

**nwmo**

NUCLEAR WASTE  
MANAGEMENT  
ORGANIZATION

SOCIÉTÉ DE GESTION  
DES DÉCHETS  
NUCLÉAIRES

# Learning More Together

Triennial Report  
2011 to 2013



**Nuclear Waste  
Management Organization**

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## *Correction*

On page 60, the fifth sentence of the first paragraph should read: “Based on current inventory projections, the underground repository requires a subsurface area in suitable host rock of about 2 kilometres by 3 kilometres.”

On page 12 of Appendix 1, the fifth sentence of the first paragraph should read: “Based on current inventory projections, the underground repository requires a subsurface area in suitable host rock of about 2 kilometres by 3 kilometres.”









NUCLEAR WASTE MANAGEMENT ORGANIZATION  
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

The Honourable Joe Oliver  
Minister, Natural Resources Canada  
Ottawa, Ontario K1A 0A6

March 2014

Dear Minister,

We are pleased to submit to you the second Triennial Report of the Nuclear Waste Management Organization (NWMO) for fiscal years 2011 to 2013.

We submit this report in compliance with sections 16(1), 16(2), 18, and 23(1) of the *Nuclear Fuel Waste Act*.

In fulfillment of our obligations under section 24 of the *Act*, we are also making this report available to the public.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'G. Kugler'.

**Gary Kugler**  
Chairman

A handwritten signature in black ink, appearing to read 'K. E. Nash'.

**Ken Nash**  
President and CEO

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# Guide to the Triennial Report



Every third fiscal year, the NWMO produces a triennial report. This is the NWMO's second triennial report. It describes what the NWMO did over the past three years (2011 through 2013), and what it plans to do over the next five years (2014 through 2018).

As with its annual reports, the *Nuclear Fuel Waste Act (NFWA)* requires the NWMO to make its triennial reports public at the same time it submits them to the Minister of Natural Resources Canada.

The content follows the requirements set out in the *NFWA* of 2002. These requirements are listed on the following pages, along with a guide to where each is addressed in the present report.



## 16. (2) Requirements of Each Report

Each annual report after the date of the decision of the Governor in Council under section 15 must include:

### Annual Report Requirements of the NFWA

### Where these requirements are addressed in the NWMO Triennial Report 2011 to 2013

- |   |  |
|---|--|
| a) the form and amount of any financial guarantees that have been provided during that fiscal year by the nuclear energy corporations and Atomic Energy of Canada Limited under the <i>Nuclear Safety and Control Act</i> and relate to implementing the approach that the Governor in Council selects under section 15 or approves under subsection 20(5); | <i>Financial Reporting Requirements</i> (chapter 9.2).   |
| b) the updated estimated total cost of the management of nuclear fuel waste;  | <i>Financial Reporting Requirements</i> (chapter 9.2).   |
| c) the budget forecast for the next fiscal year;  | <i>Financial Reporting Requirements</i> and <i>Budget Forecast, 2014 to 2018</i> (chapters 9.2 and 9.1). |
| d) the proposed formula for the next fiscal year to calculate the amount required to finance the management of nuclear fuel waste and an explanation of the assumptions behind each term of the formula; and  | <i>Financial Reporting Requirements</i> (chapter 9.2).   |
| e) the amount of the deposit required to be paid during the next fiscal year by each of the nuclear energy corporations and Atomic Energy of Canada Limited, and the rationale by which those respective amounts were arrived at.   | <i>Financial Reporting Requirements</i> (chapter 9.2).   |

## 23. (1) Requirements of Each Report

The waste management organization shall provide the Minister, within three months after the end of each fiscal year of the organization, with financial statements audited at its own expense by an independent auditor.

*Auditor's Report and Financial Statements* (chapter 12.1).

## 18. Requirements of Each Triennial Report

The annual report of the waste management organization for its third fiscal year after the fiscal year in which a decision is made by the Governor in Council under section 15, and for every third fiscal year after that, in this Act called the “triennial report,” must include:

### Triennial Report Requirements of the NFWA

### Where these requirements are addressed in the NWMO Triennial Report 2011 to 2013

- a) a summary of its activities respecting the management of nuclear fuel waste during the last three fiscal years, including an analysis of any significant socio-economic effects of those activities on a community's way of life or on its social, cultural or economic aspirations;

*Our Work 2011 to 2013* (chapter 6).

The chapters immediately following this overview detail the activities specific to each of the NWMO's seven strategic areas of focus over the past three years.

The requirement to summarize any significant socio-economic effects resulting from the NWMO's activities is addressed in the following chapters:

- *Building Sustainable Relationships* (chapter 6.1): Describes how the project's potential social, economic and cultural effects inform the NWMO's engagement activities;
- *Adapting Plans* (chapter 6.5): Describes how the NWMO tracks societal expectations so as to meet social, cultural and economic aspirations as they evolve; and
- *Social, Economic and Cultural Considerations* (chapter 8.3): Describes work done to assess whether the project can enhance a community's well-being and meet its social, cultural and economic aspirations.

- b) its strategic plan for the next five fiscal years to implement the approach that the Governor in Council selects under section 15 or approves under subsection 20(5);

*Implementing Adaptive Phased Management 2014 to 2018* (Appendix 1), with a summary in *Overview of Adaptive Phased Management Strategic Plan 2014 to 2018* (chapter 7.1). Also see *Moving Forward: The Next Five Years* (chapter 7).

- c) its budget forecast for the next five fiscal years to implement the strategic plan;

*Budget Forecast, 2014 to 2018* (chapter 9.1).

- d) the results of its public consultations held during the last three fiscal years with respect to the matters set out in paragraphs a) and b); and

*What We Heard on Implementing Adaptive Phased Management* (chapter 8); also see *Listing of Engagement and Research Activities, 2011 to 2013* (Appendix 2).

- e) the comments of the Advisory Council on the matters referred to in paragraphs a) to d).

*Report of the Advisory Council* (chapter 12.2), as independently prepared by its members and submitted to the NWMO Board of Directors in January 2014 for inclusion in the current Triennial Report.

## Additional Areas Addressed in This Report

In addition to implementing a long-term plan for safely and securely managing Canada's used nuclear fuel, the NWMO also provides support services to Ontario Power Generation to develop a deep geologic repository for managing low- and intermediate-level waste. These activities are described in the following sections:

- *Other Activities: Ontario Power Generation's Deep Geologic Repository Project for Low and Intermediate Level Waste; and*
- *Other Activities: Overview of Support to Ontario Power Generation's Deep Geologic Repository Project for Low and Intermediate Level Waste, 2014 to 2018.*





# Corporate Overview

The background features a large, stylized 'X' shape formed by two overlapping chevron-like shapes. The left chevron is a light yellow color, and the right chevron is a light blue color. The overall design is clean and modern, with a professional feel.







# NWMO Mandate

The NWMO was established in 2002 by Canada's nuclear waste owners in accordance with the *Nuclear Fuel Waste Act (NFWA)*. Operating on a not-for-profit basis under Part II of the *Canada Corporations Act*, the NWMO is responsible for designing and implementing Canada's plan for the long-term management of used nuclear fuel. Used nuclear fuel is created from the generation of electricity in nuclear power plants.

Ontario Power Generation (OPG), New Brunswick Power Corporation<sup>1</sup> and Hydro-Québec (HQ) are the founding Members of the NWMO, and along with Atomic Energy of Canada Limited (AECL), are required to fund the NWMO's operations.

The *NFWA* required the NWMO to study approaches for the long-term management of used nuclear fuel and recommend to the Government of Canada a preferred approach. The NWMO initiated this study in 2002, and in 2005, after a three-year dialogue with Canadians from coast to coast, submitted to the Minister of Natural Resources a proposed approach for the long-term management of Canada's used nuclear fuel.

In June 2007, the Government of Canada selected Adaptive Phased Management (APM) as Canada's plan for the long-term management of used nuclear fuel. Technically, APM has as its end point the containment and isolation of used nuclear fuel in a deep geological repository constructed in an appropriate rock formation where the used fuel will be safely and securely contained by engineered barriers and the surrounding geology. The management system involves realistic, manageable phases, each marked by explicit decision points with continuing participation by interested Canadians.

---

<sup>1</sup> In 2004, through a transfer order, the Government of New Brunswick assigned responsibility for all aspects of the provincially owned nuclear generating assets to a new subsidiary corporation, NB Power Nuclear.

The NWMO is now responsible for implementing APM, subject to all the necessary regulatory approvals. In implementing APM, the organization is committed to proceeding in stages, in an open, transparent and inclusive manner, taking the time that is needed to collaboratively plan and then confirm each step with Canadians before moving forward to the next step.

All Canada's used nuclear fuel is safely stored on an interim basis in licensed facilities at the nuclear reactor sites where it is generated in Ontario, Quebec and New Brunswick, and at AECL's facilities in Manitoba and Ontario. Used nuclear fuel remains radioactive for hundreds of thousands of years. Canada's plan, APM, is based on the best available knowledge, including the physical sciences, social science and Aboriginal Traditional Knowledge. It is designed to safely contain and isolate the material from people and the environment essentially indefinitely.

An early milestone in implementing APM was the collaborative design of a process to select a site for Canada's used nuclear fuel repository and centre of expertise. That process was finalized in 2010, after extensive input from Canadians, and in May of the same year, the NWMO proceeded to the first step in implementing it by initiating a broad program to provide information, answer questions, and build awareness among Canadians about APM and the siting process itself.

The site selection process is designed to ensure, above all, that the site selected is safe, secure, and located in an informed and willing host community. The process must meet the highest scientific, professional and ethical standards. The safety and appropriateness of any potential site will be evaluated through a series of progressively more detailed scientific, technical and social assessments over a series of steps spanning many years. A robust safety case will need to demonstrate with confidence that the project can be safely implemented at the site and can meet or surpass the requirements of regulatory authorities.

The *NFWA* requires the nuclear fuel waste owners – OPG, HQ, NB Power and AECL – to establish segregated trust funds to finance the long-term management of used fuel. These funds were established in 2002. Contributions are made annually by the waste owners, and audited financial statements are posted on the NWMO website at [www.nwmo.ca/trustfunds](http://www.nwmo.ca/trustfunds).

In 2008, as required by the legislation, the NWMO proposed a funding formula to determine the deposits to be made each year by the waste owners to pay for APM implementation. The proposed formula was approved by the Minister of Natural Resources in April 2009.

The *NFWA* also required the NWMO to establish an Advisory Council whose independent comments on the organization's work and triennial reports are made public. In addition to its legislated responsibilities, the Advisory Council meets regularly and provides ongoing advice and guidance on NWMO work plans and activities.

# Used Nuclear Fuel

Canada has been generating electricity from nuclear power for just over half a century. In that time, just over 2.4 million used fuel bundles have been produced. Each fuel bundle is about the size and shape of a fireplace log, with a total weight of approximately 24 kilograms.

Used nuclear fuel remains radioactive for a long period of time, and the material must be contained and isolated from people and the environment essentially indefinitely. Canada's used nuclear fuel is currently safely managed in facilities licensed for interim storage at nuclear reactor sites in Ontario, Quebec, and New Brunswick, and at Atomic Energy of Canada Limited's sites in Manitoba and Chalk River Laboratories in Ontario.

Canadian nuclear power plants are fuelled by natural uranium, formed into ceramic pellets which are encased in Zircaloy tubes that are welded together in a cylindrical fuel bundle. Once the fuel bundle has been used to generate electricity, it is removed from the reactor. Physically, the bundle looks the same as when it was placed in the reactor.

When used nuclear fuel is removed from a reactor, it is considered a waste product, is radioactive and requires careful management. It is first placed in a water-filled pool where its heat and radioactivity decrease. After seven to 10 years, the used bundles are placed in dry storage containers, silos or vaults.

The containers have a minimum design life of 50 years. Although its radioactivity decreases with time, the used fuel will remain a potential health risk for many hundreds of thousands of years. For this reason, used fuel requires careful management.

Currently, about 85,000 used nuclear fuel bundles are generated in Canada each year. A small amount of used nuclear fuel is also created at research and development facilities operated by Atomic Energy of Canada Limited, and Canadian university facilities. If the entire inventory of used nuclear fuel bundles could be stacked end-to-end like cordwood, it would fit into a space the size of about six hockey rinks, from the ice surface to the top of the boards.

The NWMO has a legal obligation to provide long-term management of all Canada's used nuclear fuel, that which exists now and that which will be produced in the future. There are other heat-generating wastes generated in Canada (such as cobalt-60 sources produced in Canadian CANDU reactors and used in industrial and therapeutic radiation devices) that the NWMO is not mandated to manage. These are not currently planned for the deep geological repository to be built as part of Adaptive Phased Management, Canada's plan for the safe and secure long-term management of used nuclear fuel.

The following table summarizes the current inventory of nuclear fuel waste in Canada as of June 30, 2013.

The inventory is expressed in terms of number of used CANDU fuel bundles and does not include fuel that is currently in the reactors, which is not considered to be "nuclear fuel waste" until it has been discharged from the reactors.



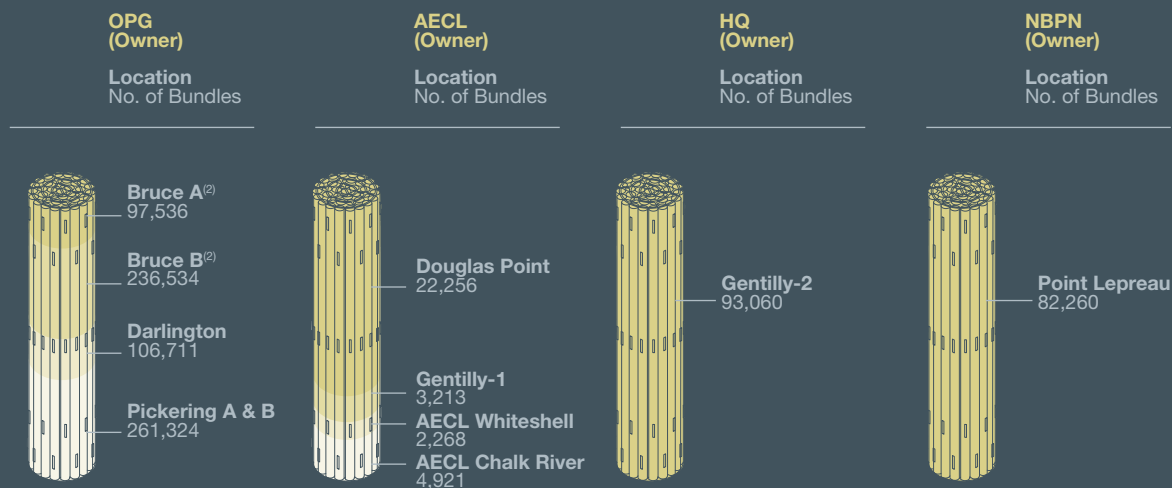
## Table 1: Summary of Nuclear Fuel Waste in Canada as of June 30, 2013

### Wet Storage – Number of Bundles: 1,513,805



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### Dry Storage – Number of Bundles: 910,083



**AECL**  
Atomic Energy of  
Canada Limited


**NBPN**  
New Brunswick  
Power Nuclear


**OPG**  
Ontario Power  
Generation

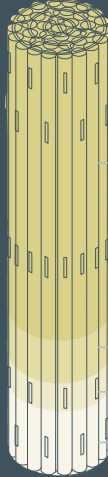
**HQ**  
Hydro-Québec

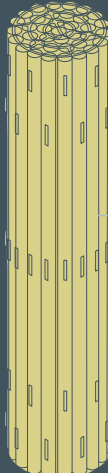
**NPD**  
Nuclear Power  
Demonstration

## Total Bundles: 2,423,888

OPG (Owner)		
Location	No. of Bundles	Current Status
	<b>Bruce A<sup>(2)</sup></b> 438,867	4 units operational
	<b>Bruce B<sup>(2)</sup></b> 588,280 <sup>(4)</sup>	4 units operational
	<b>Darlington</b> 445,221 <sup>(5)</sup>	4 units operational
	<b>Pickering A &amp; B</b> 667,639	A – 2 units operational, 2 units permanently shut down B – 4 units operational

HQ (Owner)		
Location	No. of Bundles	Current Status
	<b>Gentilly-2</b> 128,233	Permanently shut down end of 2012, defueling completed in Q3 2013

AECL (Owner)		
Location	No. of Bundles	Current Status
	<b>Douglas Point</b> 22,256	Permanently shut down
	<b>Gentilly-1</b> 3,213	Permanently shut down
	<b>AECL Whiteshell</b> 2,268	Permanently shut down (see note 1)
	<b>AECL Chalk River</b> 4,921	Mostly fuel from NPD (permanently shut down) and with small amounts from other CANDU reactors (see note 3)

NBPN (Owner)		
Location	No. of Bundles	Current Status
	<b>Point Lepreau</b> 122,990	Operational

- (1) 360 bundles of Whiteshell fuel are standard CANDU bundles. The remaining bundles are various research, prototype and test fuel bundles, similar in size and shape to standard CANDU bundles.
- (2) Bruce reactors are leased to Bruce Power for operation.
- (3) In addition to the totals shown in Table 1, AECL also has some ~22,000 components of research and development fuels such as fuel elements, fuel pellets and fuel debris in storage at Chalk River. While the total mass of these components is small compared to the overall quantity of CANDU fuel, their varied storage form, dimensions, etc. requires special consideration for future handling.
- (4) Total includes approximately 96,000 "long bundles."
- (5) Total includes approximately 115,000 "long bundles."

**Total of:**  
- 19 units in operation  
- 7 units shut down (including prototype and demonstration reactors)

Assuming a rounded average of 20 kilograms of heavy metal in a fuel bundle, 2.4 million bundles is equivalent to approximately 48,000 tonnes of heavy metal (t-HM).



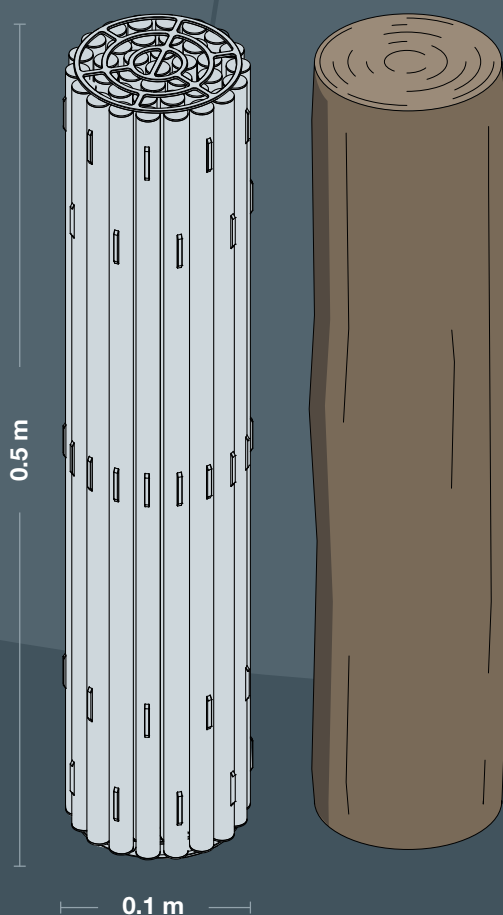
# CANDU Fuel Bundle

> 2  
million

**There are currently just over 2.4 million used nuclear fuel bundles in Canada.**

If stacked like cordwood, all this used nuclear fuel could fit into six hockey rinks from the ice surface to the top of the boards. At the end of the planned operation of Canada's existing nuclear reactors, the number of used nuclear fuel bundles will total about 4.6 million.

Each CANDU fuel bundle is about the size and shape of a fireplace log.



Whiteshell Laboratories,  
Manitoba



# Where Is the Used Nuclear Fuel Now?



# Vision, Mission and Values

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## Vision

Our vision is the long-term management of Canada's nuclear waste in a manner that safeguards people and respects the environment, now and in the future.

## Mission

The purpose of the NWMO 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.

## Values

### » Integrity

We will conduct ourselves with openness, honesty and respect for all persons and organizations with whom we deal.

### » Excellence

We will pursue the best knowledge, understanding and innovative thinking in our analysis, engagement processes and decision-making.

### » Engagement

We will seek the participation of all communities of interest and be responsive to a diversity of views and perspectives. We will communicate and consult actively, promoting thoughtful reflection and facilitating a constructive dialogue.

### » Accountability

We will be fully responsible for the wise, prudent and efficient management of resources, and be accountable for all our actions.

### » Transparency

We will be open and transparent in our process, communications and decision-making, so that the approach is clear to all Canadians.

# Chairman's Message

In 2007, the federal government approved Adaptive Phased Management (APM), Canada's plan for the safe and secure long-term management of used nuclear fuel. APM was the approach the NWMO recommended after a three-year (2002 to 2005) dialogue with the Canadian public, and the plan's technical end point, a deep geological repository, is internationally recognized as the safest known way of containing and isolating used nuclear fuel over very long periods of time.

The NWMO is now in the process of implementing APM. One of its legal responsibilities during the implementation period is to submit a Triennial Report to the Minister of Natural Resources Canada. It is with great pleasure that we now submit the second such report.

Over the past three years, the NWMO has made significant progress in advancing the site selection process. This process grew out of extended dialogues (2008 to 2009) with interested Canadians. Initiated in May 2010, it is now being implemented in collaboration with interested communities.

A strong showing of interest from communities in Ontario and Saskatchewan allowed the NWMO to limit the site selection process, at the end of September 2012, to the 21 communities already engaged in learning more about APM. By the end of 2013, 20 of these communities had requested that the NWMO conduct the first phase of preliminary assessments (Step 3 of a nine-step process).

In 2013, guided by the outcomes of the first eight Phase 1 preliminary assessments, the NWMO began the process of narrowing down the number of communities in the site selection process. Further decisions will be made in 2014 as Phase 1 preliminary assessments are completed in additional communities.

Over the past three years, the NWMO continued to fulfil its mandate under the *NFWA*. The NWMO set the requisite contributions by waste owners and completed APM cost estimates. It continued to review membership of the Advisory Council so that its expertise matches the NWMO's current work.

Jointly with management, the Board of Directors developed the organization's strategic direction. This work focused on five key areas: siting activities, geosciences, container development, lifecycle financial liabilities management, and the provision of services to Ontario Power Generation's proposed deep geologic repository for low- and intermediate-level waste. The Board's work was managed through four committees: the Audit, Finance and Risk Committee; the Siting Committee; the Human Resources and Compensation Committee; and the Low and Intermediate Level Waste Deep Geologic Repository Oversight Committee.

At the same time, the NWMO sought independent review and advice from several different groups: the Advisory Council; the Independent Technical Review Group; the APM-Geoscientific Review Group; the Municipal Forum; and the Elders Forum and its successor, the Council of Elders.





As it has since its inception, the NWMO continued to invite input into its plans. Consistent with the organization's commitment to conducting its work in a transparent manner, it reports out regularly.

Over the next five years, the NWMO will focus site selection on a smaller number of communities and their surrounding areas. Equally important, we intend to advance dialogue within the interested communities and with the Aboriginal and non-Aboriginal communities in the area to explore the potential to foster well-being through the project in the community and surrounding area.

On behalf of the NWMO, I invite you to read this Triennial Report to learn more about our work, our values, and the progress we have made toward working with Canadians to implement APM in a manner that is socially acceptable, technically sound, environmentally responsible, and economically feasible.

I also invite you to regularly check our website ([www.nwmo.ca](http://www.nwmo.ca)) for updates on this important national infrastructure project. All Canadians have a stake in the safe and secure long-term management of the country's used nuclear fuel, and the NWMO encourages you to get involved and stay informed.

Gary Kugler  
Chairman



# President's Message

It has now been just over a decade since the NWMO was established to develop and implement a long-term approach for the safe and secure management of the nation's used nuclear fuel. As the NWMO enters its second decade of operation, it is important to reflect on the history and principles behind its mandate and on the key role collaboration has played from the very beginning.

The NWMO spent its first three years (2002 to 2005) in a nationwide dialogue about how best to manage Canada's used nuclear fuel over the long term. During that time, the NWMO consulted more than 18,000 Canadians, including 2,500 Aboriginal people. They came from every province and territory. Overwhelmingly, they told us that safety and security must be our top priority, that this generation must take responsibility for the waste it has created, that we must use best international practice, and that we must be adaptable.

Adaptive Phased Management (APM) is the approach that would best meet the values and priorities for the safe long-term management of Canada's used nuclear fuel. It was approved by the Government of Canada in 2007.

The technical end point of APM requires used nuclear fuel to be safely isolated in a deep geological formation where it can be monitored, and if need be, retrieved. This is consistent with the policy direction of all countries with major nuclear power programs.

APM also requires a fair and transparent site selection process to identify an informed and willing host community with a suitable geological formation.

The site selection process was initiated in 2010. The process was designed to be led by communities interested in learning about the project and potentially hosting Canada's used nuclear fuel management facilities. Working together with the NWMO, communities have actively guided learning and dialogue about this national plan. Their focus on long-term safety and responsibility to future generations is consistent with the values and priorities of those who participated in our original three-year study.

In November 2013, the NWMO completed the first phase of preliminary assessments in eight of the 21 communities participating in the site selection process. All eight communities have made a valuable contribution to Canada's plan for the safe long-term management of used fuel. Four (Creighton, Hornepayne, Ignace, and Schreiber) were selected to be the focus of more detailed studies and engagement. The remaining four (Ear Falls, English River First Nation, Pinehouse, and Wawa) were not selected for more detailed study.

Through new communications initiatives, the NWMO kept both communities and the public at large informed about the organization, the project, and the site selection process. A notable example is the new mobile transportation exhibit, featuring a full-size used fuel transportation package certified by the Canadian Nuclear Safety Commission (CNSC).



In parallel with site selection, the NWMO's work program is aimed at ensuring we are using the best technology available in Canada and internationally. This program is focused on safety and proceeding in collaboration with 16 universities, including 13 in Canada, and is complemented by exchange agreements with partners in France, Sweden, Finland, United Kingdom and Switzerland. In anticipation of the regulator's future role when a site is selected, submissions have been made to the CNSC on the safety assessment methodology the NWMO plans to use to demonstrate long-term safety. Design optimization and proof-testing plans have been developed to ensure design will be optimized for safety and efficiency and thoroughly tested before use.

As we implement APM, we continue to assess the need to adapt our plans to changing circumstances, including the potential for, and implications of, recycling of used nuclear fuel. Scientific findings from the past three years continued to indicate that existing recycling technologies are prohibitively expensive, especially for the un-enriched CANDU fuel used in Canadian nuclear power plants. Because of the high costs of recycling and concerns over proliferation, most of the countries that have historically engaged in a nuclear cycle where used fuel is reprocessed and then recycled through conventional light water reactors have stopped using this approach.

The NWMO has since its inception been committed to working collaboratively with Canadians in meeting a challenge that affects us all. It is this collaboration that has helped move the site selection forward over the past three years, while also helping ensure that the site ultimately selected will have the approval of an informed and willing community. Over the next five years, as the site selection process starts to narrow down the number of possible sites, collaboration – with interested communities, Aboriginal and other communities in the surrounding area, and the public at large – will continue to be the cornerstone of the NWMO's work.

*K. E. Nash*

Ken Nash  
President and CEO

# Highlights 2011 to 2013



## Tracking, Communications and Safety Equipment

## Équipements de surveillance, de communication et de sécurité



A requirement of the *Nuclear Fuel Waste Act (NFWA)*, the *Triennial Report 2011 to 2013* reports to Canadians on the NWMO's activities over the past three years in implementing Canada's plan for the long-term management of the country's used nuclear fuel. Consistent with the requirements of the *NFWA*, this Triennial Report also presents the NWMO's future plans as set out in its strategic plan for the next five years (2014 to 2018).

## Strategic Objectives

The NWMO will:

- Build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.
- Implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.
- Refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.
- Ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.
- Adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, insight from Aboriginal Traditional Knowledge, evolving societal expectations and values, and changes in public policies.
- Maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.
- Build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.

Following the Government of Canada's selection, in 2007, of Adaptive Phased Management (APM) as Canada's plan for the long-term care of used nuclear fuel, the NWMO developed and confirmed through public review seven strategic objectives that would serve as the foundation of strategic plans for implementing APM.

It is against these seven strategic areas that the NWMO presents both its achievements for 2011 to 2013 and its plans for 2014 to 2018. Highlights of past progress and future plans are presented in summary form in the sections that follow. A detailed account of the NWMO's past activities and future plans are provided in individual chapters and appendices of the *Triennial Report 2011 to 2013*.





## Overview

Over the past three years, the NWMO has made significant progress toward implementing Canada's plan for the safe and secure long-term management of the nation's used nuclear fuel. It continued to build and enhance relationships with interested individuals and organizations, communities involved in the site selection process, and Aboriginal peoples. At the same time, the NWMO began the work of engaging neighbouring communities.

The nine-step site selection process, initiated in May 2010, has moved forward – initial screenings (Step 2) were completed, and 20 communities that expressed an interest in further learning chose to move into Step 3. By the end of 2013, the first phase of preliminary assessments was completed in eight communities and was ongoing in 12 other communities. Of the first eight communities to complete Phase 1 assessments, four were found to have strong potential to meet site selection requirements and identified for further study.



In parallel, optimization and improvement of designs, illustrative safety analyses, and related engineering and scientific methods helped ensure the repository will meet high technical standards. The work of the APM technical program was enhanced through extensive collaboration with universities and international partners. These partnerships helped ensure the best knowledge and understanding are being applied to the NWMO's work.

Financially, the NWMO fulfilled its obligations under the *NFWA* by completing a full update of lifecycle cost estimates for the APM program, including the transportation of used nuclear fuel, while also continuing to update trust fund contributions to reflect the latest lifecycle cost estimates and trust fund balances.

To ensure APM incorporates the latest scientific advances and is responsive to evolving societal expectations, the NWMO engaged in a program of continuous learning.

The NWMO sought advice from independent groups with a wide variety of perspectives, including its Advisory Council, Independent Technical Review Group, APM-Geoscientific Review Group, Municipal Forum, Elders Forum and its successor, the Council of Elders.

As an organization, the NWMO recruited staff and contractors with the skills to support the site implementation process as it moves forward.

Over the next five years, the NWMO will continue to work collaboratively with communities, interested organizations, and the public at large to implement the site selection process in a manner that is fair, transparent, and scientifically sound. Just as the process is community-driven, so is the pace at which it proceeds. Communities decide whether – and when – they are willing to progress to the next step.

The NWMO's key activities for the next five-year planning period include:

- Completing the first phase of preliminary assessments, which involves desktop studies and local engagement, for communities that have passed an initial screening *and* that requested the NWMO to initiate this step in the site selection process;
- Using findings from the first phase of work to identify communities with strong potential to meet the requirements of the project to be the focus of the next phase of study, which explores suitability of an area to host the project through fieldwork, more detailed studies, and broadened engagement; and
- Preparing to use findings from the second phase of preliminary assessments to guide identification of one or possibly two areas and sites to be the focus of later detailed site evaluations.

As the NWMO continues to learn from and work with communities, it will also continue to adapt the site selection process as appropriate in the light of new learning and evolving societal expectations.

The range of activities planned for the next five years will help advance future phases of field investigations and other detailed assessments, more intensive engagement with interested communities, transportation planning, and further refinements to repository design and the development of safety cases.



## Strategic Areas of APM Implementation: Progress and Plans



### Building Sustainable Relationships

Because APM will be implemented over many decades and will involve generations to come, its success depends on the NWMO's building and sustaining relationships that will support and direct implementation well into the future. Over the past three years, the NWMO expanded its engagement activities to include communities participating in the site selection process, and early outreach to Aboriginal and other communities in surrounding areas. At the same time, it continued to engage such groups as municipal organizations, Aboriginal communities and organizations, federal and provincial government officials, and youth.

The NWMO undertook a number of new communications initiatives, including an animated online introduction to used nuclear fuel and APM, a mobile transportation exhibit that shows how used nuclear fuel is being safely and securely transported in Canada and internationally, and publications explaining key aspects of APM. The Corporate Social Responsibility Program, which encourages youth involvement in science, added three new initiatives (the Science North School Outreach Program, Scientists in School, and Science Ambassadors) to the programs it already helps fund.

Over the next five years, the NWMO's engagement activities will be designed to further strengthen established relationships to sustain program momentum. These will include information sessions, briefings, joint projects and partnerships with governments (municipal, provincial, federal, and Aboriginal) and interested individuals and organizations. The NWMO will continue to work with its Council of Elders and Municipal Forum. It will also work together with potentially affected Aboriginal peoples. As the site selection process moves forward, the NWMO's engagement program has evolved to focus more directly on participating communities and the areas surrounding them. Over the next five years, Aboriginal peoples and surrounding communities, as well as communities along potential transportation routes as a large group with a shared interest, will become an important focus.

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### Collaboratively Implementing the Site Selection Process

The nine-step site selection process began in May 2010 with a broadly based communications program to inform Canadians about APM and the process itself (Step 1). Over the past three years, interested communities have learned more about APM and the site selection process. During that time, and as part of the process of learning more, the NWMO completed 22 initial screenings (Step 2), and began preliminary assessments (Step 3) in 20 communities. Preliminary assessments consist of two phases, and in 2013, the first phase was completed for eight communities. Of these, four were assessed as having strong potential to meet site selection requirements and were identified for further study. A strong showing of interest on the part of potential host communities allowed the NWMO to suspend new expressions of interest in the project effective September 30, 2012.

In all three years, the NWMO provided resources and opportunities for interested communities to learn more about the project and the site selection process. This included resources to seek independent advice, including staff at the Canadian Nuclear



Safety Commission and leaders from communities in other countries that have participated in a site selection process for a deep geological repository. Many communities in Step 3 of the site selection process established community liaison committees to facilitate community learning, help engage with Aboriginal peoples and other communities in the surrounding area, and provide guidance and feedback on preliminary assessments.

Over the next five years, the NWMO will continue to support and assist interested communities in learning more about APM, while also expanding its engagement with Aboriginal and other surrounding communities.

The NWMO will complete the first phase of remaining preliminary assessments and use these to identify a smaller number of communities that appear at this early stage to have strong potential to meet the project's requirements. In communities identified for further study, the NWMO will undertake more detailed technical and social assessments, including field investigations of potential sites. At the same time, it will also work with interested communities to engage Aboriginal and other communities in the surrounding area. As preliminary assessments are completed, the NWMO will continue to gradually narrow its focus to areas with strong potential to be suitable for hosting a repository. All evaluations will be undertaken in collaboration with communities.

The next five years of the site selection process will also involve broader engagement and study in areas surrounding potential siting communities, as well as an increasing focus on transportation planning. There will be increased engagement with regulatory authorities and all levels of government, transportation experts, and communities along potential transportation routes as a large group with a shared interest.

Ultimately, the project will only proceed at a site that can safely contain and isolate used nuclear fuel, and with the involvement of the interested community, First Nations and Métis peoples, and surrounding communities working together to implement it.

### Optimizing Repository Designs and Further Increasing Confidence in Safety

The APM technical program works to improve the safety case for a deep geological repository where Canada's used nuclear fuel will be safely contained and isolated on an indefinite basis. It does so through three complementary programs: design optimization, building confidence in the understanding of geological and other processes that affect long-term safety, and illustrative repository safety assessments.

The program achieved a number of milestones over the past three years. These included:

- The completion of an update to the conceptual design and cost estimate for a deep geological repository and used fuel transportation system;
- The completion of two illustrative postclosure safety assessments – one in crystalline rock, the other in sedimentary rock;
- Refinements to site-specific natural analogue studies that help predict future site evolution from past system evolution and response to external disturbances; and
- A significant improvement in the neutron shielding performance of a conceptual used fuel transportation package; and the preparation of conceptual designs for the handling, transfer, loading, and sealing of used fuel containers.

Examples of ongoing studies include the performance of uranium dioxide, copper, and clay under geologic conditions, and the effects of glaciation on deep-seated groundwater system stability.

Over the next five years, the APM repository engineering program will be increasingly focused on large-scale engineering and demonstration projects. Specific objectives include:

- The design and manufacture of physical prototypes of the used fuel container;
- The establishment of a container, engineering, and test facility for both the repository and transportation containers;
- Completion of an integrated review of microbiological processes that could occur within the repository environment;
- Work with waste owners in planning for future transport of used nuclear fuel from the interim storage facilities where it is currently stored; and
- Completion of an update to the conceptual design and cost estimate for APM.

Collaborative research and other joint activities with universities and international organizations will also continue. To keep abreast of the latest international technical advances, the NWMO undertakes numerous joint research projects with its counterparts in other countries, including those of Sweden, Switzerland, Finland, France, and as of 2013, the United Kingdom. International joint projects include experiments at underground research facilities in Sweden and Switzerland.



### Providing Financial Surety

The *NFWA* requires the NWMO to address the cost and funding of the long-term management of used nuclear fuel. This is to ensure the money necessary to pay for the long-term management of that fuel will be available when it is needed. The NWMO continued to fulfill this requirement between 2011 and 2013. It began a full update of the lifecycle cost estimates for the APM program in 2009 and completed it in 2011. This update includes the lifecycle cost estimates for a deep geological repository and related transportation of used nuclear fuel. In each of the three years, it updated the amount each waste owner must deposit for the next fiscal year. Over the next five years, the NWMO will continue to maintain and update cost estimates and adjust the funding formula as required.

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### Adapting Plans

It will take several generations to implement APM, and during that time, there will be many opportunities to continuously improve safety and performance, enhance effectiveness, reduce uncertainty, and refine the plan in response to evolving societal expectations. To keep abreast of new technologies and new ways of thinking, the NWMO engages in continuous learning and encourages the public to provide input on its five-year implementation plans.

Over the past five years, the NWMO pursued a number of approaches to learn from best practices and experience in project implementation in Canada and abroad. In addition to engaging in joint research projects with Canadian universities and nuclear waste management organizations in other countries, it continued to participate in the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development, where it regularly reported on its work and exchanged information on best practices in such areas as safety case development, community-driven site selection processes, and citizen engagement. The NWMO continued to monitor developments in environmental and energy policies that might affect APM, including any new nuclear build.

To meet evolving societal expectations, the NWMO continued to seek guidance from holders of Aboriginal Traditional Knowledge about how best to interweave that knowledge in the NWMO's activities. In 2012, it organized a conference (the fourth International Conference on Geological Repositories) that brought together community leaders, regulators, and implementers from around the world to discuss how best to meet societal expectations in developing repositories.

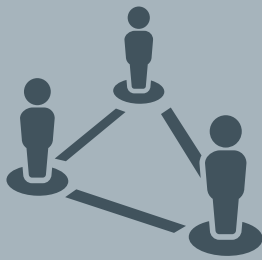
Over the next five years, the NWMO will continue to monitor and review national and international research, experience, and events for lessons learned and as an opportunity to consider refinements to APM. It will continue its exploration of best practices in engagement, capacity building, and community well-being, and will seek to build its understanding of how to interweave Aboriginal Traditional Knowledge in the site selection process. To keep abreast of the latest technical advances, it will continue to undertake joint research projects with Canadian universities and nuclear waste management organizations in other countries. It will also continue to be an active participant in such international organizations as the NEA. It will publish a preliminary technical assessment of Generation III reactor (CANDU and other) used fuel on deep geological repository design and safety, and will continue to monitor other developments in energy and environmental policy. As in previous years, it will continue to keep a watching brief on any new developments in reprocessing used nuclear fuel, while also monitoring potential new build so as to be ready to address any potential changes in volume and fuel types. Throughout, the NWMO will continue to seek public input on its work, including its five-year strategic plans.



### Ensuring Governance and Accountability

Since its inception, the integrity of the NWMO's work has been guaranteed by multiple layers of oversight. Internally, the NWMO is governed by its Board of Directors. The *NFWA* requires the Board to appoint an Advisory Council to review and comment on the organization's work. There is a four-member Independent Technical Review Group (ITRG) that since 2008 has been conducting annual reviews of the APM technical program. Externally, the NWMO reports to the Minister of Natural Resources Canada on an annual basis. It submits an annual report to the Minister, and every three years, a Triennial Report. The NWMO also holds itself accountable to the public at large by posting key documents on its website, most notably, Annual Reports, Triennial Reports, minutes from the meetings of the Board of Directors and the Advisory Council, the ITRG's annual reports and the NWMO's responses to them, draft five-year implementation plans for public comment, research papers, the results of the NWMO's engagement activities, and studies (e.g., initial screenings and preliminary assessments) conducted as part of the site selection process.

The NWMO fulfilled each of these obligations over the past three years and will continue to do so in the years to come.



### Building and Sustaining a High-Performing Organization

Implementing APM requires expertise in a wide range of fields – in geoscience, finance, social research, community engagement, engagement with Aboriginal peoples and Aboriginal Traditional Knowledge, communications, and many more. The NWMO's hires and contracts over the past three years evolved to meet these demands, and were complemented by investments in new business systems, most notably, state-of-the-art computer modelling. At the same time, several complementary initiatives helped in the vital task of sustaining the organization over the many generations it will take to implement APM. These included funding of programs designed to encourage youth involvement in science, and support to graduate students through the Natural Sciences and Engineering Research Council's (NSERC) Industrial Postgraduate Scholarships Program.

Over the next five years, the NWMO will continue to ensure it has the resources and expertise to carry the site selection process forward. Because its work will be increasingly community-focused, it is anticipated that hires of regionally based staff will increase as well. To support their efforts, the NWMO will expand local offices in communities with the most potential for successful implementation of the project.

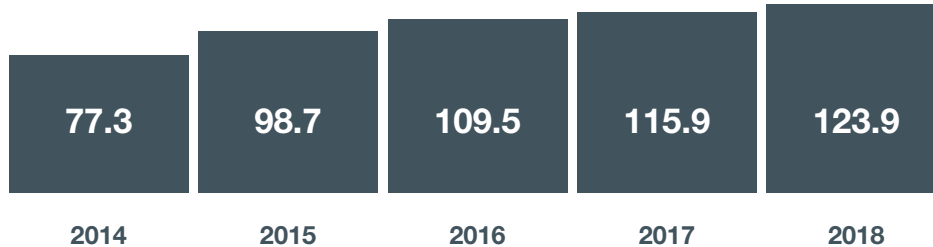


### Other Activities

In 2009, Ontario Power Generation (OPG) contracted the NWMO to process technical services and other support through the regulatory approvals for OPG's proposed Deep Geologic Repository (DGR) Project for low- and intermediate-level waste from OPG-owned or operated reactors. This repository is separate from the APM repository for the long-term management of used nuclear fuel. In 2011, OPG further contracted with the NWMO to manage the detailed design of the DGR. Between 2011 and 2013, the NWMO made significant progress on the detailed design of the OPG repository.

In April 2011, OPG submitted to the Canadian Nuclear Safety Commission (CNSC) the Environmental Impact Statement, Preliminary Safety Report and other documents prepared by the NWMO. These documents were in support of OPG's application for a Site Preparation and Construction Licence for the DGR Project, and were later provided to the three-member Joint Review Panel established by Environment Canada and the CNSC in 2012. In June 2013, after 15 months of public review, the Panel determined that the documentation, along with additional information supplied by OPG, was sufficient to proceed to four weeks of public hearings starting in September 2013.

Within 90 days of the close of the public record for the DGR Project, the Panel will submit an Environmental Assessment Report to the federal Minister of the Environment outlining its conclusions, rationale and recommendations. Subject to the Government of Canada's decision, the Panel may then be authorized to make a decision on the application for a Licence to Prepare a Site and Construct a Deep Geologic Repository at the Bruce nuclear site in the Municipality of Kincardine. If a licence is issued, the NWMO would continue with the detailed design of the facility and provide construction services for the repository.

**Five-Year APM Budget Forecast 2014 to 2018 (\$ million)**

The NWMO's annual operations prior to the receipt of a construction licence are funded by nuclear fuel waste owners outside the trust funds outlined below. The NWMO's annual budget process is further described in chapter 9.1 (*Budget Forecast, 2014 to 2018*).

## Trust Funds

The *NFWA* requires that nuclear fuel waste owners establish and make annual deposits to trust funds that will address future financial costs of implementing APM, following receipt of a construction licence. As required by the *NFWA*, contributions have been made annually beginning in 2002.

Trust fund balances as of December 2013 are outlined below for each company. Every year, the NWMO must establish the level of trust fund deposits for each company for the upcoming year. The required level of 2014 deposits is presented in chapter 9.2 (*Financial Reporting Requirements*).

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**Total Trust Fund Deposits: Year 2014**

Owner	Trust Fund Balances as at December 2013 (\$ million)	2014 Deposits to Trust Funds Required by Waste Owners* (\$ million)
	December 2013	2014
OPG	2,668	161
HQ	105	9
NBPN	104	6
AECL	42	2
<b>Total</b>	<b>2,919</b>	<b>178</b>

\* Annual trust fund deposits are required to be made within 30 days of the submission of the Annual Report.



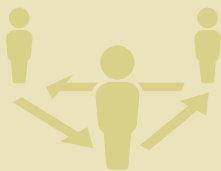
## APM Milestone Achievements 2011 to 2013



### Building Sustainable Relationships

- Worked closely with communities interested in exploring the APM Project to advance the site selection process on behalf of Canadians.
- Worked with the Municipal Forum to develop a better understanding of the needs and processes of municipalities involved in the site selection process and of the communities in the surrounding area.
- Worked closely with the Elders Forum and later the Council of Elders to incorporate Aboriginal Traditional Knowledge in the NWMO's work.
- Worked with Aboriginal communities, and regional, provincial and national Aboriginal organizations to provide briefings and involve Aboriginal peoples in the design, development, and decision-making for APM.
- Continued to strengthen relationships with federal and provincial governments and to brief elected representatives about the project and the site selection process.
- Supported initiatives designed to increase youth interest and participation in science, including Youth Science Canada, Shad Valley, the Science North School Outreach Program, and Scientists in School.
- Used a wide variety of communications media to keep communities and the public at large informed about the NWMO, its work, and the site selection process.

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### Collaboratively Implementing the Site Selection Process

- Supported interested communities in learning more about APM and the site selection process.
- Completed initial screenings (Step 2) for 22 communities, and at the request of 20 interested communities, initiated the first phase of preliminary assessments (Step 3) of potential suitability for the project.
- Effective September 30, 2012, suspended new expressions of interest from potential host communities so that the NWMO could focus on working with the communities already engaged in the site selection process.
- Supported the formation of community liaison committees by Step 3 communities to facilitate community learning and to provide guidance in such areas as preliminary assessments and engagement with neighbouring communities.
- Completed Phase 1 preliminary assessments (Step 3) in eight communities, four of which were identified for further study.
- Provided resources to communities to seek independent advice, including meetings with the Canadian Nuclear Safety Commission and forums such as the 2011 conference of the Federation of Canadian Municipalities, the Canadian Nuclear Society's 2011 conference on Waste Management and Decommissioning and Environmental Restoration, and the 2012 International Conference on Geological Repositories.



### Optimizing Repository Designs and Further Increasing Confidence in Safety

- Completed an update to the conceptual design and cost estimate for a deep geological repository and used fuel transportation system.
- Maintained and advanced geoscientific research specific to the long-term behaviour and evolution of deep-seated, low-permeability groundwater systems in crystalline and sedimentary bedrock settings.
- Worked collaboratively with Switzerland's nuclear waste management organization (Nagra) to develop copper coatings for repository containers using Canadian technologies developed by the National Research Council, the University of Ottawa, the University of Windsor, and the University of Toronto.
- Prepared conceptual designs for the handling, transfer, loading, and sealing of used fuel containers.
- Conducted site-specific natural analogue studies to help predict future site evolution from past system evolution and response to external disturbances.
- Collaborated with other nuclear waste management organizations in repository-related research activities at underground rock laboratories in sedimentary and crystalline rock formations.
- Completed two illustrative postclosure safety assessments – one in crystalline rock, the other in sedimentary rock.
- Conducted analyses specific to the safe and secure transportation of used nuclear fuel, including work that resulted in a significant improvement in the neutron shielding performance of a conceptual used fuel transportation package.
- Acquired the used fuel transportation package and upgraded the Canadian Nuclear Safety Commission certificate for that package to current regulations.

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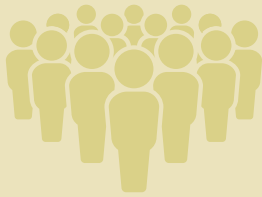
### Providing Financial Surety

- Completed a full update of the lifecycle cost estimates for a deep geological repository and related transportation of used nuclear fuel.
- Updated trust fund contributions to reflect the latest lifecycle cost estimates and trust fund balances.



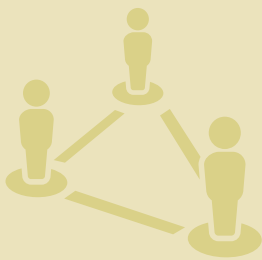
### Adapting Plans

- Continued to solicit public input so that evolving societal expectations are reflected in implementing APM.
- Continued to monitor any developments in reprocessing used nuclear fuel and report findings to the public on an annual basis.
- Continued to partner with Canadian and international universities, nuclear waste management organizations in other countries, and international agencies to keep abreast of the latest advances in the field.



### Ensuring Governance and Accountability

- Continued to seek independent review of the organization's work through an Independent Technical Review Group, Advisory Council, Municipal Forum, and a forum of Aboriginal Elders.
- Continued to update the CNSC and seek feedback as part of the organization's arrangement to obtain CNSC review of illustrative safety assessments for a used fuel repository in both crystalline and sedimentary rock formations.
- Ensured the organization's management system meets the highest standards by adding two new certifications to its existing Quality Management (ISO 9001:2008) certification: Occupational Health and Safety Management (CSA Z1000:2006) and Environmental Management Systems (ISO 14001:2004).
- Continued to report annually to the Minister of Natural Resources Canada, as required by the *Nuclear Fuel Waste Act*.



### Building and Sustaining a High-Performing Organization

- Supported the site selection process by recruiting specialists in such areas as repository design and construction, environmental assessment, Aboriginal Traditional Knowledge, social research, municipal planning, ethics, finance, communications, and public engagement.
- Opened local offices in Step 3 communities.
- Promoted knowledge transfer to future generations by encouraging youth involvement in science and by providing financial support to graduate students through the NSERC's Industrial Postgraduate Scholarships Program.

## APM Strategic Planning Milestones, 2014 to 2018



### Building Sustainable Relationships

- Communications and media relations programs to raise awareness of APM Project.
- Engagement, education, outreach and capacity-building initiatives to support multi-generational involvement in APM Project.
- Relationship building with interested communities, First Nations and Métis peoples, surrounding communities and regions potentially affected by the APM site selection process.
- Working together with affected Aboriginal peoples as holders of Traditional Knowledge, users of environmental resources and environmental stewards, to be active participants in the site selection process.
- Collaborative work with, and advice sought from, the NWMO Council of Elders, Municipal Forum, community-based organizations, and national and provincial Aboriginal organizations.
- Developing and maintaining relationships with federal, provincial, regional and local governments.



### Collaboratively Implementing the Site Selection Process

- Broadened engagement with interested communities, First Nations and Métis peoples, and surrounding communities to support more detailed reflection on the APM Project and to explore the potential to implement the project in partnership.
- Tailored communications and public engagement activities to support ongoing dialogue and learning about the project.
- More detailed evaluation of potentially suitable areas, focusing on geoscientific suitability, engineering, transportation, environment and safety, as well as social, cultural and economic assessment.
- Identification of potential transportation modes and routes to each potential repository site, evaluated against technical safety criteria and aligned with community input.
- Selection of one or two candidate sites for detailed site characterization and assessment.



### Optimizing Repository Designs and Further Increasing Confidence in Safety

- Advancement of technical program activities to optimize repository designs and safety assessments.
- Initiate proof test plans to demonstrate Canadian-engineered barrier systems in advance of submission of a site preparation and construction licence.
- Completion of the Canadian Nuclear Safety Commission pre-project reviews in crystalline and sedimentary rock.
- Continued studies, analyses and joint activities with international partners to improve understanding of key processes and confidence in the safety case for deep geological repositories.



### Providing Financial Surety

- Completion of updated cost estimate for APM.
- Estimated financial implications of potential future scenarios of varying volumes of used nuclear fuel, when available.
- Identification as appropriate of implications for funding formula of potential new reactors or owners.
- Continued establishment of level of trust fund deposits by waste owners required annually.



### Adapting Plans

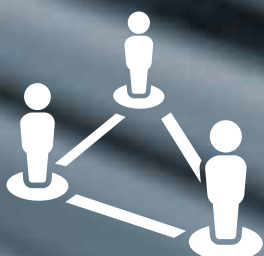
- Reporting on projected used fuel inventories, emerging technologies and potential implications of any new nuclear reactor units for APM plan.
- Continued published reviews of developments in used nuclear fuel reprocessing and alternative used nuclear fuel management technologies.
- Tracking of expectations of citizens, including youth and interested organizations, to ensure site selection process continues to meet needs and expectations; adapting process as may be required as experience is gained.
- Interweaving Aboriginal Traditional Knowledge in APM program implementation.



