
- Proximity to population centres (“away from heavily populated areas”);
- Length of route and condition of infrastructure;
- Number of potential inter-modal transfers (fewer risks associated with “less transfers”);
- Environmental impacts (away from “environmentally sensitive areas,” including “large bodies of water”);
- Geography and terrain (i.e. prevalence of “tunnels, bridges, road crossings, etc.”);
- Weather (e.g. snow storms, etc.) and seasonal “usability”;
- Accessibility for emergency services;
- Options for alternative routing or “Plan B”;
- Potential for congestion;
- Impacts to “commuter transport” and “on other agencies/companies etc. using similar routes”;
- Cost (“do not prioritize cost of infrastructure over efficiency of movement”); and
- Political and social acceptance.
3.6. THE SCIENCE BEHIND THE PLAN

Public dialogue participants were presented with and asked to review program components and activities that the NWMO has committed to completing to support the development of Canada’s plan.

Participants were then invited to share comments in plenary and encouraged to consider:

+ What research, information, or technology development or demonstration might help us build a better plan and make better decisions?

+ What kinds of specialists should we be consulting and engaging in the development and implementation of the transportation plan?

In general, participants supported proposed program components and provided the following additional suggestions:

+ Provisions for an “environmental response plan” to support restoration and land reclamation;
+ Communications plan to help “clarify misconceptions” about the transportation of used nuclear fuel;
+ Economic impact analysis for modes of transportation;
+ Funding program for communities to support emergency preparedness and response; and
+ A strategy to determine appropriate levels of community involvement.

With respect to program activities, participants focused largely on packaging and the need for more exhaustive “real life scenario” testing that will take the container “to the point of destruction.” More specifically, participants asked for further testing of the container under water, at greater depths and for longer periods of time, e.g. “at least 24 hours.”

In addition, participants highlighted the need to identify best practices related to worker and operational safety, e.g. mitigating risks associated with “driver fatigue” and the handling of used nuclear fuel. Participants also emphasized the importance of robust planning for emergency response and shipment security, suggesting that the NWMO consider “pilot projects” to test and strengthen response and security measures for road, rail and inter-modal transport.

Finally, participants recommended conducting research on “public awareness and readiness” to support transportation planning, and suggested monitoring potential “[public] health impacts” in communities along the selected route.
3.7. FINAL COMMENTS – IS THE NWMO ON THE RIGHT TRACK?

Public dialogue participants were asked to carefully consider everything they had heard and to indicate whether they felt the NWMO was on the right track.

As a whole, participants responded positively to the opportunity to provide input, indicating that they “learned a lot” and that the NWMO is heading in the right direction with respect to ensuring that “the necessary precautions and steps are in place” for planning the transportation of used nuclear fuel. At the same time, several participants noted that they would need “much more time and information” prior to offering an informed view on the plan, including background on public engagement efforts and access to “detailed reports.”

A few participants also indicated that the NWMO is “not on the right track,” with one participant stating that the planning process seems “too traditional” and suggesting that it be “more responsive.” Additionally, participants also expressed significant concern that enough money be put aside for the project and asked numerous questions related to financial accountability, funding partners, structure and management, and the amount of total budget used to date.

In closing, participants encouraged the NWMO to continue engaging Canadians, particularly those in communities involved in the site selection process, and reiterated the following considerations:

+ Safety and security are paramount;
+ It is important to conduct a “thorough review of existing technical and safety standards” to ensure that the transportation plan incorporates national and international best practices;
+ The plan should consider a dedicated rail line – new or existing – for the shipment of Canada’s used nuclear fuel;
+ All aspects of the plan, modes of transportation in particular, should be “flexible” and “adaptable” to new technologies and future “social, political and environmental” risks; and
+ Communities must be informed “before and during” plan development, especially those along the selected route.
4. OVERVIEW OF PRE- AND POST SESSION SURVEY RESULTS

As indicated in Section 1, research assessed the extent to which participants’ initial, uninformed reactions (as measured by a pre-session questionnaire) were influenced by information and discussion (as measured by a post-session questionnaire).

The results of this exercise are presented in the tables below. Overall, participation in the public dialogue had a positive net impact on the views of participants. This impact was particularly positive with respect to opinions about nuclear energy and the transportation of used nuclear fuel.

The four tables should be read as follows:

- **Pre-dialogue net confidence**: Pertains to the results of the survey completed by participants before the dialogue session. The score is obtained by subtracting the total percentage of respondents who indicated low confidence (i.e. rated 1-3 on a 7-point scale) from the total percentage of respondents who indicated high confidence (i.e. rated 5-7). For example, results of 50% high confidence, 20% neutral (i.e. rated 4) and 30% low confidence, produce a net confidence score of +20%.

- **Post-dialogue net confidence**: Same calculation as the pre-dialogue confidence, but for the results of the survey that was completed after the session.

- **Individual net change**: This is an aggregate measure of individual change (or movement). Through a comparison of the pre- and post-survey results, we determined the percentage of participants that provided a more negative rating after the dialogue session and subtracted this number from the percentage of participants that provided a more positive rating to an item. For example, if 50% provided a higher rating in their post-session survey, 20% provided the same rating and 30% provided a lower rating, the individual net change is +20%.
Table 4.1 – How much confidence do you have in each of the following to keep Canadians safe and secure? (7-point confidence scale).

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-session net confidence score</th>
<th>Post-session net confidence score</th>
<th>Individual net change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government</td>
<td>+48%</td>
<td>+69%</td>
<td>+5%</td>
</tr>
<tr>
<td>Electricity Companies</td>
<td>+35%</td>
<td>+30%</td>
<td>-11%</td>
</tr>
<tr>
<td>Pipeline Companies</td>
<td>-13%</td>
<td>-8%</td>
<td>+13%</td>
</tr>
<tr>
<td>Environmental Groups</td>
<td>+41%</td>
<td>+46%</td>
<td>0</td>
</tr>
<tr>
<td>Airlines</td>
<td>+47%</td>
<td>+35%</td>
<td>-26%</td>
</tr>
<tr>
<td>Scientists/Engineers</td>
<td>+87%</td>
<td>+87%</td>
<td>-2%</td>
</tr>
<tr>
<td>Local Police</td>
<td>+56%</td>
<td>+56%</td>
<td>-16%</td>
</tr>
<tr>
<td>Nuclear Energy Companies</td>
<td>+36%</td>
<td>+47%</td>
<td>+7%</td>
</tr>
<tr>
<td>NWMO</td>
<td>NA</td>
<td>+62%</td>
<td>NA</td>
</tr>
</tbody>
</table>

Table 4.2 – Every day in Canada and around the world, natural resources and other products are transported by truck, rail, pipelines, and by ship. Overall, how much confidence do you have in the safety and security of each of the following? Transporting... (7-point confidence scale).

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-session net confidence score</th>
<th>Post-session net confidence score</th>
<th>Individual net change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used nuclear fuel by truck</td>
<td>-3%</td>
<td>+41%</td>
<td>+34%</td>
</tr>
<tr>
<td>Oil by pipeline</td>
<td>+35%</td>
<td>+5%</td>
<td>-32%</td>
</tr>
<tr>
<td>Propane by rail</td>
<td>+44%</td>
<td>+26%</td>
<td>-13%</td>
</tr>
<tr>
<td>Gravel stones by truck</td>
<td>+59%</td>
<td>+31%</td>
<td>-29%</td>
</tr>
<tr>
<td>Chlorine by rail</td>
<td>+28%</td>
<td>+41%</td>
<td>+3%</td>
</tr>
<tr>
<td>Wood logs by truck</td>
<td>+74%</td>
<td>+57%</td>
<td>-26%</td>
</tr>
</tbody>
</table>

Table 4.3 – Please indicate whether you agree or disagree with each of the following statements. (7-point confidence scale).

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-session net confidence score</th>
<th>Post-session net confidence score</th>
<th>Individual net change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that nuclear power generation in Canada is safe</td>
<td>+64%</td>
<td>+82%</td>
<td>+13%</td>
</tr>
<tr>
<td>I view nuclear power as a green technology</td>
<td>+33%</td>
<td>+48%</td>
<td>-2</td>
</tr>
<tr>
<td>I am very strongly opposed to nuclear energy</td>
<td>-56%</td>
<td>-79%</td>
<td>-24%</td>
</tr>
<tr>
<td>I am confident that used nuclear fuel can be transported safely and securely</td>
<td>NA</td>
<td>+85%</td>
<td>NA</td>
</tr>
<tr>
<td>I think that nuclear power generation in Canada is safe</td>
<td>+64%</td>
<td>+82%</td>
<td>+13%</td>
</tr>
<tr>
<td>I view nuclear power as a green technology</td>
<td>+33%</td>
<td>+48%</td>
<td>-2</td>
</tr>
</tbody>
</table>
Table 4.4 – Would you rather see used nuclear fuel transported by truck, rail or ship?