### Ensuring Governance and Accountability

- Oversight by NWMO Members, Board of Directors and Board Committees.
- Advice and independent comment by Advisory Council.
- Review of APM technical program by the Independent Technical Review Group.
- Assessments and audits of internal governance to maintain and achieve certifications to management system standards for quality, safety and environmental management.
- Interaction with the Canadian Nuclear Safety Commission for regulatory information and pre-project reviews for APM.
- Submission of annual and triennial reports to Minister of Natural Resources and the public.

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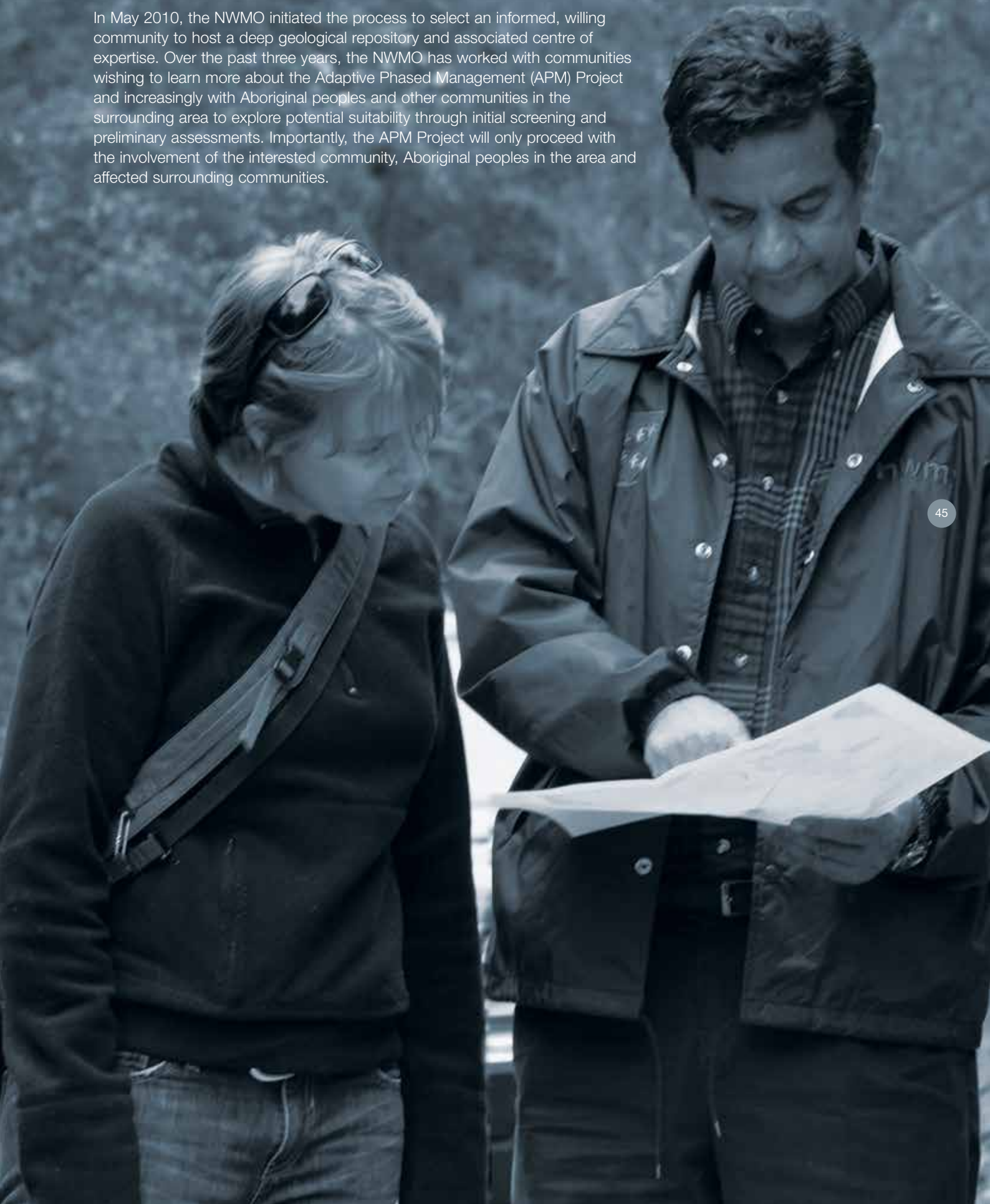
### Building and Sustaining a High-Performing Organization

- Further development of staffing capability, contractor capability, and business systems and processes.
- Continued support for regionally based staff and local information offices as required to support communities engaged in the site selection process.
- Continued staff support, funding and resources for potential host communities, First Nations and Métis peoples, and surrounding communities to build capacity to participate in the site selection process.

# **What We Heard as We Engaged Canadians**



In May 2010, the NWMO initiated the process to select an informed, willing community to host a deep geological repository and associated centre of expertise. Over the past three years, the NWMO has worked with communities wishing to learn more about the Adaptive Phased Management (APM) Project and increasingly with Aboriginal peoples and other communities in the surrounding area to explore potential suitability through initial screening and preliminary assessments. Importantly, the APM Project will only proceed with the involvement of the interested community, Aboriginal peoples in the area and affected surrounding communities.



Between 2011 and 2013, the NWMO worked collaboratively with interested communities that passed an initial screening and elected to proceed in the site selection process to learn more about the project and to reflect on their interest in it. As well, the NWMO completed Phase 1 assessments with eight of the 20 communities involved in preliminary assessments (Step 3 of a nine-step site selection process), and through these studies, it worked with communities to foster further learning and reflection on their interest in the project. The NWMO also explored with communities the potential to meet the robust safety requirements of the project and for the project to foster well-being as each community defines it.

Over the course of working with communities, and communities learning about the project and reflecting on their interest, communities have raised many questions which have fueled dialogue and learning throughout the three years.

Key themes included:

- Understanding what used nuclear fuel is and the hazard that needs to be managed, including what radiation is and its potential health effects if not properly managed.
- Understanding how safety of people and the environment will be assured by the design of the deep geological repository, including “what if” scenarios if the repository does not operate as planned.
- Understanding how safety of people and the environment will be assured through the transportation of used nuclear fuel from where it is currently stored to a centralized facility, including “what if” scenarios covering road accidents and malevolent acts.
- Understanding how the long-term sustainability of the community might be fostered through the implementation of the project, including how long-term community objectives might be achieved, and how the NWMO and community would work together to accomplish this. Potential benefits include job creation, opportunities for youth, expansion of population, expansion of infrastructure, and enhancement of services and broadening of revenue streams for the community.
- Understanding how the project may affect important activities in the community such as hunting, fishing and trapping, and tourism.
- Understanding how property values, infrastructure, and revenue streams in the community might be affected.
- Ensuring the involvement of Aboriginal peoples and surrounding communities in the implementation of the project, were it to come to the area, and understanding how all would work together to implement the project. This includes discussion of the distribution of risks, costs and benefits.

Over the past three years, the NWMO has developed exhibits, brochures, and other information material to support this learning and discussion. It has facilitated a variety of community learning opportunities involving regulators, academics, and consultants working in the field, as well as exchanges with communities involved in similar processes in other countries. It has also developed and refined resource programs for communities and Aboriginal peoples in response to their requests, along with exhibits and other learning material designed to help foster conversation in the community.



More broadly, and particularly among critics, conversation has continued about whether there are better technical approaches for the long-term management of used nuclear fuel, and whether more used fuel should be created.

Misinformation has circulated in some communities about the site selection process itself, the project, and the NWMO. This misinformation has included suggestions that the NWMO is targeting disadvantaged communities and that there is no foundation for confidence in the long-term safety of a deep geological repository and in its ability to safely and securely contain and isolate used nuclear fuel for the long time periods required. It will be important to address this misinformation as the site selection process proceeds and that those in the area surrounding interested communities engage in more intensive learning and reflection on the project.

The NWMO has received advice and guidance from Aboriginal peoples on how to incorporate Aboriginal Traditional Knowledge in NWMO processes overall, and in particular in the assessment of the suitability of potential sites. As the site selection process advances, with more intensive engagement of Aboriginal peoples at the local level in the conduct of assessment studies and decision-making, the incorporation of Aboriginal Traditional Knowledge in assessment activities will both broaden and deepen.

Finally, the NWMO continues to engage communities involved in the site selection process, as well as interested Canadians, in the design and refinement of its plans. This engagement includes:

- Developing and refining strategic plans;
- Designing of processes and approaches for studies;
- Developing communications materials to help build understanding of APM and the site selection process;
- Identifying areas for additional work; and
- Supporting informed decision-making.

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The NWMO greatly appreciates the interest, involvement, and direction of communities and interested Canadians in the implementation of APM. It welcomes and invites comments, questions, and concerns that help advance dialogue, the learning process, and the safe, long-term management of Canada's used nuclear fuel.

For more details on what the NWMO heard over the past three years, please see chapter 8 (*What We Heard on Implementing Adaptive Phased Management*).



# Canada's Plan: How We Got Here





## A Matter of Responsibility

For decades, Canadians have used electricity generated by nuclear power reactors in Ontario, Quebec and New Brunswick. In that time, they have produced just over 2.4 million bundles of used fuel. If these bundles could be stacked like cordwood, all Canada's used nuclear fuel bundles could fit into six hockey rinks, from the ice surface to the top of the boards.

When used nuclear fuel is removed from a reactor, it is considered a waste product, is radioactive and requires careful management. Although its radioactivity decreases with time, chemical toxicity persists and the used fuel will remain a potential health risk for many hundreds of thousands of years. For this reason, used fuel requires careful management essentially indefinitely.

Canada's used nuclear fuel is safely stored on an interim basis at licensed facilities located where it is produced. Like many other countries with nuclear power programs, Canada is planning for the future. Putting in place a plan for the long-term, safe and secure management of used nuclear fuel for the protection of people and the environment is an important responsibility we as Canadians share.

## The Deep Geological Repository Concept

Used fuel storage technologies have been demonstrated for many years at reactor sites where used fuel is cooled and then safely managed in interim storage facilities. The approach Canada has selected for the long-term management of that fuel – containment and isolation in a deep geological repository in a suitable rock formation – is the culmination of more than 30 years of research, development and demonstration of technologies and techniques in Canada, the United States, Switzerland, Sweden, France, the United Kingdom, and elsewhere. Repositories have been constructed and are operating around the world for various types of radioactive wastes.

In 1978, the governments of Canada and Ontario established the Canadian Nuclear Fuel Waste Management Program to study and advance the technology for the storage, transportation and permanent disposal of Canada's nuclear fuel waste. This was followed, starting in 1989, by an intensive and lengthy period of deliberation by the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel. Chaired by Blair Seaborn, the Panel's mandate was to conduct an environmental assessment of an Atomic Energy of Canada Limited (AECL) proposal for deep geological disposal. In 1998, the Seaborn Panel provided insight and direction on key issues to be addressed in order to move the decision-making forward. With respect to the AECL disposal concept, the Panel concluded that:

- From a technical perspective, the safety of the AECL concept had been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it has not;
- Broad public support is necessary in Canada to ensure the acceptability of a concept for managing nuclear fuel wastes; and
- Safety is a key part, but only one part, of acceptability. Safety must be viewed from two complementary perspectives: technical and social.

The Government considered and responded to the Seaborn Panel Report, and in November 2002, it brought into force the *Nuclear Fuel Waste Act (NFWA)*.

### Milestones in the Long-Term Management of Canada's Used Nuclear Fuel

#### 2005

The NWMO submits its study to the Minister of Natural Resources

#### 2007

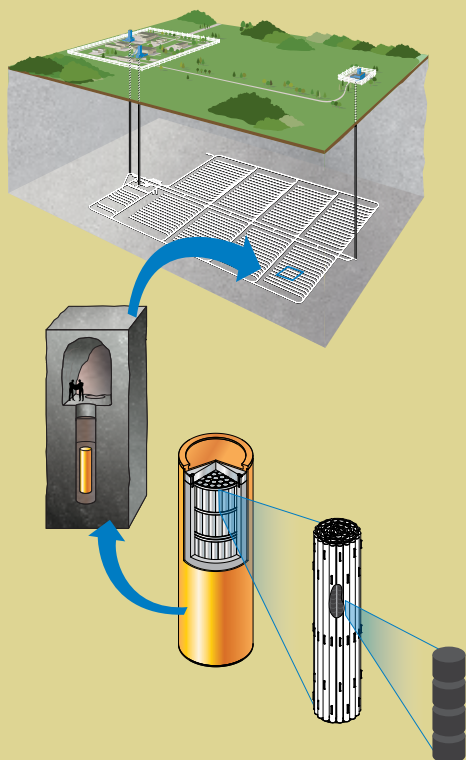
The Government of Canada approves Adaptive Phased Management

#### 2008–2009

Canadians provide input and feedback on a draft site selection process



**Deep geological repositories** are the preferred approach internationally because a multiple-barrier system in a stable rock formation is the safest known way of containing and isolating used nuclear fuel over very long time periods. Canada is one of 20 countries currently planning on developing a repository, including Finland, Sweden, and Switzerland. Repositories are also the official policy of the European Union. Under the terms of the “Radioactive Waste and Spent Fuel Management Directive” of 2011, member states have been asked to present national programs, indicating when, where and how they will construct and manage deep geological repositories guaranteeing the highest safety standards.



## Advancing our Understanding of Deep Geological Repositories

Since 1978, Canada has invested more than \$1 billion in the research, development and demonstration of used fuel repository technology. A number of technical issues were raised during the Seaborn Panel review process (1998). These have been the subject of a robust technical research program going forward. Progress in the following, as well as other areas, is documented in a series of annual reports that can be found at [www.nwmo.ca/technicalresearch](http://www.nwmo.ca/technicalresearch):

- Used fuel container development;
- Copper corrosion modelling and experimental studies;
- Sealing material properties and behaviour;
- Rock mass characterization and monitoring instruments and methods;
- Repository design development;
- Modelling climate change for evaluating deep geological repositories;
- Modelling regional groundwater flow and transport; and
- Postclosure safety assessment studies and safety model development.

International co-operation and information sharing are advanced through formal agreements between the NWMO and its counterparts in Finland, Sweden, Switzerland, France, and since 2013, the United Kingdom.

### 2010

Initiation of the site selection process

### 2012

Suspension of new expressions of interest from potential host communities

### 2013

Phase 1 Preliminary Assessments (Step 3) are completed in eight communities

## Working Together to Develop Canada's Plan

The *NFWA* required Canada's nuclear energy generators – Ontario Power Generation (OPG), New Brunswick Power<sup>1</sup> and Hydro-Québec – to establish a waste management organization to study approaches for managing Canada's used nuclear fuel over the long term, propose a preferred approach to the Government of Canada, and then implement the approach selected by the Government. That waste management organization, founded in 2002, is the NWMO.

Acting on this mandate, the NWMO conducted a three-year study (2002 to 2005) involving thousands of citizens, specialists and Aboriginal peoples in every province and territory in Canada. The goal of this dialogue was to develop a long-term management approach that is socially acceptable, technically sound, environmentally responsible, and economically feasible.

The plan that emerged from this dialogue, Adaptive Phased Management (APM), enables our generation to proceed in a deliberate and collaborative way to establish the foundation for the safe and secure stewardship of Canada's used nuclear fuel over the long term.

APM involves the containment and isolation of used nuclear fuel in a deep geological repository in a suitable rock formation. Under APM, used nuclear fuel will be safely and securely contained and isolated from people and the environment in the repository using a multiple-barrier system. The plan builds in the potential for the retrieval of the used fuel for an extended period, until such time as a future society makes a determination on final closure, along with the form and duration of postclosure monitoring.

In having a deep geological repository as its technical end point, APM embraces the internationally accepted technical approach for the long-term management of used nuclear fuel. As a management plan, it is adaptive, meaning that it is responsive not only to new technologies, but also to the evolving societal expectations and needs of Canadians.

In 2005, the NWMO made its recommendations to the Government of Canada, which in June 2007 selected APM as the best approach for Canada to safeguard both the public and the environment over the very long time in which used nuclear fuel must be carefully managed.



The NWMO has met with thousands of citizens from many parts of Canadian society to hear their advice and suggestions about how to proceed. We have talked to people in their communities; local, provincial and national elected representatives; Aboriginal peoples; technical and social specialists; environmental and faith groups; and business people, about the many social, technical, economic, environmental and ethical issues involved in managing used nuclear fuel.

A strong sense of responsibility emerged from these conversations. This generation wants to move forward in dealing with our used nuclear fuel, believing it to be imprudent and unfair to future generations to wait any longer.

<sup>1</sup> In 2004, through a transfer order, the Government of New Brunswick assigned responsibility for all aspects of the provincially owned nuclear generating assets to a new subsidiary corporation, NB Power Nuclear.





## Adaptive Phased Management: A Canadian Choice

The *NFWA* required the NWMO to study approaches based on three methods for the long-term management of used nuclear fuel: deep geological disposal in the Canadian Shield; storage at nuclear reactor sites; and centralized storage, either above or below ground, anywhere in Canada. Through the three-year study the NWMO conducted, it became clear that each of these approaches possesses some unique strengths, but also some important limitations. This led to the search for an approach that would better meet the objectives Canadians said are important – safety, security, protection of the environment, community well-being, fairness, and economic viability. APM is this approach.

Other options that had at some point received international attention were also reviewed. These options were found to not meet important criteria such as “proof of concept” (they could not be implemented today) or legality. The options included recycling or reusing nuclear fuel. This would involve reprocessing the used fuel with an aim to reduce the volume and toxicity of the high-level waste to be managed. This might be done by partitioning or transmutation. The NWMO continues to keep a watching brief on the development of these and other alternative used nuclear fuel management technologies as part of its ongoing effort to incorporate new learning and knowledge, and to review and adjust the way in which Canada's plan is implemented, as needed.

### Canadians said Canada's Plan must

Be fair – both to current and future generations – and the outcome must be safe and secure for people, communities and the environment.

Our generation needs to take active responsibility to achieve a safe, long-term response to our waste problem.

The plan needs to have a definitive outcome, and it needs to provide flexibility along the way to take advantage of newer and better technologies when they are developed, or to adjust if people's values or priorities change over time.

We need to provide the option to future generations to monitor the waste over an extended period.



## Engaging With the Public About How Best to Implement Adaptive Phased Management

Following the government's selection of APM in 2007, the NWMO embarked upon the process of re-engaging with the public as the organization moved from being a study organization to one responsible for the implementation of Canada's plan for the long-term management of the nation's used nuclear fuel. It invited people and groups who took part in the study to provide feedback, along with other Canadians, including Aboriginal peoples, who might have an interest in APM or be potentially affected by its implementation.

The people and groups who participated in this dialogue helped shape the strategic directions and priorities to be followed in implementing APM.

In 2008, the NWMO began to work collaboratively with interested individuals and organizations to help identify the principles that should guide the site selection process. Their input was incorporated in a discussion document outlining the proposed process, which was then widely disseminated for public comment in 2009. At this time, participants delved deeper into some of the issues raised during the previous year's dialogues while also providing more specific direction on refinements that would strengthen the process.

Over the course of this two-year dialogue, Canadians were very clear in their expectation that a process be outlined as the road map for decision-making. At the same time, it was understood that the road map does not in itself constitute the destination, nor identify every step that will need to be taken along the way.

Their feedback was carefully reviewed and then incorporated in the final document, *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel*. In 2010, the document was published, and the site selection process was launched in May of that year. It is this road map the NWMO is now following as it works collaboratively with interested communities to select a site where Canada's used nuclear fuel may be safely and securely contained and isolated.

Canadians told the NWMO that the site selection process should ensure, above all, that the site selected for a repository be safe and secure – and meet the highest scientific, professional and ethical standards. They wanted a process that ensured the long-term well-being of the community that agrees to host the site. And they wanted a process that is community-driven, meaning that the initiative to enter and then continue in the process must come from the community, and that the decision to host the site must be made by an informed and willing community.

In May 2010, the NWMO initiated the site selection process that had been developed in collaboration with Canadians. Since that time, the NWMO has worked with communities wishing to learn more about APM, and increasingly, with Aboriginal and other communities in the surrounding area to explore potential suitability through initial screenings and preliminary assessments. The project will only proceed with the involvement of the interested community, surrounding communities, and affected First Nations and Métis peoples.

This Triennial Report details how the NWMO is implementing the site selection process in a way that meets the priorities of the Canadians who participated in framing it – and of the communities that are now participating in that process.

# **Adaptive Phased Management**

The background features a light yellow field with a large, dark blue chevron shape pointing towards the bottom right. On the right side, there is a blurred, high-contrast image of a person's face, partially obscured by the geometric shapes.





Canada's plan for the long-term care of used nuclear fuel is known as Adaptive Phased Management (APM). Used fuel will be safely and securely contained and isolated from people and the environment in a deep geological repository in a suitable rock formation using a multiple-barrier system. A fundamental tenet of Canada's plan is the incorporation of learning and knowledge at each step to guide a process of phased decision-making.

## **Description of the Adaptive Phased Management Plan**

The long-term management of Canada's used nuclear fuel involves the development of a deep geological repository, a used fuel transportation system and a national centre of expertise. This large infrastructure project will generate thousands of jobs in the host region and potentially hundreds of jobs in a host community for many decades. It has an estimated cost of \$16 billion to \$24 billion.

### Cornerstones of Adaptive Phased Management

Centralized containment and isolation of used nuclear fuel in a repository deep underground in a suitable rock formation.

A series of steps and clear decision points that can be adapted over time.

An open, inclusive and fair siting process to identify an informed and willing host community.

Opportunities for people and communities to be involved throughout the implementation process.

Provision for optional temporary shallow storage at the central site, if needed<sup>1</sup>.

Long-term stewardship through the continuous monitoring of used fuel.

Ability to retrieve the used fuel over an extended period should there be a need to access the waste or take advantage of new technologies.

Financial surety and long-term program funding to ensure the necessary money will be available for the long-term care of used nuclear fuel.

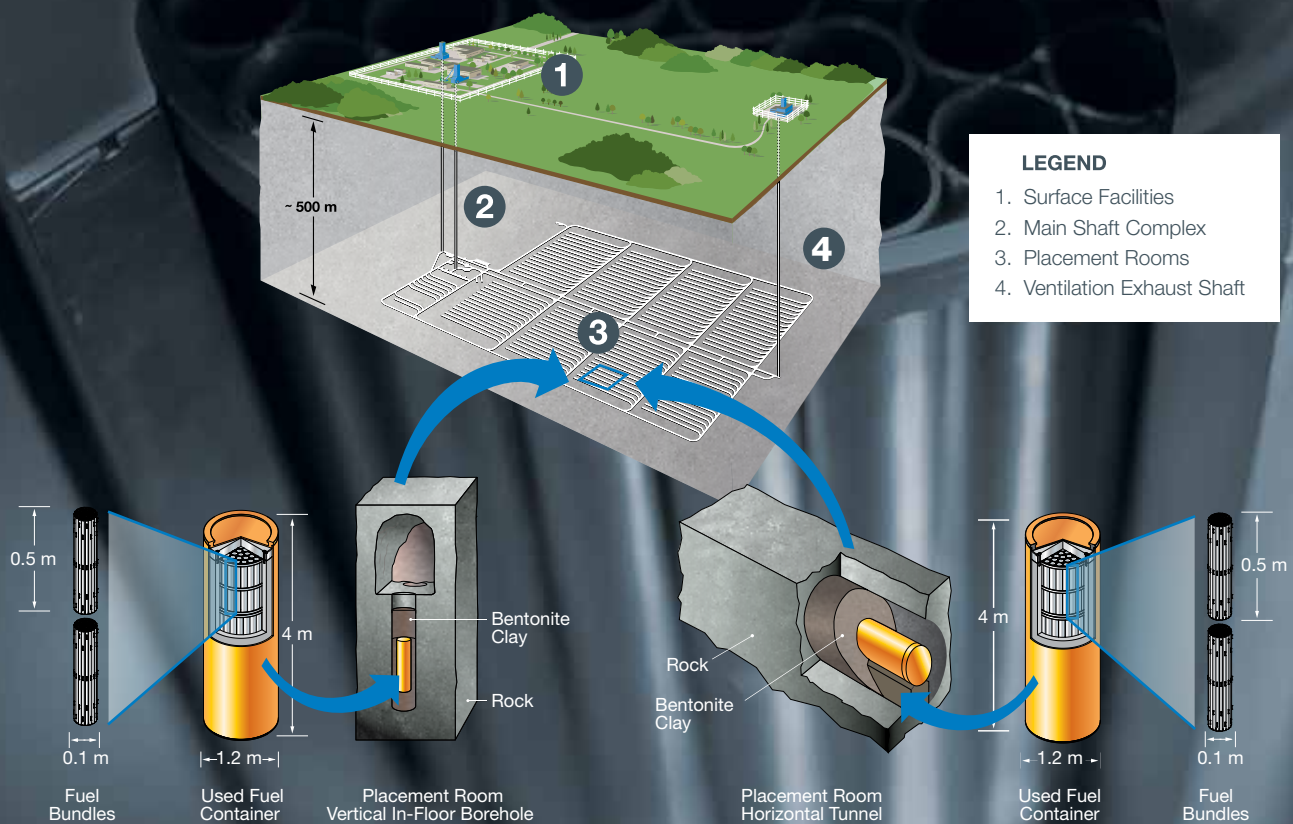
<sup>1</sup> Temporary shallow storage at the deep geological repository is optional and not currently included in the NWMO's implementation plan.

## Deep Geological Repository

The deep geological repository is a multiple-barrier system designed to safely contain and isolate used nuclear fuel over the long term. It will be constructed at a depth of approximately 500 metres, depending upon the geology of the site, and consist of a network of placement rooms for the used fuel (see diagram below). This project requires a dedicated surface area of about 600 metres by 550 metres for the main buildings and about 100 metres by 100 metres for the ventilation exhaust shaft. Land above the underground footprint that is not required for the surface facilities or to meet regulatory requirements could be available for other uses. Based on current inventory projections, the underground repository requires a subsurface area in suitable host rock of about 2 kilometres by 1 kilometre (375 hectares/930 acres). As well, regulatory or other requirements may limit activities in the immediate area surrounding the surface facilities.

Used nuclear fuel will be loaded into specially designed and certified containers at the reactor sites and transported to the repository site where it will be repackaged in corrosion-resistant containers for placement in the repository. The containers will be transported underground to one of many placement rooms. The containers will be placed in vertical or horizontal boreholes drilled into the rock and sealed with an effective sealing material such as bentonite clay.

The specific volume of used fuel to be placed in the repository will be agreed with the community using the best information available at the time, and an open and transparent consultation process involving surrounding communities and others who are interested and potentially affected. Regulatory review processes and approvals, which are required by law before the project can proceed, will be based on a specific fuel volume and will involve an open and transparent consultation process.





## Monitoring and Retrievalability

The used fuel will be monitored and retrievable throughout all phases of implementation consistent with the direction of Canadians. Once the host community and the NWMO decide to close the site, the NWMO will backfill and seal the access tunnels, and will seek the appropriate regulatory approvals prior to decommissioning. Following successful decommissioning, the NWMO will seek appropriate regulatory approvals for postclosure monitoring.

A robust safety case must be developed to demonstrate that the project can be safely implemented at the site, including transportation, and that it can meet or exceed the requirements of regulatory authorities and the host community.

## Transportation

Used nuclear fuel is currently safely stored in facilities licensed by the Canadian Nuclear Safety Commission (CNSC) at sites where it is produced. Placing all Canada's used nuclear fuel in a single central location will require transportation from these interim storage facilities to the deep geological repository. Depending on the location of the site, this may involve road, rail, or water transport, or a combination of the three. The NWMO will need to demonstrate to regulatory authorities and citizens the safety and security of any transportation system before transport of used nuclear fuel can begin. Transportation of the used nuclear fuel will have to meet the stringent requirements of Transport Canada and the CNSC prior to a licence being issued and will be subject to ongoing compliance monitoring.

## Centre of Expertise

A centre of expertise will be established for the one or more communities in which a site has been selected for detailed evaluation. The centre will be located in or near the community, as determined with the community. Its purpose will be to support the multi-year testing and assessment of the site on technical safety and community well-being related dimensions, which are key components of the site selection process. It will be the home for an active technical and social research and technology demonstration program during this period, involving scientists and other experts in a wide variety of disciplines, including geoscience, engineering, and environmental, socioeconomic and cultural impact assessment.

The design details of the centre of expertise would be developed with the community, affected Aboriginal peoples and surrounding communities, with their preferences in mind. Discussion of the design details is also an important opportunity for involvement of youth. The centre of expertise could be designed as a focus for engaging members of the community to learn more about the project, and to view the scientific and engineering work-in-progress involved in site assessment, through public viewing galleries and interactive displays. The centre could be created as a small science centre, highlighting and demonstrating the science and technology being used to determine whether the site is suitable. It may be developed as a meeting place and learning centre for the community, and as a destination that welcomes interested visitors from the area and beyond.

Should the site ultimately be selected to host the deep geological repository, the centre of expertise would be expanded to include and support the construction and operation of an underground facility designed to confirm the characteristics of the site. The centre of expertise would become a hub for knowledge sharing across Canada and internationally.

### **A Partnership Approach**

The project will provide significant economic benefits. It offers direct employment for hundreds of people at the facility for many decades and many more indirect jobs in the host area and host province, with the opportunity to develop transferable skills and capacities. Implementation of the project will involve scientists, engineers, tradespeople and many others. The project may contribute to social and economic pressures that will need to be carefully managed to ensure the long-term health and sustainability of the community. For example, the potential influx of temporary construction workers may increase demand for social and physical infrastructure. To minimize social costs and help communities adapt to the opportunities and challenges of the project, the need for assistance, such as job training, affordable housing and infrastructure, would be examined.

Project implementation will require a long-term partnership among the community, Aboriginal peoples and surrounding communities, and the NWMO to ensure the project fosters well-being and sustainability of the area, consistent with its vision for the future. The project will only proceed with the involvement of the interested community, potentially affected First Nations and Métis peoples, and other communities in the surrounding area working in partnership to implement the project.

### **Phased Implementation**

The deep geological repository and centre of expertise will have a significant impact on any community and area in which they are located. It is a multi-generational project that will be developed in phases. The repository will be sited and constructed over two to three decades. Waste will be placed in the facility over a period of three decades or more, and then monitored for an extended period of time prior to closure.

### **Adaptive Management**

A fundamental tenet of Canada's plan is the incorporation of learning and knowledge at each step to guide a process of phased decision-making. The plan builds in flexibility to adjust the plan if needed. The plan will be implemented over several decades. Over this period of time, we may experience changes in the values and preferences of Canadian society, advancements in knowledge and technologies, and changes in the use of nuclear technology and fuel volumes. APM is designed to be flexible to ensure new learning and social priorities are incorporated in Canada's plan and to allow this plan to adapt to other changes we may encounter along the way.



## Regulatory Oversight of Adaptive Phased Management

The NWMO is committed to meeting or exceeding all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

Implementation of a repository under APM falls within federal jurisdiction and will be regulated under the *Nuclear Safety and Control Act (NSCA)* and its associated regulations.

The CNSC, as Canada's independent nuclear regulator, regulates the use of nuclear energy and materials to protect the health, safety and security of Canadians and the environment, and implements Canada's international commitments on the peaceful use of nuclear energy. The CNSC's regulatory philosophy for long-term management of radioactive waste stems from the *NSCA*, and is articulated in CNSC documents *P-299, Regulatory Fundamentals*, *P-290, Managing Radioactive Waste*, and *G-320, Assessing the Long Term Safety of Radioactive Waste Management*.

Under section 26 of the *NSCA*, activities associated with a nuclear facility can occur only in accordance with a licence issued by the CNSC. The APM repository will be subject to the CNSC's comprehensive licensing system, which covers the entire life cycle of the repository. This licensing system is administered in co-operation with other federal and provincial government departments and agencies in areas such as health, environment, transport and labour. It is a stepwise approach that requires a licence for each phase of the repository life cycle. A licensing decision by the CNSC on a repository can only be taken after the successful completion of the environmental assessment process under the *Canadian Environmental Assessment Act*. For details on CNSC licensing process, please visit [www.nuclearsafety.gc.ca](http://www.nuclearsafety.gc.ca).

The transportation of used nuclear fuel is jointly regulated by the CNSC and Transport Canada.

### Some aspects of siting or construction of the facility and transportation may be governed by provincial legislation

Most provinces and territories include nuclear substances in legislation and regulations addressing the transportation of dangerous goods within that province or territory.

Provincial governments are responsible for protecting public health and safety, property and the environment within their borders, which often includes provincial emergency preparedness legislation.

Provincial governments are responsible for the regulation of resource exploration and/or extraction (e.g., drilling and underground mining) and Crown land management (e.g., disposition of provincial lands).

Provincial legislation requiring the assessment of potential environmental effects of an activity, plan or program may apply to some aspects of this work. Legislation governing endangered species, environmental protection, heritage protection or preservation, water resources protection, occupational health and safety, employment standards or labour relations may be relevant.

Various permits, licences and approvals will be required, and provincial policies and guidelines may be applicable at the site selection stage.

Municipalities, which derive their authority from provincial legislation, may have requirements such as permits, codes, standards and/or bylaws that also need to be addressed.

## Phases of Implementation

### Site Evaluation

(10 years or more)

Phase 1

In collaboration with the host community, the NWMO will conduct detailed studies and evaluations at the site to assess safety and community well-being, and support the regulatory process. Work will involve field and laboratory studies, drilling boreholes, monitoring and safety analyses, and socio-economic studies. A centre of expertise will be established at the site that will involve dozens of workers with a wide range of skills, including technical and social scientists, equipment operators and other skilled workers and technicians.

The NWMO will support potentially interested communities to build understanding of the project, participate in site assessment, and engage citizens in evaluating and ultimately demonstrating interest in hosting the project.

### Regulatory Approvals

(5 years or more)

Phase 2

Once a site has been selected, the NWMO must meet the requirements of the *Canadian Environmental Assessment Act* and Canadian Nuclear Safety Commission (CNSC) to obtain a licence for site preparation and construction. This will involve a formal, public evaluation of safety. Work will continue at the site during this period in order to be ready to proceed once licences have been received.

### Construction

(10 years or more)

Phase 3

After receiving the appropriate licences, the NWMO will construct an underground demonstration facility to continue characterization of the site and support application for an operating licence. This work will involve several hundred workers per year to build and staff the underground facility. The centre of expertise will be expanded to become a national knowledge centre.

The NWMO will construct the deep geological repository and related facilities. Construction will involve about 600–800 workers per year with a range of skills, including equipment operators, engineers, scientists, mining personnel, tradespeople, social researchers, financial administrators and communication professionals. The NWMO will work with the community to develop needed infrastructure.

Construction will create significant direct employment opportunities in the host community for services such as transportation, catering and equipment supply. Depending on the host economic region, the construction phase will create wealth throughout the region in the form of business profits and personal income, amounting to hundreds of millions of dollars.

The NWMO will work with the community, and others, to ensure that implementation of the project fosters the long-term well-being and sustainability of the community and the region.

## Operation

(30 years or more)

Phase 4

Operation of the facility will begin when an operating licence is received from the CNSC. Used nuclear fuel will be transported from interim storage sites in specially designed transportation casks, repackaged into long-lived containers and placed in the repository. Operations will involve hundreds of workers with many skills, including equipment operators, engineers, scientists, safety specialists, mining personnel, tradespeople, financial analysts and community engagement professionals. Operation of the facility and supporting business activities will create employment in the host community.

The NWMO will work with the community, and potentially others, to operate the facilities in a way that fosters long-term well-being and sustainability of the host community and the region, as outlined in an agreement with the community.

## Monitoring

(extended period of time)

Phase 5

The NWMO will work with the community, and potentially others, to monitor and study the long-term safety and performance of the repository system. Future society will determine the appropriate form and duration of monitoring. The regulator will be involved in all decisions.

## Decommissioning and Postclosure Monitoring

Phase 6

The NWMO will work with the community, and potentially others, to decommission the facilities. Once a decision is made to close the facility, the NWMO will apply to the CNSC for a decommissioning licence. A decommissioning licensing decision by the CNSC will require successful completion of the environmental assessment process. The NWMO will remove underground equipment, backfill and seal the access tunnels and shafts, and dismantle surface facilities, in a manner determined with the community, regulators and other interested individuals. Future society will determine the manner and timing of the final closure of the repository, and the form and duration of monitoring.

# **Our Work 2011 to 2013**







## The Strategic Focus for 2011–2013

Over the past three years, the NWMO has focused on working collaboratively with interested communities to implement the site selection process in a way that is fair, transparent, and scientifically sound. The NWMO has completed the first two steps of this nine-step process, and the third step, in which preliminary assessments of potential suitability are conducted, is well underway. Because of a strong showing of interest by potential host communities, the NWMO took the decision to suspend new expressions of interest in the project, effective September 30, 2012.

### APM Milestones 2007 to 2013

2007	2008	2009	2010	2012	2013
Government of Canada selects Adaptive Phased Management as Canada's plan for the long-term management of used nuclear fuel.	The NWMO begins two-year dialogue to collaboratively develop with Canadians the process to seek and select an informed and willing community to host the deep geological repository.	Government of Canada approves funding formula.	The NWMO publishes <i>Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel</i> . The NWMO begins work to build awareness and understanding of the APM Project, which is the first step in the siting process.	The NWMO suspends new expressions of interest from potential host communities, September 30, 2012.	Phase 1 preliminary assessments are completed in eight communities.

Through optimizations and improvement of designs, illustrative safety analyses, and the advance of related engineering and scientific methods, the APM technical program has worked in parallel to ensure the repository will meet high technical standards.

Canada's plan for the safe and secure long-term management of its used nuclear fuel is called Adaptive Phased Management (APM). Its implementation is guided by seven strategic objectives. First developed in 2007, the objectives address the key program areas in the implementation of APM: engagement, the site selection process, technical research and development, adaptation to new technologies and evolving societal expectations, finance, governance, and organizational capacity.

The seven strategic objectives were the subject of public review and comment in 2007 and 2008. Since then, the strategic objectives have evolved as planning milestones have been met and as the nature and focus of the NWMO's work have changed. Every year, the NWMO posts a draft of its newest five-year implementation plan for public review and comment. This opportunity for the public to engage with the NWMO helps shape the organization's strategic objectives to ensure they continue to reflect the goals and priorities of Canadians.



### Strategic Objectives 2013

Build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.

Implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.

Refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.

Ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.

Adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, evolving societal expectations and values, and changes in public policies.

Maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.

Build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.

Achievements against each of these strategic objectives are set out in the sections that follow.

# Building Sustainable Relationships

## STRATEGIC OBJECTIVE

The NWMO will build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.

The long-term nature of Adaptive Phased Management (APM) makes it essential that the NWMO build and sustain relationships to support and direct its work well into the future. The wide range of these relationships – with potential host communities, municipal organizations, Aboriginal organizations, federal and provincial ministries and agencies, youth, and the Canadian public at large – reflects the fact that safely managing used nuclear fuel is a matter that concerns a broad spectrum of Canadian society.

By keeping all interested and potentially affected individuals and organizations informed about APM, and by continuously involving them in its planning and implementation, the NWMO will build and sustain relationships that will support and direct implementation well into the future, sustain the ongoing involvement of Canadians, and ensure the long-term management of Canada's used nuclear fuel continues to be transparent, collaborative, and responsive to deeply held values.

Relationship building requires a sustained dialogue about values, principles, and safety, as well as the broad range of questions that will need to be addressed at each point in implementation. With the guidance and goodwill of individuals, organizations and communities involved in the process, the NWMO will continue to learn how relationships are best built and how best to move forward together to implement Canada's plan.

Throughout, the NWMO has sought mechanisms to help ensure the relationships established today are sustained into the future, and in a way that helps build the capacity of society to address challenges that may emerge over the course of the implementation of APM. This includes efforts to build awareness, as well as efforts to enshrine collaborative processes in ongoing engagement and briefings, development of programs and policies, protocol agreements, and multi-year initiatives.

Crucially, the NWMO has begun expanding its relationship-building activities to include communities that have come forward to participate in the site selection process and with Aboriginal peoples and communities surrounding them.



## Building Relationships With Interested Communities and Municipal Organizations

From its inception in 2002, the NWMO has sought to develop its processes and plans with the involvement of interested communities and Aboriginal peoples – laying a foundation for ongoing engagement and partnership development that are respectful of community practices and approaches to decision-making. Since initiating the site selection process in May 2010, the NWMO's efforts have been focused on collaboratively implementing the process with communities wishing to explore their interest in the project. This is discussed in more detail in chapter 6.2 (*Collaboratively Implementing the Site Selection Process*). Relationship building is an important component of this work.

The NWMO supports interested communities in exploring whether the project may be a good fit. This involves working with the community to first reflect upon its goals and aspirations for its long-term future, and then explore the potential for the project to help achieve the future it has set out for itself. This journey, taken together by the NWMO and the community, is guided by a letter of agreement that outlines how the community and the NWMO will work together and the values and commitments that guide this work.

Between 2011 and 2013, the NWMO engaged with a range of community leaders in all communities participating in the site selection process. Among these were representatives of municipal councils, community liaison committees (CLCs), local economic development groups, community service groups and chambers of commerce. In response to invitations, the NWMO attended and participated in community events such as home shows, fishing festivals, fairs, festivals, trade shows, and an Elders' gathering. To support community learning and involvement, the NWMO made funding and resources available through its Learn More Program, as detailed online at [www.nwmo.ca/invitation\\_to\\_learn\\_more](http://www.nwmo.ca/invitation_to_learn_more).

Among the broad range of activities and resources available to support community learning and reflection, the NWMO invited each community involved in the site selection process to send representatives to the 2011 annual conference of the Federation of Canadian Municipalities (FCM) to hear presentations from representatives of communities involved in the site selection process in Sweden. The session, sponsored by the NWMO, was titled "Deciding to Host a National Repository for Used Nuclear Fuel: Swedish Experience." In it, representatives from Canadian municipalities met privately with, and heard from in a plenary workshop, representatives of two municipalities that had agreed to host Sweden's deep geological repository project. Topics discussed included community-driven decision-making processes, and what had worked and what had not.

The NWMO also invited each community involved in the site selection process to send two representatives to the 2012 International Conference on Geological Repositories (ICGR) conference. Held in Toronto and hosted by the NWMO, the ICGR brought together regulators, senior-level decision-makers, and community members from 15 countries to exchange ideas about how to develop repositories in a way that best meets the expectations of the societies they serve. Community representatives met separately with John Heaton, a former New Mexico legislator involved in Carlsbad's decision to host a repository for U.S. transuranic waste (the Waste Isolation Pilot Plant), and Jacob Spangenberg, the mayor of Östhammar, the municipality that

has agreed to host Sweden's deep geological repository. Among other subjects, the agenda included a seminar led by experts in Aboriginal Traditional Knowledge, chaired by Phil Fontaine, former National Chief, Assembly of First Nations, Canada. There are additional details about the ICGR in chapter 6.5 (*Adapting Plans*).

Understanding community perspectives is critical to the design and refinement of plans and processes involved in implementing the site selection process. With this in mind, in each of the past three years, the NWMO continued to seek advice through ongoing meetings with communities that currently host nuclear facilities in Canada, as well as with municipal associations in the nuclear fuel cycle provinces. Among the former were the Canadian Association of Nuclear Host Communities and the Durham Nuclear Health Committee, which continued to provide insight and advice about how the NWMO might broaden its awareness-building activities and municipal outreach both in the nuclear provinces and nationally.

In accordance with the NWMO mandate and values around engagement, the Municipal Forum was established in 2009 with the support of the FCM. The Forum is an assembly of municipal association representatives with experience and expertise on municipal issues and challenges. It provides a neutral venue intended to help guide the NWMO towards producing products and tools to assist Canadian municipalities and communities in engaging, and helping to lead the process to site a national infrastructure project. Between 2011 and 2013, the Forum met several times each year, providing insight on best practices for communicating and working with local governments and associations, while also acting as a link to municipal associations and their members.


The Forum's members helped the NWMO better

understand the needs and processes of municipalities involved in or potentially affected by the APM site selection process. In particular, they provided advice about information and communications materials appropriate to municipalities considering locating a large, national infrastructure project in their communities.

Over the course of 2011 to 2013, the NWMO also participated in 49 conferences hosted by municipal associations, and through this involvement, provided information and updates about the site selection process to municipalities primarily in Saskatchewan, Ontario and New Brunswick. Representatives of communities involved in the site selection process were frequent visitors to NWMO exhibits, and in many instances, these visitors introduced representatives of neighbouring communities to speak with NWMO personnel and learn more about the project. Representatives from other communities were also frequent visitors to the NWMO's booths. The NWMO's mobile transportation exhibit, launched in 2013, was also featured at the conferences held by the Northwestern Ontario Municipal Association, the Federation of Northern Ontario Municipalities, and the Ontario Small Urban Municipalities.

Among the municipal conferences the NWMO regularly participated in between 2011 and 2013 was the annual conference of the FCM. At each of these conferences, the NWMO provided municipalities with updates about the current status of the site selection process. At the same time, the NWMO supported relationship building and sharing of experience among communities involved in the site selection process and more broadly internationally.

In 2012, the NWMO invited each association represented on the Municipal Forum to send a representative to the ICGR.



Swedish delegates to the 2011 Federation of Canadian Municipalities annual conference discuss their participation in that country's site selection.

## Involving Aboriginal Communities and Organizations

From its inception in 2002, the NWMO has sought to develop its processes and plans with the involvement of interested communities and Aboriginal peoples – laying a foundation for ongoing engagement and partnership development that are respectful of community practices and approaches to decision-making. As the site selection process has moved forward over the past three years, the NWMO's Aboriginal engagement activities have expanded to include the First Nations and Métis communities in the areas surrounding potential host communities.

Through engagement with potentially affected Aboriginal communities, the NWMO is seeking to understand the nature of any potential impacts on Aboriginal rights, treaties, and land claims resulting from the implementation of APM. As well, the NWMO wishes to learn from communities and begin to understand their goals and aspirations regarding the project, along with its potential impact in their community if the facility were built in their area. Because each Aboriginal community is unique in its history, culture, and traditional and contemporary ways of life, each will have unique goals and aspirations.

Between 2011 and 2013, the NWMO undertook to contact all Aboriginal and Métis communities in the areas surrounding potential host communities. During that time, close to 80 communities were identified and contacted. Additional details are provided in chapter 6.2 (*Collaboratively Implementing the Site Selection Process*).

In 2013, the NWMO invited Aboriginal communities to provide their own narrative around such topics as their priorities for land use and the vision they have for their communities, both now and in the future. These narratives will help guide the NWMO as it begins to engage more fully with potentially affected Aboriginal communities. Whenever possible, neighbouring Aboriginal communities were invited to attend and meet with the NWMO and local community leaders at open houses hosted by the NWMO.

While building new relationships with potentially affected Aboriginal communities, the NWMO also continued to maintain and strengthen its relationships with national, provincial, and regional Aboriginal organizations. These organizations have assisted in providing guidance about how best to engage with their members. Their agreements with the NWMO are designed to

support broad-level Aboriginal involvement, capacity building, and information sharing at each stage of implementing APM. Each agreement reflects the unique needs, priorities, and cultural and political protocols of the individual Aboriginal organizations.

The NWMO engaged Aboriginal people through a wide variety of channels, including information sessions, workshops, attendance at Aboriginal trade shows, and meetings with Elders and Chiefs, as well as Métis leaders and citizens. Several First Nations organizations invited NWMO staff to meet them and make presentations. These included Treaty 3 Elders and youth, Treaty 4 Elders in Saskatchewan, the Federation of Saskatchewan Indian Nations, the Prince Albert Grand Council, the Union of New Brunswick Indians, the Nishnawbe Aski Nation (Treaty 9), the Assembly of First Nations, the Meadow Lake Tribal Council, and the Northeast Superior Regional Chiefs Forum. Several communities also invited the NWMO to meet with them, make presentations and speak with their community members. Several also accepted the NWMO's invitation to tour an interim nuclear waste storage facility and learn more about the NWMO's work.

The NWMO also engaged with Métis organizations in Saskatchewan and Ontario. The Métis Nation of Ontario (MNO) is the NWMO's principal point of contact with that province's Métis communities, and every year, NWMO staff attend the MNO's general assembly. The NWMO has ongoing agreements with the MNO, and in November 2012, the two organizations signed a liaison agreement that provided additional funding to support regional consultation committees in the areas surrounding communities engaged in the site selection process. In December 2012, the members of five regional consultation committees toured Ontario Power Generation's Western Waste Management Facility at the Bruce nuclear site in Ontario. This was followed, in 2013, by community information sessions in the six regions in the vicinity of the potential host communities, as hosted by regional consultation committees and attended by Métis Nation community members and NWMO staff.

Wherever possible and appropriate, members of the Council of Elders (described on the next page) accompanied NWMO staff in meetings and gatherings with individual First Nations and Métis communities.



## Seeking Guidance From Elders

The Council of Elders functions as an advisory body to NWMO management, providing counsel on the application of Traditional Knowledge in the implementation of APM. The Council also provides advice on matters that could enhance the development and maintenance of good relations with Aboriginal communities. Through its guidance, the Council works to protect and preserve all creation: air, land, fire, water, plants, medicines, animals and humankind – guided by the seven universal teachings of love, trust, sharing, honesty, humility, respect and wisdom.

The Council of Elders is the successor to the Elders Forum, which advised the NWMO between 2005 and the end of 2011. The Forum was restructured after its members identified a need to enhance the work they were doing. As a result, a working group of Elders was formed to work with NWMO staff, the Board of Directors and the Advisory Council. Based on these discussions, dialogue with Aboriginal organizations, and an examination of best practices, a *Proposal for the Redevelopment of the NWMO Elders Forum* was drafted. The proposal, which was discussed by the Elders Forum when it met in July 2011, featured a draft terms of reference for a new Council of Elders. When the process for selecting members of the Council of Elders was initiated, there were strong expressions of interest from many who had participated in the original Forum, in addition to recommendations from Aboriginal organizations.

The Council's inaugural meeting was held in June 2012, and included traditional ceremonies to welcome the new members of the Council of Elders and thank the former members of the Elders Forum. In 2013, the Council and the NWMO decided to increase Council membership so as to have equal numbers of men and women.







## Remembering Jim Sinclair, 1933–2012

It was with great sadness that the NWMO learned of the passing of Jim Sinclair, a lifelong champion of Aboriginal rights, on November 9, 2012. He was 79.

Jim's association with the NWMO began in 2003, when he was part of the Traditional Knowledge workshop designed to assist the NWMO in understanding Aboriginal Traditional Knowledge and how it could be included in and contribute to the approach the NWMO recommended to the Government of Canada for managing used nuclear fuel.

Jim is perhaps best remembered for successfully leading the campaign to have Canada's Métis people recognized in the Constitution, but he was also instrumental in starting numerous organizations designed to advance Aboriginal rights, including, most notably, the Congress of Aboriginal Peoples (formerly the Native Council of Canada) and the Métis National Council. In his native Saskatchewan, he helped start several organizations that have made a difference in the province's Aboriginal communities.

Over the course of his long and distinguished career, Jim had four private meetings with Pope John Paul II, and addressed both the European and Australian Parliaments on the subject of Aboriginal rights. The Canadian Senate is one of several groups to have honoured him with a lifetime achievement award.

Jim was a member of the NWMO's Elders Forum, where he was a strong advocate for respecting Aboriginal treaty rights. He was also a strong advocate for involving Aboriginal youth in the Forum's work. Speaking in 2010, he noted that "The youth are seen by all members of the Elders Forum as the leaders of tomorrow, and leaders need to know more about this topic."

## Strengthening Relationships With Federal and Provincial Governments

By building and strengthening relationships with representatives of provincial and federal governments, the NWMO fosters greater understanding of the organization's work, and facilitates the exchange of information on such shared areas of interest as transportation, the duty to consult Aboriginal peoples, and potential access to Crown land.

Because APM involves several government agencies and departments, the NWMO encourages linkages among and across these. At the same time, a lead ministry functions as the NWMO's primary point of contact with other ministries and departments within each jurisdiction. In addition to working with government officials, the NWMO briefs elected representatives at both the federal and provincial levels.

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## Engaging With Young Canadians

Given the long time frames associated with implementing APM, the NWMO recognizes the importance of engaging youth and building their understanding of the plan in order to enable decision-making by future generations. The NWMO provides numerous opportunities for youth to become engaged in its work, and to learn more about used nuclear fuel and Canada's plan for safely and securely containing and isolating it in a deep geological repository.