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-session selection</th>
<th>Post-session selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
<td>28%</td>
<td>77%</td>
</tr>
<tr>
<td>Truck</td>
<td>18%</td>
<td>13%</td>
</tr>
<tr>
<td>Ship</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>I don’t know, I need more information</td>
<td>38%</td>
<td>8%</td>
</tr>
<tr>
<td>I don’t think used nuclear fuel should be transported</td>
<td>8%</td>
<td>0%</td>
</tr>
</tbody>
</table>
APPENDICES
APPENDIX A – PUBLIC DIALOGUE PRESENTATION

Planning Transportation for Adaptive Phase Management

June 17, 2017

Welcome
NWMO: Who we are

- Formed in 2002 as required by Nuclear Fuel Waste Act
- Funded by Canada’s nuclear energy corporations
- Operates on a not-for-profit basis

Our mission is to develop and implement collaboratively with Canadians, a management approach for the long-term care of Canada’s used nuclear fuel that is socially acceptable, technically sound, environmentally responsible, and economically feasible.

Our values

- Integrity
- Excellence
- Engagement
- Accountability
- Transparency
Today’s objective

To seek your input on questions and considerations for planning the transportation of Canada’s used nuclear fuel.

Today’s focus and agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 – 10:15</td>
<td>Welcome and Introductions</td>
</tr>
<tr>
<td>10:15 – 10:55</td>
<td>Context and Background</td>
</tr>
<tr>
<td>10:55 – 12:00</td>
<td>Transportation</td>
</tr>
<tr>
<td>12:00 – 12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>12:30 – 1:30</td>
<td>Guiding Principles and Objectives</td>
</tr>
<tr>
<td>1:30 – 2:30</td>
<td>Ensuring We Are Inclusive</td>
</tr>
<tr>
<td>2:30 – 2:40</td>
<td>Break</td>
</tr>
<tr>
<td>2:40 – 3:20</td>
<td>Modes and Routes</td>
</tr>
<tr>
<td>3:20 – 3:40</td>
<td>The Science behind the Plan</td>
</tr>
<tr>
<td>3:40 – 4:00</td>
<td>Closing</td>
</tr>
</tbody>
</table>
How we’ll work together

- Presentations
- Personal reflection, table brainstorming and reporting
- Plenary discussion

Housekeeping

- Emergency
- Self-Care
- Quiet!
- Ground Rules
- Honoraria
- Comments
Safe space to agree, disagree, ponder or question.

Think at altitude... Stay out of the weeds.
There are no bad ideas.

Share the airtime.
Honour diverse perspectives.

Nuclear in Ontario
Did you know?

- Chose a trivia card and introduce yourself!
- Read the question aloud to your table
- Let everyone guess away!

Q: How much of Ontario’s electricity needs are produced using nuclear power?

Q: What international organization promotes nuclear safety and nuclear security standards?

Canada’s Plan for Used Nuclear Fuel
CANDU Fuel

One fuel bundle . . .
• Is about the size of a fireplace log
• Can power 100 homes for a year
• Contains about 20 kg uranium

Used nuclear fuel is a potential health risk for a very long time.
It must be safely contained and isolated from people and the environment, essentially indefinitely.

Nuclear fuel cycle in Canada

Uranium Mining
Saskatchewan

Refining
Blind River, Ontario

Conversion
Port Hope, Ontario

Fuel Fabrication
Port Hope, Ontario
Peterborough, Ontario
Toronto, Ontario

Electricity Generation
Ontario
Quebec
New Brunswick
CANDU Reactor

- About 5,000 fuel bundles per reactor
- Each bundle stays in reactor for about 15 to 18 months

Wet storage

- Used nuclear fuel initially very hot and highly radioactive
- Stored in water pools for cooling and shielding
- Pool water kept separate from other water
- After 7 to 10 years, used fuel cool enough to move to dry storage
A three-year dialogue with Canadians

- NWMO met with more than 18,000 Canadians (2002 – 2005)
- 2,500 Indigenous people
- 500 specialists
- 120 information and discussion sessions
- Every province and territory
What Canadians told us

- Safety and security is top priority
- This generation must take action – we owe it to future generations
- Be consistent with best international standards and practices
- Approach must be adaptable – allow improvements based on new knowledge or societal priorities

Deep Geological Repository (DGR)

- Fuel Bundle
- Used Fuel Container
- Bentonite Clay Rock
- Lateral Tunnel Approach

LEGEND
1. Surface Facilities
2. Main Shaft Complex
3. Placement Rooms
4. Ventilation Exhaust Shaft
Adaptive Phase Management

Site selection process initiated May 2010

Seeking an informed and willing host with a suitable geologic formation

• Communities expressed interest to participate
• Communities can choose to leave the process

The project will only proceed with interested communities, First Nation and Métis communities and surrounding municipalities working in partnership.
Plenary discussion

Initial thoughts…
What stands out for you?

Do you have any questions or concerns?
What else would you like to know?
Transportation

Overview

- Within the next 30 years, Canada’s used nuclear fuel will start to be moved from licensed interim storage locations to a deep geological repository.
- Transportation of used nuclear fuel is an important part of Canada’s plan to protect people and the environment over the long term.
Overview

Involves:

- Taking the waste, which is currently stored at or near nuclear generating stations and research facilities, to a deep geological repository for long-term management.
- Approximately 40 years of safe transportation, beginning in 2040 or so.

Used nuclear fuel transportation

- Highly regulated
- Excellent safety record
- More than 50 years with no incident leading to release of radioactive substances
- Robust package design
- Based on international standards & testing
- Road and rail being studied as possible modes
Average number of shipments per year

The transportation program is expected to extend over approximately 40 years, based on current anticipated volumes from existing nuclear facilities.

Developing the plan

We have time to develop the plan and consider if carefully.

Let's start by considering the principles, priorities, objectives and activities that should guide this planning, and the information we will need from technical and other knowledge specialists to make decisions in the future.
Table discussion

1. What do you think needs to be included or addressed in the APM transportation plan?

2. What kinds of questions and concerns need to be addressed in developing the plan?

3. What Canadian and international experience should be reviewed?

Instructions

Step 1: Identify a table note-taker and reporter

Step 2: Personal reflection – individual worksheet

Step 3: Roundtable discussion – table worksheet

Step 4: Report to plenary
Plenary

Highlights

Areas of consensus

Points of divergence

More on Transportation…
Regulation of radioactive materials

Transport Canada
• Transportation of Dangerous Goods Regulations (TDG)
• Sets transport requirements for all 9 classes of dangerous goods

Canadian Nuclear Safety Commission
• Covers Class 7 Radioactive Materials
• Sets transport packaging requirements
• Packaging and Transport of Nuclear Substances Regulations (PTNSR)
• Based on IAEA Standards

Certifying package designs
Plenary discussion

Initial thoughts…
What stands out for you?

Do you have any questions or concerns?
What else would you like to know?

Lunch
Guiding Principles and Objectives

Principles

- Safety and security is central
- Meet or exceed regulatory requirements
- Aboriginal rights, treaties and land claims
- Inclusiveness
- Informing the process
- Ongoing engagement of governments
Objectives

- Protect public health and safety from the risk of exposure to radioactive or other hazardous materials, and from the threat of injuries or deaths due to accidents;
- Protect workers from and minimize hazards associated with managing used nuclear fuel;
- Ensure fairness in the distribution of costs, benefits, risks, and responsibilities;
- Ensure the well-being of all communities with a shared interest;

Objectives

- Ensure the security of facilities, materials and infrastructure;
- Ensure that environmental integrity is maintained over the long term;
- Ensure economic viability of the used nuclear fuel management system; and
- Ensure a capacity to adapt to changing knowledge and conditions over time.
Table discussion

From your perspective, what **guiding principles and objectives** must inform the development of the APM transportation plan?

1. **Individually:**
   - Review the principles and objectives identified in dialogue with Canadians during the development of APM.