Over the past three years, the organization has expanded its engagement activities to include youth living in communities participating in the site selection process. Through open houses, presentations to students, and youth participation in CLCs, NWMO staff met with nearly 1,300 young people during that time, providing them with information about APM, the project, and the site selection process, and answering their questions.



### NWMO Support to Youth Science Canada, 2011 to 2013

- In 2011, the NWMO helped support Youth Science Canada (YSC) by sponsoring Team Canada at the MILSET<sup>1</sup> Expo-Sciences International, a non-governmental, non-profit, and politically independent youth organization which aims to develop a scientific culture among youth by fostering networking and international collaboration.
- At the 2012 Canada-Wide Science Fair, the NWMO funded and presented bronze medal awards to finalists in the junior, intermediate and senior categories.
- In 2013, the NWMO provided funding for YSC regional science fairs encompassing communities in the site selection process. It also provided funds for youths from these communities to travel to regional science fairs. As part of this community-based initiative, the NWMO also subsidized registration fees for students in the region whose projects qualified for the 2013 Canada-Wide Science Fair.
- In addition, the NWMO hosted a trade show booth at the annual YSC Canada-Wide Science Fair in order to build understanding about the NWMO's work.

<sup>1</sup> International Movement for Leisure Activities in Science and Technology



Presentation of the 2013 Best of the Fair Award at the Bluewater Regional Science and Technology Senior/Intermediate Fair.



### Post-Secondary Outreach

By engaging with university-level students, the NWMO helps inform young Canadians about APM while also encouraging them to develop the sorts of expertise required for its implementation. Toward that end, NWMO specialists routinely give talks at Canadian universities. The practice continued between 2011 and 2013, during which time NWMO specialists gave a total of 26 talks at 12 different universities, including the University of Toronto, Queen's University, Ryerson University, the University of Guelph, Lakehead University, and Durham College.

Through its ongoing support of the Natural Sciences and Engineering Research Council's Industrial R&D Scholarship and Fellowship program for university graduate students, the NWMO helped fund the doctoral work of several students between 2011 and 2013, in addition to providing them with opportunities to present their work at the annual NWMO Geoscience Seminar and other conferences.

### The Corporate Social Responsibility Program

The NWMO's Corporate Social Responsibility Program (CSRP) provides funding to initiatives that help young Canadians enhance their appreciation of science and develop their own scientific skills. Between 2011 and 2013, the CSRP helped fund five such initiatives: Youth Science Canada, Shad Valley, the Science North School Outreach Program, Scientists in School, and the University of Saskatchewan's Science Ambassador Program.

The NWMO has supported **Youth Science Canada** since 2008. The program encourages Canadian youth to get involved in science by developing scientific and technological knowledge and skills through project-based science.

The NWMO supported **Shad Valley** between 2011 and 2013. Shad Valley is a four-week summer enrichment program for high-achieving secondary school students with strong academic records. Held on different Canadian university campuses, the program focuses on science, engineering, technology, leadership and entrepreneurship. The NWMO supported the program by providing bursaries to students from Ontario, Saskatchewan, New Brunswick and Quebec.

In 2012 and 2013, the NWMO provided funding to the **Science North School Outreach Program** for communities in northern Ontario participating in the site selection process. NWMO funding provided an opportunity for schools to augment their existing science curriculum through hands-on interactive programs. The program was classroom-based.

NWMO funding for **Scientists in School** began in 2013. The organization provides classroom-based science education in southern Ontario, and NWMO funding focused on schools in potential host communities in that region.

NWMO funding for the **Science Ambassador Program** began in 2013. An initiative of the University of Saskatchewan, the program provides funding for senior undergraduate and graduate students in the sciences to spend a significant period of time in schools with a high proportion of students of Aboriginal ancestry.

## Building Understanding and Awareness of the NWMO's Work

The NWMO's communications program helps keep the public informed about Canada's plan for the safe, long-term management of the nation's used nuclear fuel. It also helps address the public's questions about the program. As the site selection process has moved forward over the past three years, the NWMO has adapted its communications programs in response to questions raised by communities engaged in learning more about the project and how it might affect them. To make information as accessible as possible, the NWMO uses both traditional and electronic media, ranging from exhibits to brochures, newsletters and videos.

### Printed Materials

Many of the publications the NWMO produced between 2011 and 2013 focused on addressing questions raised by residents of communities engaged in learning more about APM and the site selection process. A notable example was "Ask the NWMO," an advertising feature launched in 2012. Published on a regular basis in newspapers and on websites serving communities engaged in the site selection process, each column features commonly asked questions about a particular facet of APM, with answers provided by a NWMO specialist. In 2013, many of these columns were also compiled and reprinted in a flyer format for distribution at conferences, in brochure stands set up in communities, and at various NWMO events.

In 2012, the NWMO published *Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise*. Written for a general readership, this booklet provides a conceptual description of the surface facilities, underground facilities, and centre of expertise that are part of the APM Project, along with a timeline and an estimate of the number of jobs for each of the project's phases.

In all three years (2011 to 2013), the NWMO continued to publish a newsletter featuring the latest news about the site selection process, the APM technical program, and NWMO employees who make a difference in their field of expertise or community.

### Exhibits

As each community entered the site selection process, the NWMO installed local kiosks and document stands to provide information to residents interested in learning more about both the project and the site selection process.

Since 2010, the NWMO has had a travelling exhibit for use at community events such as open houses. In 2013, the communications group added two modules to the exhibit – one to provide more information about the transportation of used nuclear fuel, the other about the role of community well-being in the site selection process.





## Learning More About the Safe and Secure Transportation of Used Nuclear Fuel

As the site selection process moves forward, communities have expressed an interest in learning more about how used nuclear fuel will be safely and securely transported from interim storage sites to a deep geological repository. To help answer their questions, the NWMO developed several new materials outlining the regulations that must be met before shipments could begin, along with an overview of how Canada and other countries are currently managing such shipments.

In 2012, the NWMO published a brochure titled *Safe and Secure Transportation of Canada's Used Nuclear Fuel*. This was followed in 2013 by a pamphlet about the specially engineered package that will be used to transport used nuclear fuel.

In April 2013, the NWMO rolled out a custom-built mobile transportation exhibit. The exhibit provides a hands-on opportunity to learn more about plans for the safe and secure transportation of Canada's used nuclear fuel. It features a full-size used fuel transportation package (UFTP) that has been certified by the Canadian Nuclear Safety Commission, and comes with touch screens and panels that provide information about such topics as the rigorous safety tests the UFTP must pass, regulatory oversight and requirements, security measures, and the safety record in Canada and other countries that routinely transport radioactive materials.

The exhibit made its debut at the Northwestern Ontario Municipal Association's conference in April 2013. Visitors included mayors and municipal representatives from communities participating in the site selection process. Over the remainder of the year, the exhibit travelled to several other annual conferences, including the Ontario Small Urban Municipalities conference and trade show in Alliston, Ontario, and the Transportation Association of Canada's conference and exhibition in Winnipeg, Manitoba. It was also showcased in a number of communities engaged in the preliminary assessments phase (Step 3) of the site selection process.



## Web-Based Communications

As in previous years, the NWMO regularly updated its website ([www.nwmo.ca](http://www.nwmo.ca)), posting new publications and discussion documents as they became available. These included backgrounders, brochures, meeting minutes of the Advisory Council and Board of Directors, technical reports, news releases, annual reports, and implementation plans, both for public comment and in their final form. In this way, the NWMO website functioned both as a way for the public to learn more about the organization and its work, and as a way to maintain transparency.

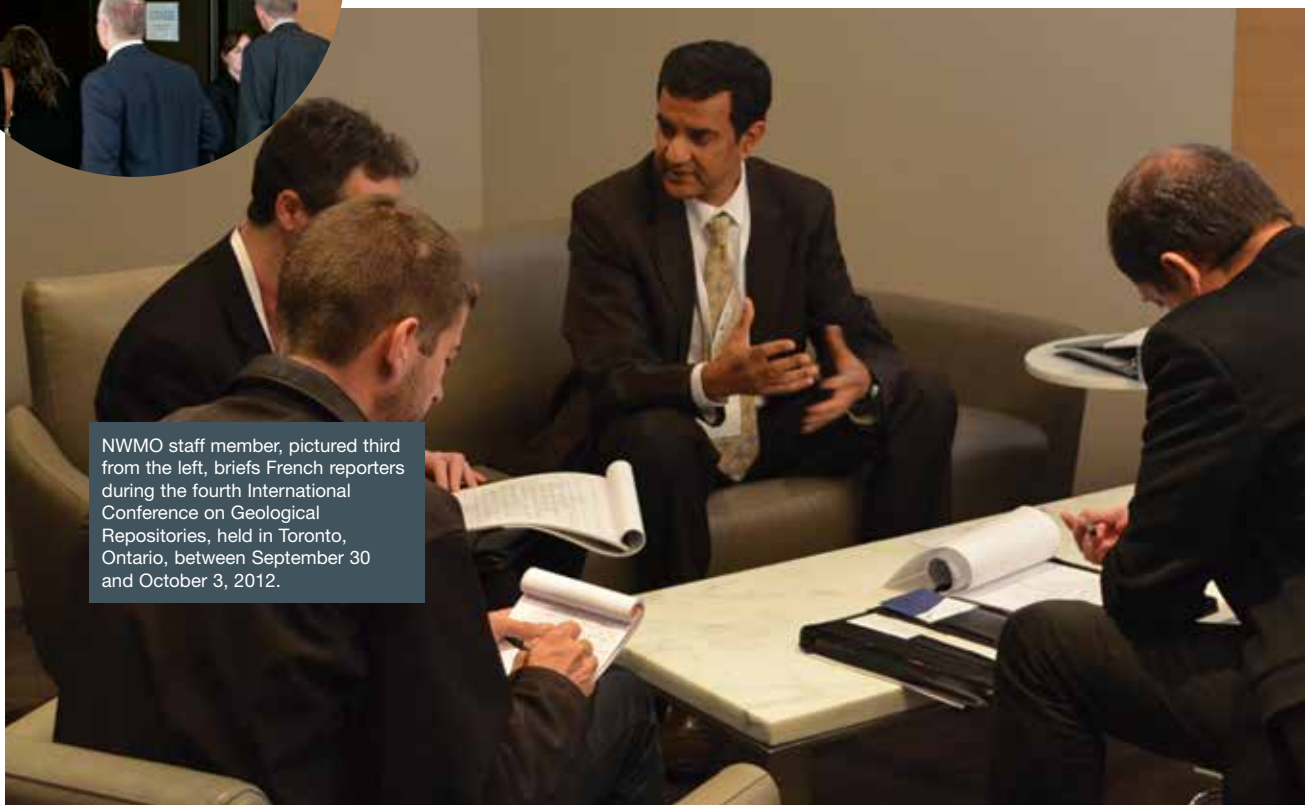
The NWMO also used its website to provide access to various conferences and seminars. In 2011, for example, it posted a presentation by representatives from Sweden who had participated in that country's site selection process. The presentation was part of the Federation of Canadian Municipalities annual conference. That same year, the NWMO posted materials from a series of technical workshops conducted by its staff at the Canadian Nuclear Society Conference on Waste Management. The fourth International Conference on Geological Repositories, hosted by the NWMO in 2012, provided another opportunity for the organization to share knowledge and diverse perspectives by providing links to a complete webcast of the proceedings.

## Other Communications Initiatives

Between 2011 and 2013, the NWMO hosted five "Learn More" days for media from communities and larger areas engaged in the site selection process. These sessions included a tour of an interim nuclear waste storage facility, and a briefing about the APM Project and site selection process. Since 2012, the organization has responded to more than 90 media inquiries from outlets serving communities involved in the site selection process, in addition to making its specialists available to local, national, and international broadcast and print media.

The NWMO's communications work was enhanced with the construction, in 2012, of the *Learn More Centre* at the organization's Toronto headquarters. A fully equipped meeting space, the Centre features exhibits and panels explaining APM and the safeguards and regulations that will be in place at Canada's deep geological repository. The venue is used for meetings and briefings with a wide range of groups and individuals with an interest in the site selection process.

As part of helping communities learn more about the project, the NWMO's communications team also provided support to CLCs as they set up websites and newsletters to communicate with residents. This work began in 2012 and continued into 2013. The committees' respective websites can be accessed at [www.clcinfo.ca](http://www.clcinfo.ca).



NWMO staff member, pictured third from the left, briefs French reporters during the fourth International Conference on Geological Repositories, held in Toronto, Ontario, between September 30 and October 3, 2012.





NWMO employees and their families have a long tradition of volunteering their expertise to support youth in science. In 2013, for example, NWMO employees and their families volunteered as judges at the Toronto Science Fair at the University of Toronto Scarborough. The Toronto Science Fair program encourages kindergarten to Grade 12 students to undertake genuine scientific inquiry and technological innovation.



## Giving Back to Our Communities

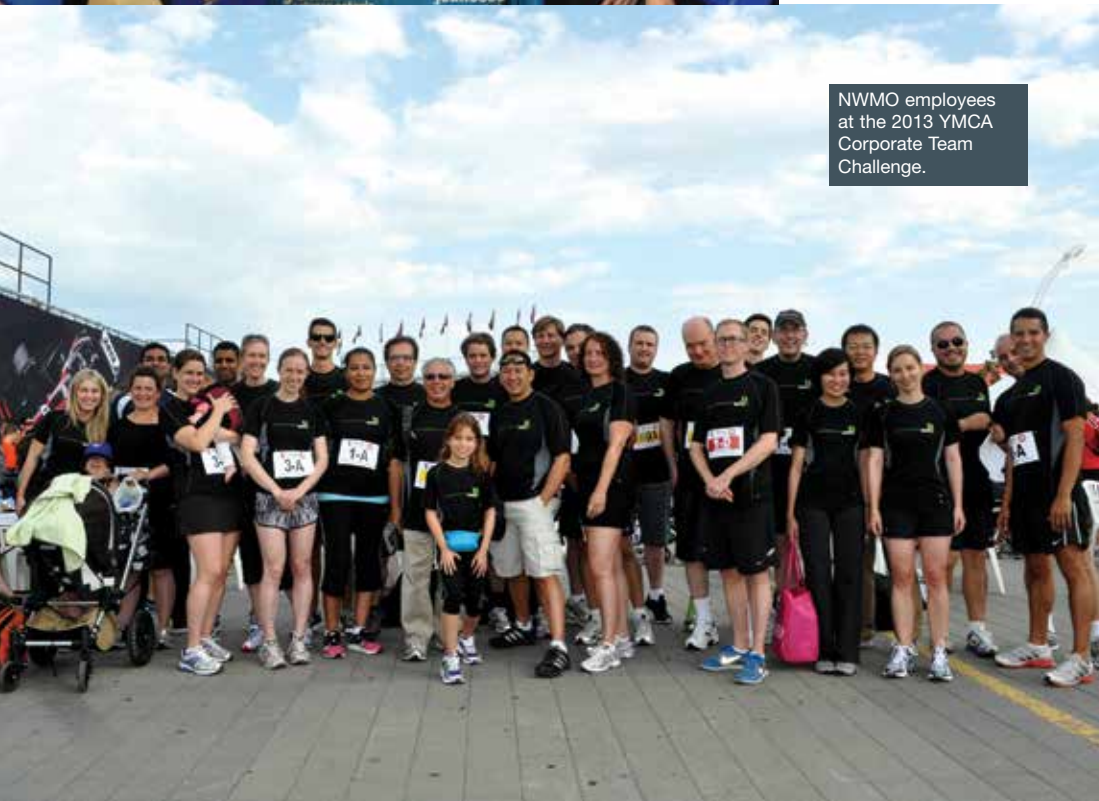
Since its founding in 2002, the NWMO has consistently encouraged and supported employees who want to make a difference in their communities. The organization's involvement with three initiatives – Strong Kids, Movember, and Pollution Probe – has made them annual events at the NWMO.

Every summer since 2007, teams of NWMO employees have been running and walking in the Toronto Corporate Team Challenge for the YMCA Strong Kids Campaign. The funds raised help children, teens, and young adults live healthier and happier lives.

Movember raises funds to fight prostate cancer, build awareness about the disease, and address the mental health issues it raises. Since 2011, NWMO's male employees have been raising both funds and awareness for this cause by sporting moustaches during the month of November.

Pollution Probe's Clean Air Commute has been an annual event at the NWMO since 2010. The weeklong challenge is a friendly competition among workplaces that encourages commuters to choose more sustainable forms of transportation, whether by walking, biking, taking public transportation, carpooling, or telecommuting. Between 2011 and 2013, NWMO participation in this initiative spared the air more than 6 tonnes of pollutants.

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**POLLUTION PROBE**  
CLEAN AIR. CLEAN WATER.



# Collaboratively Implementing the Site Selection Process

## **STRATEGIC OBJECTIVE**

The NWMO will implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.



The site selection process the NWMO is implementing grew out of a two-year dialogue with interested Canadians and Aboriginal peoples (2008 to 2009). Above and beyond ensuring the safety of people and the environment, those who participated in this dialogue told us that it should be community-driven and that the project should foster the well-being of both the host community and surrounding area over the long term. For this reason, the NWMO works collaboratively with interested communities, potentially affected Aboriginal peoples, and other communities in the surrounding area.

The NWMO works with communities to explore the project's potential to foster well-being in the community and surrounding area. It actively works with interested communities to involve Aboriginal and other communities in the surrounding area in learning and decision-making.

Canada's site selection process relies on collaboration for its implementation. The initiative to enter the

process and proceed through each step must come from communities interested in learning about the project and process. The process is designed to give communities the time and information they need to make a decision that is right for them. Throughout the site selection process, the NWMO provides resources for communities to learn more about Adaptive Phased Management (APM) and the site selection process. This includes providing resources to seek independent advice.

There are nine steps in the site selection process. The first step, a broadly based program to inform Canadians about APM and the process itself, began in May 2010, and will continue over the lifetime of the project. This is followed by increasingly detailed studies: initial screenings (Step 2), preliminary assessments (Step 3), and detailed site evaluations (Step 4).

#### A Glance at the Site Selection Process Since May 2010

Site selection process is initiated (May 2010).

Communities express interest in learning more and request initial screenings as part of Step 2.

Initial screenings are conducted in Step 2 communities. Results are shared with communities and published on the NWMO website.

Description of preliminary assessments (Step 3) is published (November 2011).

Brochures and other materials are provided in response to community requests. These include a *Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise* (2012), *Safe and Secure Transportation of Canada's Used Nuclear Fuel* (2012), and a mobile transportation exhibit (2013).

The NWMO suspends new expressions of interest (September 2012) so that it can focus on communities already engaged in the site selection process.

The first phase of preliminary assessments (Step 3) is initiated in collaboration with interested communities.

The results of the first phase of preliminary assessments for eight communities are announced (November 2013), and supporting materials are published.

A strong showing of interest from potential host communities allowed the NWMO to suspend new expressions of interest effective September 30, 2012. Taking this step allowed the NWMO to focus on working with the communities already formally engaged in learning more about APM and what it might mean for them.



## Steps in the Siting Process

Getting Ready	<b>The NWMO publishes the finalized siting process, having briefed provincial governments, the Government of Canada, national and provincial Aboriginal organizations, and regulatory agencies on the NWMO's activities.</b> The NWMO will continue briefings throughout the siting process to ensure new information is made available and requirements which might emerge are addressed.
Step 1	<b>The NWMO initiates the siting process with a broad program to provide information, answer questions and build awareness among Canadians about the project and siting process.</b> Awareness-building activities will continue throughout the full duration of the siting process.
Step 2	<b>Communities identify their interest in learning more, and the NWMO provides detailed briefing. An initial screening is conducted.</b> At the request of the community, the NWMO will evaluate the potential suitability of the community against a list of initial screening criteria.
Step 3	<b>For interested communities, a preliminary assessment of potential suitability is conducted.</b> At the request of the community, the NWMO will conduct a feasibility study collaboratively with the community to determine whether a site has the potential to meet the detailed requirements for the project. Regional engagement will be initiated, and an initial review of transportation considerations will be conducted. Interested communities will be encouraged to inform surrounding communities, including potentially affected Aboriginal communities and governments, as early as possible to facilitate their involvement. Preliminary assessments are conducted in two phases: <b>Phase 1:</b> Desktop study and engagement; <b>Phase 2:</b> Field investigations and expanded engagement.
Step 4	<b>For interested communities, potentially affected surrounding communities are engaged if they have not been already, and detailed site evaluations are completed.</b> In this step, the NWMO will select one or more suitable sites from communities expressing formal interest for regional study and/or detailed multi-year site evaluations. The NWMO will work collaboratively with these communities to engage potentially affected surrounding communities, Aboriginal governments and the provincial government in a study of health, safety, environment, social, economic and cultural effects of the project at a broader regional level (Regional Study), including effects that may be associated with transportation. Involvement will continue throughout the siting process as decisions are made about how the project will be implemented. A centre of expertise will be launched in or near the community.
Step 5	<b>Communities with confirmed suitable sites decide whether they are willing to accept the project and propose the terms and conditions on which they would have the project proceed.</b>
Step 6	<b>The NWMO and the community with the preferred site enter into a formal agreement to host the project.</b> The NWMO selects the preferred site, and the NWMO and community ratify a formal agreement.
Step 7	<b>Regulatory authorities review the safety of the project through an independent, formal and public process, and if all requirements are satisfied, give their approvals to proceed.</b> The implementation of the deep geological repository will be regulated under the <i>Nuclear Safety and Control Act</i> and its associated regulations to protect the health, safety and security of Canadians and the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy. Regulatory requirements will be observed throughout all previous steps in the siting process. The documentation produced through previous steps, as well as other documentation that will be required for a licence application, will be formally reviewed by regulatory authorities at this step through an Environmental Assessment, and if this assessment is successful, then licensing hearings related to site preparation (and possible construction) of facilities associated with the project. Various aspects of transportation of used nuclear fuel will also need to be approved by regulatory authorities.
Step 8	<b>Construction and operation of an underground demonstration facility proceeds.</b> The NWMO will develop the centre of expertise, launched in Step 4, to include and support the construction and operation of an underground demonstration facility designed to confirm the characteristics of the site before applying to regulatory authorities for an operating licence. Designed in collaboration with the community, it will become a hub for knowledge-sharing across Canada and internationally.
Step 9	<b>Construction and operation of the facility.</b> The NWMO begins construction of the deep geological repository and associated surface facilities. Operation will begin after an operating licence is obtained from regulatory authorities. The NWMO will continue to work in partnership with the host community in order to ensure the commitments to the community are addressed throughout the entire lifetime of the project.

Between 2011 and 2013, 22 communities completed initial screenings (Step 2 of the site selection process). By the end of 2013, 20 communities had initiated preliminary assessments (Step 3). By the end of 2013, the first phase had been completed in eight communities. Creighton in Saskatchewan, and Hornepayne, Ignace and Schreiber in Ontario, were assessed as having strong potential to meet site selection requirements and have been identified for further study. The communities of English River First Nation and Pinehouse in Saskatchewan, and Ear Falls and Wawa in Ontario, were not selected for more detailed study. These findings do not affect ongoing work in the other communities involved in earlier steps of the site selection process.



## Initial Screenings (Step 2)

Between 2011 and 2013, 22 communities expressed an interest in learning more about the project. In each case, the NWMO provided a detailed briefing, and then, upon receiving a formal request from the local council, conducted an initial screening to determine whether there were any obvious conditions that would exclude the community from further consideration in the site selection process. Initial screenings were based on readily available information, and to be eligible to advance to the next step in the site selection process, the community had to have available land that:

1. Is of sufficient size to accommodate surface and underground facilities;
2. Is outside protected areas, heritage sites, provincial parks, and national parks;
3. Does not contain known groundwater resources at repository depth;
4. Does not contain economically exploitable natural resources as known today; and
5. Is not located in areas with known geological and hydrogeological characteristics that would prevent the site from being safe.

Step 2 also provided an important opportunity for interested communities to learn more about Canada's plan for the long-term management of the nation's used nuclear fuel. The NWMO's Learn More Program supported a wide variety of initiatives to begin to promote awareness and understanding. These resources are made available to communities at each and every step in the process.

At the request of Step 2 communities, the NWMO also met with local students, and made presentations to service organizations, first responders, business leaders, and other interested groups.

### The NWMO and Community Capacity Building

The NWMO's **Learn More Program** makes available resources (information and funding) to support participation in early steps of the site selection process. Communities wishing to learn more are eligible to receive resources (funding and expertise) from the NWMO for capacity building and engagement to enable the community to learn about the project, reflect on its interest, encourage local discussion and debate, and engage with the NWMO throughout preliminary assessments. Initiatives include funding for: administrative expenses associated with co-ordinating community activities to learn more about APM and the site selection process; the development of a long-term vision for community sustainability; independent advice from third-party experts recognized as experts in their field; and fact-finding trips to an interim storage facility and the Canadian Nuclear Safety Commission (CNSC) in Ottawa.

The NWMO's **Aboriginal Relations Resources Program** seeks to work together with First Nation communities and regional First Nation organizations, and Métis Local communities together with their regional Métis organizations, in the vicinity of the communities involved in Step 3 in learning about APM to understand traditional and contemporary perspectives in answering the question, "How might traditional and contemporary views regarding land stewardship help us understand how a major development project, such as that proposed by the NWMO, must be implemented?" Through this program, resources are made available for First Nation communities and their regional organizations, and Métis Local communities, together with their regional Métis organizations in areas of the communities involved in the site selection process to understand the cultural practices, traditional laws, decision-making processes and protocols, languages and culture, and use and protection of land of Aboriginal peoples in these areas.



## Environmental Integrity

Adaptive Phased Management is designed to assure protection of the environment through repository design, safety assessments and environmental assessments in order to meet or exceed all applicable regulatory standards and requirements for protecting the health, safety and security of people and the environment over the long term.

For each of the communities participating in Phase 1 preliminary assessments, the NWMO collects information on the general features of the natural environment, protected areas, land use, species at risk (i.e., Endangered, Threatened, Special Concern), known archaeological sites, etc. Phase 1 assessment reports document, in a preliminary way, the potential effects of the APM Project on the environment (atmosphere, subsurface, aquatic, terrestrial, etc.) during the siting process and beyond.

In Phase 2 studies, the NWMO will prepare detailed plans for the collection of further environmental data. These data collection activities will address the potential interactions of activities related to APM with the biophysical environment and identify methods to mitigate any negative effects. Data collection activities include walking the land for ground-truthing of data from desktop review and airborne surveys, and collection of new environmental baseline data. These studies will be conducted with the involvement of Aboriginal peoples in the area and will seek to incorporate Aboriginal Traditional Knowledge. The studies also provide an opportunity to involve the local community and foster a broader conversation about environmental sustainability.



The siting process recognizes the importance of working with Aboriginal peoples in whose traditional territories we are proposing to work, and the need to ensure there is ongoing involvement and participation in decisions that affect them. The NWMO will work with Aboriginal communities in a shared decision-making process leading to strong and lasting partnerships. In all our work, the health and safety of the environment and of people is the first priority.

Engagement of Aboriginal communities was another important part of Step 2 activities. For each community that entered Step 2, the NWMO sent letters to nearby Aboriginal communities, informing them of the interest of the candidate community, and offering to provide additional information, including updates on the site selection process. At this early stage, the NWMO also worked with mayors and local councils to help them engage nearby Aboriginal communities in learning more about the project and the site selection process. Engagement activities with these communities are discussed in chapter 6.1 (*Building Sustainable Relationships*).

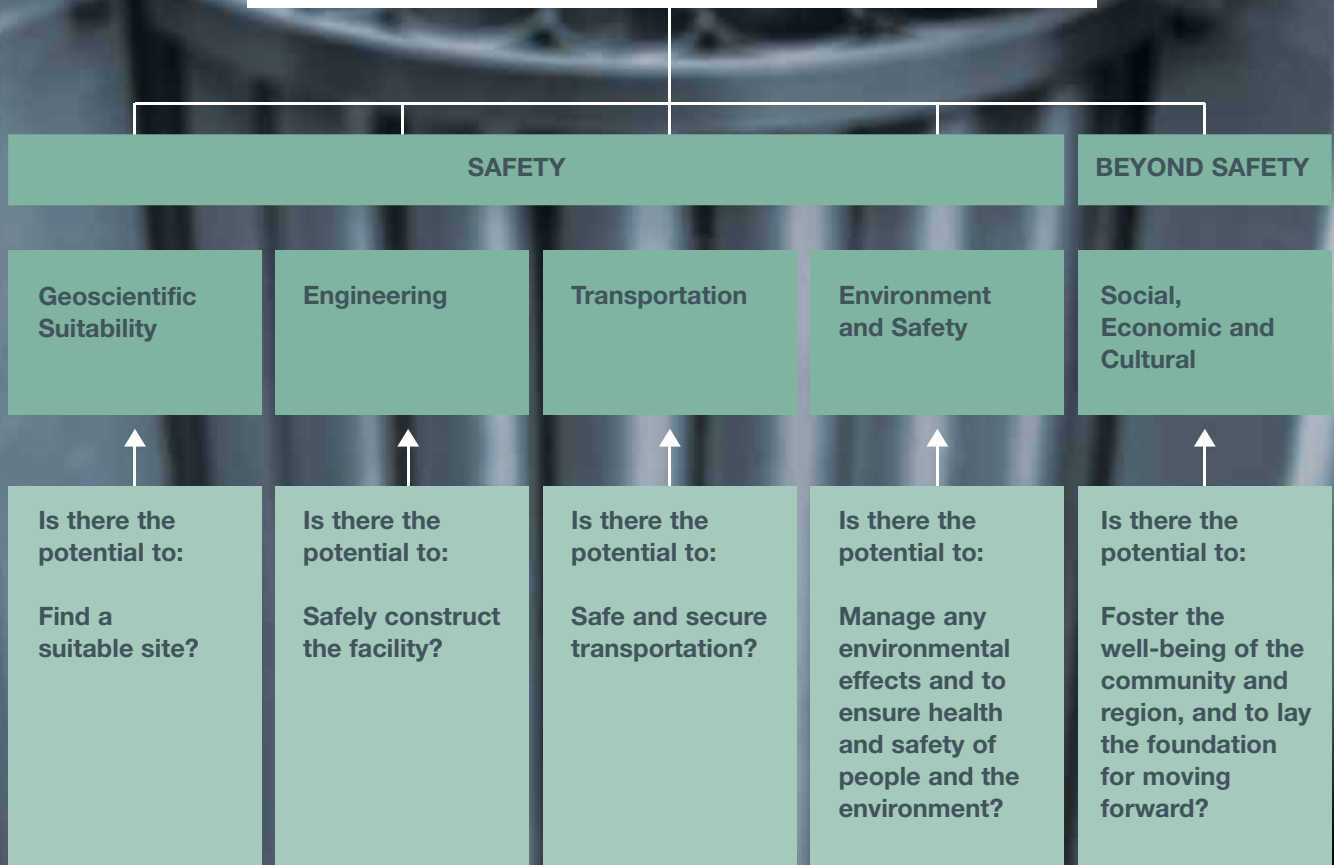
Of the 22 communities that requested initial screenings, 21 met all five criteria. Twenty of these chose to continue learning by moving into Step 3 of the site selection process. One continues in Step 2.

## Phase 1 Preliminary Assessments (Step 3)

For a community to be eligible for the preliminary assessments that take place in Step 3, it had to have met all five criteria of the initial screening conducted in Step 2. Its council also has to pass a resolution expressing interest in participating in Step 3, and then enter into an agreement with the NWMO detailing the nature of the work to be conducted in the first phase of preliminary assessments, supporting engagement activities, the resources the NWMO will provide to help carry out these commitments, and the values to guide the process. Councils of communities engaged in Step 3 can apply to the NWMO for funding to support their continued participation in the site selection process.

The purpose of preliminary assessments is to evaluate, in a preliminary way, the suitability of a community and associated site(s) to host a deep geological repository. Safety, of people and the environment, is the top priority in selecting a site, but it is not the only criterion. The project must also foster the long-term well-being of the host community and surrounding area. Preliminary assessments therefore consist of technical studies that focus on safety, and social, economic and cultural studies that go beyond safety to focus on the potential to foster the well-being of the community and surrounding area and to sustain interest in learning.

## Phase 1 Preliminary Assessment



*Preliminary assessments focus on five key areas of study: geoscience; engineering; transportation; environment and safety; and community well-being.*



Preliminary assessments are conducted in two consecutive phases, with the opportunity for stock-taking by the community and the NWMO at the end of each.

Phase 1 assessments take up to two years to complete. The focus is on desktop studies and engagement with the community.

Building on the initial screening conducted in Step 2 of the site selection process, the scientific and technical studies conducted at this stage further explore the potential to meet safety requirements and also identify potentially suitable smaller siting areas.

At the same time, NWMO staff, supported by contractors who are experts in the field, work with accountable authorities in the community to assemble information about the social, economic and cultural conditions of the community, as well as its long-term objectives and challenges. This information helps provide a foundation for discussion with the community to explore the potential effects of the project on the community, and also assists in initial identification of plans that may need to be put in place to implement the project in a way that fosters the well-being of the community.

Phase 1 preliminary assessments also provide an opportunity to foster relationship building among communities learning more and Aboriginal and other communities in the surrounding area. These partnerships play a crucial role in the implementation of APM.

### Community Liaison Committees

Communities moving into Step 3 of the site selection process may request funding from the NWMO to cover the administrative expenses of a community liaison committee (CLC), along with the salary for a halftime administrative assistant. The NWMO also provides technical support for CLCs to set up their own websites and publish newsletters. Each CLC's mandate is set by the community's Council, and the Council also selects members. In some cases, neighbouring Aboriginal communities were invited to have members join the local CLC. Some CLCs have youth members.

CLCs are an important resource for communities in Step 3 of the site selection process. Independent of the NWMO, these working groups perform several important functions, including helping residents to learn more about Canada's plan for managing used nuclear fuel over the long term, the site selection process, and the preliminary assessments being conducted during Step 3.

CLCs typically meet at least once a month, and all meetings are open to the public. Announcements, agendas, and minutes of their meetings are posted on their respective websites, which can be accessed at [www.clcinfo.ca](http://www.clcinfo.ca). Important functions performed by CLCs include:

- Regularly updating the NWMO on community activities;
- Helping develop community profiles;
- Helping shape engagement activities and advance conversations in the community;
- Identifying and engaging key community leaders; and
- Planning for and participating in local open houses.

Between 2011 and 2013, 19 communities participating in the site selection process established their own CLCs. In that time, NWMO staff attended more than 150 CLC meetings. Staff worked with CLCs on an ongoing basis to develop community profiles, plan and implement engagement in the community, and provide information about such key aspects of the project as transportation and multi-barrier systems. NWMO staff also helped facilitate presentations to CLCs by First Nations representatives.

## What Phase 1 Preliminary Assessments Explore

**Phase 1 technical studies** are a preliminary exploration of the potential suitability of the local geology to contain and isolate used nuclear fuel. They have safety, for people and the environment, as their overriding goal, and with this in mind, the questions they explore include:

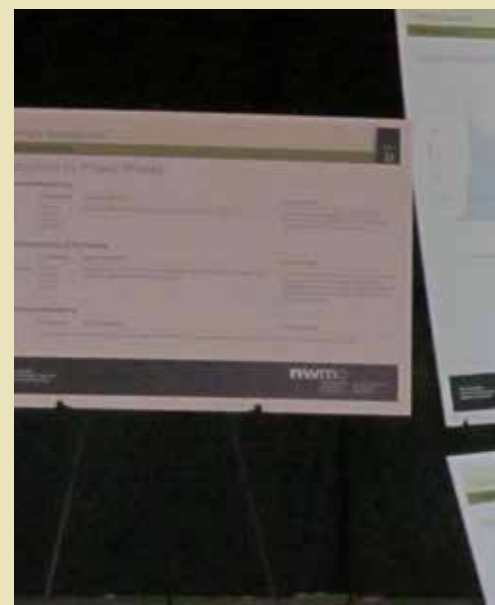
- Are the characteristics of the rock at the site appropriate to ensuring the long-term containment and isolation of used nuclear fuel from people, the environment and surface disturbances caused by human activities and natural events?
- Is the rock formation geologically stable and likely to remain stable over the very long term in a manner that will ensure the repository will not be substantially affected by geological and climate change processes such as earthquakes and glacial cycles?
- Are conditions suitable for the safe construction, operation and closure of the repository?
- Is future human intrusion (e.g., exploration or mining) unlikely?
- Can the geologic conditions be practically studied and described at a scale that supports demonstration of long-term safety?
- Can a transportation route be identified or developed for the safe and secure transportation of used nuclear fuel from the locations where it is currently stored?

In 2011, the NWMO established a five-person APM-Geoscientific Review Group to provide advice and guidance on the approach, methods, and findings of the Phase 1 geoscientific preliminary assessments conducted during Step 3 of the site selection process.

**Phase 1 community well-being studies** are designed to develop a deeper understanding of the community and how its well-being (social, cultural and economic) might be affected by the project. Conducted in collaboration with the community, they explore the potential of the project to align with values and aspirations of the community over the long term and to contribute to the well-being of the community and surrounding area. Key activities in the early phase include review of community reports and other publicly available information, and discussions with the community about vision, priorities and objectives. Key questions include:

- What is the community's capacity to host the project (e.g., decision-making processes, infrastructure and labour), or to develop the capacity to host the project with the assistance of the NWMO?
- How does the project align with the objectives and/or vision the community has for itself (its values, sensitivities and concerns), and how is the community expected to benefit from the project both in the near term and over the long term?
- Can the well-being of the community be enhanced if it is selected to host the project?
- Are there likely to be social and economic pressures that will need to be managed? Can these pressures be successfully managed?

The results of the first eight Phase 1 assessments can be viewed at [www.nwmo.ca/sitingprocess\\_phase1](http://www.nwmo.ca/sitingprocess_phase1).





### Recognizing Community Leadership

The completion of the first eight Phase 1 preliminary assessments marked a milestone in the site selection process. Through their multi-year participation, all eight communities have contributed to advancing Canada's plan for safely managing used nuclear fuel over the long term. Each has built understanding of the project, helped shape and deliver engagement, and ensured the meaningful involvement of citizens.

In acknowledging these significant contributions to the process, the NWMO provided \$400,000 to each of the eight communities upon their establishment of a Community Well-Being Reserve Fund.

Administered by the communities, these funds will support continuing efforts to build community sustainability and well-being. Examples of activities the funds could support include projects, programs or services that benefit community youth or seniors, community sustainability, energy efficiency, or economic development initiatives.

Other communities engaged in the process will be similarly recognized upon completion of their Phase 1 studies.

### Increased Engagement With Neighbouring Aboriginal Communities

Engagement with Aboriginal communities plays a vital role in the NWMO's work. This engagement expanded as interested communities entered Step 3 (preliminary assessments) of the site selection process. In each case, the NWMO sent letters to all potentially affected Aboriginal communities in the surrounding region. The letters informed them of the decision taken by the interested community to learn about the process, and asked for an opportunity to brief them on the work underway and to discuss the role they might wish to play. The goal was to encourage collaboration and mutual learning.

Toward this end, the NWMO also actively sought opportunities to engage neighbouring Aboriginal communities in learning more about the project. Initiatives included:

- Visits to interim storage facilities;
- NWMO attendance at Aboriginal trade shows;
- Invitations to attend open houses in interested communities;
- Meetings with local councils and Treaty groups;
- Presentations to Aboriginal assemblies;
- Participation in ceremonies, Elders' meetings, and community events such as powwows;
- Invitations to Aboriginal communities to conduct their own research; and
- Access to independent advice.

To build the sorts of relationships required for shared planning, the NWMO also worked with the mayors and councils of Step 3 communities to help them engage neighbouring Aboriginal communities in learning more about APM. Engagement activities with these communities are discussed in chapter 6.1 (*Building Sustainable Relationships*).



## Learning From Independent Experts

To help community leaders learn more about APM and the site selection process, the NWMO actively encourages them to seek independent advice.

In 2011, the NWMO's **Learn More Program** provided funds for community leaders to attend the Federation of Canadian Municipalities annual conference. That same year, some 50 community delegates received funding from the NWMO to attend the Canadian Nuclear Society's conference on Waste Management and Decommissioning and Environmental Restoration.

In 2012, the NWMO invited each interested community to send two community leaders to the **International Conference on Geological Repositories** (ICGR) held that year in Toronto. In addition to representatives from Aboriginal organizations, the NWMO also invited each association represented on its Municipal Forum to send a representative to the ICGR. At the conference, community representatives met separately with John Heaton, a former New Mexico legislator involved in Carlsbad's decision to host a repository for transuranic waste (the Waste Isolation Pilot Plant), and Jacob Spangenberg, the mayor of the municipality (Östhammar) that has agreed to host Sweden's deep geological repository. The agenda included a seminar led by experts in Aboriginal Traditional Knowledge, chaired by Phil Fontaine, former National Chief, Assembly of First Nations, Canada.



## Addressing Transportation Issues

Transportation is a key element in the scientific and technical studies conducted in Step 3 of the site selection process. Phase 1 transportation assessments address, in a preliminary way, the question of whether a safe and secure transportation route can be identified or developed from the current interim locations to a potential host site. This factor will be studied in greater detail in the smaller number of communities identified for further assessment in Phase 2. It is expected that groups and individuals will have questions, concerns, and preferences to be addressed as assessments continue through the second phase of study and engagement.

The NWMO developed a mobile exhibit that includes a CNSC-certified used fuel transportation package, as well as videos, information panels, and a brochure. Input from the NWMO's Municipal Forum helped ensure the material was responsive to the needs of municipalities. The Forum also suggested appropriate venues. This exhibit is intended to help build awareness and

understanding of equipment, policies, and procedures involved in the transportation of used nuclear fuel.

Several communities invited the mobile exhibit to local events. It was also showcased at several municipal conferences, including those hosted by the Northwestern Ontario Municipal Association (Thunder Bay), the Federation of Northern Ontario Municipalities (Parry Sound), and the Ontario Small Urban Municipal Association (Alliston). Also in 2013, the exhibit was showcased at the annual conference of the Transportation Association of Canada (Winnipeg).

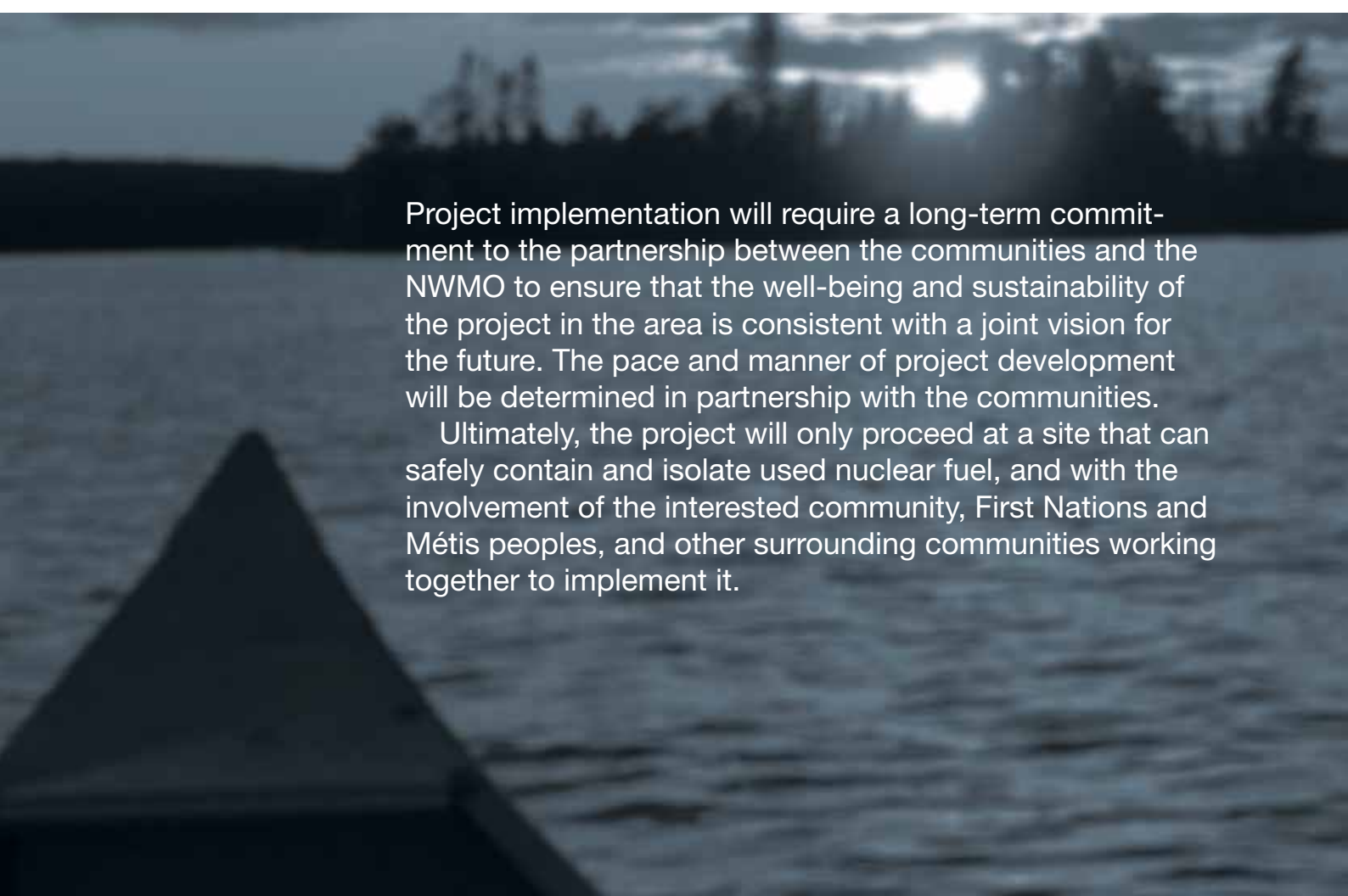
NWMO staff participated in international conferences and forums dedicated to increasing understanding of best practices in the transportation of used nuclear fuel. In 2013, the NWMO published two reviews of international practices: a review of drop and impact tests of used fuel transportation packages, and a review of the performance of certified Type B transportation packages during real-world accidents involving severe fires.

## Looking Ahead

As the first phase of preliminary assessments is completed, they will be used to guide identification of a smaller number of communities to be the focus of more detailed study (Phase 2). For communities continuing to Phase 2, assessments involve more intensive community learning and engagement. Work will take on a broader, more regional focus to include First Nations and Métis peoples and other communities in the surrounding area. Preliminary fieldwork will also begin, including aerial surveys and borehole drilling, to further assess geology and site suitability against technical safety requirements.

Phase 2 will include ongoing stock-taking of the potential for the areas engaged in the process to meet the technical and social requirements to host the project. Communities may be screened out during this phase as individual studies are completed and the NWMO continues to gradually narrow its focus to areas with higher potential to be suitable for hosting a repository.

It is expected to take several more years to complete the necessary studies to select a preferred site in an informed and willing host community. Communities may choose to end their involvement at any point during the site evaluation process, until a final agreement is signed, subject to all regulatory requirements being met and approvals received. Any site selected in the future must have an informed and willing host, meet strict scientific and technical criteria for protecting people and the environment for the very long term, and meet or exceed regulatory requirements.



Project implementation will require a long-term commitment to the partnership between the communities and the NWMO to ensure that the well-being and sustainability of the project in the area is consistent with a joint vision for the future. The pace and manner of project development will be determined in partnership with the communities.

Ultimately, the project will only proceed at a site that can safely contain and isolate used nuclear fuel, and with the involvement of the interested community, First Nations and Métis peoples, and other surrounding communities working together to implement it.



# Optimizing Repository Designs and Further Increasing Confidence in Safety

## **STRATEGIC OBJECTIVE**

The NWMO will refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.



The technical end point of Adaptive Phased Management (APM) is a deep geological repository where Canada's used nuclear fuel will be safely contained and isolated on an indefinite basis. Through optimizations and improvement of designs, illustrative safety analyses, and the advance of related engineering and scientific methods, the APM technical program works to ensure the repository will meet high technical standards.

To help achieve this goal, the APM technical program conducts joint research projects with Canadian universities, international organizations, and its counterparts in other countries, including Sweden, Switzerland, Finland, France, and starting in 2013, the United Kingdom. Its work is reviewed annually by an Independent Technical Review Group (ITRG), which was established by the NWMO Board of Directors in 2008. An important part of the ITRG's work is to evaluate the sufficiency of the program to meet requirements of APM implementation.

The APM technical program's work falls under three broad categories: repository engineering, geoscience, and repository safety. The highlights of each area's achievements over the past three years are described below, followed by an overview of the different ways (reports, papers, conferences, collaborative research with universities, and joint projects with international organizations) all three areas of the technical program maintain the technical capability necessary for the safe implementation of APM.

## Repository Engineering

The main objectives of the repository engineering design program are to: (1) develop the engineering data, models, methods and tools necessary to advance and optimize the conceptual designs for a repository project and associated systems; (2) provide required engineering data inputs for the safety assessment of the repository project concepts; (3) support planned site characterization and subsurface investigation activities; and (4) provide engineering designs necessary to support APM repository cost estimates.

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### Container-Related Work

The containers in which used nuclear fuel will be stored must be able to withstand corrosion over the long term. For this reason, the engineering program has been testing different options for encasing the containers in copper, including, most notably, copper coatings and copper shells. Over the past three years, the NWMO worked collaboratively with Switzerland's nuclear waste management organization (Nagra) to develop copper coatings for repository containers. These coatings use Canadian technologies developed by the National Research Council, the University of Ottawa, the University of Windsor and the University of Toronto.

Tests at Western University subjected the coatings to conditions consistent with those found in a repository setting, where a progression from a dry aerobic to a wet anaerobic environment is expected. Further experiments were designed at the University of Toronto to test coating performance in the highly saline environments that occur in sedimentary rock formations in Southern Ontario. All tests have confirmed the excellent corrosion protection capability of the copper coating. In 2012, the NWMO presented these results at the International Society of Electrochemistry Annual Meeting in Prague.

In 2013, the NWMO had two independent researchers, one at the University of Virginia, the other at Virginia Polytechnic Institute and State University, undertake an independent review of the NWMO's copper corrosion allowance over the span of approximately 1 million years. Their report concluded that the corrosion allowance is appropriate for the specified time span.

Other work conducted over the past three years included corrosion tests of wrought and welded steel in a repository environment. Samples produced in Canada continue to be tested at the Mont Terri Rock Laboratory in Switzerland.

Advanced welding technologies were also investigated. Laser welding is currently being explored at the Centre spécialisé de technologie physique du Québec, one of the world's foremost laser development facilities, while a friction stir welding review is underway with MegaStir in the United States.

As well, the repository engineering program evaluated different container sizes for their manufacturability.

## Used Fuel Encapsulation

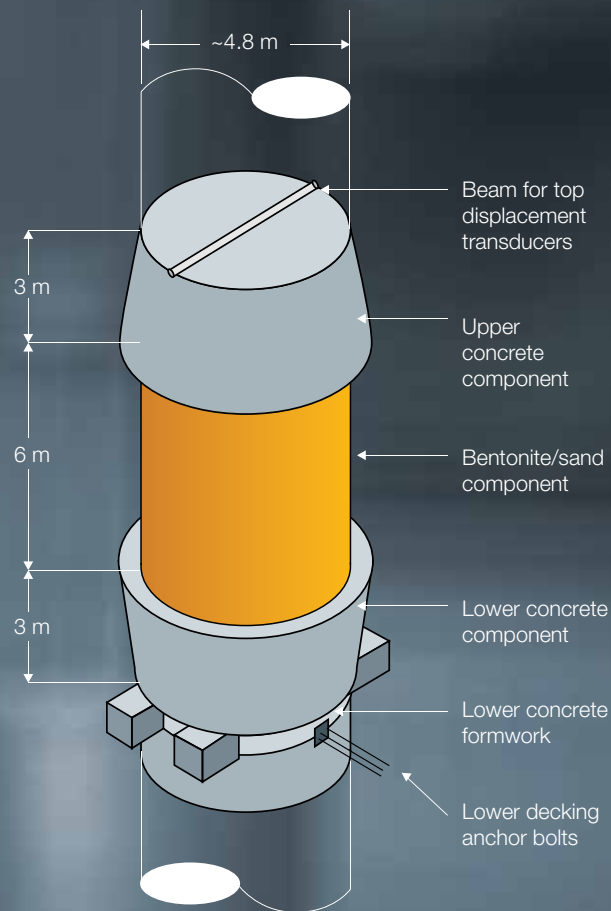
The repository engineering program advanced design work on the process to receive and encapsulate used nuclear fuel into long-lived corrosion-resistant containers for placement in a repository. An important milestone was reached in 2012 with the preparation of conceptual designs for handling, transfer, container-loading, and container-sealing.