2. **Discuss:**
   - Are these the right principles and objectives to guide the development of a transportation plan?
   - What would you add, change or remove?
   - Which guiding principles and objectives are most important?

---

Plenary

- **Highlights**
- **Areas of consensus**
- **Points of divergence**
Ensuring We Are Inclusive

Working together…

…it to make good decisions.
Key considerations

A balancing act
Table discussion

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

1. Who needs to be informed?
2. Who needs to be involved in decision-making?

Consider...
• Why?
• When in the process?
• To what extent?

Plenary

Highlights

Areas of consensus

Points of divergence
Break

Modes and Routes
Modes and routes
Average number of shipments per year

The transportation program is expected to extend over approximately 40 years, based on current anticipated volumes from existing nuclear facilities.

Table discussion

1. What factors or criteria should be considered in future decisions about:
   a) Modes (how we transport)?
   b) Routes (where we transport)?
Plenary

Highlights

Areas of consensus

Points of divergence

The Science behind the Plan
Work in progress

Components – what?

• Plan components that will be shaped by research, technology development and demonstration activities
• Reflect regulation and best practices identified to date

Activities – how?

• Activities the NWMO has committed to completing to support the development of Canada’s plan

Plenary discussion

What research, information, or technology development or demonstration might help us build a better plan and make better decisions?

What kinds of specialists should we be consulting and engaging in the development and implementation of the transportation plan?
Final thoughts
Is NWMO on the right track?

Learn more!
www.nwmo.ca
Questionnaire

Closing
APPENDIX B – PARTICIPANT HANDOUTS

Principles and Objectives
Guiding the development of the APM transportation plan

The NWMO’s five fundamental values are integrity, excellence, engagement, accountability, and transparency. In addition to corporate values, there are principles and objectives that will shape APM transportation planning. A preliminary list of these is outlined below.

Principles – The following initial set of principles emerged from conversations with citizens:

- Safety is the overarching principle guiding all APM planning and activities: Safety, security, and protection of people and the environment are central and must not be compromised by other considerations.
- Meet or exceed regulatory requirements: The plan must meet, and if possible, exceed all applicable regulatory standards and requirements for protecting the health, safety, and security of humans and the environment, and respect Canada’s international commitments on the peaceful use of nuclear energy.
- Aboriginal rights, treaties and land claims: The plan must respect Aboriginal rights and treaties, and take into account that there may be unresolved claims between Aboriginal peoples and the Crown.
- Inclusiveness: The plan must respond to and address, where appropriate, the views of those who are most likely to be affected by the plan.
- Informing the process: The plan must be informed by the best relevant available knowledge, including science, social science, Indigenous Knowledge, and ethics. This information used to develop the plan must also be made public.
- Ongoing engagement of governments: The NWMO must involve all potentially affected provincial governments in the development and review of the plan.

Objectives – The following set of preliminary objectives were identified through dialogue with Canadians:

- Protect public health and safety from the risk of exposure to radioactive or other hazardous materials, and from the threat of injuries or deaths due to accidents;
- Protect workers from and minimize hazards associated with managing used nuclear fuel;
- Ensure fairness in the distribution of costs, benefits, risks, and responsibilities;
- Ensure the well-being of all communities with a shared interest;
- Ensure the security of facilities, materials and infrastructure;
- Ensure that environmental integrity is maintained over the long term;
- Ensure economic viability of the used nuclear fuel management system; and
- Ensure a capacity to adapt to changing knowledge and conditions over time.
The Science behind the Plan

Program Components

The following will be shaped by research, technology development and demonstration activities and reflect regulation and best practices identified to date:

- A robust, tested and certified transportation package;
- A plan to meet commercial vehicle and railroad safety and security requirements;
- A Transportation Security Plan;
- An Emergency Response Plan;
- A plan for periodic reviews;
- A program for hiring high-quality and well-trained workers and vehicle operators;
- A plan for training and joint exercises with provincial and community emergency responders; and
- Procedures for safe and secure operations.