Unlike light water reactor fuel rods, which are three to four metres long, CANDU fuel bundles are only half metre long. This has led to the development of a more compact container specifically designed for used fuel produced in Canada. In 2013, Automated Tooling Systems Limited of Cambridge, Ontario, undertook a study to produce a robotic system for loading the CANDU fuel bundles into this compact used fuel container.

### The Enhanced Sealing Project

Properly sealing the access shaft is an important element in the safe decommissioning and closing of a deep geological repository. The purpose of the Enhanced Sealing Project (ESP) is to demonstrate the installation and monitor the behaviour of a composite shaft seal. The project consists of the instrumentation and monitoring of a shaft seal at Atomic Energy of Canada Limited's (AECL) Underground Research Laboratory near Pinawa, Manitoba. It is designed to provide a barrier between the deep, high-salinity waters in the lower shaft and near-surface waters. AECL is responsible for execution of the work, which is conducted as a joint research project supported by the NWMO, the Swedish Nuclear Fuel and Waste Management Company (SKB), the Finnish Nuclear Fuel Waste Management Company (Posiva), and the French National Radioactive Waste Management Agency (Andra).

The 12-metre-thick seal consists of two 3-metre-thick concrete components that sandwich a 6-metre-thick clay component that straddles a hydraulically active fracture zone located approximately 275 metres below the surface. Construction of this structure was completed in late 2009, and the Underground Research Laboratory has been allowed to passively flood since the installation of the seal.



The concrete and clay components of the shaft seal are instrumented with a suite of sensors that monitor temperature, hydraulic pressure, total pressure, water content and suction, strain (concrete) and displacement (at the top of the structure). After three and a half years of passive water uptake, these sensors indicate that the seal is mechanically stable and the clay-based component has undergone substantial water uptake in the peripheral regions, while portions of the core still remain unsaturated. Swelling of the clay resulting from access to free water has caused the development of mechanical pressure being applied on the clay-confining rock and concrete materials. The sensors installed in and around the rock and concrete are also showing discernible recovery of the regional groundwater pressure in the vicinity of the seal and in the region below the seal. Collective readings from a suite of instruments indicate that up to this point the seal is evolving as expected and that the upper and lower regions of the shaft are hydraulically isolated from each other.

## Transportation Studies

As the site selection process has moved forward over the last three years, transportation has played an increasingly important role in the work undertaken by the APM technical group. In a separate analysis of the current reference transport package, radiological dose values were confirmed to be several orders of magnitude below regulatory limits. The NWMO began reviewing the used fuel transportation package design to further optimize performance. This work resulted in a reduction in dose to half the previous values.

The Canadian Nuclear Safety Commission (CNSC) regularly updates the *Packaging and Transport of Nuclear Substances Regulations* based on international standards for the safe transport of radioactive materials. In 2013, the NWMO upgraded the certificate for its used fuel transportation package to meet the current regulations and renewed the design certificate for this package.

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## Geoscience

The geoscience technical program has four primary objectives, each focused on advancing the understanding of geosphere evolution as it relates to the development of a safety case for the APM repository. The objectives are (1) to advance understanding of the geosphere in terms of stability, predictability and resilience to long-term disturbances; (2) to provide a geoscientific basis for the APM safety cases the NWMO prepares; (3) to conduct site characterization activities in support of an APM safety case; and (4) to maintain the program's technical expertise by involving national and international specialists in its work.

Over the past three years, the geoscience technical program continued to support research and development activities related to the application of site characterization techniques in deep-seated crystalline shield and sedimentary settings. Key elements in this program focused on the unique aspect of site characterization activities in low permeability environments. Specific technical activities included pore fluid hydrogeochemical and isotopic characterization, petrophysics, estimation of effective diffusion coefficient, fracture infill dating and fluid inclusion thermometry, sorption, derivation of thermal-hydraulic-mechanical properties of sedimentary rock, repository excavation damage zone formation, seismicity, and microbiology.



Further work program activities have been undertaken to explore the use of site-specific natural analogues, such that the understanding of future site evolution is based, in part, on an understanding of past system evolution and groundwater system response to external disturbances such as glacial episodes. Because of this, paleo-hydrogeologic, paleoseismicity and site-specific analogue studies continued to assume an important role in the geoscience technical program.

The program's analogue studies continued to provide insights into the response and resilience of the geosphere to expected site disturbances and to the phenomena governing subsurface mass transport over long geologic time frames. As in previous years, the geoscience program sponsored the involvement of Canadian geoscientists at international underground research laboratories to maintain awareness of the state of the science practice and to collaborate on relevant experiments.

The program also contributed to the preparation of illustrative case studies that examine the long-term postclosure performance of APM repositories in crystalline and sedimentary settings. These studies are described in the next section.

## Repository Safety

The objective of the current repository safety program is to evaluate the long-term safety of any candidate repository site and design in order to assess and improve the safety of the proposed facility. In the near term, before any candidate site has been proposed, the safety objective is addressed through case studies and continuous improvements to our understanding of important features and processes influencing repository performance.

Case studies provide feedback to the NWMO on the safety-relevant aspects of a deep geological repository. Through identifying the factors that are important for safety, they provide direction for further work to improve repository design and safety assessments. In 2011, the NWMO undertook an illustrative postclosure safety assessment for a hypothetical site in crystalline rock. In 2012, this was submitted to the CNSC for pre-project review. In 2013, the NWMO completed an illustrative postclosure safety assessment for a hypothetical site in sedimentary rock. This was also submitted to the CNSC for pre-project review.

The case study completed in 2012 considered varied geologic conditions representative of crystalline Canadian Shield sites, and calculated potential radiological and non-radiological impacts to humans and non-human biota for multiple future scenarios. These scenarios included the expected normal evolution of the repository, variance of key repository features, events, and processes, and a number of disruptive events or "what-if" scenarios. Its main purpose was to show how the postclosure safety assessment approach is consistent with the CNSC Guide G-320, Assessing the Long Term Safety of Radioactive Waste Management.

### Partnerships With Universities

Research partnerships with universities continued to play an important role in ensuring the NWMO's technical work is scientifically rigorous. Over the past three years, these universities included the University of Toronto, the University of Alberta, the University of British Columbia, Université Laval, McGill University, the University of New Brunswick, the University of Ottawa, Queen's University, the University of Waterloo, Ryerson University, the University of Saskatchewan, the University of Windsor, and Western University. Outside Canada, NWMO researchers worked with their colleagues at the University of Bern, Virginia State University, and the University of Virginia.

## Support for Post-Secondary Education

Since 2009, the NWMO and the Natural Sciences and Engineering Research Council of Canada (NSERC) have been co-supporting graduate students through the NSERC's Industrial Postgraduate Scholarship Program. Funding helps support thesis projects of interest to the students, their supervisors, and the NWMO. It covers the first three years of thesis work for PhD candidates, and the first two for master's-level students. Through the NSERC Industrial Postgraduate Scholarship Program, the NWMO supported three PhD students between 2009 and 2012. Their projects contributed to an improved understanding of glacial processes. The NWMO is currently supporting two PhD students whose thesis projects will refine our understanding of the mechanics, prediction, verification, and mitigation of excavation damaged zones, and one master's student working on a project to characterize the composition

of fracture infill minerals. The NWMO is also providing support to a PhD student who is developing an innovative technique for reliably determining the chemical and isotopic composition of porewaters within low-porosity rock cores.

Since 2000, the NWMO has supported a NSERC/NWMO Industrial Research Chair in Used Fuel Disposal Chemistry at Western University. Between 2011 and 2013, this program supported four PhD candidates and one master's-level student.

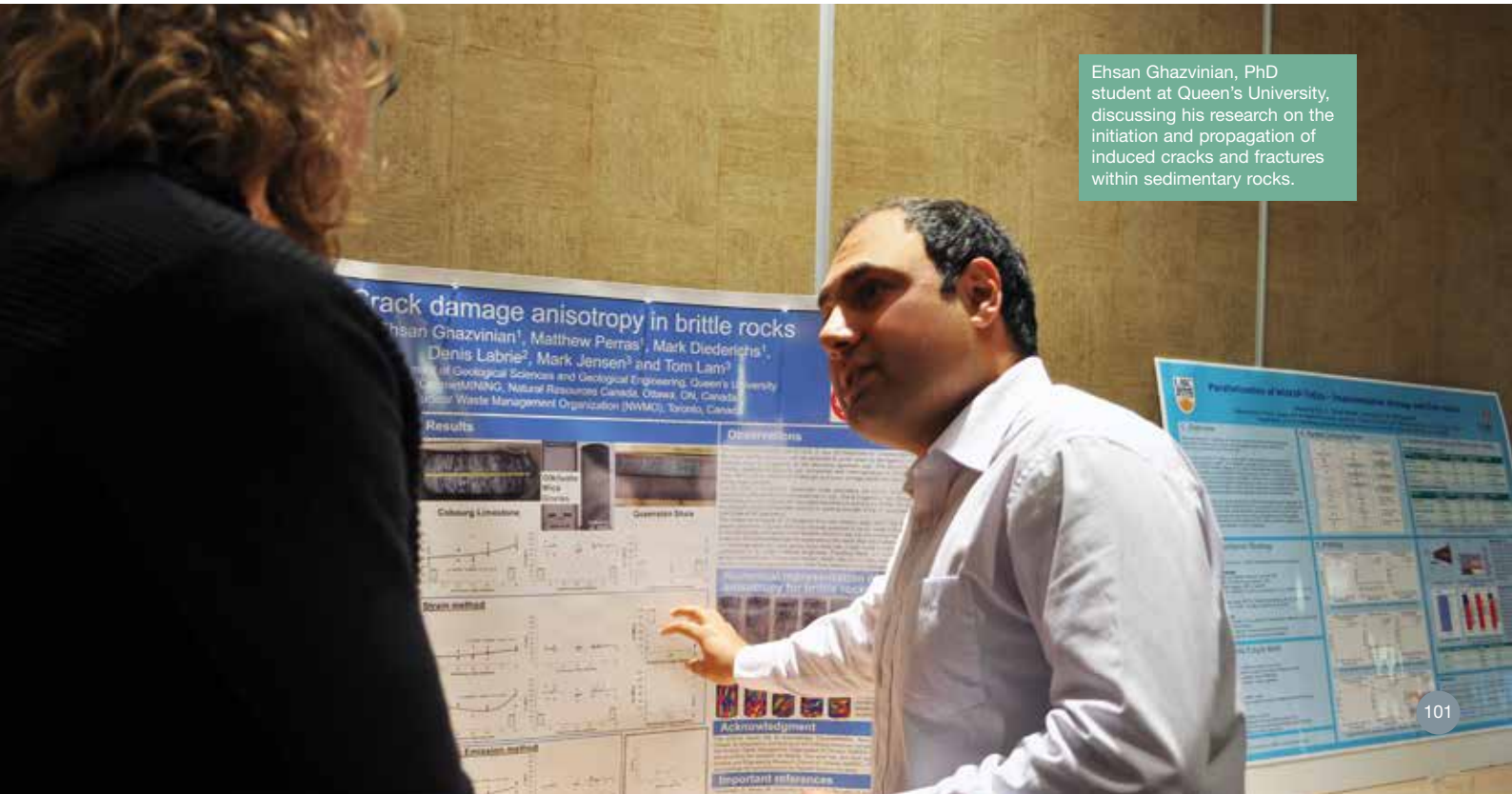
NWMO technical staff also provided support to university students by acting as mentors, by participating on PhD thesis committees, and by sharing their expertise through review of research proposals and theses, and hands-on assistance with the design and setup of specific experiments or methods.

## NWMO Support to Graduate Students Through the Natural Sciences and Engineering Research Council of Canada's Industrial Postgraduate Scholarship Program

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Matthew Perras (right), PhD student at Queen's University, speaking to Rolf Christianson, a senior geomechanical expert from the Swedish Nuclear Fuel and Waste Management Company (SKB).



Ehsan Ghazvinian, PhD student at Queen's University, discussing his research on the initiation and propagation of induced cracks and fractures within sedimentary rocks.

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Emily Henkemans, PhD student at the University of Waterloo, discusses the research she is conducting as part of the International Greenland Analogue Project. The project is co-funded by the Swedish Nuclear Fuel and Waste Management Company (SKB), Finland's Posiva, and the NWMO.





Magda Celejewski, a PhD student at the University of New Brunswick, discusses the new methods she is developing for determining the chemical composition of waters within the pore space of rocks.

The NWMO's participation in the University Network of Excellence in Nuclear Engineering (UNENE) is another way it helps foster interest and expertise in its work among post-secondary students. An alliance of universities, nuclear power utilities, and research and regulatory agencies, the UNENE is a not-for-profit corporation for the support and development of nuclear education, research, and development capacities in Canadian universities. The NWMO became an associate member in 2011.



PhD candidate Wendy Stone (Ryerson University) conducting research on micro-organisms found in engineered barrier system components and interfaces.

## International Partnerships and Networking

Partnering with other radioactive waste management organizations allows the NWMO to foster international co-operation on research, development and demonstration of technology, learn from other countries' experience, and keep abreast of developments in repository design and safety case development for various host rock formations. These partnerships greatly enhanced the work done by the APM technical program over the past three years. In 2013, an additional exchange agreement was signed between the NWMO and its British counterpart, the Nuclear Decommissioning Authority.



Bruce McKirdy (left), Managing Director of the United Kingdom's Radioactive Waste Management Directorate of the Nuclear Decommissioning Authority, and Ken Nash, President and CEO of the NWMO. In 2013, the two organizations signed an exchange agreement.

As in previous years, SKB and Posiva were the NWMO's partners in the Greenland Analogue Project, an ongoing research project looking at how an ice sheet affects the groundwater flow and water chemistry around a repository in crystalline bedrock during glacial events. The NWMO also continued to participate in SKB's Äspö Hard Rock Laboratory in crystalline rock through the Task Force on Engineered Barrier Systems, the Long-Term Test of Buffer Material, and the Large-Scale Gas Injection Test, and up through 2013, the Retrieval of Prototype Repository Project at the Äspö site.



The Mont Terri Rock Laboratory Project and Grimsel Test Site, both in Switzerland, were two other important collaborative projects with international partners. The NWMO has been a partner in the Mont Terri Project since 2008, along with researchers from Switzerland, France, Spain, Germany, Belgium, and the United States. Located 300 metres underground in sedimentary rock in Switzerland, the laboratory is an underground facility in which experiments are performed to advance the scientific understanding of geologic disposal for long-term nuclear waste management. The laboratory also provides hands-on training for technical staff, university researchers, and students. In 2013, the NWMO hosted the annual steering meeting for the project's partners.



Researchers in the Mont Terri Project on their 2013 visit to the Bruce nuclear site.

The NWMO remained an active participant in the European Commission Fate of Repository Gases Project, a collaborative development and comparison of models for gas transport in field-scale experiments and a generic repository.

The NWMO continued to support the Nuclear Energy Agency's (NEA) Thermodynamic Database Project, which is developing a quality-assured database for key elements in radioactive waste management systems. The NWMO also continued to participate in the NEA's Integration Group for the Safety Case. A recent activity of this group was the completion of a report about current practices for conducting safety assessments. The NWMO is a member of BIOPROTA, an international forum on biosphere modelling for radioactive waste facilities.

In addition, NWMO researchers also collaborated with researchers from the United States Geological Survey, the Geological Survey of Finland, and swisstopo, Switzerland's geoinformation centre.

### Integrating and Sharing New Knowledge

The NWMO's knowledge base was enhanced through active participation in workshops and conferences sponsored by such organizations as the Canadian Nuclear Society (CNS), the NEA of the Organisation for Economic Co-operation and Development, and the International Atomic Energy Agency. In 2011, for example, NWMO staff presented 11 technical papers at the CNS conference on Waste Management and Decommissioning and Environmental Restoration. In 2012, NWMO geoscientists and associated researchers presented 12 papers at the International Association of Hydrogeologists Congress in Niagara Falls, Ontario.

Between 2011 and 2013, NWMO technical staff also participated in:

- The International High-Level Radioactive Waste Management Conference (2011 and 2013);
- The International Conference on Environmental Remediation and Radioactive Waste Management (2011);
- The V.M. Goldschmidt Conference (2012);
- The International Association of Hydrogeologists Congress (2012);
- The Waste Management Symposia (2012);
- The European FORGE Project International Workshop on Gas Generation and Migration (2013); and
- The NEA Safety Case Symposium (2013).

The NWMO continued to host its annual Geoscience Seminar, which held its 11<sup>th</sup> meeting in June 2013. The seminar brings together researchers from academia and industry, including NWMO geoscientists and the graduate students the organization sponsors through the NSERC's Industrial Postgraduate Scholarship Program.



Attendees at the NWMO's 2013 Geoscience Seminar.

# Providing Financial Surety

## **STRATEGIC OBJECTIVE**

The NWMO will ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.



Canadians expect that the money necessary to pay for the long-term care of used nuclear fuel will be available when it is needed and will be fully funded by the waste producers. Financial surety has the objective of determining what costs can reasonably be expected to occur over the life of the project, along with a contingency for unexpected events, and then designing a system that collects enough money from the waste producers and protects this money to ensure that the entire cost can be covered under a variety of social and economic circumstances, and within the required time frame.

The Adaptive Phased Management (APM) Project will be implemented in phases and spanning many decades. It has an estimated cost of \$16 billion to \$24 billion (2010 \$).

The NWMO completed a full update of these estimates in 2011. The updated cost estimate covers many decades of APM lifecycle activity for the deep geological repository and related transportation of used fuel. For planning purposes, a cost estimate for the deep geological repository and used fuel transportation system has been developed, which assumes an inventory of 4.6 million used CANDU fuel bundles. The specific volume of Canada's used fuel to be placed in the repository will be agreed with the community using the best information available at the time, and an open and transparent consultation process involving surrounding communities and others who are interested and potentially affected. The current estimated cost is \$21.2 billion (2010 \$), with a present value of \$7.7 billion (2010 \$). These cost estimates include costs to develop, construct and operate a central long-term facility, including a deep geological repository and transportation for the used nuclear fuel to the repository, which are carried out and funded by the NWMO. Reactor site storage is carried out and directly funded by the individual waste owners.

The eventual cost of this project may differ from these estimates, depending on a number of factors, including the location of the facility, surrounding infrastructure, the rock type and characteristics, the design of the repository, the volume of used fuel to be managed, and the period of extended monitoring following used fuel placement. The NWMO must estimate what costs can reasonably be expected to occur over the lifetime of the project, along with a contingency for unexpected events. The NWMO is committed to providing regular assessments on all those factors to ensure that sufficient funds are set aside.

The NWMO will also be monitoring any development in new reactors and new owners of used nuclear fuel, applying the appropriate principles to the update of the funding formula when the specific circumstances arise.

The APM program is implemented with waste owner funds collected from rate-payers through the sale of electricity and with funds from Atomic Energy of Canada Limited commensurate with its small volume of used fuel that will need to be managed. The NWMO is committed to the prudent use of these resources.

As required by the *Nuclear Fuel Waste Act*, the NWMO's Annual Report must outline the funding formula for the next fiscal year to ensure funds required to cover the full costs of the implementation of APM is borne by the waste producers and an explanation of assumptions is provided. Trust funds must be maintained and annual contributions made by major waste producers, reflecting the funding formula.

# Adapting Plans

## STRATEGIC OBJECTIVE

The NWMO will adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, evolving societal expectations and values, and changes in public policies.

Developing a deep geological repository for used nuclear fuel is a long-term project that will span several decades. Because of the timelines involved, Adaptive Phased Management (APM) includes numerous opportunities to refine and adjust the plan in the light of change, whether in societal expectations or in new technologies. To achieve this goal, the NWMO is committed to continuous learning and to incorporating new knowledge at each step in the process. Each step, in other words, is an opportunity to take stock and make any adjustments before proceeding.





## Keeping Abreast of Evolving Societal Expectations

To ensure its planning is responsive to evolving societal values, the NWMO welcomes input from the project's many stakeholders, including communities involved in the site selection process, Aboriginal communities, potentially affected and interested individuals and organizations, and the public at large. Their input is detailed in chapter 8 (*What We Heard on Implementing Adaptive Phased Management*).

Every year, the NWMO also solicits broad public input on its seven corporate strategic objectives and associated planned activities by publishing a draft of its upcoming five-year strategic plan. The public's responses are discussed in chapter 8.2 (*What We Heard: Strategic Plans*).

### The 2012 International Conference on Geological Repositories

The NWMO organized the International Conference on Geological Repositories (ICGR) between September 30 and October 3, 2012. Hosted by the Government of Canada, the conference was held in Toronto. A key objective was to provide an international forum to discuss progress made amongst countries in advancing programs for the safe, long-term management of long-lived high-level radioactive waste in deep geological repositories.

The conference theme was *National Commitment – Local and Regional Involvement*. Sessions focused on exploring how different countries are developing their own deep geological repositories. The conference was designed to invite information-sharing and discussion in policy development, safety, regulatory frameworks, planning and implementation of repository programs with societal involvement, and work underway within international organizations.

The conference was held in co-operation with Natural Resources Canada, the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD), the International Atomic Energy Agency (IAEA), the European Commission, and the International Association for Environmentally Safe Disposal of Radioactive Materials. The 2012 ICGR attracted more than 200 participants from 15 countries. Participants included industry representatives, government officials and regulators. Also invited were representatives from Canadian communities involved in the site selection process; Canadian municipal associations; and Aboriginal organizations that have an interest in the NWMO's work.



## Incorporating Aboriginal Traditional Knowledge

Understanding and integrating Aboriginal Traditional Knowledge with the NWMO's work is a high priority for the organization. To further this goal, the NWMO conducted a cultural training session for its staff in December 2011. Among the topics covered were traditional practices and protocols and the history of Ontario's First Nations. This was followed by three workshops in 2012, each designed to enhance staff understanding of Aboriginal Traditional Knowledge. The workshops helped inform the organization's processes, both in its social engagement activities and in its technical work.

As the site selection process has moved forward over the past three years, the NWMO has worked to involve Traditional Knowledge holders from areas neighbouring interested communities, and to encourage these communities to develop or expand respectful and long-lasting relationships with neighbouring First Nations and Métis communities. At the same time, the NWMO has sought to understand, at a general level, the traditional territories and land uses of First Nations and Métis communities in the various siting areas. Through ongoing engagement, the NWMO hopes to gain an understanding of the Aboriginal communities' traditional territories, Traditional Knowledge (to the extent a community wishes to share), issues, concerns, goals, and aspirations for their community and area.

To help incorporate Aboriginal Traditional Knowledge in the preliminary assessments conducted in Step 3 of the site selection process, the NWMO sought the assistance of independent contractors with expertise in this field and of the Assembly of First Nations (AFN). In March 2012, the NWMO, with the help of the AFN, held a workshop with Traditional Knowledge practitioners. Participants provided information and insight about the practices of Traditional Knowledge and its application to such diverse projects as oil and gas exploration, mining, and water protection. They also shared their experiences in providing advice to First Nations in environmental assessments.

That same year, the AFN made recommendations to the NWMO in two separate reports. The first, *Alternative Exposure Groups, Characteristics and Data for the Post-Closure Safety Assessment of a Deep Geological Repository*, advised the NWMO to provide more detail about the project's potential impact on Plains Hunter/Gatherers on the assumption that a deep geological repository could potentially be built in a plains environment. It also recommended closer attention to traditional diets and their potential to act as pathways for radiation exposure. The AFN reviewed this report and provided further advice on it in 2013.

In 2013, the NWMO responded to advice from the AFN with further study in the draft document *Aboriginal Lifestyles Characterization*. This document provided a study of additional scenarios. The NWMO sought the AFN's advice on the revised document, which it did in a formal report submitted to the NWMO (*Assembly of First Nations Report on Aboriginal Lifestyle Characterization*, NWMO TR-2013-08, October 2013).

The second report, *Assembly of First Nations Nuclear Waste Management Traditional Decision-Making Consensus Building – Draft Tool Kit*, described the principles that go into traditional decision-making and consensus building, and as such, offered an invaluable insight into processes and methods for involving First Nations communities in community dialogue and decision-making.

In 2012, Aboriginal organizations were invited to have a representative attend the 2012 ICGR. A special session (*Learning From Indigenous Peoples*) explored Indigenous issues, with a focus on how Aboriginal Traditional Knowledge, values, and world views can affect both the social process and technical development of a project. In particular, presenters were asked to relate their knowledge and experience to the site selection process and related activities for a nuclear fuel waste facility.



From the session *Learning From Indigenous Peoples*, at the 2012 International Conference on Geological Repositories. Phil Fontaine, former National Chief, Assembly of First Nations, Canada, was the moderator. Pictured from left to right are: Richard Arnold (Chairman, Pahrump Paiute Tribe, United States), Phil Fontaine, Fred Kelly (Anishinabe, Onigaming First Nation, Canada), and Joanne Barnaby (Co-Founder, Dene Cultural Institute, Canada).



### Other Input

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NWMO staff continued to participate in the NEA Radioactive Waste Management Committee. They were also represented in two working groups of the committee: the Integration Group for the Safety Case of Radioactive Waste Repositories, and the Forum on Stakeholder Confidence. The forum works to facilitate the sharing of experience in addressing the societal dimension of radioactive waste management, and explores means of ensuring an effective dialogue with the public with a view to strengthening confidence in the decision-making processes.

From its inception, the NWMO has committed itself to adhering to the highest ethical standards both in its procedures and in its assessment of management options. To guide it in this matter, the NWMO created a Round Table on Ethics in 2003. As part of its mandate, the Round Table produced an Ethical and Social Framework in 2004 and revised it in 2005. In December 2011, the Framework was reviewed for its continued appropriateness to guide new phases of the NWMO's work, most notably the site selection process.

In 2012, as part of its ongoing efforts to seek guidance on ethical issues, the NWMO appointed Dr. Wesley Cragg, a specialist in business ethics, to its Advisory Council.



## Keeping Abreast of Technical Issues and Advances

A program that is implemented over a long time will have many opportunities to improve safety and performance. Maintaining a robust research program is one of the ways the NWMO works to identify those opportunities. As part of that program, the NWMO undertakes joint research with its sister organizations in other countries, as well as with universities in Canada and abroad. The NWMO's research partnerships are detailed in chapter 6.3 (*Optimizing Repository Designs and Further Increasing Confidence in Safety*). The NWMO also monitors developments in used fuel reprocessing and Canadian energy policy that might have a bearing on the implementation of APM.

### Ongoing Monitoring of Advances in Reprocessing Used Nuclear Fuel

One of the questions frequently asked of the NWMO is whether used nuclear fuel, and used CANDU fuel in particular, can be recycled or reused. In 2005, the NWMO made a commitment to keep a “watching brief” on technological developments in the field, and it has been posting updates on its website since 2008.

Reprocessing and partitioning involves the separation of potentially fissile materials, such as plutonium, from used nuclear fuel through the application of chemical and physical processes. A portion of this recovered material can then be recycled into some current reactor types as mixed oxide (MOX) fuel. The remainder is stored as radioactive waste. Some reprocessing is practised in several countries that operate light water reactors, such as France and Japan.

Transmutation is a possible next step and involves the conversion of some long-lived radionuclides in the used fuel into shorter-lived ones through irradiation and/or fissioning in a reactor, usually an advanced reactor like a fast neutron reactor. This is not currently practised, although research to demonstrate its feasibility is underway in several countries.

Scientific findings from the past three years continued to indicate that existing reprocessing technologies are prohibitively expensive, especially for the un-enriched CANDU fuel used in Canadian nuclear power plants. Because of the high costs involved and because of concerns over proliferation, most of the countries that have historically engaged in a nuclear cycle where used fuel is reprocessed and then recycled through conventional light water reactors have stopped using this approach.

In addition, reprocessing or advanced fuel cycle scenarios do not eliminate the need for a deep geological repository, as they result in a large number of chemically complicated radioactive waste streams with long-lived radionuclides. These are often more difficult to manage than the original used fuel. France, for example, has the most advanced used fuel reprocessing program in the world, but it is nonetheless also planning to develop a repository. This is because residual high-level wastes must still be managed, along with the low- and intermediate-level wastes produced during the recycling process.

Between 2011 and 2013, the NWMO continued to monitor the findings of international research and development programs in advanced fuel cycles, including reprocessing, partitioning and transmutation (RP&T), on waste management issues. Various programs were sponsored by the IAEA, the NEA of the OECD, the Electric Power Research Institute, the US Blue Ribbon Commission on America's Nuclear Future, the US Government Accountability Office, the US Nuclear Waste Technical Review Board, and the UK Nuclear Decommissioning Authority.

As part of its ongoing monitoring, the NWMO also closely followed international conferences in the field. These included:

- The World Nuclear Fuel Cycle Conference (2011);
- The 15<sup>th</sup> International Conference on Emerging Nuclear Energy Systems (2011);
- The Nuclear Fuel Cycle Conference sponsored by the UK Institution of Chemical Engineers (2012);
- The OECD/NEA 12<sup>th</sup> Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation (2012);
- The International Centre for Environmental Management's 15<sup>th</sup> International Conference on Environmental Remediation and Radioactive Waste Management (2013);
- The World Nuclear Fuel Cycle Conference (2012);
- The IAEA International Conference on Fast Reactors (2013); and
- The Global 2013: International Nuclear Fuel Cycle Conference (2013).

As in previous years, the NWMO annually posted its most recent *Watching Brief on Reprocessing, Partitioning and Transmutation* online at [www.nwmo.ca/adaption](http://www.nwmo.ca/adaption).

## Energy Policy

As it had in previous years, the NWMO continued to monitor the status of potential new or refurbished reactors for the implications of these industry developments on the quantities and characteristics of the used nuclear fuel that the organization may be asked to manage in the future. In all three years, 2011 to 2013, the NWMO updated its inventory of the nation's used nuclear fuel and posted it online at [www.nwmo.ca/technicalresearch](http://www.nwmo.ca/technicalresearch).

## Planning for the Long Term

As part of the work it does on the international stage, the NWMO continued to participate in the NEA's International Collaboration on Preservation of Records, Knowledge and Memory across Generations. Initiated in 2011, the project supports the lengthy and complex decision-making processes that are inherent in the long operational and post-operational lifetimes of radioactive waste repositories. Its particular focus is on sharing international information, comparing approaches, testing potential solutions, and sharing decisions.



# Ensuring Governance and Accountability

## STRATEGIC OBJECTIVE

The NWMO will maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.

The integrity of the NWMO's work is advanced by multiple layers of oversight and peer review. Internally, the NWMO is governed by its Board of Directors. The *Nuclear Fuel Waste Act (NFWA)* also requires the Board to appoint an Advisory Council that has a mandate to review and publicly comment on the work of the NWMO. There is also a four-member international Independent Technical Review Group (ITRG) that since 2008 has conducted annual reviews of the NWMO's technical program to evaluate whether appropriate scientific and engineering approaches are in place to support the implementation of Adaptive Phased Management (APM).

Externally, the NWMO reports to the Minister of Natural Resources Canada on an annual basis, as required by the *NFWA*. This annual report is tabled in Parliament, and the Minister issues a statement on it each year. Every three years, an expanded version of the annual report – the triennial report – is required under the *NFWA* and must also include the comments of the Advisory Council. These are published in chapter 12.2 (*Report of the Advisory Council*).

The end point of APM is a deep geological repository that will be regulated under the *Nuclear Safety and Control Act*. Any licensing decisions about a repository must meet the requirements of the *Canadian Environmental Assessment Act, 2012*, and only then can the Canadian Nuclear Safety Commission (CNSC) make a determination on whether to license a site.

At each step along the way, the NWMO's work will meet or exceed all applicable regulatory standards and requirements for protecting the health, safety, and security of both people and the environment. The NWMO holds itself accountable to the public at large by posting key documents on its website, most notably annual reports, triennial reports, minutes from the meetings of the Board of Directors and Advisory Council, the reports of the ITRG and the NWMO's responses to them, research papers, and the results of the NWMO's engagement activities.



## Annual Report to the Minister of Natural Resources

As required under the *NFWA*, the NWMO reported annually on its work to the Minister of Natural Resources. It submitted annual reports in 2011 and 2012, and in 2013, a Triennial Report describing the organization's progress over all three years. Each year, the minister made a statement on the current report. These statements and the corresponding reports are posted on the NWMO's website at [www.nwmo.ca/annualreport](http://www.nwmo.ca/annualreport).

## Technical Review

The ITRG conducts annual reviews of the NWMO's ongoing and future applied research and development activities in the areas of geoscience, safety assessment, and engineering technology development. Its four members are internationally recognized specialists in these areas, and meet to evaluate whether the NWMO's work in each area is consistent with the current international state of knowledge and whether there is an adequate scientific, technical, and resource basis to implement APM.

The ITRG conducted three technical reviews between 2011 and 2013. In each case, a written report outlining ITRG findings was prepared and presented to the NWMO's Board of Directors and Advisory Council. Recommendations provided by the ITRG serve as a basis with which a NWMO response and action plan are created and tracked to demonstrate program position and progress. The ITRG's annual reviews and the NWMO's response are publicly available on the NWMO website at [www.nwmo.ca/itr](http://www.nwmo.ca/itr).



**Olle Olsson** has 30 years of experience working within the Swedish nuclear waste management program, primarily on geoscientific issues related to the final disposal of spent nuclear fuel within a deep geological repository. Starting in 2002, he managed the recently completed investigations of two potential Swedish repository sites, and was responsible for preparation of the licence application – submitted to the Swedish government in March 2011 – for the selected site.



**Allan Hooper** is the Chair of the ITRG. After more than 30 years working in the waste management and decommissioning sector of the United Kingdom nuclear industry, he is now an independent consultant specializing in the safe, long-term management of radioactive waste. Until recently, he acted as the Chief Scientific Advisor to the UK Nuclear Decommissioning Authority Radioactive Waste Management Directorate. In 2008, Dr. Hooper was appointed Visiting Professor of Repository Science and Engineering at Imperial College London.



**Lawrence Johnson** is a senior scientist and research and development coordinator at the Swiss National Cooperative for the Disposal of Radioactive Waste (Nagra), where he has worked since 1999 on various aspects of engineered barriers performance. Prior to this, he was Manager of the Fuel Waste Technology Branch at Atomic Energy of Canada Limited's Whiteshell Laboratories.



**Derek Martin** has been a professor in the Department of Civil and Environmental Engineering at the University of Alberta, Edmonton, since 2000. He has been a Senior Advisor to the Director of the Canadian Nuclear Fuel Waste Management Program, as well as head of the Geotechnical Research Section of Atomic Energy of Canada Limited's Whiteshell Underground Research Laboratory. Dr. Martin is a Fellow of the Canadian Academy of Engineering and the Engineering Institute of Canada.

## Early Involvement of the Canadian Nuclear Safety Commission

At this early stage of the project, the NWMO has not submitted a licence application to the CNSC. Drawing on the international best practice of getting involved early in proposed new nuclear projects, the CNSC provides guidance to the NWMO and meets with affected communities to help them understand the CNSC's role in regulating Canada's nuclear sector. As part of a service agreement in place since 2008, the CNSC continues to provide regulatory guidance to the NWMO, conducts pre-project reviews, and is participating in public and community meetings to provide information about the CNSC's independent regulatory role.

The NWMO is committed to seeking regulatory guidance early in the implementation of APM. Its objective in doing so is to confirm, at this stage of the project, that its postclosure safety assessment approach follows the guidance in the CNSC Regulatory Guide G-320 on *Assessing the Long Term Safety of Radioactive Waste Management*. With this goal in mind, two reports were completed – one in 2012, the other in 2013 – and submitted to the CNSC for pre-project review. The two studies can be viewed online at [www.nwmo.ca/technicalresearch](http://www.nwmo.ca/technicalresearch).

At the request of communities interested in learning about APM, CNSC staff provided independent briefings on the regulator's role in licensing an APM facility. These briefings began in 2010 and continue to be provided.

### Planning for Transportation of Used Nuclear Fuel

Starting in 2012, the CNSC, Transport Canada and provincial transportation agencies participated in a planning group to address the issues and concerns arising from the transportation of used fuel. This participation is an important part of confirming understanding of regulatory requirements and expectations associated with the transport of used fuel. Going forward, the NWMO will need to demonstrate to regulatory authorities the safety and security of a transportation system before shipments of used nuclear fuel can begin. In 2012, the NWMO took an important step toward that goal by beginning work on recertifying the used fuel transportation package to meet current regulatory requirements. This work was completed in 2013.

## International Reporting

Internationally, the NWMO reports on its progress at meetings of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)*. Reports to the *Joint Convention* are made under the auspices of the CNSC, and are part of the convention's requirement that Canada and other signatory nations demonstrate that they are meeting international commitments to manage radioactive waste and used nuclear fuel safely. The Fourth Review Meeting was held in May 2012. The Canadian delegation, led by the CNSC, included representatives from Natural Resources Canada, Atomic Energy of Canada Limited, Ontario Power Generation, and the NWMO. Canada was one of 63 countries participating in the *Joint Convention*.

On May 15, 2012, the Canadian delegation delivered a presentation on progress since the last Review Meeting and updates since the publication of its Fourth National Report to the Contracting Parties (other participating countries). NWMO staff provided an update on progress made toward the long-term management of Canada's used nuclear fuel since 2009 (the year of the most recent *Joint Convention*). The discussions covered a broad range of topics, including used nuclear fuel inventory, facility costs, community dialogue and engagement activities, and the next steps in the site selection process. The peer review by the Contracting Parties noted that Canada has a solid plan to move forward on the long-term management of used nuclear fuel.

## Quality Management

Two of the NWMO's fundamental values are Excellence and Engagement. As part of implementing these values, the NWMO has developed its management system to ensure that the views and perspectives of interested communities and groups are internalized, and that the organization is compliant with internationally recognized management standards.

In 2011, the NWMO maintained and continued to operate the organization's management system in compliance with ISO 9001:2008 Quality Management System Requirements. The organization also maintained conformance with the Canadian standard, CSA N286-05 Management System Requirements for Nuclear Power Plants, that is applicable to the development of a repository for nuclear waste. Being in compliance with the CSA N286-05 management system requirements standard is an expectation of the CNSC.

Also in 2011, the NWMO completed a number of audits to confirm that the organization is in conformance with the established management system and that the organization's suppliers were also in conformance with the NWMO's expectations for quality and safety. Results from these internal and external audits were integrated

into the organization's continuous improvement activities which included improvements to the management system. Over the course of 2011, the organization also developed the necessary policies, procedures and standards to augment the management system and ready the organization for the management of health, safety, and environmental issues using recognized management standards.

As a result of these efforts, in 2012 the NWMO received certification to the CSA Z1000:2006 Occupational Health and Safety Management System and ISO 14001:2004 Environmental Management System. These two certifications are in addition to the ISO 9001:2008 certification, which the organization achieved in 2010. The three certifications demonstrate that the NWMO's management system has effectively implemented processes for the management of quality, safety, health and environment. To ensure the organization stays the course, annual certification maintenance audits will be conducted. The first round of annual audits for all three certifications was successfully conducted in 2013, with the NWMO retaining all three certifications.



# Building and Sustaining a High-Performing Organization

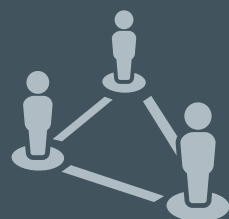
## STRATEGIC OBJECTIVE

The NWMO will build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.

The NWMO's staffing priorities and policies reflect the fact that the management of used nuclear fuel is a long-term responsibility requiring expertise in a wide variety of areas. These include repository design and construction, environmental assessment, Aboriginal Traditional Knowledge, social research, ethics, law, finance, communications, and public engagement. All are critical to responding to the needs and concerns of interested and potentially affected communities, developing collaborative partnerships with those communities, and ensuring that evaluations of potential sites meet the highest technical standards, as does the eventual site itself.

To help staff develop their skills, the NWMO provided numerous training opportunities. These included:

- Attendance and participation at national and international conferences and projects related to NWMO activities;
- A cultural training session for staff on the traditional practices, protocols, and history of Ontario's First Nations;
- A series of workshops designed to enhance staff understanding of Aboriginal Traditional Knowledge;
- Project management training;
- Health and safety training;
- Communications training;
- Training in state-of-the-art cold spray techniques; and
- Advanced computer simulation training on nuclear pressure vessel design.





Inside one of the NWMO's community offices.

Over the past three years, the NWMO has focused on hiring staff and contractors whose specialties match the complex social and technical requirements of the site selection process. During that time, the number of people working for the organization, both at its Toronto headquarters and in the field, has grown from 120 to 130.

Consistent with the increasing community focus of the site selection process, the NWMO opened 15 local offices in communities participating in preliminary assessments (Step 3 in the nine-step site selection process).

The NWMO also increased the number of Aboriginal people on its staff. This was recommended by both the Council of Elders and the Advisory Council in 2012, and in response, the NWMO recruited and hired Aboriginal people to support work at its headquarters and in individual communities.

Because it will take several generations to implement Adaptive Phased Management (APM), succession planning is an important priority for the NWMO. To preserve and transfer institutional memory, the NWMO implemented systematic procedures for archiving and retrieving policies, technical reports, field notes, and briefings.

The goal of equipping a new generation to assume responsibility for APM was also advanced through a number of youth-based science initiatives, including, most notably, the NWMO's ongoing support to graduate students through the Natural Sciences and Engineering Research Council's (NSERC) Industrial R&D Scholarship

and Fellowship program. NSERC-NWMO initiatives are described in chapters 6.1 and 6.3 (*Building Sustainable Relationships* and *Optimizing Repository Designs and Further Increasing Confidence in Safety*).

To keep staff and contractors informed about the latest advances in their fields, the NWMO facilitated their participation in a variety of research conferences. The same goal was also furthered through the NWMO's numerous partnerships with universities and nuclear waste management organizations in other countries. Both activities are detailed above, in *Optimizing Repository Designs and Further Increasing Confidence in Safety*.

To accommodate new staff, the NWMO expanded its office space at its headquarters in 2011. Investments in business systems over the past three years included the acquisition of state-of-the-art technical and cost-estimating computer modelling in 2012, and the installation of more powerful computers for all staff in 2013.

Notable investments in specialized software included:

- SolidWorks, a software package used for designing engineered systems and components and assessing their performance; and
- ANSYS with computational fluid dynamics, a software package used to model and predict thermal, hydraulic, and mechanical performance of engineered systems in different postulated scenarios.

# Other Activities:

Ontario Power  
Generation's Deep  
Geologic Repository  
Project for Low and  
Intermediate Level  
Waste





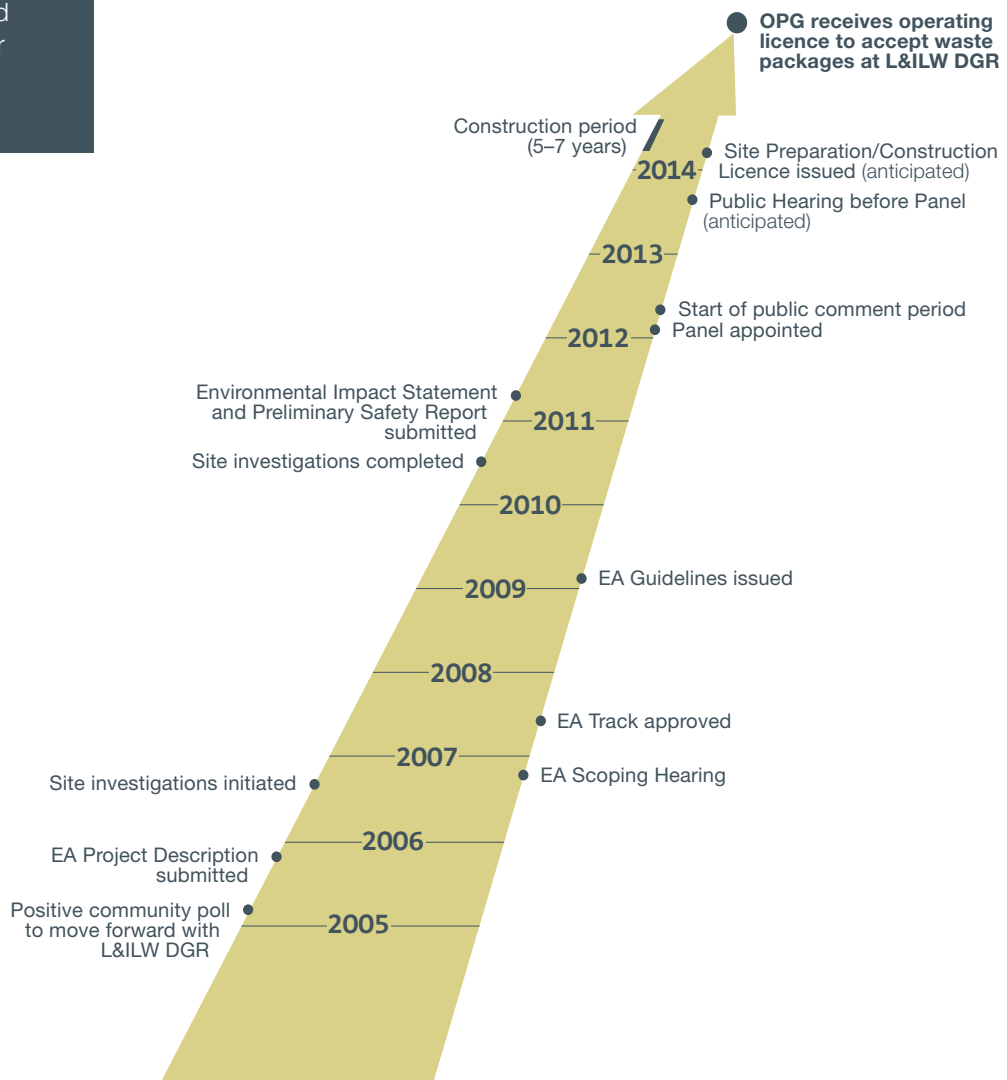
**Low-level radioactive waste** consists of industrial items that have become contaminated with low levels of radioactivity during routine cleanup and maintenance activities at nuclear generating stations.

**Intermediate-level radioactive waste** consists primarily of used nuclear reactor components, ion-exchange resins, and filters used to purify reactor water systems.

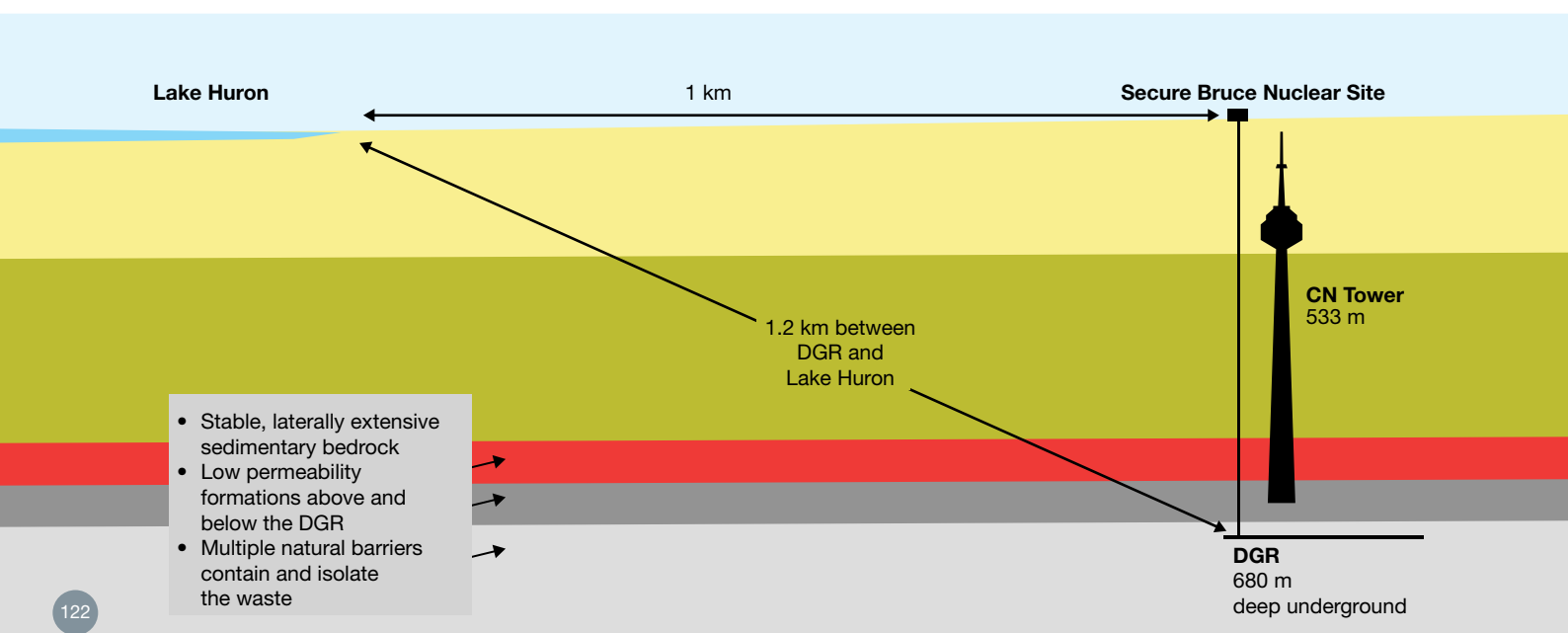
Since 2009, the NWMO has been under contract to Ontario Power Generation (OPG) to help develop a deep geologic repository for the long-term management of low and intermediate level radioactive waste at the Bruce nuclear site in the Municipality of Kincardine. In 2011, OPG further contracted with the NWMO to manage the detailed design of the future repository. The NWMO will provide construction services following the receipt of a licence for the repository.

The NWMO's work on behalf of OPG is separate from its mandate to implement Adaptive Phased Management, and the repository to be built at the Bruce site will not be used to store or manage used nuclear fuel. What the OPG repository will safely contain and isolate is low and intermediate level waste currently in interim storage on the Bruce nuclear site in the Western Waste Management Facility, as well as low and intermediate level waste that continues to be produced by the operation and refurbishment of nuclear generating stations at the Bruce, Pickering and Darlington sites.

The NWMO provided 46 technical reports in support of OPG's 2011 licence application. These and other project reports are available through [www.opg.com/power/nuclear/waste/dgr](http://www.opg.com/power/nuclear/waste/dgr).



The proposed deep geologic repository would be approximately 680 metres below ground in low permeability limestone, beneath a 200-metre-thick layer of low permeability shale. These sedimentary bedrock formations provide multiple natural barriers which will safely contain and isolate the radioactive waste for many thousands of years and beyond.

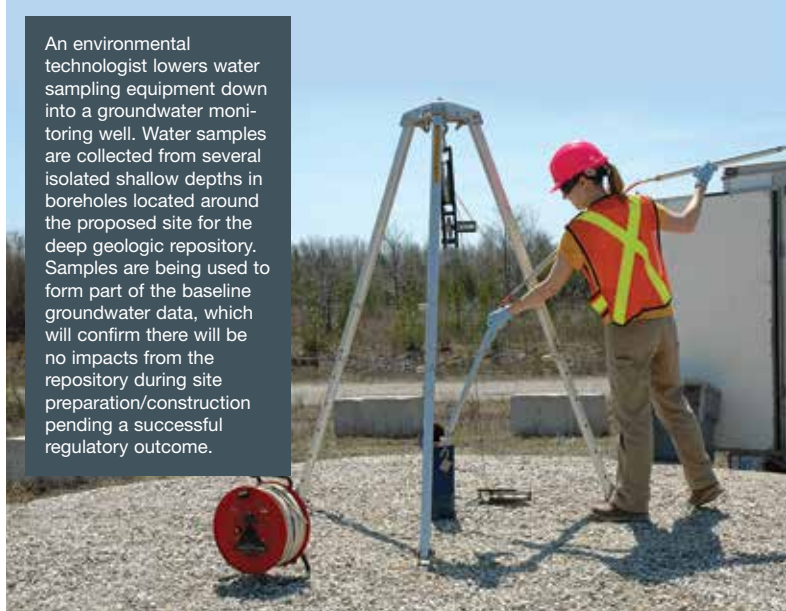


## Design Work

In 2011, the NWMO commenced fieldwork as part of developing a detailed design for the proposed project. This work continued into 2012, at which time the NWMO undertook a grouting verification program at the ventilation shaft to a depth of 200 metres, and extended the shallow groundwater monitoring network with the installation of 10 new wells. All work was conducted in accordance with the NWMO's Health and Safety Management Plan and Environmental Management Plan for the project. It was completed on time and on budget without a lost-time accident, injury or environmental reportable event.