Program Activities

Activities the NWMO has committed to completing to support the development of the plan:

- Identifying and technically assessing road and rail modes of transport and mode combinations;
- Studying and developing approaches to handling used nuclear fuel during transport, including logistics for trans-portion used nuclear fuel by road and rail from interim storage facilities to the siting regions;
- Assessing a set of bounding transportation accident scenarios as part of a transportation risk assessment;
- Identifying and technically assessing packaging options to ensure protection of the public and the environment during normal operations, as well as during accident conditions;
- Studying risk and approaches to controlling exposure to the public and workers;
- Identifying and designing the necessary transportation equipment and facilities;
- Outlining an approach for emergency response;
- Outlining an approach to shipment security;
- Constructing and testing all equipment required for loading, transporting and unloading used nuclear fuel transportation packages, including truck trailers and/or railcars;
- Developing updated package designs for transportation packages, with consideration of ‘beyond-design-basis’ scenarios;
- Reviewing and reporting on experience and best practices with transportation of hazardous materials, including transportation of nuclear waste in Canada and internationally, to identify lessons that can be applied to APM transportation;
- Completing public and worker dose assessments; and
- Securing and maintaining CNSC design certificates for road and/or rail transport packages.
APPENDIX C – PARTICIPANT WORKSHEETS

TABLE DISCUSSION #1 – TRANSPORTATION PLANNING FRAMEWORK

<table>
<thead>
<tr>
<th>What do you think needs to be included or addressed in the APM transportation plan?</th>
<th>What kinds of questions and concerns need to be addressed in developing the plan?</th>
<th>What Canadian and international experience should be reviewed?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>
## TABLE DISCUSSION #2 – GUIDING PRINCIPLES AND OBJECTIVES

**Table #:**

<table>
<thead>
<tr>
<th>From your perspective, what guiding principles and objectives must inform the development of the APM transportation plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referring to your handout, are these the right principles and objectives to guide the development of a transportation plan? What would you add, change or remove?</td>
</tr>
<tr>
<td>Which guiding principles and objectives would you say are most important? Why?</td>
</tr>
</tbody>
</table>
**Table Discussion #3 – Ensuring We Are Inclusive**

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

<table>
<thead>
<tr>
<th>Who needs to be informed?</th>
<th>Why?</th>
<th>Who needs to be involved in decision-making?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Other comments**

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Table #:
**TABLE DISCUSSION #4 – MODES AND ROUTES**

*The NWMO has begun to reflect on the potential to identify or develop alternative routes for the transportation of used nuclear fuel from the locations where it is currently stored to each of the areas under study for the deep geological repository.*

| What factors or criteria should be considered in future decisions about modes (how we transport) and routes (where we transport)? |
| What questions do we need to answer to make good decisions regarding modes and routes? |

<table>
<thead>
<tr>
<th>MODES</th>
<th>ROUTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D – POST-SESSION QUESTIONNAIRE

<table>
<thead>
<tr>
<th>NAME ___________________________</th>
<th>DATE ________</th>
</tr>
</thead>
</table>

1. How much confidence do you have in each of the following to keep Canadians safe and secure?

<table>
<thead>
<tr>
<th></th>
<th>No confidence whatsoever</th>
<th>A great deal of confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>The federal government</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Electricity companies</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Pipeline companies</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Nuclear energy companies</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Nuclear Waste Management Organization (NWMO)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Environmental groups</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Airlines</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Scientists and engineers</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Your local police</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
2. Every day in Canada and around the world, natural resources and other products are transported by truck, rail, pipelines, and by ship. Overall, how much confidence do you have in the safety and security of each of the following?

<table>
<thead>
<tr>
<th>No confidence whatsoever</th>
<th>A great deal of confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- Transporting used nuclear fuel by truck
- Transporting oil by pipeline
- Transporting propane by rail
- Transporting gravel stones by truck
- Transporting chlorine by rail
- Transporting wood logs by truck
3. Please indicate whether you agree or disagree with each of the following statements.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- I think that nuclear power generation in Canada is safe
- I view nuclear power as a green technology
- I am very strongly opposed to nuclear energy
- Overall, pipelines are the best way to move oil and natural gas
- There is no reason why all our electricity can’t come from green energy sources
- I am confident that used nuclear fuel can be transported safely and securely

4. Would you rather see used nuclear fuel transported by truck, rail or by ship?
(Select only one answer)

- Truck...1
- Rail...2
- Ship...3
- I don’t know, I need more information...4
- I don’t think used nuclear fuel should be transported...5

Thank you very much for your participation!