In 2012, there were several design review meetings held with representatives from the design firms, mining and nuclear industry experts, conventional and radiological safety experts, and OPG staff. These meetings improved understanding of the design, incorporated recent experience, identified improvements and verified that all safety requirements were being implemented. The NWMO also conducted several quality reviews of its internal design processes and audited external contractor performance.

An environmental technologist lowers water sampling equipment down into a groundwater monitoring well. Water samples are collected from several isolated shallow depths in boreholes located around the proposed site for the deep geologic repository. Samples are being used to form part of the baseline groundwater data, which will confirm there will be no impacts from the repository during site preparation/construction pending a successful regulatory outcome.





## The Joint Review Panel



The deep geologic repository mobile exhibit on display at the 2013 Kincardine Home and Garden Show.



NWMO staff at the Joint Review Panel public hearing in Port Elgin, Ontario.

The Joint Review Panel established in 2012 was responsible for (1) examining the environmental effects of the proposed project to see whether it can meet the requirements of the *Canadian Environmental Assessment Act*; and (2) obtaining the information necessary for the consideration of the licence application under the *Nuclear Safety and Control Act* to prepare a site and to construct the deep geologic repository facility.

In February 2012, the Panel initiated a public comment period, which was subsequently extended until May 24, 2013. The public comment period was an opportunity for the Panel, federal agencies, the public, and First Nations and Métis communities to review, assess, and comment on the adequacy of the Environmental Impact Statement and licensing documents in meeting the requirements of the guidelines issued for the project in January 2009.

Over the course of the public comment period, the Panel made more than 570 information requests. NWMO and OPG staff members and their supporting contractors were heavily involved in preparing and reviewing responses to these, and many also participated in three Panel-convened Technical Information Sessions. These sessions were held to assist the Panel in their review of the submission materials. All responses and submissions were made on schedule.

The Joint Review Panel subsequently held public hearings in Kincardine and Port Elgin in the fall of 2013. The hearing was an opportunity for participants to hear about the project and the results of the EIS, and to present their views to the Panel. The Panel has requested additional information before concluding its review period.

The next step, to be completed within 90 days of the close of the review period, is for the Panel to submit an environmental assessment report to the federal Minister of the Environment outlining its conclusions, rationale and recommendations. Subject to the Government of Canada's decision, the Panel may then be authorized to make a decision on the application for a Licence to Prepare a Site and Construct the Deep Geologic Repository.

# Moving Forward Together: The Next Five Years

WHO WE ARE

The French Republic is a democratic country, founded on the values of liberty, equality and fraternity. It is a country that respects the rights of all its citizens and promotes the well-being of its people. It is a country that is open to the world and committed to peace and cooperation.

SURVOL DE

Le monde de demain sera différent de celui d'aujourd'hui. Il sera plus complexe, plus globalisé, plus technologique. Mais il sera aussi plus riche, plus diversifié, plus humain. Nous devons nous préparer à ce monde-là, nous devons nous adapter à ces changements. Nous devons travailler ensemble, nous devons nous soutenir, nous devons nous unir. Nous devons aller de l'avant, nous devons avancer.

## RE

and Singapore, 2004-05, and starting operations in Kuala Lumpur in 2006-07. The company has 100% equity participation in the following subsidiaries:

# ELAS

## LA SGDN

1. *Hydrobiologia* is an international journal devoted to a wide range of topics in the field of aquatic biology.

**Abstract**

## WHAT WE DO

## NOS TRAVAUX

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Quelques-uns des points les plus intéressants des publications récentes, en fait, à propos des effets des médicaments sur les approches liées à la gestion des perturbations hydrologiques dans les bassins versants. Plus de 30 études ont été réalisées, y compris 19400 observations de DDF approchées, de données des précipitations, de flux des rivières et de la température de l'eau, et ont permis de constater que l'impact des médicaments sur les écosystèmes aquatiques est important, en particulier pour les poissons et les invertébrés. Parmi les auteurs de cet article, il y a des experts de la gestion des bassins versants, des chercheurs, des ingénieurs, des gestionnaires de l'eau, des étudiants et des professionnels de la santé.

La CIGRA a promulgué des normes de référence des lignes de transmission en 1990. En 1993, la CIGRA a commencé à travailler à l'élaboration d'un guide de conception des lignes de transmission. Ce guide est actuellement en cours de révision et sera publié en 1995.

# **Overview of Adaptive Phased Management Strategic Plan 2014 to 2018**



Every year, the NWMO publishes a draft five-year strategic plan (*Implementing Adaptive Phased Management*) for public comment. This process reconfirms and demonstrates the NWMO's commitment to engaging and collaborating with Canadians in defining how we go forward. The draft is distributed by mail and electronically, and posted on the NWMO website with an invitation for public input. Comments and suggestions received are used as input to inform our program planning and to refine the draft.

The strategic plan for the period 2014 to 2018 was published in draft in September 2013 for a period of public review. The results of this period of review are described in the section *What We Heard: Strategic Plans*.

This section provides highlights of the 2014–2018 strategic plan. The full plan, as required under the *Nuclear Fuel Waste Act*, is published in Appendix 1, *Implementing Adaptive Phased Management 2014 to 2018*.

The strategic plan's seven objectives represent work program areas that are key to the successful implementation of Adaptive Phased Management (APM) and are the starting point for the annual review and update of the NWMO's strategic plan. Like the strategic plan, these objectives are reviewed for appropriateness each year as part of the process of seeking input on implementing APM.

The focus of the 2014 to 2018 period will be on siting and working with potentially interested communities as they move through the many steps of the siting process. When communities ask to advance in the process, the NWMO will be ready to implement activities such as learning more, site evaluation and engagement. We expect that the site selection process will advance over the five-year period with increasingly detailed studies of potential suitability. The NWMO will continue to refine postclosure safety assessments for a repository in both crystalline and sedimentary rock formations, and submit these to the Canadian Nuclear Safety Commission for a pre-project review. Throughout the planning period, engagement and social research will continue. Attention to sound governance and assurances around program funding will be maintained. Investing in people and the skills key to program success and continuity will remain a priority.

Key activities for the next five-year planning period include:

- Completing desktop preliminary assessments for communities that have passed an initial screening and elect to proceed in the site selection process;
- Engaging Aboriginal peoples and other communities in the surrounding area in learning and consideration of the project;
- Based on the results of this work, identifying the communities with the strongest potential to be suitable for the project to progress with the next phase of work involving preliminary field studies and engagement of Aboriginal peoples and other communities in the surrounding area in order to establish a foundation to proceed to implement the project together;
- Conducting this work collaboratively with the communities involved; and
- Based on the findings from preliminary field studies and assessments, identifying one or two communities to progress to the detailed site characterization phase of work.



The plan for the next five years is organized along seven strategic objectives outlined in the following pages. This 2014 to 2018 strategic plan is a “living” document that is regularly assessed, strengthened and redirected in the face of new information, advances in science and technology, changes in societal values and evolving public policy. APM will only proceed as quickly as Canadians, successful technology development and demonstration, and the regulatory authorities allow.

#### Strategic Objectives, 2014 to 2018

Build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.

Implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.

Refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.

Ensure funds are available to pay for the safe, long-term management of Canada’s used nuclear fuel.

Adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, insight from Aboriginal Traditional Knowledge, evolving societal expectations and values, and changes in public policies.

Maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO’s work.

Build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada’s used nuclear fuel.



## APM Strategic Planning Milestones, 2014 to 2018



### Building Sustainable Relationships

- Communications and media relations programs to raise awareness of APM Project.
- Engagement, education, outreach and capacity-building initiatives to support multi-generational involvement in APM Project.
- Relationship building with interested communities, First Nations and Métis peoples, surrounding communities and regions potentially affected by the APM site selection process.
- Working together with affected Aboriginal peoples as holders of Traditional Knowledge, users of environmental resources and environmental stewards, to be active participants in the site selection process.
- Collaborative work with, and advice sought from, the NWMO Council of Elders, Municipal Forum, community-based organizations, and national and provincial Aboriginal organizations.
- Developing and maintaining relationships with federal, provincial, regional and local governments.



### Collaboratively Implementing the Site Selection Process

- Broadened engagement with interested communities, First Nations and Métis peoples, and surrounding communities to support more detailed reflection on the APM Project and to explore the potential to implement the project in partnership.
- Tailored communications and public engagement activities to support ongoing dialogue and learning about the project.
- More detailed evaluation of potentially suitable areas, focusing on geoscientific suitability, engineering, transportation, environment and safety, as well as social, cultural and economic assessment.
- Identification of potential transportation modes and routes to each potential repository site, evaluated against technical safety criteria and aligned with community input.
- Selection of one or two candidate sites for detailed site characterization and assessment.



### Optimizing Repository Designs and Further Increasing Confidence in Safety

- Advancement of technical program activities to optimize repository designs and safety assessments.
- Initiate proof test plans to demonstrate Canadian-engineered barrier systems in advance of submission of a site preparation and construction licence.
- Completion of the Canadian Nuclear Safety Commission pre-project reviews in crystalline and sedimentary rock.
- Continued studies, analyses and joint activities with international partners to improve understanding of key processes and confidence in the safety case for deep geological repositories.



### Providing Financial Surety

- Completion of updated cost estimate for APM.
- Estimated financial implications of potential future scenarios of varying volumes of used nuclear fuel, when available.
- Identification as appropriate of implications for funding formula of potential new reactors or owners.
- Continued establishment of level of trust fund deposits by waste owners required annually.



### Adapting Plans

- Reporting on projected used fuel inventories, emerging technologies and potential implications of any new nuclear reactor units for APM plan.
- Continued published reviews of developments in used nuclear fuel reprocessing and alternative used nuclear fuel management technologies.
- Tracking of expectations of citizens, including youth and interested organizations, to ensure site selection process continues to meet needs and expectations; adapting process as may be required as experience is gained.
- Interweaving Aboriginal Traditional Knowledge in APM program implementation.



### Ensuring Governance and Accountability

- Oversight by NWMO Members, Board of Directors and Board Committees.
- Advice and independent comment by Advisory Council.
- Review of APM technical program by the Independent Technical Review Group.
- Assessments and audits of internal governance to maintain and achieve certifications to management system standards for quality, safety and environmental management.
- Interaction with the Canadian Nuclear Safety Commission for regulatory information and pre-project reviews for APM.
- Submission of annual and triennial reports to Minister of Natural Resources and the public.



### Building and Sustaining a High-Performing Organization

- Further development of staffing capability, contractor capability, and business systems and processes.
- Continued support for regionally based staff and local information offices as required to support communities engaged in the site selection process.
- Continued staff support, funding and resources for potential host communities, First Nations and Métis peoples, and surrounding communities to build capacity to participate in the site selection process.



# **Other Activities:**

**Overview of  
Support to Ontario  
Power Generation's  
Deep Geologic  
Repository Project  
for Low and  
Intermediate Level  
Waste, 2014 to 2018**



Over the next five years, the NWMO will continue to support Ontario Power Generation (OPG) in its efforts to obtain regulatory approvals, and prepare for construction of its proposed deep geologic repository project for the safe, long-term management of low and intermediate level waste (L&ILW). This support includes the completion of the regulatory approvals phase, for which the NWMO has been under contract with OPG since 2009, with a decision on the application of the site preparation and construction licence anticipated in 2014.

The NWMO will also continue with the management of the design and construction phases of the project under a further agreement (reached in February 2011) pending successful regulatory approvals. The near-term objectives for this work include the development of project execution governance, maintenance of environmental baseline monitoring, and preparation of key contract pre-qualification and procurement packages. Pending receipt of the site preparation and construction licence and OPG approvals, the detailed design of the

facility will be completed, key site infrastructure will be established, and the site will be prepared for construction. The construction phase of the project is expected to last five to seven years. It will include the development of two access shafts to the repository level 680 metres below the surface, 31 emplacement rooms with associated access tunnels and supporting infrastructure, and surface facilities for the receipt and handling of waste.

OPG will continue to provide strategic direction, oversight and approval as it has with all previous NWMO work programs and activities undertaken on behalf of the project. OPG is committed to ongoing engagement activities with the public, and First Nations and Métis communities as it moves forward in 2014.

The activities in support of the OPG L&ILW repository, including design, safety assessment, environmental assessment and construction management, will further enhance the NWMO's organizational capacity to implement Adaptive Phased Management.



Labelling water sample bottles which are then sent to a commercial lab for analysis.



Researchers from the Mont Terri Underground Laboratory examine core samples extracted from beneath the Bruce nuclear site.

# **What We Heard on Implementing Adaptive Phased Management**





The NWMO has committed to collaboratively develop and implement Canada's plan for the long-term management of used nuclear fuel. With the initiation of the site selection process in May 2010, the NWMO began to engage potentially interested communities in collaboratively implementing this plan. At the same time, the organization continued to work with communities to develop and refine the site selection process. This process has been the focus of the NWMO's engagement activities over the past three years.

Engagement activities were conducted as part of an ongoing conversation with Canadians – a conversation focusing on the values that are at stake, and the principles, priorities and concerns that need to shape the processes and plans being developed. Although there was much common ground identified over the course of these engagement activities, important and strong differences in opinion also came to light. These differences often reflected strongly held positions about how best to proceed. The NWMO will continue to examine them, and toward that end, its plans and processes are continuously reviewed for their continued alignment with the values, priorities and concerns of Canadians.

The following sections report on the results of the NWMO's engagement activities between 2011 and 2013.

## What We Heard: Implementing the Site Selection Process

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At this early stage of the site selection process, engagement has focused on interested communities that came forward to learn more about the project and participate in the site selection process. Much of what we heard over the last three years has been from individuals and organizations in these communities.

A variety of engagement activities have been used to support learning, discussion and reflection about the project within the community, and to build an understanding of the thoughts and concerns of residents. These activities included open house events, discussions with community groups and community leaders, involvement in community liaison committee (CLC) meetings, and conversations during community events or visits to the local NWMO office.

Community learning was also supported by attendance at conferences addressing nuclear waste management issues, practices and approaches in other countries; visits to interim storage sites where used nuclear fuel is currently managed; information briefings; and support for community visits to the Canadian Nuclear Safety Commission (CNSC) to learn about the regulatory framework governing the Adaptive Phased Management (APM) Project.

Some communities also engaged independent experts, using NWMO funds available through the Learn More Program, for the purpose of developing a community vision or strategic plan and/or to conduct a literature review of safety-related information concerning the project.

The NWMO also began to engage Aboriginal peoples and other communities neighbouring those involved in the siting process to involve them in learning and dialogue about the project and the multi-step process of assessment and decision-making. This engagement is at a very early stage and will be built upon over the next three years. For this reason, the description that follows focuses on what we heard from interested communities. As engagement of Aboriginal peoples, surrounding communities, and communities along potential transportation routes deepens, it is expected that the next triennial report will outline in more detail what we have heard from these important participants in the site selection process.

The NWMO also continues to seek engagement with Canadians more broadly through briefings and presentations to students, interested individuals, and organizations; displays, interactive exhibits and open house events; newsletters; staff participation in a wide variety of conferences; and interactive material on the NWMO website. These activities are described in chapter 6.1 (*Building Sustainable Relationships*).

## Learning and Exploring

Over the course of 2011 to 2013, 22 communities participated in Step 2 of the site selection process. Of these, 20 initiated preliminary assessments as part of Step 3, following resolutions passed by local accountable authorities. In order to understand the potential to meet robust safety requirements of the project, progressively more detailed technical studies were conducted over the course of each of these steps, and reports were published.

At the same time, communities reflected on their long-term vision and goals, and began to learn about the project and discuss how it might be implemented in the area and whether it might be a good fit for the community. In order to sustain dialogue and learning and foster conversations within communities, locally established CLCs and the NWMO were involved in a wide variety of engagement activities. To support these discussions, the NWMO sponsored events and produced materials in response to frequently asked questions.

### **What We Heard in Step 2: Introduction to the NWMO, the Project, and the Site Selection Process**

Communities interested in learning more approached the NWMO in order to enter the site selection process. Early engagement activities in each community focused on introducing the NWMO, the project, and the site selection process, and on beginning learning and dialogue within the community. An initial screening report summarized the results of the technical studies conducted to determine whether there were any obvious reasons that would preclude communities from continuing in the process. Information about the history of the project, the NWMO, the material and nature of the hazard to be managed, the site selection process, and more were developed and used to help foster conversation.



Shortly after entering Step 2 of the site selection process, the NWMO was invited by communities to meet with citizens and share information about Canada's plan for the long-term management of used nuclear fuel, and the site selection process. Working with community leaders, open-house-style sessions were organized and conducted over several days in each community. Local advertising of these sessions invited people to drop in; view the poster board display, the NWMO interactive exhibit and information videos; and speak with NWMO staff and community leaders.

The NWMO also met with groups in each community and surrounding area that expressed an interest. These conversations continued throughout Step 2 engagement activities, which covered many months for most communities. All material used in these open houses were shared with community members in conversations during this stage, and published on the NWMO website in the form of a virtual open house and briefing for those visiting the website.

Most of the people who visited open house sessions, or who were involved in meetings and discussions, told us the information provided was helpful, as was the opportunity to ask questions and speak directly with NWMO staff.

In the course of these conversations, some residents voiced objections to the project in the community, and others were supportive of the opportunities the project represents. The vast majority of individuals were supportive of learning more about APM, and the ongoing process to find a willing and informed community to host a deep geological repository. In this initial phase, many indicated no strong feelings about the project, and were interested in gathering information and having NWMO staff respond to their questions and concerns.

Among those whose initial reaction was supportive of the project, comments included the appropriateness of the deep geological repository approach, the logic of siting the repository in the area, and the potential for the community and region to benefit from the project. Among those who initially expressed concern, comments included questioning the safety of the deep geological repository and whether this kind of facility is consistent with the long-term vision the community has for itself. Many visitors counselled that the community needs to learn more before residents make up their minds.

Many visitors highlighted the need for decision-making to be open, inclusive and transparent, to involve community members at the grassroots level early in the process, and to include independent experts in assessments and decision-making. In this regard, they were reassured by the many steps in the site selection process, and the safeguards and protections built into it that enable communities to learn without commitment, receive resources to assist informed decision-making, and ultimately require a compelling demonstration of willingness that goes beyond municipal or Tribal Council decision-making.

Key points of conversation are outlined in the following discussion, and provide some sense of how community residents began the process of learning about the project and the questions and concerns that were top of mind for them. These conversations continued throughout Step 2 engagement activities. Community members were looking for information and answers to a range of questions:

1. **What is the NWMO?** Is the NWMO a government organization, is it a for-profit organization, and what is its relationship with the nuclear industry? People were interested to learn (among other facts) that the NWMO was set up in response to federal legislation and that it operates on a not-for-profit basis.
2. **What is used nuclear fuel?** What is used nuclear fuel, how much is there, and where is it currently stored? People were interested in seeing a model of a used fuel bundle. They were interested to learn that used fuel is a solid material rather than a liquid or a gas, and that it is stored on an interim basis at nuclear plant sites. Many people had assumed used nuclear fuel is liquid and were reassured by the look and feel of the solid used fuel bundle.
3. **What is Canada's plan for the long-term management of used nuclear fuel?** What is a deep geological repository, and on what basis can we be confident that a repository will contain and isolate the used nuclear fuel for the long period of time that is required? Information of interest included the lengthy research program that led to the development of Canada's plan, and the multiple engineered and natural barriers that are a core component of the design of the deep geological repository.
4. **How will a site be selected?** Who decides on the site and on whether a community is willing? How is willingness defined? How will the citizens in a community be involved in decision-making? Has the Council already made a decision without involving citizens? How will surrounding communities and Aboriginal people be involved? Information of interest included the nine steps and sequence of decisions that are part of the site selection process, the series of detailed technical and social studies that will be conducted, and the fact that it will take 10 or more years before a preferred site is selected. Many people were interested to learn that "a compelling demonstration of willingness" involving citizens at the grassroots level in a community will be required in order for a community to be selected for the project. Visitors were interested to learn the site selection process requires the involvement of Aboriginal peoples and other communities in the surrounding area in decision-making. Visitors were interested to learn about the detailed safety criteria and testing over many years which will be used to select a site.
5. **Is transportation of used fuel safe?** Can used nuclear fuel be transported safely? What would happen if there were an accident; how likely is it that there would be a release of radiation? How vulnerable is transportation to terrorist attack and accident scenarios? Information of interest to visitors included the extent of the regulatory framework that will govern the transportation of used nuclear fuel; the design of transportation containers and the rigorous testing required by Transport Canada and the International Atomic Energy Agency; and the fact that safety assessments of potential transportation routes will be examined as part of the site selection process. Videos of extreme tests that have been conducted on the containers were of interest. Visitors were interested to know that used nuclear fuel is transported safely on a regular basis using a range of transport modes internationally.
6. **Is it safe for this facility to be close to the Great Lakes and populated centres?** Is it safe for a deep geological repository to be close to the Great Lakes? Is it safe for the repository to be in a populated area? Information of interest included the broad range of factors that will be used to evaluate safety of a site for the facility and that a deep geological repository could be safely sited near a large body of water and in a populated centre.
7. **What sites are being considered?** Has the community been selected to host the deep geological repository? Have potential sites within the municipality been identified? Information of interest to visitors included the fact that many other communities are currently involved in the site selection process, and that a decision for a preferred community and site will not be made for many years. Many were also interested to learn that a series of technical and social studies is required to identify potential sites within interested communities, and that these studies are conducted in collaboration with the community and are designed to involve community residents.
8. **Why is the community interested in the project?** Why did our Council decide to participate in the Learn More process? In response to these questions, community leaders tended to mention three points: (i) the long-term management of Canada's used nuclear fuel is an important public policy issue for Canada; (ii) the community may be in a position to help address this issue because of its geology, mining experience, ease of transportation or other characteristic; and (iii) the project has the potential to contribute to the long-term sustainability of the community and help the community improve and protect its quality of life far into the future.
9. **How can we be sure this is safe?** What is radiation, and how does it affect people's health? How long is used nuclear fuel hazardous to people and the environment? Will drinking water be affected? Many were interested in learning about radiation from the NWMO exhibit that outlines how radiation is all around us, along with the steps taken to keep people from being harmed by it. Many people were

interested to learn about the multiple-barrier system that will be used to contain and isolate used nuclear fuel from people and the environment.

- 10. What is APM?** How was APM selected as Canada's plan? Were other approaches considered, and why were they not selected? Many people were interested to hear about the extent of Canadian and international research and development, and engagement of Canadians, that has taken place and that underpins the plan. Some suggested that Canada should stop creating used nuclear fuel before we proceed with APM.
- 11. What are the project timelines?** Has the site been selected already? How quickly will decisions be made about the community and site for the deep geological repository? Many people were interested to learn that the site selection process is a long and deliberate one, and that decisions will not be made for many years. Visitors were interested to learn that time will be taken for the community to thoroughly think through its interest in hosting the project, and that time will be taken to rigorously assess the long-term safety of the site.
- 12. What are the benefits and negative effects of the project?** What kinds of jobs are required for the project? Will workers underground be safe? What types of opportunities are there for local businesses? Many people were interested to learn about the number and types of jobs involved in the project over many decades, and about the NWMO's willingness to invest in local training, hiring and procurement.
- 13. How would this project affect way of life in the community?** What impacts would it have on our

way of life, on the sustainability of our community well into the future, on the future for young people, and on hunting and fishing activities? Many people were interested to hear how the project could be implemented in a way that preserves valued components of community life while also providing a foundation for growth. Some people were interested in knowing that exploring potential effects on community well-being is an important part of the siting process and is conducted together by the community and the NWMO.

- 14. What is a deep geological repository?** How will the used fuel be contained and isolated from the environment? How do the barriers work? How are used fuel containers constructed and sealed? Many people were interested to learn about the extent of research conducted in Canada and internationally, and the international consensus on best practices to be used.
- 15. How do we get more people involved?** How do we get young people involved now so they are prepared for future decision-making roles? How do we get this information out to other members of the community who did not visit the open house? Many suggested that people who are concerned about the project would have many of their questions and concerns addressed if they were able to see information about the project and speak with NWMO staff.
- 16. What are the implications of the events in Japan on this project?** How will seismicity be addressed in the APM Project? Many people were interested to hear about the different approach, circumstances, and type of facility involved in the APM Project.



Early stages of the site selection process saw the involvement of individuals and groups opposing the implementation of APM. Many oppose the use of nuclear power and are opposed to implementing a long-term management approach on this basis. Much of the involvement of these groups was focused directly on the communities involved in the site selection process. The questions and concerns raised by opposing groups were introduced into the discussion. The NWMO encourages this discussion, as all perspectives should be heard and considered, and all issues and concerns about Canada's plan and the deep geological repository in particular should be discussed, examined and addressed as warranted.

Based on a review of material published by these individuals and groups and their public statements, the key concerns they expressed included:

- Concern about the risk to communities and the environment associated with the transportation of used nuclear fuel;
- Concern that the disposal concept has not been sufficiently proven to be safe and that people and the environment will be adversely affected;
- Concern that vulnerable communities and Aboriginal peoples may be unfairly targeted for this project;
- Concern that the project will not be fully funded by the waste producers;
- Concern that fair, accurate, and balanced information is being shared, and that all risks, costs and benefits are being fully examined; and
- Concern about the appropriateness of the continued use of nuclear power and the continued generation of used nuclear fuel.

Misinformation has circulated in some communities about the site selection process itself, the project, and the NWMO. This misinformation has included suggestions that the NWMO is targeting disadvantaged communities, and that there is no foundation for confidence in the long-term safety of a deep geological repository and in its ability to safely and securely contain and isolate used nuclear fuel for the long time periods required. It will be important to address this misinformation as the site selection process proceeds and those in the area surrounding interested communities engage in more intensive learning and reflection on the project.

### **What We Heard Early in Step 3: Continuing to Learn More, Community Profiles, and Preliminary Assessments**

By early 2012, communities that passed an initial screening were eligible to continue their learning by moving to Step 3 of the site selection process. This step involves further learning by the community, and beginning to expand engagement to Aboriginal peoples in the surrounding area and nearby communities. Working with each of these communities, a community profile was developed, along with a preliminary assessment of potential suitability on a range of safety-related dimensions. The potential to foster community well-being was also considered.

Learning and engagement activities continued with communities that proceeded to Step 3 of the site selection process. CLCs were formed by each community, and their monthly meetings, newsletters, website, and events provided additional opportunities to foster and sustain dialogue in the community.

Key points of conversation are outlined in the following discussion, and provide some sense of the how community residents continued to learn, deepen their understanding, engage in conversations in the community, and further reflect on the potential for the project to fit with what the community wants for itself over the long term.

## Local Considerations, Risks, and Opportunities

Many comments and questions concerned local geology, with residents interested in learning what NWMO studies have revealed about it. Residents were interested in knowing how deep the local granite layer is, whether the area is seismically active, and how the potential suitability of local rock formations compares to that in other communities engaged in the site selection process.

Land was another source of questions and concerns. People were interested in knowing how land for the repository would be acquired. They wanted assurances that the municipality or the NWMO would not expropriate land for the project, but would instead negotiate with land owners and that owners would be compensated fairly. People also wanted assurances that municipalities would be involved in decision-making regarding sites on Crown land immediately outside their boundaries.

Questions and concerns about the potential effect on community well-being increased and deepened. These covered a wide range of factors – social, cultural, environmental, and economic. Examples included:

- In what ways could the project contribute to the sustainability of our community? Could the project help the community return to its earlier size and reclaim lost facilities and infrastructure? Could it help the community grow and contribute to improved quality of life?
- What opportunities will the project provide for young people to stay in the community?
- What is the Centre of Expertise, how many staff would it have, and how long would it operate?
- What would be the economic benefits and/or risks to existing local businesses?
- How many new jobs would be created, and for how long? Would people in the community be in a position to take these jobs? Would local education and training be available to help people build the knowledge and expertise required?
- Will we be able to protect what is precious to us in our community, such as hunting and fishing pursuits, wilderness, and other important aspects of the community?
- Will there be an impact on local infrastructure, especially roads?
- How will surrounding communities be affected by the project? How will they benefit from the project?
- Will the project diminish property values?
- Will the project hurt tourism in the area?

While residents in and around siting communities often wanted to conserve many aspects of their current lifestyle and local economy, this was balanced by a desire to explore the opportunities associated with a large infrastructure project. Questions about jobs were very common in every community, yet their focus often reflected local concerns. In communities where economic conditions have deteriorated in recent years, there was interest in the possibility of new investment, infrastructure, and jobs in the construction and operation of the facility, or in the support industries and services that will be required over the duration of the project. This was discussed by some in the context of a larger vision for the community to return to previous levels of economic activity or a certain population size.

In communities in close proximity to nuclear facilities, the project was discussed in the context of their own experience with the costs and benefits of nuclear facilities in the area, and it was common to hear support for the jobs which would come from the project, even from critics.



Residents also wanted to know more about specific natural features that might impact the community's suitability to host a safe and secure facility. As discussed below, these features included proximity to local water sources, as well as traditional hunting, fishing or trapping grounds.

### Implementing Adaptive Phased Management

People's first questions were often about APM, revealing a general desire for a better understanding of the project as a whole and of the NWMO as its implementing organization.

Though awareness of the NWMO and its mandate increased among residents of communities involved in the site selection process during Step 2, there was still considerable interest in knowing more about the organization. People wanted to know more about the NWMO's mandate, ownership, financing, and accountability. Questions about the relationship between the NWMO and other organizations in the Canadian nuclear industry were also common, and there was special interest in the NWMO's annual reporting requirement to the federal Minister of Natural Resources, and the role of the CNSC.

The financial basis of the project was a source of considerable interest. Most commonly, clarification was sought on updated cost estimates for the project and the differences between the present and future values referred to in NWMO publications. The cost of transportation was another area of interest, as were the source and means for assuring funding over the long time period involved in managing used nuclear fuel. Beyond questions of costs, people often asked who owns and funds the NWMO. They also wanted to know whether the NWMO falls under Canada's *Nuclear Liability Act* and if the organization will continue to own the used nuclear fuel after it is emplaced in the repository.

Commonly asked questions about operations at Canada's nuclear generating facilities included the current management of used nuclear fuel, the number of bundles to be managed, and conditions in the water-filled pools that cool used nuclear fuel. Other people were interested in the amount of energy left in used fuel bundles and their chemical composition, including whether used nuclear fuel is a solid, liquid, or gas, and if it has the potential to become a weapon.

Historical questions about APM continued to be raised. For example, many visitors to public events who were previously unaware of the project were interested in learning more about how APM developed after the NWMO was created in 2002. There was still also considerable interest in learning more about the options that were considered during the NWMO's study period (2002 to 2005).

People also requested details about the proposed deep geological repository and the technological and engineering concepts on which it will be built. These questions ranged from a desire to know more about the physical conditions deep underground where a repository will be built, to details on the above-ground footprint and the science behind the choice of copper or other material for the containment vessels that will be emplaced within the repository. These kinds of detailed questions are frequently answered by NWMO subject-matter experts, and were especially common at NWMO-hosted open houses and other events where staff were on hand to hand out information materials and answer questions.

Some questions concerned the facility after its closure. There was interest in learning more about institutional controls and the plans for long-term monitoring of the facility, including how containers might be monitored for corrosion.

## The Site Selection Process

People were interested in how the NWMO is implementing the site selection process, and not just within potential host communities. Some people thought that the process is too long and that milestones in the decision-making process should be achieved more quickly. This was often an initial response to hearing that it may take another five to 10 years to find a suitable host community. More commonly, people expressed confidence in the proposed path forward, and thought that the nature of the project requires spending the time necessary to implement it safely.

Common questions about the site selection process included:

- Which provinces are involved in the process?
- What is the process for opting in or out?
- What is the role of independent scientists in reviewing studies and advising communities, the surrounding area, and the region as a whole?
- When and how will decisions be made to select the preferred community?
- How will residents of the community, at the grassroots level, ultimately decide if they are willing to host the repository?

The subject of host community willingness was frequently raised. People were interested in knowing what threshold or percentage of citizen support will be necessary as evidence of a “compelling demonstration of willingness” for the purposes of this project, and what measures will be used to gauge willingness. Specific concerns about potential polling methods that could be used in order to determine willingness were also raised. The importance of the willingness of Aboriginal peoples who live near potential host sites was also raised. Some wondered if there would be ongoing assessments of how informed residents are so that there will be equal certainty that a potential host community is both willing *and* informed.

The NWMO heard many comments related to how the NWMO communicates and distributes information about APM to the broader public. Many individuals acknowledged the importance of communicating with the public, as well as using educational campaigns to help clarify some of the more complex or technical aspects of the project. Open houses like the ones the NWMO has held multiple times in each community were encouraged, and so was participation in established community events. Some people recommended NWMO participation in town-hall-style events. Local post offices, libraries and town halls were all recommended as venues for displaying information. There were also frequent requests for mail drops to all community members.

Numerous comments indicated the importance of engaging Aboriginal communities and incorporating Traditional Knowledge into the site selection process. We heard from some Aboriginal people that the NWMO must continue to work on communicating in a way that facilitates understanding (especially of technical terms), most notably through the continued and expanded production of communications materials written in Aboriginal languages. Aboriginal youth and elders were specifically noted as subgroups where special effort to communicate must be made.

People also spoke about issues that will need to be addressed as the site selection process proceeds. These included:

- Making resources available to support community members and Aboriginal people who want to work at the repository and who need to obtain proper construction surface and subsurface worker certification, security level accreditation, adult upgrade, and post-secondary education;
- Providing opportunities for participation in the implementation of the project, including joint partnership ventures in the construction and operation of the facility;
- Envisioning and communicating the project in a way that reflects the insight, knowledge and understanding of the interested community and Aboriginal communities.

## Safety

Perhaps the most frequently voiced comments and questions heard by NWMO staff concerned the health and safety of people and the environment. People asked for details about the estimated effects of radiation on humans and animals, on local and regional environmental features like aquifers and watersheds, and on the Great Lakes. Some also wanted to know how the NWMO could assure the public of the facility's long-term safety. Others wanted to understand the medical science behind radiation exposure, and asked for information on topics such as dose rates, the safe distance between a fuel bundle and humans, and the types of barriers required to reduce exposure.

Many questions were specific to the radioactivity of fuel bundles when they are ready to be placed into the repository. For example:

- Is the bundle dangerous, and if so, for how long?
- What are the effects of exposure to a fuel rod with and without a barrier?
- How does radiation dissipate when it is in a sealed container/repository?

We also heard comments and questions about the need for emergency preparedness at hospitals and by first responders in and around the eventual host community, and the kinds of preventive measures that would be taken during the construction and operational phases to ensure the safety of workers from radiation hazards.

Underlying many of these comments was a desire for more certainty around the ability of a repository to isolate used nuclear fuel for such a long period of time. People wanted to know more about the safety features of the project such as the natural and multiple engineered barriers designed to isolate radioactive material from the surface.

Some people asked if the proposed repository had a demonstrated track record of safety and if any similar facilities exist around the world. Related to this were questions about how other countries are planning to safely manage their used nuclear fuel, especially with regard to the similarities between APM and the plans being pursued by other countries. Some people cited the accidental release of non-civilian, legacy nuclear wastes in underground storage facilities in the United States and Germany.

The safety of water resources in particular was a major area of interest. Citizens were clear that they want to protect water resources and ensure the safety of their water, including local fishing lakes, regionally shared rivers and the Great Lakes. They also wanted to better understand the impacts of the project on water safety during construction, and the relationship between their groundwater sources and the saline water trapped in rocks hundreds of metres underground at repository depths.

Another topic was water flow through the repository. A number of the northern communities engaged with the NWMO have significant historical experience with the mining industry and the flooding that can occur in mines. This direct experience with underground water flow was a source of questions about the NWMO's efforts to identify a suitable and safe site that will have very little water flow through the repository. Many were interested in the effects fractures and cracks in the rock might have on the ability of the repository to stay safe for hundreds of thousands of years. Some questions appeared intended to test the robustness of NWMO plans, as in the question of what would happen if there were a flood at the repository.

Beyond questions about the health effects of radiation, many people wanted to know about the nuclear security aspects surrounding used nuclear fuel management. Often, questions were posed about consequences of malfunctions, accidents, malevolent acts, and the precautions and emergency planning that would be in place to respond. Some people wanted to be assured that preventive measures would be in place to combat against potential damage, theft, or misuse of nuclear material by criminals or terrorists. People also wanted details about the precautionary measures that would be in use during the operating phase of a facility. Some wanted assurance that emergency responders will be adequately prepared for an accident at the repository or threat to the site.

## Transportation

Transportation figured prominently in safety-related questions. People wanted to understand the safety aspects of moving fuel bundles from reactor sites to a deep geological repository through a number of communities en route. Questions about potential routes and modes of transportation (e.g., rail, road, etc.) were common and anticipated potential siting decisions many years in the future. In the meantime, residents of potential host communities and those along potential transportation corridors wanted a high level of assurance that transportation packages will be safely moved from existing nuclear facilities to a host community.

Residents of communities involved in the site selection process were especially interested in knowing how the NWMO intends to transport used nuclear fuel from reactor sites to the repository. Specific questions included:

- Which mode or modes (road, rail, or sea) of transportation would be used?
- Would new roads be needed? Who would pay for them? What types of road surfaces would be considered?
- How long would it take to move all the materials to the repository?
- How many shipments would be required? How many shipments would there be per week?
- How and when will communities along the transportation route be engaged?
- Will the public be aware of the final transportation routes once a willing host community is selected to host the repository?

Conversations about transportation were supported by a newly developed transportation trailer and exhibit that began to tour selected communities beginning in the spring of 2013. The trailer, which included an integrated viewing platform, features a licensed used fuel transportation package (UFTP), a stainless steel container weighing almost 35 tonnes and designed to transport up to 192 used fuel bundles on a transport truck. Displayed with the 1,400-kilogram impact limiter, the exhibit aims to demonstrate the kinds of redundant safety measures that will be employed when moving used nuclear

fuel in Canada. First seen at a series of municipal conferences and community visits, the exhibit drew positive reactions from visitors and led to a number of in-depth discussions about used nuclear fuel safety.

People were impressed by the size and robustness of the UFTP, and by test videos from Germany and the United Kingdom involving similar transportation packages withstanding an explosion and a collision with a locomotive. People more familiar with APM also noted that it was helpful to be able to touch and see the UFTP up close.

There were many questions about the integrity of UFTPs and fuel bundles in the case of accidents. People were curious about how the UFTP is designed, who licenses it and on what basis, and its integrity in the case of extreme accidents. They wanted to know what might happen if a UFTP broke open en route and who would then be responsible for its cleanup. Many visitors to community events asked about the safety protocols that would be in place for accident prevention (as in monitoring of environmental and road conditions and vehicle tracking). A number of questions touched on transportation regulations, both in Canada and internationally. People wanted to know whether Canada is working with other countries on the development of common standards in the transportation of used nuclear fuel.

In 2013, well-publicized accidents and derailments, such as the one that occurred in Lac-Mégantic, Quebec, opened up a new line of questions about transportation safety. These events had a noticeable impact on the public's interest in the plans to safely transport used nuclear fuel and the safety elements built into the UFTP.

In discussing the potential for accidents and the planned responses to emergencies, people frequently expressed an interest in more information about the safety features inherent in the UFTP, and the security measures that will be implemented. They were interested in knowing more about the possibility of terrorist attacks on shipments and about actions the NWMO and responsible authorities would take in the event of any accident involving the release of radiation. Related questions included:

- Will there be radiation coming from vehicles and canisters during transportation?
- To how much radiation will drivers or those accompanying used fuel shipments be exposed?
- What are the costs and risks associated with transporting used fuel over long distances from existing nuclear generating facilities?
- Will transportation of used nuclear fuel be done with or without the consent of neighbouring communities and/or First Nations and Métis peoples?

In general, community members were eager to learn more about the NWMO and APM, regardless of their predisposition to support or oppose the project. Many repeat visitors to public events told us that they changed their original opinion – from initial opposition to the project to one of cautious support for their community's involvement in learning more about APM. Even some of those critical of their community's involvement have indicated general support for the nature of the project, acknowledging that used nuclear fuel exists and must be safely managed.

Step 3 saw the continued involvement of individuals and groups opposing the implementation of APM. The questions and concerns raised by these groups during Step 2 continued to be expressed in sessions they convened in interested communities, on their websites, through the media, and through social media. Additional comments included communities are being unfairly targeted for the project; the NWMO is too close to the nuclear industry and therefore has a conflict of interest; and no waste management plan should be implemented before there is a plan to stop production of nuclear energy and used nuclear fuel.



Other positions or concerns held by critics included:

- Disagreement with the development of two deep geological repositories – one for low- and intermediate-level waste, and one for used nuclear fuel;
- Concern about the potential proximity of any future repository to the Great Lakes;
- Disagreement on the selected management approach (i.e., advocacy for other used fuel management approaches, such as keeping used fuel above ground or closer to the surface instead);
- Concerns about safety (e.g., reliability of shaft seal technology; the possibility of disruptive event scenarios like flooding; the validity of computer modelling over long time frames; copper and clay barrier properties; container design; performance of the system over hundreds of thousands of years); and
- Transparency of NWMO documentation and communications.

The NWMO continued to encourage this discussion, consistent with an understanding that all perspectives should be heard and considered, and all issues and concerns about Canada's plan and the deep geological repository in particular should be discussed, examined and addressed as warranted.

### **What We Heard in Concluding Phase 1 Assessments: Assessing Community Well-Being**

The completion of Phase 1 assessments in the first eight communities was an important milestone for them and the NWMO. These assessments were shared with communities in November 2013. Reaction from the eight communities as represented by Mayors, Councils and CLCs was supportive. The assessments, and in particular, the portions of the assessments that the CLCs were most closely involved in developing (the assessment of the potential to foster community well-being through the implementation of the project) were seen to be fair.

NWMO decisions about which of these communities should be the focus of further study, and which should not, were also seen to be fair by the communities involved. Communities selected to advance to further study were pleased; communities not selected were disappointed, and to some extent relieved that they will not need to make a decision in the future about whether they wish to host the project. All said they had benefitted from participation in the site selection process; had learned a lot about APM and about themselves as a community; and had gained valuable information about the community and area in the form of the assessment reports that will help them in future endeavours. They also said that the processes they had put in place in the community to discuss and consider the project will be helpful to them in the future.

## Community Responses to Phase 1 Preliminary Assessments

### Creighton

“Creighton is looking forward to continuing its participation in the NWMO site selection process,” said Bruce Fidler, Mayor of Creighton. “The next phase of work will involve much more detailed technical and social studies and will see an enhanced level of engagement within our own community and with our neighbours. Creighton can be proud of its role in helping the advancement of Canada’s plan for the long-term management of used nuclear fuel. We appreciate the NWMO’s acknowledgement of our work through its contribution to a Community Well-Being Reserve Fund.”

### Ear Falls

“Ear Falls residents can take pride in knowing our community has made significant contributions to advancing an important national infrastructure project,” said Kevin Kahoot, Mayor of Ear Falls. “I would particularly like to thank the volunteers of the Ear Falls Nuclear Waste Community Committee and all citizens who shared their views, questions and concerns over the past three years. The siting process has provided reports and information that will benefit Ear Falls in the future, and I would like to thank the NWMO for all the support and resources they have provided over the course of the process. The NWMO Community Well-Being Reserve Fund is tangible recognition of our community’s contribution to the NWMO process.”

### English River First Nation

“Although English River First Nation will not be continuing in the NWMO site selection process, we are proud of the contribution we have made to the national discussion,” said Chief Marie Black of English River First Nation. “Establishment of a Community Well-Being Reserve Fund will provide our members with opportunities to work together and continue building a stronger community based on a common vision of traditional values all of us hold dear.”

### Hornepayne

“We are still in the early steps of a very long learning process,” said Morley Forster, Mayor of Hornepayne. “Ultimately, the community as a whole will have to decide whether hosting this project is in our best interests and can contribute to our long-term well-being. We look forward to the progressively more detailed studies to come and to increased community and regional engagement activities. Our residents can be proud of the contributions Hornepayne has already made in shaping this important national infrastructure project, regardless of the eventual outcome.”

### Ignace

“Our Community Nuclear Liaison Committee and citizens who have been involved in this process are to be commended for their contributions thus far,” said Lee Kennard, Mayor of Ignace. “While it will be many years before a final decision is made, we look forward to continuing to work and learn collaboratively with the NWMO. In the next few years, residents can expect to see increased levels of study, community engagement and regional outreach as Ignace continues to learn about this important national infrastructure project and what it might mean for our area if we were to host it.”

### Pinehouse

“I want to thank everyone in our community who participated in the NWMO learning process,” said Mike Natomagan, Mayor of Pinehouse. “Regardless of the different views our people have expressed, Pinehouse has played an important role in Canada’s efforts to address a difficult issue. I look forward to working with a united Pinehouse to achieve our common goals of growing and prospering as a healthy, self-determined and self-sustaining northern Aboriginal community. I want to thank the NWMO for its contribution to a Community Well-Being Reserve Fund, which we will use wisely to help achieve our long-term aspirations.”

### Schreiber

“Schreiber is looking forward to further exploring how this important national infrastructure project could potentially impact our community and region,” said Don McArthur, Mayor of Schreiber. “We have a great deal of work and many studies ahead of us before we will be in a position to decide whether a deep geological repository is a good fit for our community and area. All Schreiber residents can be proud of the contribution our community has already made to the NWMO site selection process, regardless of the eventual outcome.”

### Wawa

“Wawa residents can be proud of the considerable contribution our community has made to advancing this important national infrastructure project,” said Linda Nowicki, Mayor of Wawa. “Our local volunteer Nuclear Waste Community Advisory Committee has put a great deal of effort into the process and is deserving of public acknowledgement. The NWMO’s contribution to a Community Well-Being Reserve Fund is tangible recognition of Wawa’s significant participation in the site selection process.”

## What We Heard About Incorporating Aboriginal Traditional Knowledge

The NWMO recognizes that Indigenous Elders carry the wisdom that connected their peoples to all creation since the Creator placed them here on Turtle Island. The NWMO also acknowledges that Elders possess an understanding of Mother Earth that constitutes traditional science that enabled their ancestors to live in harmony with nature. The NWMO further respects that Elders are the custodians of traditions, customs and values of their respective societies, and form a link between the past and the future.

The Elders have much Traditional Knowledge to share with others, and one of their roles is aiding in decision-making based on this ancient knowledge. The NWMO has been honoured to have received the counsel of Elders and Traditional Knowledge holders, as well as community leaders and members and Aboriginal organizations, over the past several years, and seeks to enhance this relationship of mutual support and respect as it continues to implement its mandate in harmony with the traditional teachings of the Indigenous peoples.

The NWMO began to receive advice from the Council of Elders, which was the successor to the Elders Forum. The Council was established in July 2012 in a traditional ceremony in which all former members of the Elders Forum were honoured and thanked for their many years of advice and thoughtful assistance to the NWMO and Aboriginal organizations and communities involved in the NWMO's work.

Over the course of the first two meetings of the Council, there was concern expressed for the uncertainty of the future and nuclear waste storage. Members pointed out that all those potentially affected must understand both the positive and negative aspects of nuclear waste. There were questions about how many fuel bundles will be in the repository by the time it goes into operation, and whether this number will continue to grow over time. There were also questions about projections for new nuclear reactors in Canada.

The Council discussed the similarities and differences between Aboriginal Traditional Knowledge and Western Science, as well as the sharing of experience about how traditional values, principles, and ethics, and a commitment to Aboriginal languages might be strengthened in the NWMO's decision-making processes and work. Discussions included the importance of protecting treaty and Aboriginal rights, the importance of building an economy, and planning for the future with training opportunities for young people. Discussions also included the importance of respecting traditional ceremonies of communities, while also respecting that these ceremonies may be different in each community. The importance of prophecies, teachings and sacred laws also figured prominently in the initial discussions of the Council of Elders. The NWMO looks forward to receiving advice from the Council as it deepens its understanding of an involvement in the NWMO's work.

The NWMO's ongoing relationships with national and provincially based Aboriginal organizations are outlined in chapter 6.1 (*Building Sustainable Relationships*), as is the development of new relationships with First Nations and Métis communities in the vicinity of communities involved in the site selection process. Reviews of the NWMO's work by Aboriginal contractors has helped the organization identify opportunities for redirecting and refining current and future work by incorporating Aboriginal Traditional Knowledge in the site selection process. For instance, an important component of planned Phase 2 activities is to engage Aboriginal communities in the area to provide input into both technical and social assessment activities, including walking the land to understand the characteristics and processes associated with the land, and to work together with these communities to help interpret the findings. In this way, the NWMO can begin to understand the culture, traditions, use of the land, decision-making processes, and practices of neighbouring Aboriginal communities.

In assessing the potential to foster the well-being of the area, the NWMO will seek the advice of Elders, Traditional Knowledge holders, and community leaders and members to refine the framework used for the assessment, and also to expand it to include considerations associated with ways of life and spiritual considerations as a foundation for broader discussion and involvement in decision-making.

# How We Responded to Input Received

The NWMO seeks to foster an ongoing conversation with communities and within communities. It responds to their questions both in face-to-face meetings and in written answers to correspondence. The NWMO has also developed a range of materials to respond to frequently asked questions and comments, thus helping communities make informed decisions about Adaptive Phased Management (APM).

The NWMO understands that demonstrating the safety of the project to technical specialists, governments, and regulators is of high importance, and that the project will not proceed without a robust safety case that meets all expectations. Although this is necessary, it is not sufficient. Communities will also need to reflect on their own confidence in the project's safety. Similarly, communities need to reflect on the extent to which the project will foster their own well-being and help achieve the future community has itself identified.



Examples of material created to respond to questions and concerns by communities include:

- **Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise.** This brochure was created to help inform communities about the project and to help further detailed conversation about the potential effects of the project in the community during the assessment process.
- **Safe and Secure Transportation of Canada's Used Nuclear Fuel.** This brochure was created to provide more information about what is entailed in transporting used nuclear fuel, as well as the technologies, practices and regulatory framework available to help ensure safe transportation.
- **Community open houses.** Working with communities, several open houses were organized in each to share information and involve community members in the site selection process.
- **NWMO participation in community events.** Upon the invitation of communities, the NWMO participated in community-sponsored events as informal opportunities to share information and involve community members.
- **Mobile transportation exhibit.** This travelling exhibit was created to provide a physical example of the type of used fuel transportation package that would be used to transport used nuclear fuel.
- **Additional modules for the NWMO interactive exhibit.** Additional modules were developed for the NWMO interactive exhibit to address areas of interest to community members.
- **"Ask the NWMO" inserts in local newspapers.** These inserts were designed to answer frequently asked questions by community members.
- **Organization of learning experiences.** To facilitate learning, the NWMO organized opportunities for community delegations to visit an interim storage facility where used nuclear fuel is currently stored, visit the Canadian Nuclear Safety Commission to understand the regulatory framework, attend conferences where used nuclear fuel issues were being discussed and international experience shared, and meet with representatives of communities that have participated in similar processes and that are hosting nuclear waste management facilities.
- **Funding and resources to communities to support their participation in the site selection process.** A capacity-building program was developed to cover costs associated with community participation in the site selection process. This included funding for community visioning and strategic planning, and funding to contract independent advice.
- **Preliminary Assessment of Potential Suitability – Feasibility Studies.** This brochure builds on the description of the siting process in the May 2010 *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* by providing more detail about how the work of Step 3 Preliminary Assessment studies will be conducted. This document was published on the NWMO website and shared with communities that successfully passed an initial screening and that were considering whether or not to advance to the next step of the site selection process.
- **Funding and resources to Aboriginal communities and organizations to support their participation in the site selection process.** The NWMO's **Aboriginal Relations Resources Program** seeks to work together with First Nation communities and regional First Nation organizations, and Métis Local Communities, together with their Regional Métis Organizations, to understand traditional and contemporary perspectives in answering the question, "How might traditional and contemporary views regarding land stewardship help us understand how a major development project, such as that proposed by the NWMO, must be implemented?" A program of resources is made available for First Nation Communities and their Regional Organizations, and Métis Local Communities, together with their Regional Métis Organizations, in areas of the communities involved in the site selection process to understand: the cultural practices and traditional laws of Aboriginal peoples in these areas; how Aboriginal peoples might be respectfully involved in learning about the project and the decision-making on the path forward; what is the vision for the area today and over the long term; what is the traditional, historical, and current use of the land and area; and what are the considerations in deciding where and how the project will be implemented and how the well-being of the people and the environment in the area will be assured.
- **Funding and support for the establishment of community liaison committees (CLCs).** Funding was provided for communities to establish their own committees to foster learning and discussion within the community.
- **Establishment of community offices.** Offices were established in each community to provide further opportunities for learning and interaction with the NWMO and others in the community.
- **Review of assessment work in progress.** In conducting Phase 1 preliminary assessments, the NWMO worked from an understanding of the community that was developed with the community in the form of a community profile. The NWMO sought to share key portions of the assessment in draft form through open houses and CLC meetings.

# What We Heard: Strategic Plans

Since 2007, the NWMO has solicited broad public input on its seven corporate strategic objectives and associated planned activities by publishing a draft of its rolling five-year strategic plan for public comment. Titled *Implementing Adaptive Phased Management*, the plan describes how the NWMO will implement Adaptive Phased Management (APM) in the planning period. The NWMO invites all interested individuals and organizations to get involved in the long-term management of used nuclear fuel.

To encourage public review and comment, each year, a copy is posted on the NWMO website, while hard copies are mailed to individuals and organizations that have expressed an interest in NWMO activities, provincial and federal ministers and political representatives, and involved government departments, and Aboriginal organizations. As part of this dialogue, a five-question survey is posted on the organization's website and mailed with hard copies.

### An Ongoing Dialogue With Canadians

**To encourage public review and comment, the NWMO invites comment on five key questions:**

The draft plan is built around seven strategic objectives. Are the objectives that we have identified appropriate? Have we missed key areas?

The draft plan identifies work and activities we propose to undertake to accomplish these objectives. Have we set out appropriate activities?

The draft plan is intended to anticipate the challenges ahead and plan for them. Over the next five years, what are the key challenges that will need to be addressed?

What will the NWMO need to put in place to respond to these challenges?

Other comments, questions or suggestions?

The NWMO greatly appreciates receiving comments and suggestions about its work programs and plans. All individuals who contributed their time and ideas were formally thanked by the NWMO.

## Overall Reaction and Key Challenges

Overall, comments received were generally supportive of the plan. As we proceed with the implementation of the site selection process, comments have come to focus on the more detailed and near-term challenges in implementing what is generally perceived to be a strong plan.

Comments focused on a number of challenges. These comments helped continue the conversation about some of the ongoing challenges that need to be addressed in implementing the strategic plan, and form part of the ongoing conversation to direct and refine the plan over time.

**Ensure interested communities have the capacity to fully participate.** Small communities interested in this project may not have the capacity to take the leadership role that the site selection process requires, or to handle the pressures that may be put upon them by the media and various interests outside the community. NWMO support for capacity building in these communities to fully participate in the process and to successfully address and manage these pressures is considered very important.

**Ensure communities are willing.** Comments highlighted the importance of informed willingness in the host community and the need to sustain this willingness over the long period of construction and operation of the facility. Concern was raised about how willingness will be measured and assessed. Concern was also expressed about whether this willingness can, in fact, be achieved.

**Ensure communities will benefit from the project.** Since the project may be transformational for a community, focus must be kept on the broad well-being of the community in assessing and managing potential impacts, including spiritual and cultural dimensions, and not just economic opportunities. Communities must be both fully informed about the potential effects of the project and be in a position to manage these effects to the benefit of the community.

**Sustain direct and participatory collaboration.** Since the site selection process requires direct and participatory collaboration with the community, the NWMO needs to find ways to support communities in implementing decision-making processes of their choosing, as well as helping them address activities of outside interests that may wish to influence the community-led process.

**Ensure free, accessible and credible information on risk to communities.** Since the implementation of APM requires making decisions in the face of some uncertainty and risk, the challenge in this area concerns how differences of view and competing facts might constructively be addressed as part of the community-led dialogue and decision-making process. Sources of

neutral, unbiased and factually accurate information are important to effective community decision-making and must be made available and protected throughout the site selection process.

**Sustain involvement of interested organizations.** As the site selection process becomes more locally driven, comments underlined that the NWMO needs to continue to foster broad public conversations and discussion to sustain the interest of individuals and organizations. The challenge is how best to foster this broad conversation while ensuring the community has the space to learn about the project and reflect upon its interest.

**Build trust in the NWMO and ensure accountability.** Comments suggested that as the NWMO begins to focus its relationship building on communities that are interested in the project, and in the surrounding communities and region, it will need to ensure that it continues to be transparent and accountable for its actions to a broader audience of citizens. The challenge that will need to be addressed is in the balance to be struck between (1) providing communities space to reflect and make their own decisions and (2) ensuring the NWMO openly and transparently reports on detailed activities as they are undertaken over the course of the site selection process. Maintaining accountable governance and demonstrating prudent use of resources was identified as essential in providing Canadians with ongoing confidence in the NWMO's siting and implementation activities.

**Adapt plans.** There is general agreement that the NWMO must adapt its processes and plans throughout the implementation of APM. However, as the NWMO proceeds with the site selection process and moves to a more local focus, questions are being raised about the implications for communities that may wish to host the project. The challenge to be addressed is both to be nimble in order to be responsive to changes that may arise, but also to make firm commitments to communities about the nature of the project to be implemented to ensure these communities are fully informed in their decision-making.

**Sustain openness and inclusiveness throughout implementation.** Comments underlined the importance of the NWMO continuing its policy of openness and public consultation in its work. As dialogue becomes more focused on potentially interested communities, Aboriginal peoples, and other surrounding communities, information is expected to become increasingly more technical and detailed. Although the information being provided to communities and Canadians more generally must be comprehensive, it must also be concise and use plain language so the issues can be easily understood. As noted above, comments included the importance of free, accessible and credible information on risk to communities to inform their decision-making. Misinformation must be identified and addressed.

**Appropriately and effectively involve Aboriginal peoples, surrounding communities, and youth.** The NWMO needs to be clearer about how **Aboriginal peoples** will be involved, and specifically, how shared decision-making will be achieved on various key issues such as assessment of the suitability of potential sites and potential transportation routes. Comments reflected the importance of ensuring the NWMO respects the rights of Aboriginal peoples in engaging them over the course of implementing APM. Building awareness and capacity for participation among Aboriginal peoples was specifically identified as a challenge to be addressed. Appropriately engaging Aboriginal peoples on the subject of Aboriginal Traditional Knowledge was also identified as a challenge.

The questions and concerns of **surrounding communities** must be successfully addressed, and benefits demonstrated. Comments underlined the importance and challenge associated with involving communities in the area surrounding interested communities, and the challenge to demonstrate that benefits will outweigh the risks and any risk will be mitigated.

The importance of involving **youth** continued to be highlighted, given the multi-generational nature of APM and the need to transfer knowledge from one generation to another. The importance of involving First Nations and Métis youth in particular was highlighted.

**Ensure full funding of the project.** Comments highlighted the importance of continuing to ensure that adequate funding exists for the implementation of Canada's plan by the waste owners.

**Continue to address long time frames.** Comments suggested that the long time frames associated with the implementation of the site selection process, APM, and the long-term management of used nuclear fuel in general pose a challenge in the near term to developing and sustaining relationships with potential host communities, surrounding communities, and Aboriginal peoples. In the long term, comments reflected on the challenge of ensuring that the used nuclear fuel is effectively contained and isolated over the long time frames required.

**Demonstrate safety and build confidence in the transportation of used nuclear fuel.** Dealing with the concerns of transportation communities was identified as a key challenge going forward, and it was suggested that the NWMO address this challenge through publishing detailed studies on the risks associated with various transportation methods and through engagement of communities along potential transportation routes.

**Identify emergency management plans and procedures.** Comments raised the importance of identifying appropriate emergency plans and procedures to be examined for the transport of nuclear waste and also for the transfer of used nuclear fuel to the deep geological repository.

The NWMO also continues to receive comments and hear ongoing debate on the question of what ought to be the future of nuclear power and how the implementation of APM is, or should be, affected by decisions in this area. We have received comments from some that APM should not be implemented before a plan has been put in place to end the use of nuclear power. We have received comments from others that it is important to move forward with the long-term management plan as expeditiously as possible and that the NWMO show greater urgency in its work. We understand this latter view is the predominant view among Canadians, who tend to feel that since waste exists, it must be dealt with, and that a plan must be put in place for its management irrespective of the future of nuclear power in Canada. The NWMO received a few comments suggesting that alternative storage and management options of nuclear waste should be considered. Some interest was also expressed about the feasibility of reuse of used nuclear fuel.



## Comments on Strategic Objectives and Planned Activities

The NWMO's implementation plans are organized along seven strategic objectives. The objectives and initiatives in each area reflect priorities for the planning period. Overall, comments about the strategic objectives were generally positive, and most people found the objectives and associated activities appropriate. Key themes in the public's comments included:

- Provide more detail about the implementation of the site selection process in the plan. This included an acknowledgment of the challenges and uncertainties associated with implementing the plan – including willingness, roles, and responsibilities of different participants in the process, and in particular, Aboriginal peoples and those in the area surrounding an interested community – and the process that will be used to decide among willing and suitable communities.
- Better reflect and respond to the challenges associated with transportation of used nuclear fuel in the implementation of APM.
- Elaborate and be more transparent about how matters of safety, public health and risk are addressed through the plan. Understanding the costs associated with implementing APM was also a source of comment.
- Provide a stronger discussion of time frames involved in implementing APM. There was some frustration with a process that is designed to be collaboratively implemented with communities rather than timeline-driven by the NWMO.
- Provide more information about new and emerging technologies, and how these might be accommodated within APM.



## How We Responded to Input Received

In response to comments received, revisions were made to the strategic plan to increase clarity concerning the NWMO's plans and commitments in many of the areas raised by respondents. The NWMO continues to be challenged by respondents to bring greater specificity to its plans, even as these plans evolve. The NWMO has made efforts to bring specificity to its plan. This has been complemented by a range of material which has been produced over the past three years, including:

- **Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise.**
- **Safe and Secure Transportation of Canada's Used Nuclear Fuel.**
- **Preliminary Assessment of Potential Suitability – Feasibility Studies.**  
**Summary of November 2013 Phase 1 Decisions.** This summary document outlined key decisions at the end of Step 3, Phase 1 for eight communities. Importantly, the document provides an overview of how the NWMO selected the smaller number of communities to proceed to the next phase of work.
- **Recognizing Community Leadership.** This program acknowledges the leadership of communities in implementing APM on behalf of all Canadians and provided monies for use in a Community Well-Being Reserve Fund by the community. In addition to providing the community material such as a community profile, and technical studies, which can be used for other purposes by the community, the community well-being funds ensure the community has benefited from its participation in the site selection process.
- **Phase 2 Study and Engagement.** This backgrounder builds on the description of the site selection process in the May 2010 *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* and *Preliminary Assessment of Potential Suitability* by providing additional detail about how work will proceed in this next phase of work. This document is published on the NWMO website and is intended to be shared with communities that completed Phase 1 studies and were selected to proceed to the next phase of work.

In addition, the NWMO continues to evolve its relationships with Aboriginal peoples, interested communities, and others to address the challenges associated with implementing APM which will be reflected in refinement of processes, and activities which will be reflected in future plans.



# **Social, Economic and Cultural Considerations**

The NWMO has adopted an integrated approach to Preliminary Assessments. As outlined in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* (2010), assessments focus on safety and community well-being, through study of many technical, scientific, and social requirements for the project. The preliminary assessments that take place in Step 3 of the nine-step site selection process are an opportunity for both the community and the NWMO to explore four key questions, namely:

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

These broad questions are addressed through a series of multidisciplinary studies. The factors these address include geoscientific suitability, engineering, transportation, environment and safety, as well as social, economic and cultural considerations.

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

Once confidence is established that safety requirements can be met, the potential for the project to help foster the well-being, or quality of life, of the local community and area in which it is implemented becomes an important consideration. At this stage of study, preliminary assessments in this area are designed to explore the potential for the project to align with the vision and objectives of the community, as well as the potential to help the community advance to the future it has set out for itself. It is understood that this project may not align with the vision and objectives of all communities. For this reason, preliminary assessment in this area is an important input to the siting decision.

The ability of the community to benefit from the project, and the resources that would be required from the NWMO to support the community in achieving this benefit, would be a consideration in the selection of a site after all safety considerations have been satisfied. The project will only be implemented in an area in which well-being will be fostered.

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

## Social, Economic and Cultural Factors in Preliminary Assessments

Phase 1 community well-being studies were focused on each community that expressed interest in learning about the project. For this reason, the studies addressed the subset of factors pertaining to the community. Phase 2 studies are designed to expand the assessment to consider factors related to the surrounding area, including its Aboriginal people. Criteria considered in community well-being studies include:

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

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

In order to ensure a broad, inclusive and holistic approach to assessment in these areas, a community well-being framework was identified to help understand and assess the potential effects of the APM Project. This framework was used to help:

- Explore the project;
- Understand how communities and the surrounding area might be affected should the project be implemented in the area; and
- Identify opportunities to leverage the project to achieve other objective important to people in the area.

In the future, broadened engagement may expand the framework through, for instance, insight from Indigenous science, ways of life and spiritual considerations.

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

1. **People or Human Assets.** How might the implementation of the project affect people?
2. **Economics or Economic Assets.** How might the implementation of the project affect economic activity and financial health of the area?
3. **Infrastructure or Physical Assets.** How might the implementation of the project affect infrastructure and the physical structures that the community has established?
4. **Society and Culture or Social Assets.** How might the implementation of the project affect the sense of belonging within the community and among residents, and the services and network of activities created to serve the needs of community members?
5. **Natural Environment or Natural Assets.** How might the implementation of the project affect the natural environment and the community's relationship with it?



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

## Findings From the First Eight Communities to Complete Phase 1 Social, Economic and Cultural Assessments

In 2013, Phase 1 preliminary assessments were completed in the first eight communities that entered the site selection process. Potential suitability was studied for each interested community, exploring the areas of safety and community well-being as described in the previous section. For each community, findings were presented in a series of assessment reports focusing on individual aspects of the studies and were summarized in a *Preliminary Assessment Report* that brings findings from individual studies together in a single document. Findings from these assessments are briefly summarized in the discussion that follows.

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

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

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

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

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

The preliminary assessments suggested the population and economic activity that would come with the project has the potential to benefit communities seeking to build out existing community infrastructure, enhance services, and expand population. It also has the potential to benefit communities that would prefer the project to be located away from the community using a more remote site model, with the community providing key personnel, services, and other support.

However, within some communities, there is ongoing debate and division about the amount and type of growth desired over the long term, and the studies suggested that the project has the potential to reinforce these divisions in some communities. If the project divides along the same lines as an ongoing and divisive conversation about the community's long-term vision, the NWMO judged the potential to align the project with the vision will be diminished, and continuing discussion may negatively affect community cohesion.

A project of this scope and scale has the potential to be transformational to a community and area in many ways. Communities have helped the NWMO understand that the potential effect of the project on other aspects of community life needs to be considered. These include:

- Connection with the land and with other community members;
- Ability to pursue activities such as hunting, fishing, gathering, and trapping, which may be of spiritual, cultural or personal importance;
- Sense of responsibility for protection of the Earth, future generations, and respect for all Creation; and
- Other aspects important to the way of life of a community.

The extent to which the project has the potential to align with community well-being in these important areas is considered a matter for the community to reflect upon and decide. Where community reflection and discussion suggested there is potential for fundamental conflict between the project and these aspects of community well-being, or where alignment is uncertain, the NWMO judged that the potential to foster the overall well-being of the community was lessened.

The assessments suggested that each of the communities has at least some potential to sustain interest in the project to support learning over an extended period. However, the communities differ in the magnitude of the challenge involved in sustaining interest, reflecting the unique social and political dynamics and interest in each of them. These included pre-existing divisions within some communities (related to, for example, community priorities), or negative experiences with other industries or initiatives that breed apprehension of mistrust in the APM Project. Where there are fundamental differences within a community about its future direction, the NWMO has observed less overall interest in learning about the project.

As well, where division in the community about this project falls along the same lines as historical divisions or divisions on other long-standing matters, the NWMO also observed lower levels of interest in learning. In communities where there are large challenges to be addressed in order to sustain interest, the NWMO judged there is less potential for continued learning and ultimately informed willingness within the planning horizon of the project.

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

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

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

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

## Reflection on Learning to Date

### The Importance of a Regional Approach

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

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

As well, the size and scale of APM is such that its implementation will not only have an effect on the local area in which it is sited, but it will also have an effect on those in the surrounding area.

It is understood that Aboriginal peoples and other communities in the surrounding area need to be involved in decision-making about the project and planning for its implementation if it were to proceed in the area. Only through working together can the project be harnessed to maximize benefits to the area, manage any negative effects that may result, and ensure it fosters long-term well-being and sustainability in a way that is consistent with the area's vision for the future.

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

### Managing Uncertainty

Through Phase 1 studies, the NWMO has developed a preliminary understanding of the potential for communities to meet the requirements of the project. In conducting these early studies, questions have been raised and uncertainties identified. These questions and uncertainties vary across communities and add to the complexity of decision-making at this point.

Given the preliminary phase of work along with the questions and uncertainties still to be addressed in the future to enhance understanding of suitability, the NWMO acknowledged the value of building diversity into the selection of communities and areas for future study. In light of the learning from preliminary assessment studies, the NWMO judged there to be value in deliberately selecting areas with different geological settings, as well as different social, economic and cultural characteristics. This is intended to help ensure that the NWMO actively explores the potential to ensure safety through study of a variety of geological conditions.

This is also intended to ensure the potential to foster community well-being and to develop the kinds of partnerships that will be required with communities, Aboriginal peoples, and other communities in the surrounding area to address the divergent interests and values of a range of communities.

The approach has the additional advantage of allowing for flexibility to readjust focus if further studies in a particular area yield unexpected developments. This flexibility will help ensure the ability to adapt the siting process in response to new learning from these studies. By ensuring a diversity of areas for future study and flexibility to respond to the learning that will emerge, the foundation for a future, robust siting decision can be further built upon.

## Early Phase of Study

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

Regarding safety, several more years of field studies and detailed site evaluations are required before the NWMO, the community and the regulator could be satisfied on the safety of the site.

In the interim, there is much more information to be gathered, data to be analyzed, questions to be answered, and uncertainties to be explored in collaboration with communities to better understand the potential of sites to meet requirements. Further research questions will be carried forward to Phase 2 to explore in greater depth the range of important geoscientific, environmental, transportation and engineering considerations key to assessing suitability and ensuring safety.

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



# Financial Reporting

The background of the slide features a large, abstract geometric shape in a light yellow color, resembling a stylized 'X' or a large arrow pointing downwards and to the right. To the right of this shape, there is a vertical strip of a blurred image showing a laptop screen and some papers, suggesting a business or financial context.



# Budget Forecast, 2014 to 2018

The *Nuclear Fuel Waste Act* requires that the triennial report include the budget forecast for the next five fiscal years to implement the strategic plan for the used fuel management program. This chapter presents the NWMO's five-year budget forecast for the 2014 to 2018 Adaptive Phased Management (APM) strategic plan, which is presented in Appendix 1, *Implementing Adaptive Phased Management 2014 to 2018*.

## NWMO's Annual Budget Process

The NWMO's business planning process begins with senior management's planning discussions to confirm proposed strategic directions and objectives for the five-year planning period. The development of each five-year plan takes into account the input received through public reviews of implementation plans and engagement activities. Each year, the five-year business plan is presented to the Board of Directors for a process of review and discussion. Budgets are approved on an annual basis. Each fall, the Board approves the budget for the upcoming fiscal year. The 2014–2018 strategic plan for APM is presented in Appendix 1, *Implementing Adaptive Phased Management 2014 to 2018*.

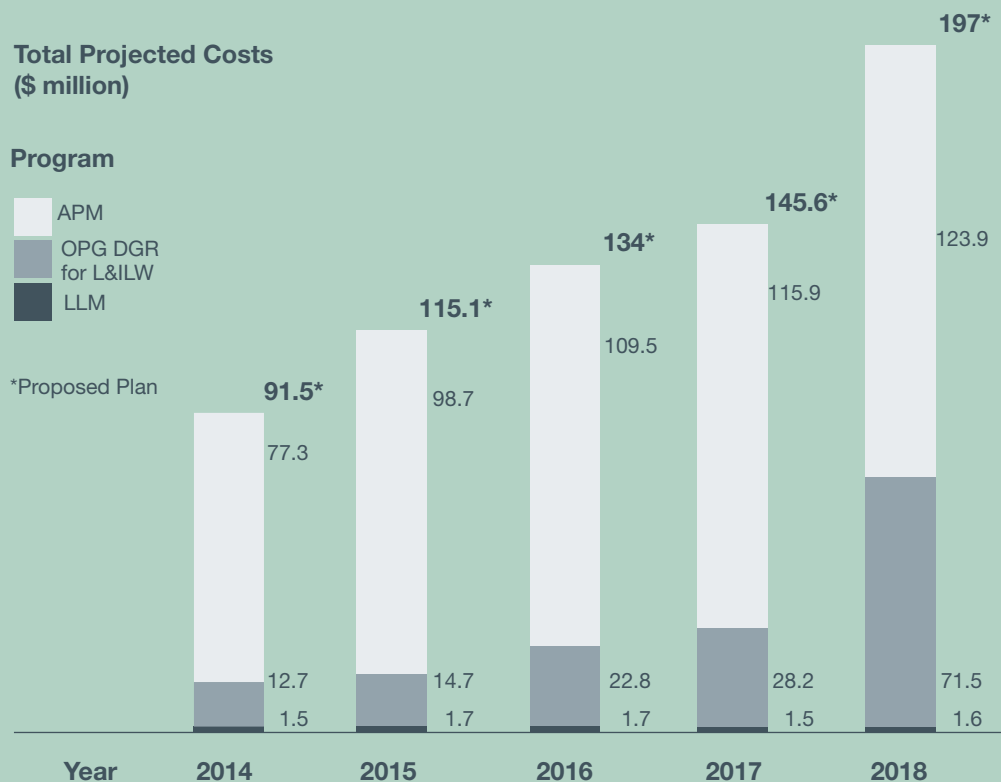
In addition to managing the implementation of APM, the NWMO leads two other major work program areas: development of Ontario Power Generation's (OPG) Deep Geologic Repository Project for Low and Intermediate Level Waste (L&ILW DGR), and Lifecycle Liability Management (LLM) Services.

The NWMO is managing the regulatory approvals phase of the L&ILW DGR project under contract to

OPG in accordance with the OPG/NWMO L&ILW DGR Services Agreement. A second contract was signed between OPG and the NWMO, whereby the NWMO will manage the design and construction phase of the L&ILW DGR project.

The NWMO provides LLM services to OPG under a contract whose terms are similar to those as for the L&ILW DGR. Work plan objectives for the LLM program include providing OPG with assistance in meeting its requirements related to the *Ontario Nuclear Funds Agreement (ONFA)*, the Canadian Nuclear Safety Commission (CNSC) Financial Guarantee, the Ontario Energy Board and the Financial Accounting Reporting, as well as providing annual report of lifecycle liability plan, cost estimates, fund contribution and supporting reports.

The total projected costs for the NWMO's activities in these three program areas for the period 2014 to 2018 are presented below.



In the section that follows, the five-year budget for APM is presented in detail.

## APM Budget Forecast, 2014 to 2018

The budget forecast supports the major APM work program objectives described in the five-year strategic plan in Appendix 1, *Implementing Adaptive Phased Management 2014 to 2018*. A summary of the work program costs in each of the seven strategic work program areas and common services is provided in the table below.

APM Projected Costs (\$ million)

Program	2014	2015	2016	2017	2018
Building relationships	3.5	4.2	4.3	4.4	4.4
Siting process	28.6	40.6	43.0	49.0	38.0
Adapting to change	0.4	0.9	0.6	0.6	0.6
Design development and safety case	17.3	23.3	28.6	28.3	46.6
Funding formula/ financial surety	0.0	0.1	0.1	0.1	0.1
Governance structure	0.6	0.6	0.6	0.6	0.7
Staffing	19.3	20.5	23.5	23.6	24.0
Common services	8.9	8.5	8.8	9.2	9.5
Bottom line adjustment	-1.3	0.0	0.0	0.0	0.0
<b>Proposed Plan</b>	<b>77.3</b>	<b>98.7</b>	<b>109.5</b>	<b>115.9</b>	<b>123.9</b>



## APM Project Costs

The 2014 to 2018 business plan period covers the next five years of implementation of APM. The strategic plan, set out in Appendix 1, *Implementing Adaptive Phased Management 2014 to 2018*, and the associated budget are based upon a set of planning assumptions and priorities:

- Implementation of APM will require a sustained commitment to building relationships. The NWMO has undertaken to implement Canada's plan collaboratively and with continued engagement of interested individuals and organizations. Such engagement will continue to be fundamental to the NWMO's work over the planning period. Relationship building will expand as communities, regions and Aboriginal peoples potentially affected by the site selection process are identified.
- The community-driven site selection process will advance over the planning period, consistent with *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* (May 2010). The budget forecast assumes that the NWMO should be prepared to work with communities as they request initial screenings and more detailed feasibility studies. Toward the end of the planning period, it is assumed that the NWMO should be prepared to advance the process to detailed site investigations.
- Adaptive management will continue to be a tenet of APM implementation. The NWMO will stay the course with continuous learning and tracking best practices. Ongoing tracking of energy policy and societal views will allow the NWMO to stay abreast of any implications for the volume and type of used nuclear fuel to be managed.
- The reference conceptual designs and safety case for a used fuel deep geological repository and transportation system will continue to be refined to ensure that the best knowledge and understanding are being applied. Joint activities will continue with our international partners to improve understanding of key processes and to improve confidence in the safety case for a deep geological repository.
- The NWMO has ongoing responsibility for ensuring that the cost estimates remain updated and that the funding formula will support the financing of all aspects of APM. Contributions will be adjusted periodically to reflect updated projections of overall costs of APM and the number of fuel bundles expected to be produced by each used fuel owner. An extensive update of the lifecycle cost estimate for the APM program will be concluded no later than 2017, forming the basis of the funding formula and trust fund deposits during the planning period.
- The NWMO is building an implementing organization with the full range of capabilities necessary to implement APM. The staffing plan takes into account future needs for regionally based staff and local information offices to support the site selection process in communities electing to enter the process.

With APM site selection formally initiated in 2010, the 2018 budget forecast shows an increase over the planning period. This assumption of gradual ramping up of activity is based on the expectation that the interested communities will proceed through the phases of the siting process, including capacity building, screenings, feasibility studies, and eventually, site investigation. The significant increase in budgetary projection in the latter part of the planning period assumes that the NWMO may need to be resourced to be active in detailed underground site characterization, should potentially interested communities have progressed to that stage of the siting process.

The site selection process is designed to move forward on a timeline determined by communities. It is difficult to predict when communities will engage; how many will enter the process; and how much time communities will wish to take as they engage citizens, Aboriginal peoples, and other surrounding communities in the consideration of the APM Project. The budget forecast reflects the NWMO's desire to be prepared and well-resourced to provide capacity-building opportunities to communities and to work collaboratively as they come forward. The NWMO is committed to a step wise and collaborative decision-making approach and will only proceed to the next step after careful consideration and only when satisfactory social conditions exist.

# Financial Reporting Requirements

The *Nuclear Fuel Waste Act* (NFWA) specifically addresses the future financial obligations for managing used fuel over the long term. The requirements of the Act are described in the box below. This section of the Triennial Report is structured to be consistent with requirements defined in subsection 16(2) of the NFWA.

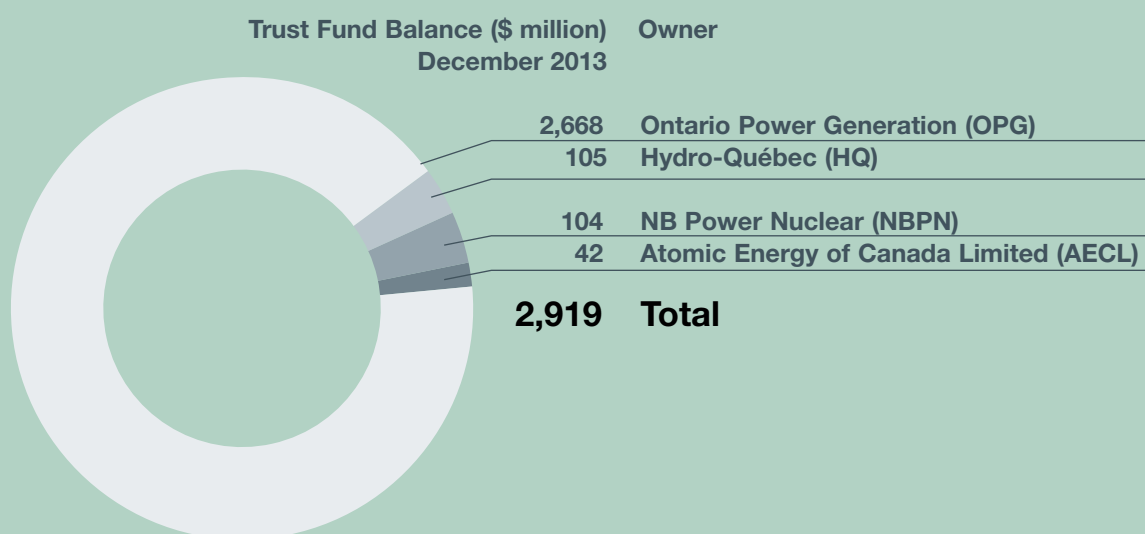
## Requirements of the NFWA (2002)

The NWMO is required to provide a range of financial information in each of its annual reports following the government's decision, as defined in subsection 16(2) of the NFWA.

### 16(2) Each annual report after the date of the decision of the Governor in Council under section 15 must include:

- (a) the form and amount of any financial guarantees that have been provided during that fiscal year by the nuclear energy corporations and Atomic Energy of Canada Limited under the *Nuclear Safety and Control Act* and relate to implementing the approach that the Governor in Council selects under section 15 or approves under subsection 20(5);
- (b) the updated estimated total cost of the management of nuclear fuel waste;
- (c) the budget forecast for the next fiscal year;
- (d) the proposed formula for the next fiscal year to calculate the amount required to finance the management of nuclear fuel waste and an explanation of the assumptions behind each term of the formula; and
- (e) the amount of the deposit required to be paid during the next fiscal year by each of the nuclear energy corporations and Atomic Energy of Canada Limited, and the rationale by which those respective amounts were arrived at.

The *NFWA* requires the establishment of trust funds by each waste owner. The funds were established in 2002, and annual contributions have been made by each waste owner since. The total value of these funds, including investment income, was approximately \$2.9 billion as of the end of 2013. This money is in addition to other segregated funds and financial guarantees the companies have set aside for nuclear waste management and decommissioning.



Experience in other countries has demonstrated the importance of safeguarding these funds so that they will be preserved for their intended purpose. The *NFWA* built in explicit provisions to ensure that the trust funds are maintained securely and used only for their intended purpose. The NWMO may have access to these funds only for the purpose of implementing the management approach selected by the Government once a construction or operating licence has been issued under the *Nuclear Safety and Control Act (NSCA)*.

These legislated obligations are the responsibilities of the individual companies named, and not the responsibility of the NWMO. The trust funds are noted here because of their significance in the overall provision for long-term nuclear waste management.

As required by the *NFWA*, the NWMO makes public the audited financial statements of the trust funds when they are provided by the financial institutions annually. They are posted at [www.nwmo.ca/trustfunds](http://www.nwmo.ca/trustfunds).

## Financial Guarantees as Required by *NFWA* Section 16(2)(a)

As specified in the *NFWA*, this report provides the form and amount of the financial guarantees that all NWMO members – OPG, HQ and NBPN have provided to the Canadian Nuclear Safety Commission (CNSC). These guarantees for year 2014 total \$16.9 billion and are provided to cover the total cost (in present value terms) of managing the decommissioning of all reactors and permanently managing all nuclear waste (including used nuclear fuel) produced to date. A large portion of these guarantees, approximately \$14.8 billion (as of year-end 2013), exist in segregated funds dedicated to nuclear waste management and decommissioning, with the remainder in the form of Provincial Guarantees.

Details of the status of these guarantees are presented below.

## Total Cost Estimate as Required by *NFWA* Section 16(2)(b)

The *NFWA* requires the NWMO to address the cost and funding of the long-term management of used nuclear fuel. The last full update of the cost estimates for the Adaptive Phased Management (APM) program was completed in 2011. This estimate provides the basis for financial planning and trust fund deposits for future years.

In producing an estimate for the long-term planning around the APM program, a number of system design and costing assumptions were adopted to guide the projections. Among these were:

- A. Engineering and conceptual design assumptions for the deep geological repository and transportation.
- B. Assumed repository capacity of 3.6 million fuel bundles.
- C. An in-service date of 2035 for the deep geological repository.
- D. Closure of repository in 2160.

Each component of APM costs was systematically addressed to develop a full lifecycle cost estimate. Allowances and contingencies are also included in the APM cost estimate to account for cost risks.

The 2011 cost estimate for the APM program for managing 3.6 million used nuclear fuel bundles is \$17.9 billion (2010 \$) or present value of \$7 billion (2010 \$). This cost estimate will form the baseline from which cost estimates for a used fuel inventory greater than 3.6 million can be derived.

When updated to January 1, 2014, present value, the estimate cost of APM is \$8.4 billion (for liabilities from 2014 onwards). Of the \$8.4 billion, approximately \$7 billion is the estimated cost of developing and building a repository, transporting the used fuel and operating the repository for the 2.4 million fuel bundles produced as of the end of June 2013. The \$7 billion present value cost estimate of a deep geological repository for the 2.4 million used fuel bundles includes \$2 billion to develop the repository to a point of obtaining a construction licence and \$5 billion to complete construction, transport the fuel to the repository, and operate, close and monitor the repository.



The costs of interim storage at the reactor sites and recovery of the used fuel from storage are not included as part of the \$8.4 billion cost estimate since they are the responsibility of the waste owners.

The next full update of baseline cost estimates is expected to be completed no later than the year 2017. In addition to a regular baseline cost estimates update on a five-year cycle, the NWMO is committed to providing annual assessments on all factors that impact these cost estimates. Any material change in the estimated cost estimates will be dealt with and disclosed in the NWMO Annual Report.

## Cost to Be Funded Through the *NFWA* Trusts

The *NFWA* requires that post-construction licence costs (currently estimated at \$5 billion) must be funded through contributions to the *NFWA* trust funds established by OPG, HQ, NBPN and AECL. As of December 2013, the total value of these funds, including investment income, was approximately \$2.9 billion.

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## Budget Forecast for 2014 as Required by the *NFWA* Section 16(2)(c)

In addition to making financial provision for work required post-construction licence, the NWMO will incur costs of approximately \$2 billion (as stated in present value as of January 1, 2014) to site the long-term management option, develop its detailed design, evaluate its environmental impacts, and obtain a site preparation and construction licence from the CNSC. For 2014, the NWMO Board of Directors approved a budget envelope of \$77.3 million. Annual costs beyond 2014 are subject to further review. Sharing of these costs will be in accordance with the percentages defined in the funding formula.

## Funding Formula as Required by *NFWA* Section 16(2)(d)

In accordance with the requirements under the *NFWA*, the NWMO proposed a funding formula to address the future financial costs of implementing the APM approach in its 2007 Annual Report. This followed the Government's selection, in June of 2007, of the APM approach to the long-term management of used fuel.

The funding principles used to develop the funding formula are consistent with the intent of the *NFWA*, the approach used by the CNSC for financial guarantees under the *NSCA*, and the approaches used in other member countries of the Organisation for Economic Co-operation and Development:

**Producer pays:** Each waste owner pays based on the quantity of waste produced and usage of the repository.

**Financial conservatism:** The highest cost option for implementing APM is used.

**Uncertainty analysis:** Provide for reasonably foreseeable and unforeseen events; contingencies are provided in the cost estimates.

**Intergenerational fairness:** Funds will be collected over the assumed economic life of the nuclear reactors producing the used fuel bundles.

**Fund growth:** Reasonable assumptions are used for real growth of funds to manage the used fuel over the long term.

The funding formula, based partly on projections of used fuel to be generated by each waste owner, allocates liabilities to each of the corporations for their portion of the estimated total cost. It identifies trust fund contributions by each nuclear waste owner for their portion of the estimated total cost. The funding formula was approved by the Minister of Natural Resources in April 2009.

## Cost Sharing

For the purpose of sharing NWMO costs, cost sharing has initially been done based on the number of fuel bundles produced as of June 30, 2006, adjusted to account for the assumed timing of transfer of used fuel to the repository. For OPG, this transfer is assumed to start in 2035. For HQ, NBPN and AECL, this transfer is assumed to start in 2050. The current cost-sharing percentage among the waste owners is approximately: OPG: 90.8%, HQ: 3.9%, NBPN: 4.2%, and AECL: 1.2%. These cost-sharing percentages are subject to periodic review and update.

These percentages apply to the sharing of both pre- and post-construction costs. Costs specific to a nuclear fuel waste owner, such as special fuel and special transportation costs that are owner-specific, are attributed to the owner.

## Possible Future Reactors

In response to the request of the Minister of Natural Resources, discussions were held with a number of stakeholders regarding the development of a funding formula that could apply to possible new waste owners and used fuel from new reactors. The results of the discussions are summarized below:

1. The principles used in the approved funding formula are reasonable and should apply to new owners and new reactors.
2. Fixed and variable costs and investments made to date need to be considered in any new funding formula for new owners and new reactors.
3. The characteristics of new fuel types must be considered.
4. The existing funding formula should be developed when specific circumstances are clear for new reactors and new owners.
5. The changes in funding formula for new owners of new reactors may be different than the changes for an existing owner with new reactors.

The NWMO proposed to apply the above principles to specific circumstances related to new owners and new reactors when they arise.

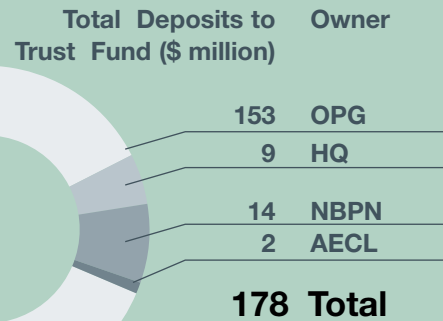
## Trust Fund Deposits 2009 to 2013 as Required by *NFWA* Section 16(2)(e)

Beginning in 2002, used nuclear fuel owners have been making annual contributions to the *NFWA* Trust Funds. The contributions for each waste owner are shown in the table on the next page.

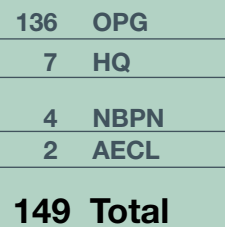
## Contributions to the *NFWA* Trust Funds

**2009\***

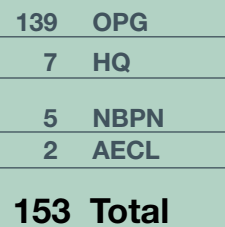
\*2009 contributions include additional funding required for 2008 contributions under the Funding Formula which was approved in April 2009.



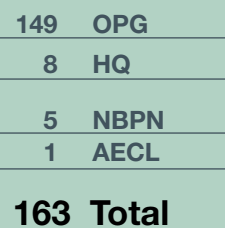
**2010**



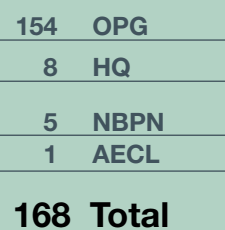
**2011**



**2012**



**2013**



## Trust Fund Deposits for 2014 as Required by *NFWA* Section 16(2)(e)

The *NFWA* trust fund deposits for 2014 stated herein have been developed based on the approved funding formula. Under this funding formula, the funding for the post-construction licence costs is divided into two parts:

1. Funding for historical used fuel bundles (Committed Liability)
2. Funding for used fuel to be produced each year (Future Liability)

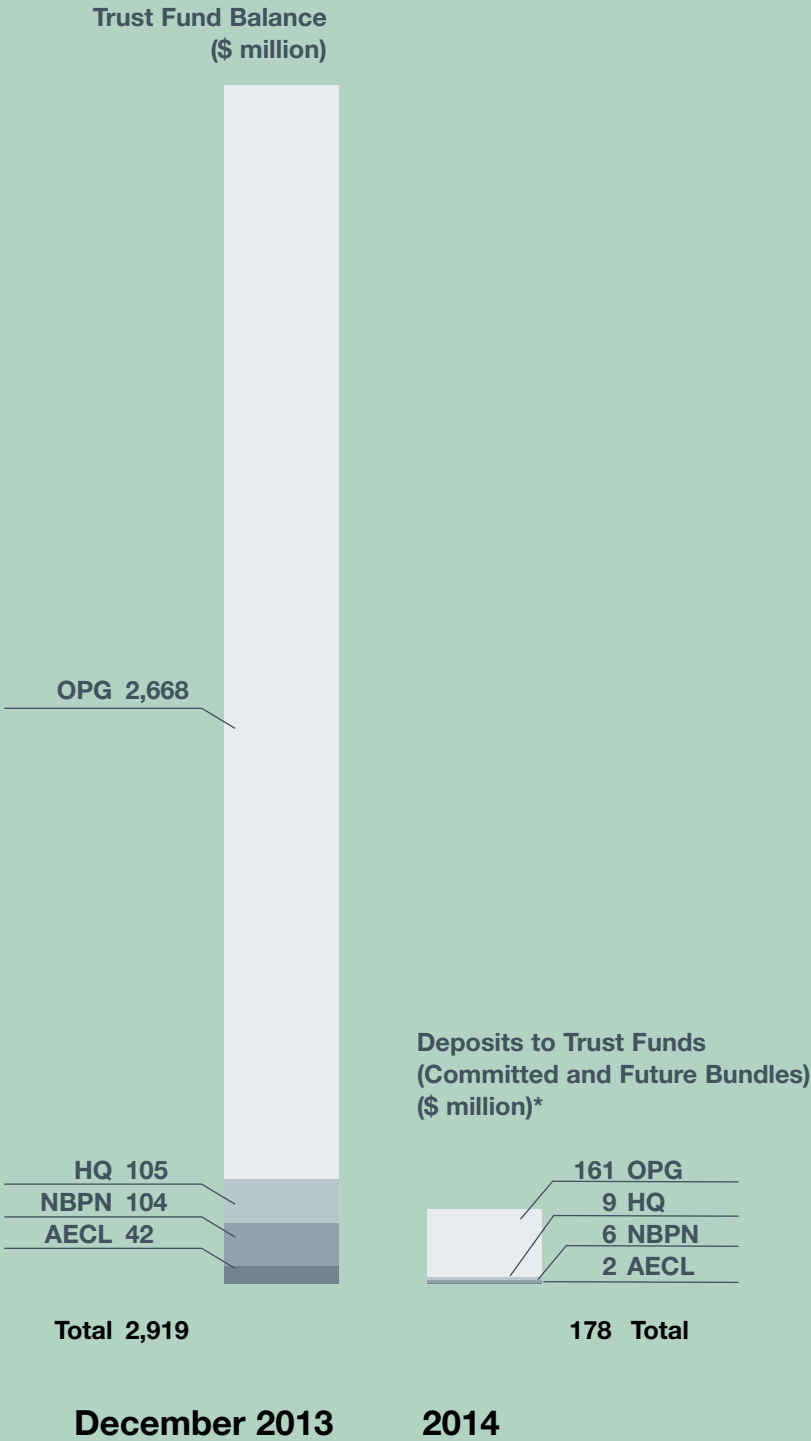
Committed Liability represents all costs that will be incurred regardless of whether any further used fuel bundles are generated in the future. This liability includes all fixed costs for the facility and variable costs attributed to the historical used fuel bundles. Contributions for the “committed” liability are to be amortized to the year 2035 in equal present value payments. The rationale for this amortization period is that 2035 is consistent with the earliest planned date when the deep geological repository would be available. This funding method has the advantage of distributing the funding obligations evenly to each year taking into account the time value of money.

Future Liability represents the incremental cost of transferring to the repository, facility expansion, and additional operating and monitoring costs of used fuel bundles to be produced each year. Each future used fuel bundle would incur the same cost in present value terms taking into account the time value of money.

The 2014 Trust Fund Deposits are shown in the table on the next page.



# Total Trust Fund Deposits: Year 2014



\*Annual trust fund deposits are required to be made within 30 days of the submission of the Annual Report. A deposit date of April 30 is assumed for illustrative purposes.

## Attachment 1

### Financial Guarantee Status – Used Fuel Owners

#### Ontario Power Generation Inc.

Effective July 31, 2003, OPG provided the CNSC with a Decommissioning Financial Guarantee that included a guarantee associated with the long-term management of used fuel arising from the operation of OPG-owned nuclear stations and waste management facilities, including those leased by Bruce Power. The Decommissioning Financial Guarantee also covers liabilities associated with long-term management of low- and intermediate-level waste, as well as plant decommissioning.

Development and maintenance of the Financial Guarantee considers the following points:

- The Financial Guarantee covers the liability based on projected waste arising to year end in any given year. As a result, the value of the used fuel Financial Guarantee changes annually to recognize the incremental cost associated with additional used fuel generated during that year.
- The initial Financial Guarantee submission covered the five-year period to year-end 2007. It has been updated twice since then, in 2007 and 2012 respectively. The latest approved 2012 Financial Guarantee submission covered from January 2013 to year-end 2017.
- The financial guarantee is satisfied in part by the actual accumulation of funds within both a Used Fuel Fund and a Decommissioning Fund under the *Ontario Nuclear Funds Agreement (ONFA)* between OPG and the Province of Ontario. This value is supplemented by a Provincial Guarantee which is executed between the Province of Ontario and the CNSC.
- The *NFWA* Trust Fund forms part of the Used Fuel Fund under the *ONFA*.

The Provincial Guarantee Agreement provides an unconditional and irrevocable guarantee to supplement monies set aside by OPG in segregated funds, including the *NFWA* Trust Fund, to satisfy the total Financial Guarantee required by the CNSC.

OPG submitted documents to the CNSC in 2012 to support its application to update the Financial Guarantee for the period from January 1, 2013, to year-end 2017. The CNSC hearing for this application was held in October 2012. The CNSC accepted the Financial Guarantee proposal on December 20, 2012.

The Annual Report to the CNSC for year 2014 shows a Financial Guarantee requirement of \$14,840 million. This will be satisfied by a 2013 year-end Used Fuel Fund balance of \$7,516 million, a Decommissioning Fund balance of \$6,579 million and a Provincial Guarantee of \$1,551 million for a total available guarantee of \$15,646 million.

The value of the OPG *NFWA* Trust Fund as of year-end 2013 is \$2,668 million. This value forms part of the segregated fund balance shown above.

## Hydro-Québec

HQ has provided the CNSC with a Decommissioning Financial Guarantee of \$685 million stated in present value as of June 30, 2016, that includes a guarantee associated with used fuel arising from the operation of Gentilly-2 and the cost of station decommissioning, including the long-term management of low- and intermediate-level radioactive waste.

- The total guarantee is made up of \$340 million for decommissioning and long-term management of low- and intermediate-level radioactive waste and \$345 million for used fuel.
- The guarantee is in the form of an expressed commitment of the Province of Quebec to HQ that provides a guarantee of payment.
- The HQ *NFWA* Trust Fund contained \$105 million as of December 31, 2013, and the fair value is estimated at \$117 million.

## NB Power Nuclear

NBPN has provided the CNSC with a Decommissioning Financial Guarantee that includes costs associated with the long-term management of used fuel projected to be produced from the Point Lepreau Generating Station and the cost of station decommissioning, including the long-term management of low- and intermediate-level radioactive waste.

- The current used fuel financial guarantee is based on the present value of future costs to manage used fuel produced to the end of 2014. The fund will be increased annually based on future used fuel production estimates.
- The financial guarantee requirement is satisfied by three separate funds: a Used Fuel Fund, a Station Decommissioning Fund, and the *NFWA* Trust Fund.
- The total market value of the funds at December 31, 2013, was approximately \$587 million and was comprised of the following:
  - » Used Fuel Fund – \$293 million
  - » Station Decommissioning Fund – \$190 million
  - » *NFWA* Trust Fund – \$104 million

## Atomic Energy of Canada Limited

AECL is not a member of the NWMO. Its financial guarantee is in the form of an expressed commitment by the Government of Canada to the CNSC combined with supporting estimates of the financial liability and the basis for same. The AECL *NFWA* Trust Fund contained approximately \$42 million as of December 31, 2013.

# The Organization

The background of the slide features a large, abstract geometric design. A prominent yellow chevron shape points towards the bottom right, overlapping a lighter yellow background. On the right side, there is a vertical blue-grey band that contains a blurred image of a modern building with glass windows.

nmme



# Members, Board of Directors, Officers

## **THE MEMBERS:**

The NWMO was established in 2002 by Canada's nuclear electricity generators, following passage by the federal government of the *Nuclear Fuel Waste Act (NFWA)*. Ontario Power Generation (OPG), New Brunswick Power Corporation and Hydro-Québec (HQ) are the founding Members, and along with Atomic Energy of Canada Limited (AECL), are required to fund the NWMO's operations.

## **Board of Directors**

The Board of Directors is responsible for oversight of the organization and taking a leadership role in the development of the corporation's strategic direction.

As of December 31, 2013, the Board was composed of eight directors.

Dr. Gary Kugler served as Chairman, and Mr. Ken Nash as President and CEO. Of the remaining seven directors, Ms. Josée Pilon was appointed by HQ; Mr. Darren Murphy by the New Brunswick Power Corporation; and Mr. C. Ian Ross, Mr. Ron Jamieson, Dr. Deborah Poff, and Mr. Pierre Charlebois by OPG.

All eight members served during the period covered by this report (2011 to 2013).

In that time, the Board of Directors convened 12 formal meetings and a conference call, in addition to which the four Committees of the Board met a total of 47 times. In 2011, it provided comment on the NWMO's Triennial Report for 2008 to 2010, and in 2012 and 2013, it provided comment on the respective Annual Reports for the preceding year. In all three years, it approved the audited financial statements, which were subsequently presented to the NWMO Members at the Annual General Meeting. The Directors also reviewed and approved the NWMO's Performance Objectives and Measures for each year, as well as the three five-year NWMO business plans produced between 2011 and 2013. The Board held several discussions related to strategic decisions and the future direction of the NWMO.

In 2011, the directors visited two of the NWMO's sister organizations: the Swedish Nuclear Fuel and Waste Management Company – SKB, and Finland's Posiva. This fact-finding mission was part of the Board's mandate to understand international best practices in used fuel management. The goal was to reach a more detailed understanding of the Swedish and Finnish programs, and to learn how the NWMO compares.

The Board's other activities between 2011 and 2013 included:

- Ongoing review and discussion of the NWMO's activities related to the site selection process, with detailed discussions about the timelines for suspending the expressions of interest phase, and briefings on the communities expressing an interest in learning more about the project;
- Discussions about completed Phase 1 preliminary assessments;
- Discussions about capacity building in communities that choose to proceed to Phase 2 preliminary assessments;
- Ongoing review of the NWMO's business risks and strategic Board decisions;
- Ongoing review of the projected overall cost of the project leading up to getting a construction licence;
- A review of the lifecycle cost estimate for Adaptive Phased Management (APM);
- Development of occupational health and safety policies and procedures in preparation for field-work;
- Annual reviews of the Advisory Council's recommendations, including the recommendations set out in the present Triennial Report;
- Reviews of the Advisory Council's Terms of Reference, composition, and membership as the terms of individual members expired and the site selection process moved forward;
- Reviews of the ongoing implementation of service agreements with OPG related to the work on OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste;
- Discussion of the NWMO's business planning assumptions for the provision of services for both the regulatory approvals and design and construction phases for OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste;
- Updates on the public hearing process held by the Joint Review Panel reviewing the Environmental Impact Statement and other documents submitted in support of OPG's application for a Site Preparation and Construction Licence for the project;
- Reviews of the annual reports prepared by the Independent Technical Review Group;
- Reviews of illustrative safety assessments submitted to the Canadian Nuclear Safety Commission;
- Discussions of different container technologies and international advances in this field;
- A briefing (in 2013) on developing linkages between Western ecological knowledge and Indigenous ecological knowledge;
- Redevelopment of the Elders Forum and ongoing updates on the successor Council of Elders;
- Carrying out the transition required under the new *Canada Not-for-Profit Corporations Act*;
- A briefing on the US Blue Ribbon Commission on America's Nuclear Future;
- Briefings on and discussions about transportation planning; and
- Reviews of benchmarking information used by nuclear waste management organizations in other countries.

## Committees of the Board of Directors

### Audit, Finance and Risk Committee

The committee met a total of 15 times between 2011 and 2013.

During that period of time, the committee provided oversight of external audits of the NWMO's financial statements. The committee also advised the Board annually on the selection of auditors for the following year and the terms of the Audit Service Plan. Meetings were held with the auditors each year to discuss their findings.

The committee also regularly reviewed in-year financial statements and reported its findings to the Board at large. The committee reviewed the NWMO's audited pension and financial statements and recommends approval. The committee's other activities included reviews of:

- The NWMO's business plans;
- Business risk;
- Updated cost estimates for APM;
- Strategies for publicly communicating updated APM cost estimates;
- Expenses reported by the Chairman, the President and the organization's top five executives;
- The NWMO's financial position reports;
- The Project Authority Register for the NWMO's contractual work on behalf of OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste;
- The organization's performance objectives and measures;
- The NWMO's financial policies;
- The NWMO's organizational authority registers;
- Pension plan performance and related developments;
- The APM engagement audit plan;
- Plans to update the reference plans for the *Ontario Nuclear Funds Agreement*;
- Work in the Lifecycle Liability Management area;
- The committee's charter;
- The *NFWA* trust fund contributions; and
- The adoption, in 2012, of the new Canadian Institute of Chartered Accountants accounting standards for not-for-profit organizations, and accounting standards for private enterprises for topics not addressed by the not-for-profit standards.

In June 2012 and June 2013, a joint meeting of the Audit, Finance and Risk Committee, and the Human Resources and Compensation Committee was held to review the NWMO's pension plan funding and sustainability.

As of December 31, 2013, there were four directors on the committee:

- Ian Ross, Chair;
- Ron Jamieson;
- Josée Pilon; and
- Donn Hanbidge (to December 2013).

### Siting Committee

The committee met a total of 12 times between 2011 and 2013.

The committee provides a vehicle through which the Board may maintain close oversight of the site selection process, while also managing the risks associated with its implementation.

Its activities between 2011 and 2013 included:

- A review of the activities underway in communities engaged in the site selection process;
- A review of the initial screenings conducted in Step 2 of the site selection process;
- A review of the timing and communication of the suspension of the expressions of interest phase of the site selection process;
- Discussion of the preliminary community assessments in Step 3 of the site selection process, plus advanced planning for the fieldwork phase;
- Ongoing updates about the external environment in which the site selection process is unfolding, plus the relationship-building work the NWMO has engaged in to ensure that the choice to host the site is made by an informed and willing community;
- Discussions about ensuring well-being for the community hosting a repository;
- A review of the accommodation of Aboriginal peoples in the site selection process, including a discussion of the importance of encouraging interested communities to involve neighbouring Aboriginal communities in that process;
- Discussions about incorporating Aboriginal Traditional Knowledge wherever possible;
- A review of the processes for acquiring Crown lands;
- Review of the transition from the Elders Forum to the successor Council of Elders;
- A review of the Siting Committee charter;
- A review of completed Phase 1 preliminary assessments;
- Preparations for the next steps in the site selection process, including recognition of the significant contributions made by communities in advancing Canada's plan for the long-term management of the nation's used nuclear fuel; and
- Discussions of capacity-building programs for the subset of communities proceeding to the fieldwork phase (Phase 2) of preliminary assessments.

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As of December 31, 2013, there were four directors on the committee:

- Ron Jamieson, Chair;
- Deborah Poff;
- Darren Murphy; and
- Pierre Charlebois.



### Human Resources and Compensation Committee

The committee met a total of 12 times between 2011 and 2013. It also held two joint meetings with the Audit, Finance and Risk Committee to discuss NWMO pension plan funding and sustainability.

The committee is responsible for overseeing the NWMO's human resource functions, including compensation practices, human resources policy, organization design, labour relations, and the pension plan.

As of December 31, 2013, there were four directors on the committee:

- Ian Ross, Chair;
- Pierre Charlebois;
- Josée Pilon; and
- Deborah Poff.

### Low- and Intermediate-Level Waste (L&ILW) Deep Geologic Repository Oversight Committee

The committee met a total of eight times between 2011 and 2013.

The L&ILW Deep Geologic Repository Oversight Committee has responsibility for monitoring the NWMO's role in managing the regulatory approvals, engineering, procurement and construction of OPG's Deep Geologic Repository Project in Kincardine, Ontario. This includes review of the NWMO's performance under its Deep Geologic Repository Services Agreement, and Engineering, Procurement and Construction Management Agreement with OPG, as well as risk management related to the project.

In 2012, the committee toured Lake Shore Gold's Timmins West mine (Ontario) and the IAMGOLD's Westwood mine near Rouyn-Noranda (Quebec). The two projects provided the opportunity for committee members to observe features similar to those proposed for the OPG L&ILW Deep Geologic Repository Project at a recently completed shaft-sinking project in operation and a shaft under development.

Other activities between 2011 and 2013 included:

- Progress updates on the regulatory review and detailed design phases of work;
- Risk reviews;
- Discussions about contracting plans;
- A review of occupational health and safety policy, procedures and performance;
- Reviews of performance objectives for the L&ILW deep geologic repository work;
- Reviews of the progress of the regulatory review phase of the work, including the work initiated by the Joint Review Panel in 2012; and
- A review of the committee's charter.

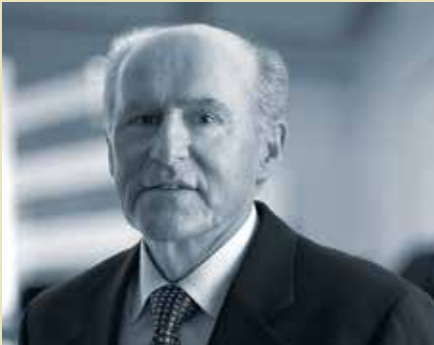
As of December 31, 2013, the committee had five members:

- Gary Kugler, Chair;
- Ian Ross;
- Donn Hanbidge (to December 2013);
- Morris Medd (non-director committee member); and
- Wolf Seidler (non-director committee member).





## Members of the Board of Directors



### **Gary Kugler – Chair**

Dr. Gary Kugler is the retired Senior Vice-President of Nuclear Products and Services at AECL, where he was responsible for AECL's commercial operations. During his 34 years with AECL, he held various technical, project management, business development and executive positions. Prior to joining AECL, he served as a pilot in the Canadian Air Force. Dr. Kugler is a graduate of the Institute of Corporate Directors' Director Education Program and also serves on the Board of OPG, as well as the Board of Perma-Fix Environmental Services. He holds an Honours B.Sc. in Physics and a PhD in Nuclear Physics from McMaster University.



### **Ken Nash – President and CEO of the NWMO**

Mr. Ken Nash is a founding director of the NWMO and the immediate past chair of the organization's Board of Directors. He has held a number of senior management positions at Ontario Hydro and OPG in the areas of finance, engineering and environmental management, and most recently was Senior Vice-President of the Nuclear Waste Management Division. He is also past chair of EDRAM, an association of waste management organizations from 10 countries, including Canada.



### **Pierre Charlebois**

Mr. Pierre Charlebois is the retired Executive Vice-President and Chief Operating Officer at OPG, and was responsible for the operation of OPG's nuclear, hydro and fossil businesses. From December 2003 to November 2006, Mr. Charlebois served as Chief Nuclear Officer, responsible for overseeing OPG's nuclear generation business and its performance. Mr. Charlebois graduated from Ottawa University in 1975 with a bachelor's degree in Applied Science. He is a member of the Professional Engineers of Ontario.



#### **Ronald (Ron) L. Jamieson**

Mr. Ron Jamieson is a member of the Board of Directors of the Ontario Power Authority. Prior to his retirement in late 2005, he served as Senior Vice-President of Aboriginal Banking at BMO Financial Group. Mr. Jamieson has held several senior executive positions in the financial services industry. Throughout his career, he has also been active in economic development initiatives for Aboriginal communities across Canada. Mr. Jamieson also served as Chairman, President and CEO of Ontario Energy Corporation, whose mandate was to invest or participate in energy projects throughout Canada. He is also Chairman of the Canadian Council for Aboriginal Business and was recently named President of First Canadian Property Investments Ltd.



#### **Darren Murphy**

In June 2012, Mr. Darren Murphy was appointed Vice-President of Corporate Services and Chief Financial Officer at NB Power. His areas of responsibility include finance, human resources, information systems, voice services, environment and regulatory affairs. Mr. Murphy joined NB Power's executive team in 2007, and in addition to his current role, he has held a number of executive positions, including Vice-President of Distribution and Customer Service, and Vice-President of Transmission. He had worked for over 17 years in Distribution field operations before joining the executive team. Mr. Murphy is a member of the Board of Directors for the New Brunswick Investment Management Corporation and the New Brunswick Energy Marketing Corporation.



#### **Josée Pilon**

Ms. Josée Pilon is an MBA graduate of Laval University. She is member of the steering committee on the evaluation project for the rehabilitation of Gentilly-2. As a special projects manager, she is responsible for evaluating business opportunities for new sources of energy from the private sector, including wind power, biomass and hydroelectric. She is also involved on the financial impact evaluation of new hydroelectric projects on municipalities. Prior to her current position, she held numerous business development positions in international projects.



**Deborah C. Poff**

Dr. Deborah Poff holds the position of President and Vice-Chancellor at Brandon University in Manitoba. Previously, Dr. Poff was a Professor of Philosophy and Political Science at the University of Northern British Columbia (UNBC). From 1994 to 2004, she was Vice-President and Provost at UNBC. In 2004, she was awarded a Fellowship in Public Policy with the Sheldon Chumir Foundation in Ethical Leadership. She is the co-founder and editor of the *Journal of Business Ethics*, and editor-in-chief of the *Journal of Academic Ethics*. She is the editor of *Business Ethics in Canada*, and the section editor on business and economic ethics of *Encyclopedia of Applied Ethics*, published by Elsevier in 2012. She recently co-edited *Citation Classics from the Journal of Business Ethics: Celebrating the First Thirty Years of Publication* with Springer.



**C. Ian Ross**

Mr. Ian Ross served at the Richard Ivey School of Business at Western University from 1997 to 2003. During that time, he was Senior Director, Administration in the Dean's Office, and was also Executive in Residence for the School's Institute for Entrepreneurship, Innovation and Growth. He has served as Governor, President and CEO of Ortech Corporation; Chairman, President and CEO of Provincial Papers Inc.; and President and CEO of Paperboard Industries Corp. Mr. Ross currently serves as a director for a number of corporations, including OPG, and is Chair of GrowthWorks Canadian Fund Ltd. He is also a member of the Law Society of Upper Canada.



**Donn Hanbidge**

Director

(September 25, 2008 – December 13, 2013)

## Officers

### Chairman of the Board

Dr. Gary Kugler

### President and CEO

Kenneth E. Nash

### Vice-Presidents

Angelo Castellan – Environmental Assessment and Corporate Support

Michael Hung – Treasurer and Chief Financial Officer

Frank King – Safety and Licensing (to November 2013)

Patrick Moran – General Counsel and Corporate Secretary

Sean O'Dwyer – Human Resources

Kathryn Shaver – APM Engagement and Site Selection

Derek Wilson – Design and Construction

### Executive Committee

Kenneth E. Nash – President and CEO

Angelo Castellan – Environmental Assessment and Corporate Support

Chris Hatton – APM Repository Design Development

Michael Hung – Treasurer and Chief Financial Officer

Frank King – Safety and Licensing (to November 2013)

Patrick Moran – General Counsel and Corporate Secretary

Sean O'Dwyer – Human Resources

Sean Russell – APM Repository Research and Development

Kathryn Shaver – APM Engagement and Site Selection

Derek Wilson – Design and Construction

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(From left to right)  
Kenneth E. Nash  
Angelo Castellan  
Chris Hatton  
Michael Hung  
Patrick Moran  
Sean O'Dwyer  
Sean Russell  
Kathryn Shaver  
Derek Wilson



# The NWMO Team

As of December 31, 2013, the NWMO had 130 full-time staff.

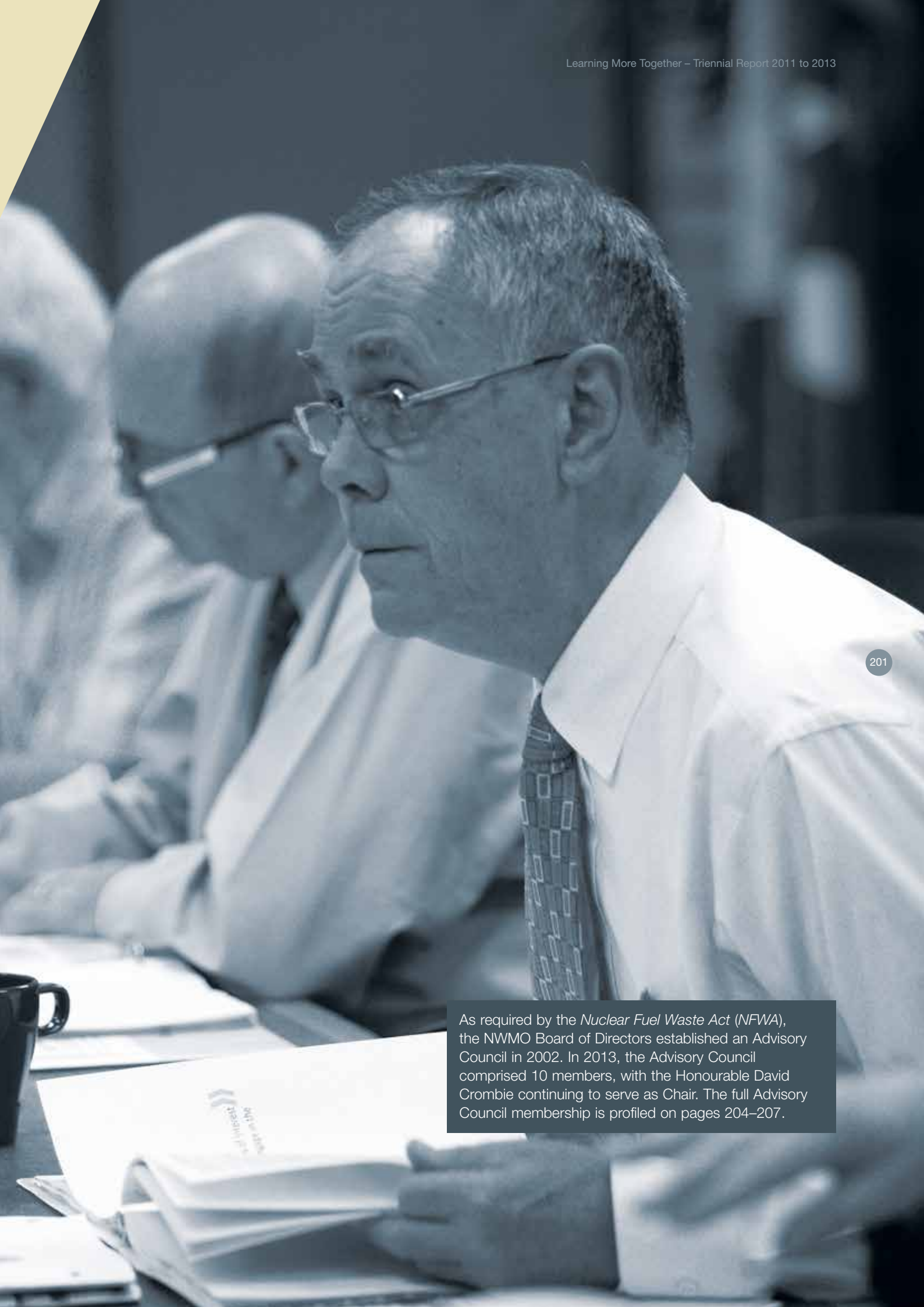
## **HEAD OFFICE**

22 St. Clair Avenue East, 6th Floor  
Toronto, Ontario M4T 2S3  
Canada



# Advisory Council





As required by the *Nuclear Fuel Waste Act (NFWA)*, the NWMO Board of Directors established an Advisory Council in 2002. In 2013, the Advisory Council comprised 10 members, with the Honourable David Crombie continuing to serve as Chair. The full Advisory Council membership is profiled on pages 204–207.

The Advisory Council comprises individuals knowledgeable in nuclear waste management issues and experienced in working with citizens and communities on a range of public policy issues. Member expertise ranges from government and geosciences to strategic communications, applied ethics, and Aboriginal Traditional Knowledge.

## Statutory Reporting Requirements

Under the *NFWA*, the Advisory Council is required to provide its independent comments on the NWMO's work for inclusion in the triennial reports. These comments include the Council's observations on the results of the NWMO's work over the previous three years, the results of the NWMO's public consultations during those three years, the NWMO's strategic plan for the next five years, and the budget forecast for implementing that strategic plan. The Council's comments are presented in chapter 12.2 (*Report of the Advisory Council*).

## Council Operations

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The Advisory Council meets regularly with the NWMO to review the organization's plans and provide ongoing advice on a range of topics. At each meeting, Council members are updated on plans under development, milestones in the technical and social research programs, and public engagement activities and findings. Agendas often incorporate topics selected by the Council as items of interest for discussion, and include presentations by management and staff to support the Council's deliberations. Each Advisory Council meeting includes an *in-camera* session where members reflect privately in the absence of NWMO staff or management.

At the Advisory Council's request, formal minutes of its meetings are recorded and posted on the NWMO website at [www.nwmo.ca/advisorycouncilminutes](http://www.nwmo.ca/advisorycouncilminutes).

Individual Council members often participate in the NWMO activities outside formal Council meetings in order to directly observe engagement activities and consider issues raised by dialogue participants.

The Advisory Council Chair has direct access to NWMO Board meetings to ensure a comprehensive exchange of information and to provide a conduit for the Chair to keep the Council fully informed on Board matters, and vice versa. Council members and the Directors meet annually for an informal exchange of views.





## Advisory Council Membership

Current appointments to the Advisory Council are for three years each, and are based on several criteria: the type of work the NWMO will be engaged in going forward, the expertise that work will require, and the specific provisions of the *NFWA*. With the NWMO now focused on collaboratively implementing the site selection process, the Board of Directors asked the Council for advice on the sorts of expertise it should be looking for in appointing new members. Among the areas members identified was a background in ethics. To meet this need, Dr. Wesley Cragg was appointed to the Council at the beginning of 2012.

In 2011, Council members reviewed proposed revisions to the Council's Terms of Reference for consideration by the Board of Directors.

For a discussion of the Advisory Council's work over the past three years, please see its independent report in chapter 12.2 (*Report of the Advisory Council*).



# Members of the Advisory Council



(From left to right)  
Michel R. Rhéaume  
Donald Obonsawin  
Dougal McCreath  
Wesley Cragg  
Eva Ligeti  
David Crombie  
Marlyn Cook  
Derek Lister  
Frederick Gilbert  
David R. Cameron



**David Crombie – Chair**

The Honourable David Crombie is the President of David Crombie and Associates, the Chair of Toronto Lands Corporation, and past Chair of Ontario Place. He is the immediate past President and CEO of the Canadian Urban Institute. He is also a past mayor of the City of Toronto and a Privy Councillor. Mr. Crombie was the first Chancellor of Ryerson University and is the recipient of honorary doctorates of law from the University of Toronto and the University of Waterloo. Mr. Crombie is an Officer of the Order of Canada and of the Order of Ontario.

**David R. Cameron**

Dr. David Cameron, a Fellow of the Royal Society of Canada, is a Professor of Political Science at the University of Toronto. His professional career has been divided between public service – in Ottawa and at Queen's Park, Ontario – and academic life. A longtime student of Canadian federalism and Quebec nationalism, he has turned his attention to constitution-making and government design in conflict and post-conflict situations in Sri Lanka, Iraq, Somalia, the Western Sahara and Jerusalem. He is currently the interim Dean of the Faculty of Arts and Science at the University of Toronto.

**Marlyn Cook**

Dr. Marlyn Cook is presently working in the community of Pikangikum First Nation in northwestern Ontario and her home community of Grand Rapids. She was the Chief of Staff and Director of the Traditional Healing Program with Weeneebayko General Hospital in Moose Factory, Ontario. Dr. Cook is Cree and a member of the Grand Rapids First Nation in northern Manitoba. She has practised medicine in the Mohawk community of Akwesasne, in Sioux Lookout Zone and in a number of northern Aboriginal communities in Manitoba. She is active in her community serving as an advisor and Board member to a number of organizations. Dr. Cook is known for her work blending Western and Traditional medicine, and has been involved with sharing this knowledge with medical students and doctors throughout Canada. Her belief is that healing needs to be focused on all aspects of the person – spiritual, mental, physical and emotional.

**Wesley Cragg**

Dr. Wesley Cragg is a graduate of the Universities of Alberta (BA Hon. and MA) and Oxford (B.Phil. and D.Phil.) which he attended as a Rhodes Scholar. He was appointed the first George R. Gardiner Professor of Business Ethics at York University's Schulich School of Business (1992 to 2006) where he launched Schulich's MBA Program in Business Ethics. He is the Founding Chair and President of Transparency International Canada (1993 to 2006), a former President of the John Howard Society of Canada and the Canadian Philosophy Association, and a longtime member of the Boards of the John Howard Society of Sudbury, Ontario and Canada. Dr. Cragg is currently a York University Senior Scholar, a Schulich School of Business Professor of Business Ethics and the Director of CBERN (Canadian Business Ethics Research Network), national, Social Sciences and Humanities funded network. Dr. Cragg is the author and editor of several books on a variety of themes in business and applied ethics and the philosophy of law, and widely published in Canadian and international journals.

**Frederick Gilbert**

Dr. Frederick Gilbert is the past President and Vice-Chancellor of Lakehead University in Thunder Bay, Ontario. Dr. Gilbert has had an extensive teaching, research and administrative career in the United States and Canada at Lakehead University, Colorado State University, the University of Northern British Columbia, Washington State University, the University of Guelph, and the University of Maine, and also has held several environmental and wildlife management public service appointments and positions. He has retired to Nova Scotia where he has started an organic farming operation.

**Eva Ligeti**

Eva Ligeti teaches Environmental Law and Policy in the graduate program in Environmental Science at the University of Toronto. As the Executive Director of the Clean Air Partnership, she worked to make Toronto more environmentally sustainable and a world leader in clean air. A lawyer, she served as Ontario's first Environmental Commissioner from 1994 to 1999. Ms. Ligeti has served on numerous boards and committees, including the Council of the Federation of Canadian Municipalities' Green Municipal Fund, as a member of the Province of Ontario's Expert Panel on Climate Change Adaptation, and as a co-chair of the Greening Greater Toronto Task Force.

**Derek Lister**

Dr. Derek Lister is Professor Emeritus in the Chemical Engineering Department at the University of New Brunswick in Fredericton, where he also holds the Research Chair in Nuclear Engineering. His main research interests are in chemistry and corrosion associated with nuclear and other power systems, areas in which he has published widely. He holds positions on a number of national and international committees advising government and industry.

**Dougal McCreath**

Dr. Dougal McCreath is Professor Emeritus in the Bharti School of Engineering at Laurentian University in Sudbury, Ontario. A Fellow of both the Engineering Institute of Canada and the Canadian Academy of Engineering, he has wide teaching, research and international consulting interests, ranging from the design of deep underground excavations to the recovery and sustainability of damaged ecosystems. He has served on two Canadian Environmental Assessment Agency review panels dealing with nuclear related issues.

**Donald Obonsawin**

Donald Obonsawin is the founder and President of DIRECTIONS, a management consulting company that provides policy, management and strategic planning services. From 2003 to 2007, he was President and CEO of Jonview Canada Inc. Previous to that, he enjoyed a 25-year career in both the provincial and federal public services, including 15 years as Deputy Minister of seven Ontario government ministries. He also held senior positions with the federal departments of Indian Affairs and Northern Development Canada, and Health and Welfare Canada. Mr. Obonsawin is a member of the Abenaki First Nation of Odanak.

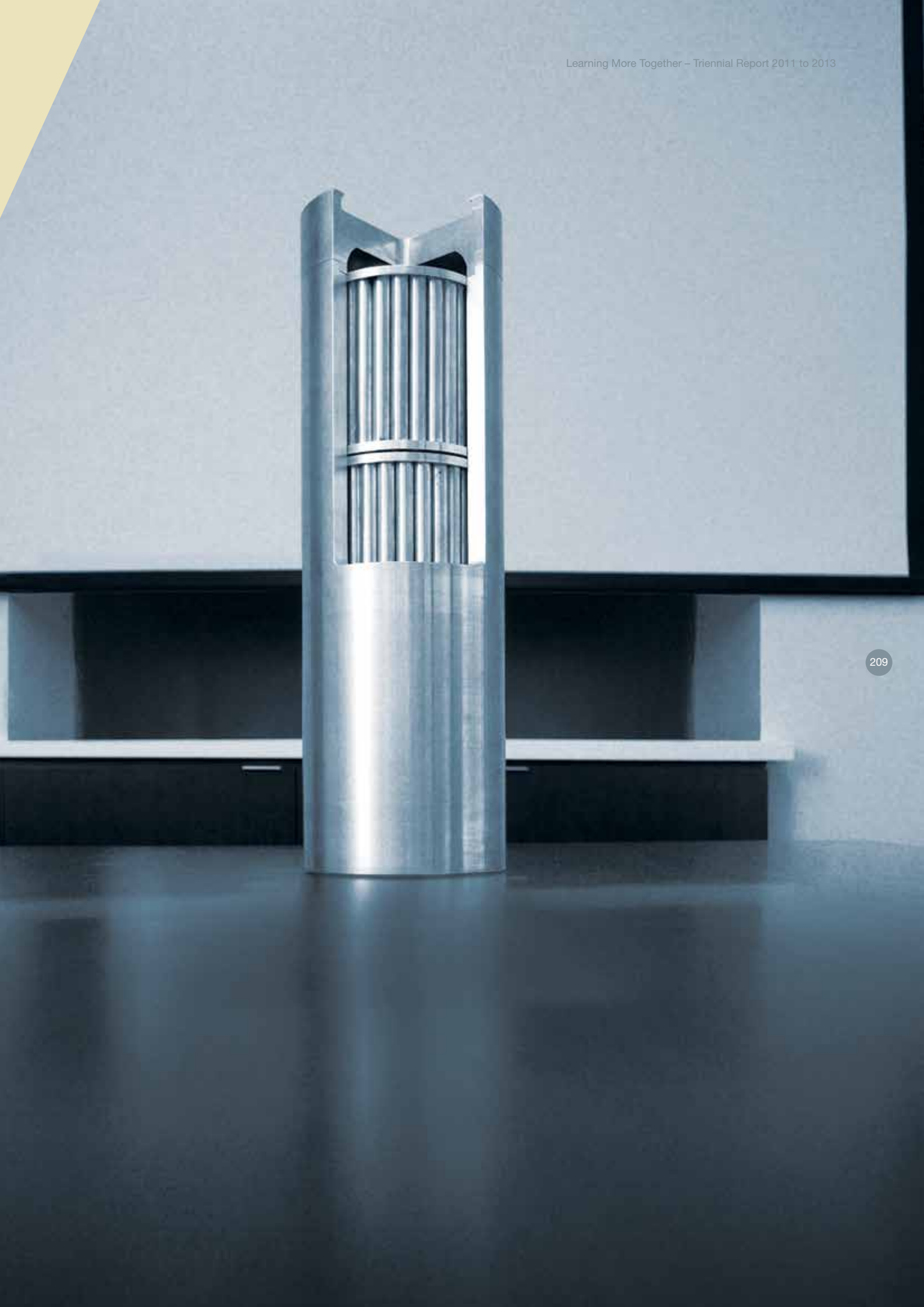
**Michel R. Rhéaume**

Michel R. Rhéaume is the CEO of RHEM Technologies Inc. in Grand-Mère, Quebec, a company specializing in health physics. Mr. Rhéaume is a physics graduate from the Université du Québec à Trois-Rivières. He began his career at Hydro-Québec in 1975 and before his retirement had been a manager in Health Physics, Emergency Preparedness, Environment, Nuclear Safety and Licensing, and Nuclear Waste Management. From 2007 to 2011, he was director of the nuclear engineering division of Genivar, Inc., an engineering consulting firm. In 1999, he received from the Canadian Nuclear Association the outstanding award in recognition for his contribution to public acceptance of nuclear technology through his skills and knowledge in Health Physics. Mr. Rhéaume also taught nuclear physics and health physics for 20 years at the Université du Québec à Trois-Rivières.



# Independent Commentary





# Auditor's Report and Financial Statements

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## Management's Responsibility for Financial Reporting

The accompanying financial statements of the Nuclear Waste Management Organization (NWMO) and all the information in this annual report are the responsibility of management and have been approved by the Board of Directors.

The financial statements have been prepared by management in accordance with Canadian generally accepted accounting principles. When alternative accounting methods exist, management has chosen those it deems most appropriate in the circumstances. Financial statements are not precise since they include certain amounts based on estimates and judgments, particularly when transactions affecting the current accounting period cannot be finalized until future periods.

Management has determined such amounts on a reasonable basis in order to ensure that the financial statements are presented fairly, in all material respects, and in light of information available up to February 20, 2014.

Management has a system of internal controls designed to provide reasonable assurance that the financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes that the systems provide reasonable assurance that transactions are properly authorized and recorded, financial information is relevant, reliable and accurate, and the Organization's assets are appropriately accounted for and adequately safeguarded.

The Board of Directors is responsible for ensuring management fulfils its responsibilities for financial reporting, and is ultimately responsible for reviewing and approving the financial statements. The Board carries out this responsibility through its Audit, Finance and Risk Committee (the Committee).

The Committee is appointed by the Board and meets periodically with management, as well as the external auditor, to discuss internal controls over the financial reporting process, auditing matters and financial reporting issues; to satisfy itself that each party is properly discharging its responsibilities; and to review the financial statements and the external auditor's report. The Committee reports its findings to the Board for consideration when approving the financial statements for issuance to the members. The Committee also considers, for review by the Board and approval by the members, the engagement or reappointment of the external auditor.

The financial statements have been audited by Deloitte LLP, the independent external auditor, in accordance with Canadian generally accepted auditing standards on behalf of the members.

February 20, 2014



**Ken Nash**  
President and CEO



**Michael Hung**  
Chief Financial Officer

# Independent Auditor's Report

## To the Members of Nuclear Waste Management Organization

We have audited the accompanying financial statements of Nuclear Waste Management Organization, which comprise the statement of financial position as at December 31, 2013, and the statements of operations and changes in net assets and of cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained in our audit is sufficient and appropriate to provide a basis for our audit opinion.

### Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of Nuclear Waste Management Organization as at December 31, 2013, and the results of its operations and its cash flows for the year then ended, in accordance with Canadian accounting standards for not-for-profit organizations.

The signature of Deloitte LLP is written in a cursive, handwritten style.

Chartered Professional Accountants, Chartered Accountants  
Licensed Public Accountants  
February 20, 2014  
Toronto, Ontario



**Statement of financial position  
as at December 31, 2013**

	2013	2012
	\$	\$
<b>Assets</b>		
Current assets		
Cash (Note 3)	6,300,670	4,976,999
Accounts receivable	2,216	2,216
Member contributions receivable (Note 6a)	2,339,534	3,821,793
Prepaid expenses and deposits	674,048	677,433
	9,316,468	9,478,441
Capital assets (Note 4)	2,828,844	3,149,378
Other assets (Note 5)	5,000	-
Deferred pension asset (Note 8)	15,266,640	13,362,177
	27,416,952	25,989,996
<b>Liabilities</b>		
Current liabilities		
Accounts payable and accrued liabilities (Note 13)	8,850,052	8,774,271
Deferred lease inducements (Note 9)	130,597	196,229
Deferred member contributions (Note 6b)	434,819	601,941
	9,415,468	9,572,441
Deferred capital contribution (Note 7)	2,828,844	3,149,378
Deferred member contributions (Note 6c)	4,759,646	4,968,770
Other post-employment and pension benefits liability (Note 8)	10,412,994	8,299,407
	18,001,484	16,417,555
<b>Net assets</b>	-	-
	27,416,952	25,989,996

Approved by the Board of Directors, February 20, 2014

*K. E. Nash*

**Ken Nash**

President and CEO  
Toronto, Canada

*C. Ian Ross*

**C. Ian Ross**

Chair – Audit, Finance and Risk Committee  
Toronto, Canada

**Statement of operations and changes in net assets  
year ended December 31, 2013**

	2013	2012
	\$	\$
<b>Revenue</b>		
Member cash contributions received (Note 5)	65,452,616	60,906,493
Non-member cash contributions received	552,116	400,793
	66,004,732	61,307,286
Change in deferred capital contributions (Note 7)	320,534	101,030
Change in long-term deferred member contributions (Note 6c)	209,124	(1,213,150)
Change in member contributions receivable (Note 6a)	(1,482,259)	3,821,793
Change in deferred member contributions (Note 6b)	167,122	(181,598)
Total contribution revenue (Note 12)	65,219,253	63,835,361
Interest income (Note 12)	57,042	50,269
<b>Total revenue</b>	<b>65,276,295</b>	<b>63,885,630</b>
<b>Expenses</b>		
Adaptive Phased Management		
Staffing and administration (Note 5)	21,733,506	17,055,421
Siting process	10,402,992	7,119,676
Design and development safety case	9,314,742	9,256,369
Building relationships	2,650,228	2,306,274
Governance structure	579,527	514,296
Adapting to change	203,320	377,507
	44,884,315	36,629,543
Deep Geologic Repository		
Regulatory review stage	10,205,583	7,632,470
Design stage	2,392,939	9,888,536
Staffing and administration	5,466,293	7,477,553
	18,064,815	24,998,559
Lifecycle Liability Management		
Contract services	34,544	180,843
Staffing and administration	1,380,913	1,179,734
	1,415,457	1,360,577
Amortization	911,708	896,951
<b>Total expenses (Note 12)</b>	<b>65,276,295</b>	<b>63,885,630</b>
Excess of revenue over expenses for the year	-	-
Net assets, beginning of year	-	-
<b>Net assets, end of year</b>	<b>-</b>	<b>-</b>

**Statement of cash flows**  
**year ended December 31, 2013**

	2013	2012
	\$	\$
<b>Operating activities</b>		
Cash received from contributions	66,004,732	61,307,286
Interest received	57,042	50,269
	66,061,774	61,357,555
Cash paid for salaries and benefits, materials and services	(64,050,522)	(65,520,775)
	2,011,252	(4,163,220)
<b>Investing activity</b>		
Purchase of capital assets	(682,581)	(795,921)
Investment in subsidiary	(5,000)	-
Net increase (decrease) in cash	1,323,671	(4,959,141)
Cash, beginning of year	4,976,999	9,936,140
<b>Cash, end of year (Note 3)</b>	<b>6,300,670</b>	<b>4,976,999</b>

# Notes to the financial statements

December 31, 2013

## 1. Description of organization

The Nuclear Waste Management Organization (“NWMO”) is a not-for-profit corporation without share capital, established under the *Canada Corporations Act*, 1970 (“the Act”), as required by the *Nuclear Fuel Waste Act* (Canada), 2002 (“NFWA”) which came into force November 15, 2002.

The NFWA requires electricity-generating companies which produce used nuclear fuel to establish a waste management organization. In accordance with the NFWA, the NWMO established an Advisory Council, conducted a study and provided recommendations on the long-term management of used nuclear fuel to the Government of Canada. The results of the study and the recommendations were submitted in November 2005. As part of the long-term mandate, the NWMO is now responsible for implementing the Adaptive Phased Management (“APM”), an approach selected by the Government of Canada to address the management of used nuclear fuel.

The NWMO formally began operations on October 1, 2002. Its founding members are Hydro-Québec, NB Power Nuclear, and Ontario Power Generation Inc. (“Members”) – which are Canadian companies that currently produce used nuclear fuel as a by-product of electricity generation.

Pursuant to a Membership Agreement, the APM costs of the NWMO are shared pro rata by the Members based on the number of used fuel bundles owned by each member. The cost-sharing ratios among members have not been changed since inception of the Membership Agreement.

In addition to the above mandate, effective January 1, 2009, the NWMO entered into two new agreements with Ontario Power Generation Inc. (“OPG”) to expand its operations to provide project management services for OPG’s Low and Intermediate Level Waste Deep Geologic Repository (“DGR”) services-Phase 1 and certain provision costing and accounting services relating to nuclear Lifecycle Liability Management (“LLM”).

Effective February 1, 2011, the NWMO entered into an Engineering, Procurement and Construction Management Agreement for the DGR phase 2 (design) and phase 3 (construction) services with OPG. The design services cover detailed engineering, geoscience characterization, environmental and safety assessment, community engagement and regulatory affairs. Phase 3, the construction services, is pending government approval as well as both parties, OPG and the NWMO, mutually agreeing to proceed with this service.

2. Significant accounting policies

Basis of presentation

The financial statements of the NWMO are the representations of management prepared in accordance with Canadian accounting standards for not-for-profit organizations set out in Part III of the Chartered Professional Accountants of Canada (“CPA Canada”) Handbook using the deferral method of reporting restricted contributions. The significant accounting policies adopted by the NWMO are as follows:

Reporting Controlled and Related Entities

The investment in the controlled enterprise is reported using the equity method (Note 5).

Capital assets

Capital assets are recorded at cost. Amortization is provided for on a straight-line basis over their estimated useful lives as follows:

Furniture and office equipment	7 years
Computer equipment and software	3 years
Vehicles	5 years
Leasehold improvements	Initial lease term plus one renewal period

Income tax

The NWMO is a not-for-profit organization, and pursuant to section 149(1)(1) of the *Income Tax Act*, is not subject to income tax.

Revenue recognition

Contributions received from members are treated as restricted contributions, and as such, are not recognized as revenue until associated costs have been incurred. Any excess or shortfall of member contributions is recorded as deferred revenue or member contribution receivable, respectively.

Contributions used for the purchase of capital assets owned by the NWMO are deferred and amortized into revenue at the rate corresponding with the amortization rate of the related capital assets.



## 2. Significant accounting policies (continued)

### Pension and other post-employment benefits

The NWMO's post-employment benefit programs include a contributory defined benefit registered pension plan, a defined benefit supplementary pension plan, and other post-employment benefits, including group life insurance, health care and long-term disability benefits. The NWMO has adopted the following policies with respect to accounting for these post-employment benefits:

- (i) The NWMO accrues its obligations under pension and other post-employment benefit ("OPEB") plans. The obligations for pension and OPEB costs are determined using the projected benefit method pro-rated on service. Under this method, the benefit costs are amortized over the average remaining service period of active employees. Any excess of the net actuarial gain (loss) over 10% of the greater of the benefit obligation and the fair value of plan assets is amortized over the average remaining service period of active employees. The average remaining service period for active employees is 15 years (Note 8).
- (ii) The obligations are affected by salary levels, inflation, and cost escalation of specific items (e.g. dental and health claims). Pension and OPEB costs and obligations are determined annually by independent actuaries using management's best estimate assumptions. The discount rates used by the NWMO in determining projected benefit obligations and the costs for the Organization's employee benefit plans are based on representative AA corporate bond yields.
- (iii) Pension fund assets are valued using market-related values for the purposes of determining actuarial gains or losses and the expected return on plan assets. The plan's assets consist of investment grade securities. Market and credit risk on these securities are managed by the plan by placing plan assets in trust and through the plan investment policy.
- (iv) Canada's Accounting Standards Board ("AcSB") approved and released the final standard (Section 3463 Reporting Employee Future Benefits by Not-for-Profit organizations) for not-for-profit organizations, for fiscal years beginning on and after January 1, 2014. The NWMO will adopt this standard effective January 1, 2014. Except as otherwise provided for in Section 3463, the NWMO applies Employee Future Benefits, Section 3462 in Part II of the CPA Canada Handbook. The transition date for the new standard is January 1, 2013. The adoption of the new standard will result in writing off any unamortized amounts (past service costs/credits and actuarial gains/losses) to net assets, and any remeasurement amounts (as defined in 0.85 of Section 3462) will be recognized directly in net assets in the statement of financial position rather than in the statement of operations.

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### Research and development

Research and development costs are charged to operations in the year incurred.

### Foreign currency translation

Monetary assets and liabilities denominated in foreign currencies are translated into Canadian currency at the year-end exchange rate. Any resulting gain or loss is reflected in staffing and administration expenses. Transactions in foreign currencies throughout the year have been converted at the exchange rate prevailing at the date of the transaction.

### Financial instruments

Financial instruments include cash, accounts receivable, and accounts payable and accrued liabilities.

Financial assets and financial liabilities are initially recognized at fair value when the NWMO becomes a party to the contractual provisions of the financial instrument. Subsequently, all financial instruments are measured at amortized cost. Financial assets measured at amortized cost are assessed at each reporting date for indications of impairment. If such impairment exists, the asset is written down and the resulting impairment loss is recognized in the statement of operations and changes in net assets.

### Related party transactions

Related party transactions are recorded at the exchange amount.

### Use of estimates

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Due to the inherent uncertainty in making estimates, actual results could differ from those estimates. Accounts requiring significant estimates include pension and other post-employment benefits, certain accrued liabilities and amortization which is based on the estimated useful life of the capital assets.

## 3. Cash

Included in cash is an amount of \$3,960,800 (2012 – \$3,073,500), which is restricted as this amount is securing a Letter of Credit issued for the Supplementary Pension Plan (Note 8).

## 4. Capital assets

			2013	2012
	Cost	Accumulated amortization	Net book value	Net book value
	\$	\$	\$	\$
Furniture and office equipment	2,015,052	1,229,229	785,823	854,867
Computer equipment and software	1,953,018	1,381,864	571,154	590,939
Leasehold improvements	2,234,099	1,095,960	1,138,139	1,440,278
Custom vehicle	374,231	40,503	333,728	263,294
	6,576,400	3,747,556	2,828,844	3,149,378

## 5. Related party transactions, balances and other information

Transactions and balances not otherwise disclosed separately in the financial statements are as follows:

			2013	2012
	APM	LLM/DGR	Total	Total
	\$	\$	\$	\$
Transactions during the year				
Member contributions				
Ontario Power Generation Inc.	42,080,000	19,981,801	62,061,801	57,522,357
New Brunswick Power	1,938,000	-	1,938,000	1,475,000
Hydro-Québec	1,452,815	-	1,452,815	1,909,136
	45,470,815	19,981,801	65,452,616	60,906,493
Transactions with Ontario Power Generation Inc.				
Payments (Receipts)				
DGR communication services			100,000	-
Managerial services (included in staffing and administration)			-	(103,534)

The NWMO set up a wholly owned subsidiary in Saskatchewan to purchase mineral exploration rights in support of the APM siting process. This subsidiary was incorporated on March 27, 2013, with share capital under the *Canada Business Corporations Act*. The subsidiary company purchased certain mineral exploration claims for \$5,000 funded by \$1 in share capital and a \$4,999 interest-free loan from the parent company. A summary of the total assets, liabilities and shareholders' equity as at December 31, 2013, and revenues, expenses, net income and cash flows from operating, financing and investing activities for the period ended December 31, 2013, is presented below:

	2013
Assets	\$
	-
<b>Total assets</b>	-
Liabilities	4,999
Shareholder's equity	
Share capital	1
Net operating loss	(5,000)
Total shareholder's equity	(4,999)
<b>Total liabilities and shareholder's equity</b>	-
Revenues	-
Operating expenses	5,000
<b>Net operating loss</b>	(5,000)
Cash from holding company	
Subscription of shares	1
Interest-free loan	4,999
<b>Cash from holding company</b>	5,000
<b>Cash used in operations</b>	(5,000)
<b>Cash as at December 31</b>	-

## 6. Member contributions receivable and deferred member contributions

The NWMO receives contributions from its members and is solely funded through their contributions. The contributions received from the members are restricted in nature, and thus revenue is recognized when qualifying expenses are incurred. Amounts received in advance of qualifying expenses are recorded as deferred member contributions. Commitments for contributions which have not been received by the NWMO are recorded as contributions receivable when the amount is determinable and the ultimate collection is likely.

### (a) Member contributions receivable

Member contributions receivable are made up of the following:

	2013	2012
	\$	\$
Ontario Power Generation	2,339,534	3,812,994
New Brunswick Power	-	8,799
	2,339,534	3,821,793

### (b) Deferred member contributions

Deferred member contributions are made up of the following:

	2013	2012
	\$	\$
New Brunswick Power	69,847	-
Hydro-Québec	215,541	484,186
Atomic Energy of Canada Limited	149,431	117,755
	434,819	601,941

### (c) Long-term deferred member contributions

Long-term deferred member contributions represent amounts received in advance to fund various employee future benefits as follows:

	2013	2012
	\$	\$
Deferred pension asset	15,266,640	13,362,177
Other post-employment benefits	(10,412,994)	(8,299,407)
Pension and other post-employment benefit liabilities – short term (Note 8)	(94,000)	(94,000)
	4,759,646	4,968,770

## 6. Member contributions receivable and deferred member contributions (continued)

### (d) Continuity of deferred member contributions

The continuity of deferred member contributions is as follows:

	2013	2012
	\$	\$
Balance, beginning of year		
Deferred member contributions – current	601,941	420,343
Deferred member contributions – long term	4,968,770	3,755,620
	5,570,711	4,175,963
Contributions received	66,004,732	61,307,286
Contributions receivable	2,339,534	3,821,793
Contribution revenue recognized	(65,219,253)	(63,835,361)
Amounts received previously recognized	(3,821,793)	-
Change related to capital contributions	320,534	101,030
	5,194,465	5,570,711
Balance, end of year		
Deferred member contributions – current	(434,819)	(601,941)
Deferred member contributions – long term	4,759,646	4,968,770

## 7. Deferred capital contributions

	2013	2012
	\$	\$
Balance, beginning of year	3,149,378	3,250,408
Contributions for the purchase of capital assets	591,174	795,921
Less amortization into revenue	(911,708)	(896,951)
Balance, end of year	2,828,844	3,149,378



## 8. Pension and other post-employment benefit plans

Effective January 1, 2009, the NWMO offers certain benefits to employees and retirees. A brief overview of these benefit plans is set out below:

*(a) Registered pension plan*

The registered pension plan is a contributory defined benefit plan covering most employees and retirees. The Plan is funded, and fund assets include pooled funds that are managed by Connor, Clark and Lunn. The benefit costs and assets related to this plan are recorded in the NWMO's financial statements.

*(b) Supplementary pension plan*

The supplementary pension plans are defined benefit plans covering certain employees and retirees. The plan is unfunded.

*(c) Other post-employment benefit plans*

These other post-employment benefit plans provide medical, dental, and group life insurance coverage for certain groups of full-time employees who have retired from the NWMO.

The most recent actuarial valuation in accordance with CPA Canada Handbook Section 3461 of the registered pension plan, supplementary pension plan and other post-employment benefit plans was completed as of December 31, 2012. The liability as at December 31, 2013, is based on an extrapolation of the previous valuation.

A funding valuation, which was completed for the pension plan as of January 1, 2013, reported a surplus of \$14 million on a going concern basis and a deficit of \$14.5 million on a solvency basis.

The significant actuarial assumptions for benefit obligation and costs adopted in estimating the NWMO's accrued benefit obligations are as follows:

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	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2013	2012	2013	2012	2013	2012
	%	%	%	%	%	%
Discount rate at the beginning of the period	4.00	4.75	4.00	4.75	4.00	4.75
Salary schedule escalation rate	3	3	3	3	-	-
Rate of cost of living increase	2	2	2	2	-	-
Rate of increase in health care cost trend	-	-	-	-	5.7	6.5
Discount rate at the end of the period	4.8	4	4.8	4	4.8	4
Expected return on plan assets	6.5	6.5	-	-	-	-
Average remaining service life for employees	15 years	15 years	15 years	15 years	15 years	15 years

## 8. Pension and other post-employment benefit plans (continued)

Information for the NWMO's pension and post-employment benefits, including long-term disability ("LTD") is as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2013	2012	2013	2012	2013	2012
	\$	\$	\$	\$	\$	\$
Changes in accrued benefit obligation						
Accrued benefit obligation, January 1	(54,252,000)	(41,683,000)	(2,846,452)	(2,518,052)	(11,885,000)	(8,028,000)
Current service cost	(3,197,000)	(2,272,000)	(283,000)	(358,000)	(1,084,000)	(514,000)
Interest cost	(2,297,000)	(2,092,000)	(132,000)	(142,000)	(516,000)	(394,000)
Employee contribution	(890,000)	(2,721,000)	-	-	-	-
Benefits paid	738,000	1,240,000	144,000	176,600	80,000	89,000
Net actuarial gain (loss)	7,058,000	(6,724,000)	85,000	(5,000)	1,336,000	(3,038,000)
Accrued benefit obligation, December 31	(52,840,000)	(54,252,000)	(3,032,452)	(2,846,452)	(12,069,000)	(11,885,000)
Changes in plan assets						
Fair value of plan assets, January 1	51,073,000	41,053,000	-	-	-	-
Actual return on plan assets	10,471,000	3,927,000	-	-	-	-
Benefits paid	(738,000)	(1,240,000)	-	-	(80,000)	(89,000)
Employers' contribution	4,671,000	4,612,000	-	-	80,000	89,000
Employees' contribution	890,000	2,721,000	-	-	-	-
Fair value of plan assets, December 31	66,367,000	51,073,000	-	-	-	-
Funded status						
Funded (unfunded) benefit obligation	13,527,000	(3,179,000)	(3,032,452)	(2,846,452)	(12,069,000)	(11,885,000)
Unamortized net actuarial loss	1,739,640	16,541,177	648,000	764,045	3,946,458	5,574,000
Accrued benefit asset (liability)	15,266,640	13,362,177	(2,384,452)	(2,082,407)	(8,122,542)	(6,311,000)
Short-term portion	-	-	(5,000)	(5,000)	(89,000)	(89,000)
Long-term portion	15,266,640	13,362,177	(2,379,452)	(2,077,407)	(8,033,542)	(6,222,000)
	15,266,640	13,362,177	(2,384,452)	(2,082,407)	(8,122,542)	(6,311,000)
Components of cost recognized						
Current service cost, net of employee contribution	3,197,000	2,272,000	283,000	358,000	1,084,000	514,000
Interest cost on accrued benefit obligation	2,297,000	2,092,000	132,000	142,000	516,000	394,000
Amortization of net actuarial loss	741,000	487,000	31,000	35,000	293,000	125,000
Expected return on plan asset	(3,469,000)	(2,755,000)	-	-	-	-
Cost recognized	2,766,000	2,096,000	446,000	535,000	1,893,000	1,033,000

An amount of \$94,000 (2012 – \$94,000) that is included in accounts payable and accrued liabilities, is part of the total \$10,506,994 (2012 – \$8,393,407) accrued benefit liability at end of year of the supplementary pension and other post-employment benefits/LTD plans.

The pension and other post-employment benefit costs recognized are included in the respective expense categories in the statement of operations and changes in net assets.

Sensitivity information related to the other post-employment benefit plans is as follows:

	2013	2012
	\$	\$
Effect of 1% increase in health care cost trends on		
Accrued benefit obligation	2,856,000	2,683,000
Service cost and interest cost	462,000	230,000
Effect of 1% decrease in health care cost trends on		
Accrued benefit obligation	(2,127,000)	(2,007,000)
Service cost and interest cost	(338,000)	(169,000)

The supplementary pension plan is not funded, but is secured by a Letter of Credit (Note 3).

### 9. Deferred lease inducements

	2013	2012
	\$	\$
Tenant inducements	408,242	408,242
Less: accumulated amortization	(277,645)	(212,013)
	130,597	196,229

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### 10. Guarantees

In the normal course of business, the NWMO enters into agreements that meet the definition of a guarantee.

- (a) The NWMO has provided indemnities for various agreements. Under the terms of these agreements, the NWMO agrees to indemnify the counterparty for various items including, but not limited to, all liabilities, loss, suits and damages arising during, on or after the term of the agreement.
- (b) The NWMO indemnifies all directors, officers and employees acting on behalf of the NWMO for various items including, but not limited to, all costs to settle suits or actions due to services provided to the NWMO, subject to certain restrictions.

The nature of these indemnification agreements prevents the NWMO from making a reasonable estimate of the maximum exposure due to the difficulties in assessing the amount of liability which stems from the unpredictability of future events and the unlimited coverage offered to counterparties. Historically, the NWMO has not made any payments under such or similar indemnification agreements, and therefore, no amount has been accrued with respect to these agreements.

The NWMO also arranged a standby Letter of Credit to secure its supplementary pension plan (Note 8).

## 11. Operating leases

The NWMO has entered into a number of leases for office premises which expire at various dates up to July 2017.

The estimated annual minimum payments over the initial term of these leases up to their expiration are as follows:

	\$
2014	685,178
2015	753,897
2016	757,019
2017	396,794
	2,592,888

## 12. Segment reporting

The NWMO has two reportable segments as follows:

- Federal mandated program (APM);
- Other direct services outside its mandated programs, which include DGR and LLM for OPG, with service contracts which became effective January 1, 2009, and February 1, 2011.

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Segment information is as follows:

	APM			DGR/LLM		Total
Year ended December 31	2013	2012	2013	2012	2013	2012
	\$	\$	\$	\$	\$	\$
Contribution revenue	45,621,221	37,319,049	19,598,032	26,516,312	65,219,253	63,835,361
Interest income	39,359	28,670	17,683	21,599	57,042	50,269
Total revenue	45,660,580	37,347,719	19,615,715	26,537,911	65,276,295	63,885,630
Amortization of capital assets	776,265	718,176	135,443	178,775	911,708	896,951
Operating cost	44,884,315	36,629,543	19,480,272	26,359,136	64,364,587	62,988,679
Total cost	45,660,580	37,347,719	19,615,715	26,537,911	65,276,295	63,885,630
Expenditure for capital assets	513,632	734,914	77,542	61,007	591,174	795,921

The allocation of the common service costs to each function of the above segment is based on direct staff in each function.

### 13. Government remittances

Accounts payable and accrued liabilities include the following amounts with respect to government remittances:

	2013	2012
	\$	\$
Goods and services tax/harmonized sales tax (GST/HST)	982,800	728,950
Less GST/HST receivable	(253,558)	(236,441)
Net GST/HST payable	729,242	492,509
Workplace Safety and Insurance Board payable	-	732
	729,242	493,241



# Report of the Advisory Council

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Advisory Council  
to the NWMO

Dr. Gary Kugler  
Chairman of the Board of Directors  
Nuclear Waste Management Organization  
22 St. Clair Avenue East  
Toronto, Ontario M4T 2S3

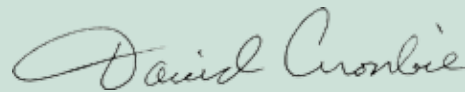
February 2014

Dear Dr. Kugler,

On behalf of the Advisory Council to the Nuclear Waste Management Organization (NWMO), I am pleased to submit our comments for inclusion in NWMO's 2011-2013 Triennial Report.

We provide comments as required of the Advisory Council under sections 8 and 18 of the *Nuclear Fuel Waste Act*.

Respectfully submitted on behalf of members of the Advisory Council,



**The Honourable David Crombie**  
Advisory Council Chair

Copy: NWMO Advisory Council

Dr. David R. Cameron  
Dr. Marlyn Cook  
Dr. Wesley Cragg  
Dr. Frederick Gilbert  
Ms. Eva Ligeti  
Dr. Derek Lister  
Dr. Dougal McCreath  
Mr. Donald Obonsawin  
Mr. Michel R. Rhéaume

# 1 Introduction and Background

This report fulfils the requirement in the *Nuclear Fuel Waste Act* that the Advisory Council (Council) must comment every three years on the process and findings of the Nuclear Waste Management Organization (NWMO).

Section 1 provides an overview of the mandate and approach of the Advisory Council, our evaluation framework, and our previous reports. Section 2 provides a summary of our activities over the past three years and our evaluation of the work the NWMO has undertaken towards its seven strategic objectives for Adaptive Phased Management. Section 3 includes comments on the NWMO's plans for future work, based on its Implementation Plan, *Implementing Adaptive Phased Management 2014 to 2018*. Finally, Section 4 provides our conclusions and recommendations, focusing on key challenges for the NWMO's next phase of work.

## 1.1 Nuclear Fuel Waste Act Requirements

As required by the *Nuclear Fuel Waste Act*, the NWMO Board of Directors established the Advisory Council in 2002. The *Nuclear Fuel Waste Act* specifies that the membership of the Council should reflect a broad range of scientific and technical disciplines related to the management of nuclear fuel waste, as well as expertise in public affairs, social sciences and Aboriginal Traditional Knowledge. Since 2002, several members have left the Council, and several new members have been appointed (see box). The Honourable David Crombie continues to serve as Chair, and the Advisory Council members are profiled on pages 204–207.

The Advisory Council is required by the *Nuclear Fuel Waste Act* to comment every three years on the previous three years of NWMO activity. These independent statements on the NWMO's work, which include observations on the results of the NWMO public consultations and analyses of any significant socio-economic effects of the Organization's activities, are to be published in the NWMO's triennial reports, beginning with the 2010 report. The Council is also obliged to comment on the Organization's five-year strategic plans and budget forecasts. The Advisory Council comments are submitted to the Minister of Natural Resources Canada and made public at the same time.

### Advisory Council Membership

David Crombie, Chair	2002–ongoing
David R. Cameron	2002–ongoing
Marlyn Cook	2008–ongoing
Helen Cooper	2002–2008
Wesley Cragg	2012–ongoing
Gordon Cressy	2002–2008
Frederick Gilbert	2002–ongoing
Rudyard Griffiths	2008–2011
Eva Ligeti	2002–ongoing
Derek Lister	2002–ongoing
Donald Obonsawin	2002–ongoing
Dougal McCreath	2008–ongoing
Michel R. Rhéaume	2010–ongoing
Daniel Rozon	2002–2009

## 1.2 Relationship With the NWMO

The Advisory Council follows the development of the Organization's plans and activities closely, and provides ongoing counsel and advice. We generally meet four times a year. The Chair helps staff to set the agenda, including requests from the Council (see sample agenda in Appendix 1). At our meetings, staff make presentations on the NWMO's work, and the Advisory Council asks questions, requests more information, considers the NWMO's work and provides advice. We hold an *in camera* session at the end of most of our meetings when we deliberate without the presence of the NWMO management or staff. The Advisory Council Chair has direct access to NWMO Board meetings to ensure a comprehensive exchange of information and to provide a conduit for the Chair to keep the Council apprised of Board matters, and vice versa. Council members and the Board of Directors usually meet once a year for an informal exchange of views.

In addition to fulfilling our legislated reporting requirements on a triennial basis, we summarize our activities on a yearly basis for inclusion in the NWMO Annual Report. The NWMO also produces detailed annual tracking matrices documenting the actions taken by the Organization in response to our advice. The tracking matrices are posted on the NWMO's website<sup>1</sup>.

## 1.3 Evaluation Framework

In order to fulfil our obligations to provide an independent review of the NWMO's work, we have developed a set of evaluation criteria (see next page). In developing these criteria, we considered the mandate and mission of the NWMO, and paid particular attention to the experience of the Seaborn Panel<sup>2</sup> and to the NWMO's Ethical and Social Framework.

### Mandate and Mission of the NWMO

The NWMO was established in 2002 under the *Nuclear Fuel Waste Act* to investigate approaches for managing Canada's used nuclear fuel. The NWMO's 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. The NWMO is guided by five fundamental values: integrity, excellence, engagement, accountability and transparency<sup>3</sup>.

<sup>1</sup> Tracking matrices are available at [www.nwmo.ca/actrackingmatrices](http://www.nwmo.ca/actrackingmatrices).

<sup>2</sup> The Seaborn Panel was an Environmental Assessment Panel chaired by Blair Seaborn between 1989 and 1998. The Panel examined the disposal concept for used nuclear fuel management proposed by Atomic Energy of Canada Limited (AECL). See [www.nwmo.ca/2.8](http://www.nwmo.ca/2.8).

<sup>3</sup> For a description of the NWMO's values, see [www.nwmo.ca/vision](http://www.nwmo.ca/vision).

### Seaborn Panel

After 10 years of study and public hearings on the concept of deep geological disposal of used nuclear fuel (1989–1998), an Environmental Assessment Panel chaired by Blair Seaborn concluded in their 1998 report that the concept was technically sound, but did not have sufficient public support to allow the government to proceed. The Panel identified the absence of any Ethical and Social Framework within which to assess options as an important issue.

### NWMO Ethical and Social Framework

When the NWMO was set up in 2002, it created a Round Table on Ethics to explore ways to address this issue. The Round Table developed an Ethical and Social Framework to guide the work of the NWMO. The members of the Round Table on Ethics were Georges Erasmus, one of the most experienced Aboriginal leaders in Canada; David MacDonald, senior United Church minister and former federal cabinet minister; Andrew Brook, a philosopher with over 30 years of experience in the ethics of nuclear waste management; and three of Canada's most senior ethicists: Wesley Cragg, Arthur Schafer, and Margaret Somerville. The Round Table concluded its work in late 2005. The Framework expresses the ethical standards as a series of 11 questions for the NWMO to ask itself. The Framework was first published by the NWMO in 2004 and revised in 2005. In December 2011, a workshop was held to review the Framework for its continued appropriateness to guide new phases of the NWMO's work<sup>4</sup>. The workshop participants were Wesley Cragg, Andrew Brook, Frances Abele, Jim Cooney and Donald Obonsawin. Their review concluded that the framework is coherent, comprehensive and well-articulated. Workshop participants were impressed with the way in which the logic of the ethical framework had been integrated into the consultation process that led to the Adaptive Phased Management process. They highlighted the challenge of understanding and accepting that integrating the framework is an ongoing process that will require ongoing commitment and dedication over all dimensions of the project into the indefinite future. Workshop participants also made suggestions for ways that the NWMO could update the Framework and apply it effectively in the site selection phase of the Adaptive Phased Management process.

### Advisory Council Evaluation Criteria

In 2005, the Advisory Council developed a statement – *How the Advisory Council of the Nuclear Waste Management Organization Intends to Fulfil its Mandate*<sup>5</sup>. The statement included four evaluation criteria (comprehensiveness, fairness and balance, integrity, and transparency) to provide a basis for our assessment of the NWMO's work.

In 2010, to reflect the evolution of the NWMO's work, we updated these criteria and added three more (technical strength, financial capacity and culture of learning). They were published in the Advisory Council's independent comments in the NWMO's *Triennial Report 2008 to 2010, Moving Forward Together*<sup>6</sup>.

<sup>4</sup> These documents on the Ethical and Social Framework are available at [www.nwmo.ca/ethicalandsocial\\_framework](http://www.nwmo.ca/ethicalandsocial_framework).

<sup>5</sup> *How the Advisory Council of the Nuclear Waste Management Organization Intends to Fulfil its Mandate* is available at [www.nwmo.ca/uploads\\_managed/MediaFiles/362\\_Advisory\\_Council\\_Statement\\_012205.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/362_Advisory_Council_Statement_012205.pdf).

<sup>6</sup> *Triennial Report 2008 to 2010, Moving Forward Together* is available at [www.nwmo.ca/uploads\\_managed/MediaFiles/1721\\_triennialreport2008to2010.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/1721_triennialreport2008to2010.pdf).



Over the intervening three years, the criteria against which we evaluate the work of the NWMO have continued to evolve. The updated wording of the Advisory Council's seven evaluation criteria is designed to indicate more clearly the role of these criteria in guiding the current work of the Advisory Council:

**1. Comprehensiveness.** In fulfilling its mandate, are all available reasonable alternative approaches and the experiences of other organizations and jurisdictions being effectively evaluated and taken into account by the NWMO? In answering this question, we evaluate carefully the advice of: the Independent Technical Review Group; the Geoscientific Review Group; the Council of Elders; the Municipal Forum; the Advisory Council; and the former Elders Forum, Niigani and Youth Roundtable. We also evaluate how effectively the understanding and knowledge that the NWMO continues to acquire is being integrated into the work of the NWMO at all levels and the work of its agents and contractors.

**2. Fairness and balance.** Is the siting process being conducted impartially, and is adequate consideration being given to diverse points of view, including minority perspectives?

**3. Integrity.** Is the NWMO fulfilling its mandate with openness, honesty, and consistency, and is it allowing adequate and meaningful opportunities for public and stakeholder participation and engagement? In answering this question, we consider how effectively the NWMO responds to public input and respects participating individuals, communities, and organizations, and their diverse perspectives, concerns and values.

**4. Transparency.** Are the plans, timetable, activities and decisions of the NWMO clear to the public, and is information shared with citizens, stakeholders and partners in a timely fashion so that they can participate effectively?

**5. Technical strength.** Does the NWMO have the human resources required to address the engineering and scientific dimensions of site characterization, repository design and safety assessment? Equally, does the NWMO have the human resources necessary to ensure the accurate understanding of the societal and Aboriginal dimensions of the site selection process, as well as the delineation and evaluation of alternative transportation corridors? Included in this aspect of our assessment is ensuring that adequate provision is made for skilled personnel required at the local level to meet the short- and long-term needs and interests of all the communities involved in the site selection process.

**6. Financial capacity.** Does the funding formula adequately reflect the costs of the Adaptive Phased Management of Canada's nuclear waste? Has the NWMO identified and accommodated all key factors and uncertainties associated with the cost estimates, such as the amount and type of used fuel to be managed, the geology of the site, and the rate of return on contributed funds? Are cost estimates being kept up-to-date, and are financial contributions being adjusted to reflect updated overall costs?

**7. Culture of learning.** Is the NWMO actively pursuing new ideas and perspectives, and applying its learning – regarding science, technology, Aboriginal Traditional Knowledge, history, ethics, sociology and culture – in a responsive way? Has the NWMO incorporated the lessons learned from international experiences and from the Ontario Power Generation's project to develop a deep geologic repository for low- and intermediate-level waste? Is new knowledge being absorbed by its own staff, shared adequately with its partner organizations, and reflected adequately in all aspects of the work and activities of the organization?

In this triennial report, we report our assessment of how effectively the NWMO is carrying out its mandate when viewed in light of these criteria.

#### 1.4 Advisory Council's Previous Reports

The NWMO's Final Study Report, *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel*, was published in 2005. In it, the Council provided independent comments on the NWMO's work to date, which recommended Adaptive Phased Management<sup>7</sup>. We concluded that Adaptive Phased Management emerged logically from a careful and thorough weighing of the alternatives that considered the broad array of citizen, stakeholder and specialist views on long-term nuclear waste management. Our comments about the NWMO's future work focused on the governance of the NWMO, development of the Adaptive Phased Management Project, public engagement, Aboriginal engagement, Advisory Council membership and energy policy.

In January 2011, the Council provided independent comments on the work undertaken during 2008–2010. They were published in a section in the NWMO's *Triennial Report 2008 to 2010, Moving Forward Together*. We reported that the NWMO had responded to the comments we made in the first triennial report<sup>8</sup>. We also concluded that the NWMO's work during 2008–2010 had generally met the Council's evaluation criteria (see above). We made 21 recommendations to assist the NWMO in its future work. A tracking matrix showing the recommendations made by the Council in the *Triennial Report 2008 to 2010*, and the actions taken by the NWMO in response, is provided in Appendix 2, grouped according to the NWMO's strategic objectives.

<sup>7</sup> See pages 434–451, Advisory Council Comments, in *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel (Final Study)*, at [www.nwmo.ca/uploads\\_managed/MediaFiles/341\\_NWMO\\_Final\\_Study\\_Nov\\_2005\\_E.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/341_NWMO_Final_Study_Nov_2005_E.pdf).

<sup>8</sup> See page 251 of Chapter 14, Advisory Council Comments, in *Moving Forward Together, Triennial Report 2008 to 2010*, at [www.nwmo.ca/uploads\\_managed/MediaFiles/1721\\_triennialreport2008to2010.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/1721_triennialreport2008to2010.pdf).

## 2 2011–2013 Activities

The primary purpose of this section is to provide the Advisory Council's comments on the work of the NWMO during 2011–2013. But first, in Section 2.1, we provide some context for these comments by summarizing our process and activities during that time period. In Section 2.2, we provide our evaluation of the NWMO's work.

### 2.1 Advisory Council Process and Activities: 2011–2013

During 2011–2013, the Council held four formal meetings each year, supplemented by conference calls on an as-needed basis. The formal meetings included progress reports from the NWMO and discussions of plans under development. At the Council's request, NWMO staff provided regular updating and assessments of potential risks to the NWMO's work that might result from internal or external socio-political, technical and organizational factors. We held four additional, full-day working sessions in fall 2013 and a conference call in early 2014 to discuss the contents of this triennial report. At our request, formal records of our meetings and copies of papers by Council members are posted on the NWMO website<sup>9</sup>. In addition, summaries of our work are published regularly in the NWMO's annual reports<sup>10</sup>.

During 2011–2013, the Council focused on the site selection process, community engagement and communications, Aboriginal engagement, third-party advice and reviews, technical aspects of Adaptive Phased Management, transportation and the evolving external landscape. Highlights of our activities are provided below, and our evaluation of the NWMO's work is provided in Section 2.2.

#### Advisory Council Meetings, March 2011–January 2014

March 7, 2011	February 11, 2013
May 9, 2011	May 27–28, 2013
September 19, 2011	September 16, 2013
November 30, 2011	September 17, 2013*
February 6, 2012	September 30, 2013*
June 5, 2012	November 5, 2013*
September 10, 2012	November 27, 2013
November 28, 2012	November 28, 2013*
January 28, 2013	January 6, 2014*

\*Working sessions to prepare Triennial Report

<sup>9</sup> Records of Advisory Council meetings are available at [www.nwmo.ca/advisorycouncilminutes](http://www.nwmo.ca/advisorycouncilminutes).

<sup>10</sup> The NWMO's annual reports are available at [www.nwmo.ca/annualreport](http://www.nwmo.ca/annualreport).

### Site Selection

The Council requested information and provided advice on the implementation of the site selection process. During 2011–2013, 22 communities learned more about the process and participated in an initial screening. An important milestone brought forward for Council advice was the timing of, and approach to, suspending the expressions-of-interest phase of the community-driven site selection process. The Council supported suspension in September 2012, and advised on the scope and content of associated communications plans and materials. During 2012–2013, the Council was actively engaged in deliberations about the approach to preliminary assessments of communities and communication of the results.

The Council also discussed project management, including how the site selection process would be resourced and overseen, along with the respective roles of NWMO staff and contracted specialists.

### Engagement and Communications

The Council received and discussed staff reports on engagement activities, including the NWMO's work with Aboriginal organizations, different levels of government, interested organizations, youth, and the media. Council members continued to provide input on the NWMO's engagement at the municipal level. A Council member regularly attends meetings of the NWMO Municipal Forum<sup>11</sup> and occasionally attends sessions of the Federation of Canadian Municipalities. The Council continued to review the NWMO's communications strategies and materials, providing advice regarding risk management, clarity and transparency.

### Aboriginal Engagement

Aboriginal engagement has been a crucial element of the NWMO's work since its inception. During the past three years, the Council continued to take a keen interest in this work, emphasizing the value of learning from traditional teachings and respecting the spirituality embodied in Aboriginal Traditional Knowledge. We encouraged the NWMO to integrate Aboriginal Traditional Knowledge throughout its work, including staff education and its work with communities. We also encouraged the recruitment of Aboriginal staff members and securing the services of Aboriginal contractors.

The Elders Forum was restructured during 2011, resulting in the creation of the Council of Elders with new terms of reference in 2012. Advisory Council members engaged in this process by convening a special preparatory session with staff, attending Forum meetings, and providing advice to the NWMO on the appointment of members to the new Council of Elders, its terms of reference and the role of Aboriginal youth.

At the recommendation of an Advisory Council member, a presentation was made by Dr. Edward Connors, who is a psychologist with the health planning firm Onkwatenro'shon:'A, on Aboriginal Traditional Knowledge, entitled *Two Minds, Two World Views* in January 2013. We sought Dr. Connors' advice on how the NWMO could interweave Aboriginal Traditional Knowledge into the Adaptive Phased Management process, and how to ensure that Aboriginal communities are appropriately involved in the siting process<sup>12</sup>. Dr. Connors talked about ways to bring together non-Aboriginal and Aboriginal world views and work towards common

<sup>11</sup> The Municipal Forum brings together municipal experts to provide information about best practices for communicating with local governments and associations, and guidance on a research agenda to explore topics that may be of interest to communities that choose to participate in the site selection process ([www.nwmo.ca/municipalengagement](http://www.nwmo.ca/municipalengagement)).

<sup>12</sup> A summary of Dr. Connors' presentation and the discussion with the Advisory Council is available in the record of discussion for the Advisory Council's meeting on January 28, 2013, at [www.nwmo.ca/uploads\\_managed/MediaFiles/2153\\_record\\_2013-1\\_-\\_advisory\\_council\\_minutes\\_-\\_jan\\_28-.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/2153_record_2013-1_-_advisory_council_minutes_-_jan_28-.pdf).

interests while respecting differences. He emphasized the strength that flows from good communications and balanced relationships, along with the values of friendship, respect and equality.

### Third-Party Advice and Reviews

Third-party advice and reviews figured prominently in the Council's discussions about ways to ensure that site selection and repository design activities are thorough, incorporate the best available knowledge, and use this knowledge to review and confirm site assessments. We received briefings on the activities of the experts contracted by the NWMO to support the delivery of preliminary assessments of interested communities. We also supported the establishment of a new Geoscientific Review Group to advise on preliminary assessments of the geological suitability of potential sites.

The Council received regular updates on the progress of the NWMO's technical program. We met with Dr. Allan Hooper, the Chair of the Independent Technical Review Group, to discuss the findings of the group's 2011 and 2012 reviews of the NWMO technical program, and received reports from the NWMO on the Organization's dispositioning of the Independent Technical Review Group's advice. A Council member also attended the inaugural meeting of the Adaptive Phased Management Geoscientific Review Group.

### Technical Aspects of Adaptive Phased Management

The Council received regular updates on the progress of the NWMO's technical program. For example, we discussed the design of containers for emplacing used fuel, particularly aspects of sizing, closure weld, and materials, and began to review lessons learned from Ontario Power Generation's Low- and Intermediate-Level Waste Deep Geologic Repository. When we emphasized the importance of harmonizing container design with repository characteristics, the NWMO established an internal co-ordinating committee to oversee the issue. We discussed the characterization of crystalline and sedimentary rock, including possible microbiological properties, along with the performance of the bentonite clay that is proposed as a buffer surrounding the emplaced fuel containers.

The Council was pleased to see the formation of the independent Geoscientific Review Group, mandated to provide advice and guidance on the approach, methods and findings of the geoscientific preliminary assessments that are part of the studies conducted in Step 3 of the site selection process<sup>13</sup>. The Council provided advice on the membership and terms of reference of the Geoscientific Review Group, and a Council member attended a meeting of the group.

A number of case studies on repository safety have been undertaken by the NWMO. During the reporting period, two case studies dealing with a deep geological repository in crystalline rock and another in sedimentary rock have been completed, and their findings presented to the Advisory Council. This recent analysis in sedimentary rock began to address our concern about the previous imbalance in studies in Canada to address repository issues in sedimentary rock compared to those in crystalline rock.

The Advisory Council reviewed the NWMO's draft report on lessons learned from the Fukushima accident and provided suggestions that were addressed in the NWMO's website posting<sup>14</sup>. See Section 2.2.5 of this Triennial Report for a summary.

<sup>13</sup> The nine-step siting process is summarized at [www.nwmo.ca/sitingprocess\\_overview5](http://www.nwmo.ca/sitingprocess_overview5).

<sup>14</sup> See [www.nwmo.ca/faq\\_fukushima](http://www.nwmo.ca/faq_fukushima).



## Transportation

The Advisory Council explored the transportation of used fuel, considering different possible modes of transportation, international experience and work underway on the Adaptive Phased Management transportation system. We emphasized the critical importance of understanding the public perceptions of risks associated with each mode of transportation and urged the NWMO to take timely action to address them.

The NWMO provided an update on the evaluation of the safety of transportation containers in terms of radiological risk – a subject that the Council has repeatedly noted as a vital public communications issue. The Council offered advice on how to provide appropriate information for discussions of transportation with communities, noting that there already exists extensive Canadian and international experience on transporting used fuel and other highly radioactive materials. We provided feedback on the NWMO's brochure on *Safe and Secure Transportation of Canada's Used Nuclear Fuel*. Council members also had an opportunity to visit the NWMO Used Fuel Transportation Package Trailer that showcases the transportation container that will be used to transport used fuel safely.

## The Evolving External Landscape

At the Council's request, one of the standing items on our agenda is an update from the NWMO about the changing external landscape both in Canada and abroad, followed by a critical assessment of potential risks to the Adaptive Phased Management program.

Several Advisory Council members attended the Fourth International Conference on Geological Repositories hosted in Toronto by the NWMO during September 30–October 2, 2012. This was a productive and important exchange for learning how other countries are approaching the development of their own repositories. It was clear that the NWMO's work on Adaptive Phased Management is well-regarded in the international context. The NWMO also provided opportunities for representatives from interested communities, Aboriginal organizations and the NWMO's Municipal Forum to participate in the conference.

Several Council members attended a presentation on April 2, 2013, in Toronto on Switzerland's nuclear waste management program that was delivered by Lawrence Johnson, RD&D Coordinator at the Swiss National Cooperative for the Disposal of Nuclear Waste.

The Council continued to track the NWMO's work in support of its contract to assist Ontario Power Generation to develop a deep geologic repository for low- and intermediate-level waste<sup>15</sup>. Although there is no legal requirement for the Council to provide comments on this project, we view it as highly relevant to the NWMO's work on Adaptive Phased Management, particularly in the context of our evaluation criterion "culture of learning."

Some Council members attended the Canadian Nuclear Society Conference on Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities that was held in Toronto during September 11–14, 2011. The conference provided the status of and proposed future directions for technical, regulatory, environment, social, and economic aspects of radioactive waste management, nuclear facility decommissioning and environmental restoration for Canadian nuclear facilities. Although the conference focused on Canadian activities, the experiences of other countries were also presented.

<sup>15</sup> A description of the NWMO's work to assist Ontario Power Generation to develop a deep geologic repository for low- and intermediate-level waste can be found at [www.nwmo.ca/dgr](http://www.nwmo.ca/dgr).

## 2.2 Advisory Council Comments on the NWMO's Activities: 2011–2013

The Advisory Council's comments on the NWMO's work during the 2011–2013 time period are provided below for the NWMO's seven strategic objectives: build sustainable relationships, collaboratively implement the site selection process, optimize repository designs and further increase confidence in safety, provide financial surety, adapt plans, ensure governance and accountability, and build a high-performing organization. We also provide brief summaries of the NWMO's actions in response to our comments, as reported by the NWMO.

### 2.2.1 Build Sustainable Relationships

A key element of the work of the Advisory Council during 2011–2013 was to track and evaluate the NWMO's continued engagement with the many groups involved in the long-term management of Canada's used nuclear fuel, including potential host communities, Aboriginal organizations, municipal associations, federal and provincial governments, and young Canadians. This work is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 70–81).

#### Municipal, Provincial, and Federal Governments and Elected Officials

The Advisory Council emphasized the importance of maintaining support for the project through engagement of different levels of government, including the federal government and provincial governments of nuclear provinces. We noted that it will be crucial to continue to engage broadly in order to keep federal, provincial and municipal governments well-informed. We continued to emphasize the importance of thorough and timely communications regarding not only local and regional transportation, but also interprovincial considerations. We noted that transportation will not just be a regional issue, but it will be an interprovincial matter, and we emphasized the importance of continuing to engage broadly to keep provinces and municipal associations informed.

The NWMO reports that its evolving engagement plan addresses these concerns through continued outreach to multiple levels of government. For example, new working relationships have been established across federal and provincial ministries to facilitate collaboration on issues of mutual interest related to site selection for Adaptive Phased Management. This includes communications with federal and provincial transportation departments. The NWMO continues to convene with municipal associations individually and through the Municipal Forum.

#### Aboriginal Engagement

The Advisory Council continued to provide advice on the NWMO's Aboriginal engagement program and urged the NWMO to move more quickly to implement the program. We emphasized that strong candidate host communities will demonstrate their commitment by reaching out early in the process to neighbouring Aboriginal communities, rather than assuming that the NWMO would be solely responsible for this outreach. Communities should actively involve Aboriginal groups and neighbours, and provide for Aboriginal participation on community liaison committees.

We emphasized the importance of capacity building with Aboriginal people in potential siting regions. The Advisory Council stressed the need for the NWMO to continue to engage Elders in order to learn how to incorporate Aboriginal Traditional Knowledge into its decision-making processes. We stressed that Aboriginal Traditional Knowledge should be considered holistically across both technical and social areas of

study, and emphasized the importance of recognizing that there is a spiritual component to decision-making. We suggested that the NWMO should review models where Aboriginal Traditional Knowledge has been successfully integrated in projects and noted that there has been some significant work on how to bring the two distinct world views together in the justice system, natural resource management, and health care. We also suggested specific examples, including Hydro-Québec's work with the Cree organizations.

In our view, the NWMO's continued and developing engagement with Aboriginal people through outreach to a large number of communities in siting regions, Treaty Organizations, Tribal Councils, and provincial and national organizations is an effective response to these concerns. The NWMO continues to engage Elders on Aboriginal Traditional Knowledge in the context of the Council of Elders, as well as in siting areas. The NWMO has developed a compendium of articles and research documents on Aboriginal Traditional Knowledge and makes it available to staff. As mentioned earlier, at the Council's suggestion, the NWMO arranged for a special meeting on Aboriginal Traditional Knowledge in January 2013 with guest speaker Dr. Edward Connors<sup>16</sup>. The NWMO has hired Aboriginal staff people and contractors. In addition, the fieldwork that will be undertaken in Phase 2 of the Step 3 assessments will include local Aboriginal Traditional Knowledge.

The Advisory Council members supported and provided comments on the Elders Forum review process. For example, we recommended a review of precedents to understand how other similar groups were constituted, such as the Aboriginal Healing Foundation. We encouraged the NWMO to invite an Elder from the Far North to join the Council of Elders. We also stressed the importance of having more women represented, perhaps with male and female co-chairs of the new Council of Elders.

In our commentary on the Elders Forum review process, we recognized the desirability of creating a smaller forum that would not rely on a working group. However, we noted that the Forum's working group Niigani was constituted by ceremony and thus had status that needed to be celebrated when the Elders Forum was reconstituted as the Council of Elders. We agreed that the Council of Elders should not function as a proponent of the project, but should work to share information, communicate learnings from Aboriginal Traditional Knowledge and encourage dialogue on Adaptive Phased Management.

The NWMO has made serious efforts to respond to input from the Elders and the Advisory Council. The NWMO took this input into account when it prepared a discussion document for the Elders Forum review, as well as the terms of reference for the new Council of Elders. The NWMO researched a range of precedents and made the findings available to support the Elders Forum discussion of possible models. Donna Augustine was elected as chairperson in 2012. The Council of Elders is seeking additional women to join the Council.

Advisory Council members have attended meetings of the Council of Elders as observers. We have also asked questions and shared relevant information with the Elders where appropriate. We are exploring ways to share information and learning through a respectful common understanding of the relationships between the Advisory Council and the Council of Elders.

<sup>16</sup> Notes on the meeting with Dr. Connors are available at [www.nwmo.ca/uploads\\_managed/MediaFiles/2153\\_record\\_2013-1\\_-\\_advisory\\_council\\_minutes\\_-\\_jan\\_28-.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/2153_record_2013-1_-_advisory_council_minutes_-_jan_28-.pdf).

The Advisory Council has continuously emphasized the importance of a role for youth, and suggested that the NWMO, in conjunction with the Council of Elders, should review the method and basis for appointing aboriginal youth to participate in the new Council of Elders. We suggested that youth appointments should be made independently from the Elders' appointments. We also suggested that allowing youth to have a forum of their own, with linkages to the Council of Elders, may be a productive way to ensure they have a voice.

In 2013, the NWMO began to establish a process for involvement of Aboriginal youth, through dialogue with the Council of Elders. This included two meetings with the Youth Council of the Assembly of First Nations.

The Council advised the NWMO to increase its efforts to hire Aboriginal personnel and to accommodate flexible working schedules and locations. We note that the NWMO has made significant progress in hiring Aboriginal staff, both at the head office and in the regions, with many benefits, including more open communication channels with Aboriginal communities.

The Advisory Council urged the NWMO to develop a procurement policy and other initiatives to facilitate the involvement of Aboriginal firms that have experience in integrating Aboriginal Traditional Knowledge into environmental, engineering, geological and other technical services. The NWMO reports that it has engaged the services of experienced Aboriginal contractors for advice on Phase 1 and Phase 2 assessments concerning how Aboriginal Traditional Knowledge may be interwoven into the assessments with communities. The NWMO plans to seek further opportunities to engage Aboriginal contractors as the Adaptive Phased Management process unfolds. These are important steps towards addressing our concerns, provided that the NWMO continues to ensure compliance with the NWMO's guiding values.

### Young Canadians

In our last Triennial Report, we recommended that the NWMO review its stakeholder engagement programs with a view to ensuring that Aboriginal peoples, youth and municipalities continue to play a constructive role in the Adaptive Phased Management process over the long term. Over the past three years, the NWMO has expended considerable effort on engagement with Aboriginal peoples and municipalities and has recently renewed discussions about ways to engage youth. We provide further commentary on this topic in Sections 2.2.2 and 3.7.

### Communications

The Advisory Council provided comments to the NWMO on its communications strategy and supported the NWMO's efforts to be transparent in its work and to set up the micro website dedicated to the siting process. We also underscored the importance of clarifying and emphasizing messages about safety in all aspects of the NWMO's work. We noted that digital media are creating new challenges and opportunities that should be addressed in the NWMO's risk framework. We suggested that the NWMO should reiterate its commitments to its core values and ethical framework, and the values embedded in the site selection process.

We urged the NWMO to seek more opportunities to broaden awareness of its innovative approaches to public engagement, management approach and values. We suggested that it would be useful to obtain a U.S. perspective on the NWMO's work, following the release of the 2012 U.S. Blue Ribbon Commission report on America's Nuclear Future. We offered suggestions for building awareness, including the potential for segments on TV or other media that cover affairs of national public interest.

The NWMO revised its communications strategy and incorporated the Advisory Council comments. The NWMO developed a new micro website dedicated to the siting process. Some expanded multimedia outreach was initiated in 2011. The NWMO engaged Tom Isaacs, lead advisor to the U.S. Blue Ribbon Commission, to prepare an article, *Handle With Care: communities, collaboration, and what Canada can teach the U.S. about managing used nuclear fuel*, that was submitted to media and was published in Ontario News North and Flin Flon Reminder.

In the fall of 2013, when the public hearing on the Ontario Power Generation project for a deep geologic repository for low- and intermediate-level waste began, we expressed concerns about negative media attention, both in Canada and the U.S., which might have adverse effects on the NWMO's work on Adaptive Phased Management. Following the conclusion of the Joint Review Panel hearings in October 2013, the NWMO provided the Council with some initial observations from its experience to date with the Ontario Power Generation project.

### 2.2.2 Collaboratively Implement the Site Selection Process

The work undertaken by the NWMO during 2011–2013 on site selection is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 82–93). Since the site selection process was launched in 2010, the NWMO reports that there has been strong interest in learning more about the project. Twenty-two communities requested initial screenings, and 20 communities chose to move forward to Step 3 of the nine-step siting process<sup>17</sup>. Step 3 is a preliminary assessment of the potential suitability of interested communities. It has two phases: Phase 1 focuses on desktop studies and engagement with the community to identify communities with relatively strong potential to be suitable for the repository project. If these communities are interested in continuing in the learning process, they will become the focus of further, more detailed studies and engagement activities in Phase 2, which will commence in 2014. Phase 2 will focus on field studies and will expand regional engagement.

The Council continued to stress the importance of ensuring that the NWMO's partners – communities and contractors – share the NWMO's values (integrity, excellence, engagement, accountability and transparency). The NWMO reported that it emphasizes its values and expectations for partner communities throughout the siting process. For example, most of these values are outlined in letters of agreement that the NWMO co-signed with communities when they entered Step 3 of the process.

The NWMO also reported that the Organization reviews ethical values and past practices prior to contracting with suppliers, ensures that they have a clear understanding of the NWMO's expectations, and requires them to adhere to the NWMO's Code of Conduct<sup>18</sup>.

The Council suggested that the NWMO could increase local technical and social capacity by providing internships and scholarships to young people so that they could obtain the necessary skills to assist their communities to participate in the Adaptive Phased Management process. The NWMO has made little progress in this regard, although it is considering the potential for providing scholarships as part of broadened capacity building and investment in youth.

<sup>17</sup> The nine-step siting process is summarized at [www.nwmo.ca/sitingprocess\\_overview5](http://www.nwmo.ca/sitingprocess_overview5).

<sup>18</sup> The NWMO Code of Conduct is posted online at [www.nwmo.ca/uploads\\_managed/MediaFiles/1861\\_nwmo\\_codeofconduct.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/1861_nwmo_codeofconduct.pdf).



The Council explored ways in which the NWMO might engage the regions around potential host communities. We suggested that as the NWMO narrows down the communities under consideration, it is important for the other communities to stay involved as part of the regional engagement process. The NWMO confirmed that its work during Step 3 assessments includes regional involvement. Interested communities are encouraged to inform surrounding communities, including potentially affected Aboriginal communities and governments, as early as possible to facilitate their involvement.

The Council explored the role of spiritual ceremonies and emphasized their importance to site selection. In our view, the NWMO's plan to work in partnership with Elders and communities to include spiritual ceremonies and respect for areas of spiritual and cultural significance in Phase 2 of Step 3 begins to address this concern.

The Council supported the NWMO's provisions for third-party reviews and involvement of independent experts in the *Learn More* and *Feasibility Study* phases of the site selection process. We also recommended that community delegations involved in *Learn More* activities should include people who are not elected officials in addition to councillors and mayors. The NWMO reported that it had conveyed this advice to the communities, which responded by broadening the membership of their delegations.

In 2012, we provided advice to the NWMO on the timing, approach and communications for suspending the expressions-of-interest phase of the site selection process. The NWMO responded by preparing a communications backgrounder explaining the rationale and considerations for suspending the expressions-of-interest phase.

The Council advised the NWMO on its preliminary assessments of potential candidate communities. We emphasized the importance of communicating the site selection criteria on which decisions would be based. We sought clarification on the NWMO's proposed approach to integrating and evaluating findings from different streams of technical and social aspects of the assessments. We emphasized the need to communicate assessment findings clearly, with well-supported information and using a transparent and traceable format with consistent criteria. We suggested that the reports should demonstrate how the assessments incorporated dialogue with each community. The Council urged the NWMO to include information about how Aboriginal Traditional Knowledge had been incorporated and would be considered in future phases. We also stressed the importance of respectful treatment of the communities that will not be invited to continue on to Phase 2.

In its response to our comments on preliminary assessments, NWMO staff reported that the siting process has been transparent, with the process and siting factors developed through two years of engagement, and then finalized and published in 2010, and subsequently reviewed with communities in 2011. The NWMO reported that it continues to provide clarity on the decision-making process and timelines through its discussions and briefings with communities. The NWMO undertook to ensure that its reports on assessment findings would include sufficient information for communities to understand the basis of assessments and the study conclusions. In November 2013, the NWMO announced the completion of the first phase of preliminary assessment in collaboration with eight of the 21 communities that expressed interest in learning more about the Adaptive Phased Management project. Creighton in Saskatchewan, and Hornepayne, Ignace, and Schreiber in Ontario, were assessed as having strong potential to meet site selection requirements and have been identified for further study. The communities of English River First Nation and Pinehouse in Saskatchewan, and Ear Falls and Wawa in Ontario, were not selected for more detailed study. The NWMO reported that the overall reaction from the eight communities and the media was positive. The Advisory Council congratulated the NWMO for the quality of its communications process and for developing strong, collaborative relationships in the communities.

The Council held intensive discussions with the NWMO about the importance of ensuring that communities feel they are being treated well by the NWMO, both during the assessments and also when they may choose to leave the process, or are removed by screening processes. We considered options for ensuring that communities would benefit from having been involved in the site selection process, to recognize their contributions to the process and to offset any deleterious effects. The NWMO sought advice from the Advisory Council on its proposals for recognizing community contributions. We discussed the timing and content of announcements about financial contributions to communities in relation to announcements of decisions based on the preliminary assessments. The NWMO reported that it was working closely with all interested communities to ensure their needs are met in a respectful way during the assessment process and to prepare appropriate exit strategies where necessary. In November 2013, the NWMO announced that it would recognize community leadership and contributions to the process by providing \$400,000 to each of the eight communities to fund community well-being projects.

As discussions proceed with potential host communities and Aboriginal people, Council members proposed that the NWMO remain open to considering the potential for co-management of the project. Partnership scenarios may be different for Aboriginal people and the rest of the community. The NWMO is considering a range of partnership models as part of its collaborative work with communities and Aboriginal people.

### 2.2.3 Optimize Repository Designs and Further Increase Confidence in Safety

The work undertaken by the NWMO during 2011–2013 on repository designs and safety is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 94–105). The NWMO's technical program continued with research and development in the key areas of geoscience, repository engineering, and analyses of repository safety cases. This work is resulting in continual evolution of incremental design improvements. For example, in 2013 the NWMO undertook optimization studies of the repository designs for both Mark 1 repository containers, which are based on European spent fuel requirements, and Mark 2 containers, which are optimized for CANDU used fuel bundles. The Advisory Council has been kept informed of the progress in the NWMO's technical work, and of the results of external review of this work by the Independent Technical Review Group.

In 2011, Council members emphasized the close linkages that exist between site selection for the repository and the specific design features and related safety assessments of the repository, particularly with respect to differences between crystalline and sedimentary host rock locations. The NWMO established an internal committee that ensures co-ordination and harmonization of all work plans, both technical and social. This helps to support decision-making on siting and contributes to the technical design work.

The Council emphasized the importance of early public engagement on transportation issues, including the development of appropriate communications materials (including a video) to address the public's interests and questions. We recommended that public concerns related to the social acceptance of spent fuel transportation matters must be identified at the earliest possible stage, recognized as legitimate, and addressed. We provided comments on the draft transportation brochure, and urged the NWMO to continue to communicate fully the robustness of transportation containers and systems. The Council also asked for more information on transportation hubs and the rationale for engaging with them before transportation routes have been identified. We noted that transportation may occur by road, rail, or water, and recommended that all forms of transportation should be addressed in the NWMO's

communications materials. The NWMO incorporated the Council's suggestions in new communications materials developed during the last few years, and transportation videos have been shown in multiple venues as part of the NWMO's engagement program. The transportation brochure was refined and reviewed with the NWMO's Inter-Jurisdictional Used Nuclear Fuel Transportation Planning Group at its June 2013 meeting. The Council also emphasized the importance of understanding and addressing public perceptions of transportation safety, beginning with public engagement to explore concerns and identify opportunities to address them (see also Section 3.6).

#### 2.2.4 Provide Financial Surety

The work undertaken by the NWMO during 2011–2013 on financial surety is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 106–107). The Advisory Council receives regular updates on this work. We continued to emphasize the challenges associated with predicting costs when the future volume of used nuclear fuel is unknown.

#### 2.2.5 Adapt Plans

The work undertaken by the NWMO during 2011–2013 to adapt its plans is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 108–113). The NWMO reports that it continues to engage in continuous learning so that it will be able to adapt its plans if new technologies emerge or societal expectations change. This learning is reflected in updates to the NWMO's Implementation and Business Plans and in various materials, including “*What We Heard*” reports, backgrounders and technical documents.

During 2011–2013, the Council continued to emphasize the importance of tracking the external landscape as it affects the Adaptive Phased Management program. In 2011, at our request, the NWMO began to provide regular reviews of potential risks to the Adaptive Phased Management program at our meetings, followed by discussions and Council advice on ways to address the risks.

The Council requested that the NWMO consider any further risks that may be identified by the Independent Technical Review Group in its review of the technical program. We underscored the importance of ensuring resource and staff capabilities to conduct assessments in different regions of the country, and the important role of the Canadian Nuclear Safety Commission in conducting pre-project reviews. The Council also recommended updates to the risk framework to address the challenges associated with messaging through digital media. The NWMO ensured that its risk framework included risks identified by the Independent Technical Review Group, as well as risks associated with digital media. The NWMO also reported that it addressed staff and contractor resourcing to ensure that they were appropriate for the siting work. Pre-project reviews by the Canadian Nuclear Safety Commission are built into the NWMO's work plans.

In the context of transportation, the Council asked about the roles of the Canadian National Railway (CN) and Canadian Pacific Railway (CP), and suggested that rail safety should be included in the NWMO's consideration of potential risks to the Adaptive Phased Management program, especially in view of recent rail accidents in Canada.

Based on a Council suggestion, the NWMO reported on the lessons learned from the Waste Isolation Pilot Plant in Carlsbad, New Mexico, where the community remains very positive about hosting the repository for transuranic waste and exploring the possible disposal of spent fuel in the future. The NWMO also arranged for a representative from New Mexico to speak at the fall 2012 International Conference on Geological Repositories in Toronto, and undertook to seek opportunities for Canada's potential siting communities to hear first-hand from communities involved in similar projects internationally.

The Council supported the NWMO's proposal to review the lessons learned from recent experiences in Fukushima, Japan. We reviewed a draft management report on the lessons learned from Fukushima and recommended that the NWMO provide further clarity on the differences between an operating nuclear plant and the operations of a deep geological repository.

The NWMO took the Council's advice when it prepared materials about Fukushima for posting on the website. The NWMO's review of lessons learned from recent experiences in Japan highlighted the following points<sup>19</sup>:

- The potential impact of extreme natural events is less relevant during the post-closure period than during operation of a surface facility because such events are unlikely to affect conditions at repository depth.
- Accident risk must be carefully assessed by the NWMO and properly reflected in the engineering design, construction, and operation of a deep geological repository and used fuel transportation system.
- Safety analyses and emergency response planning need to consider a full range of low-probability, high-consequence events.
- The multi-barrier, defence-in-depth approach to used fuel management is a key component of the design to mitigate against the propagation and impact of low-probability, high-consequence events.

The Advisory Council reviewed the NWMO 2013–2017 Business Plan and sought clarification on a number of areas. As part of this discussion, the Council discussed the preliminary assessments, the importance of allowing sufficient time to acquire fieldwork permits, and the importance of continued capacity building in siting regions and with First Nations. The NWMO clarified wording in the Business Plan based on the Council's discussion and guidance prior to finalizing for the Board of Directors. The NWMO reports that its work plans for siting take into account the time frames for permitting processes and continued capacity-building programs for siting communities and Aboriginal people.

The Advisory Council reviewed drafts of the NWMO's Implementation Plan, *Implementing Adaptive Phased Management 2014 to 2018*, raised questions and made a number of suggestions. Additional comments are provided in Section 3 of this report.

### 2.2.6 Ensure Governance and Accountability

The work undertaken by the NWMO during 2011–2013 on governance and accountability is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 114–117). The NWMO reports that multiple layers of oversight and peer review, complemented by externally audited international certifications, help to ensure that the NWMO's work is both transparent and guided by the highest scientific and professional standards. The activities of the Advisory Council, Independent Technical Review Group, Geoscientific Review Group and Council of Elders contribute to the review of the NWMO's work from a variety of perspectives.

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<sup>19</sup> See [www.nwmo.ca/faq\\_fukushima](http://www.nwmo.ca/faq_fukushima).

In 2011, the NWMO invited the Council to discuss our membership, as existing appointments would end on December 31, 2011. We advised that the NWMO's work during the next few years would continue to require a similar breadth of expertise on the Council as in previous years. However, we noted that during the next term, it would be valuable to incorporate additional expertise in the social sciences, especially ethics and the management of impacts on communities. In response, the NWMO recruited Wesley Cragg, an expert in business ethics, to join the Council in 2012.

### 2.2.7 Build a High-Performing Organization

The work undertaken by the NWMO during 2011–2013 to build a high-performing organization is described in the NWMO's *Triennial Report 2011 to 2013, Learning More Together* (pages 118–119).

During 2011–2013, the Council observed that the NWMO focused on hiring staff and contractors to meet the needs of the siting process, including the recruitment of Aboriginal people. Fifteen local offices were established in communities participating in preliminary assessments.

## 3 Implementing Adaptive Phased Management 2014 to 2018

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In this section of our report, we review the December 2013 draft of the NWMO's Implementation Plan, *Implementing Adaptive Phased Management 2014 to 2018*, and provide comments and recommendations for future work. The Plan is available as Appendix 1 of the NWMO's *Triennial Report 2011 to 2013, Learning More Together*.

Our comments are grouped under the following headings:

- Ethical and Social Framework
- Amount of Used Nuclear Fuel
- Physical Size of the Repository
- Environmental Integrity
- Transportation
- Multi-Generational Engagement
- Aboriginal Engagement
- Regional Perspective
- Learn More Program
- Adapting Plans
- Governance and Accountability

### 3.1 Ethical and Social Framework

As we noted in Section 1.3 of this report, in 2005 the NWMO's Round Table on Ethics published an Ethical and Social Framework to guide the work of the NWMO. A workshop held in 2011 concluded that the Framework was coherent, comprehensive and well-articulated. Workshop participants also observed that the framework was created in the context of the process that led to the Adaptive Phased Management approach and needed updating to improve its effectiveness during the site selection process. They made a number of suggestions for the update. The NWMO reports that



it continues to use the Framework to guide its work and built upon it when developing the values and process for the siting document in 2010 and the feasibility study design in 2012. However, the Advisory Council believes that the Framework will be more relevant and easier to use if it is updated for the current context of the NWMO's work.

**The Advisory Council recommends that the NWMO update the Ethical and Social Framework to increase its relevance to the site selection phase of the Adaptive Phased Management process.**

The 2011 review also raised the need for impartial and independent reviews of the implementation of the Ethical and Social Framework. The NWMO achieved a milestone in November 2013 with the conclusion of Phase 1 of Step 3 for the first eight communities that participated in the preliminary assessment process. This milestone creates an opportunity to learn from the experience of working with these eight communities and shape ongoing work with the remaining interested communities.

**The Advisory Council recommends that the NWMO consider options for independent evaluation of its work, using the questions in the Ethical and Social Framework, commencing at the end of Phase 1 of Step 3. We recommend that any evaluation include an assessment of communities' perceptions of the site selection process and how they have been treated to date.**

### 3.2 Amount of Used Nuclear Fuel

The draft plan *Implementing Adaptive Phased Management 2014 to 2018* notes that the NWMO has a legal obligation to provide long-term management of all Canada's used nuclear fuel, that which exists now and that which will be produced in the future (page 8). This is consistent with statements made in the NWMO's Final Study Report, *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel* (2005). However, we remain concerned about the absence of information about the amount and type of used fuel that may be generated in the future, beyond that from existing nuclear facilities. This creates potential risks to the NWMO's work and influences the NWMO's ability to effectively plan for the long-term management of Canada's nuclear fuel wastes. For example, it is difficult to predict what size of deep geological repository will be required, how used nuclear fuel will be transported, and what transportation routes will be required, among other factors. We observe that a similar concern about the amount of waste was raised at the public hearings into the Ontario Power Generation's Deep Geologic Repository for Low- and Intermediate-Level Waste. It is very likely that it will also be raised in the context of future hearings about the NWMO's deep geological repository for used nuclear fuel.

The Council addressed this issue in our previous reports in 2005 and 2010. For example, in our 2010 Triennial Report, we urged the NWMO to communicate clearly how it plans to continually review energy policy as it changes, and how it will adapt its plans as required in response to changing policies for refurbishment and new nuclear build in several provinces. The NWMO publishes an annual update on current and future potential inventories of used nuclear fuel volumes and types. The NWMO has also committed to seeking the input of Canadians on how the implementation of Adaptive Phased Management should be adapted in response to current and projected inventories of used nuclear fuel.

Since 2005, Ontario and New Brunswick have made decisions to proceed with refurbishments of some existing nuclear generating stations, and Quebec has decided to close its nuclear generating station. Specifically, in December 2013, the Ontario Government released *Achieving Balance: Ontario's Long-Term Energy Plan*. It states that Ontario will not proceed at this time with construction of new nuclear reactors at the Darlington Generating Station. However, nuclear refurbishment is planned to begin at both Darlington and Bruce Generating Stations in 2016. The Pickering Generating Station is expected to be in service until 2020.

In the section *Provide Financial Surety in Implementing Adaptive Phased Management 2014 to 2018*, the NWMO states that “the specific volume of Canada’s used fuel to be placed in the repository will be agreed with the community using the best information available at the time and an open and transparent consultation process involving surrounding communities and others who are interested and potentially affected.” The Council recognizes the importance of consultation and agreement with local and regional communities. However, we emphasize that the broader Canadian public and Aboriginal peoples, including communities along transportation routes, also have an interest in the amount of used nuclear fuel to be stored.

The Council notes that any decision that would result in a significant change to the amount or type of used fuel to be managed may add complications to the search for a site for the long-term disposal of waste generated by existing facilities, as well as waste generated by any proposed new facilities. Addressing the public policy and ethical issues associated with changes in nuclear power generation that would result in a significant change to the amount or type of used fuel to be managed is beyond the scope of the NWMO’s mandate, important as they might be to the capacity of the NWMO to fulfil its mandate. We wish to point out that there are environmental assessments and other regulatory requirements associated with decisions about nuclear energy, and they involve processes that include public input. However, we reiterate our view that such significant changes should be attended by appropriate processes that ensure public input<sup>20</sup>. We believe that it would be useful, therefore, for the NWMO to provide a “road map” explaining how decisions about nuclear energy and nuclear waste disposal are made in Canada, and how they are influenced by public input.

**The Advisory Council recommends that the NWMO prepare a “road map” showing the political, regulatory and consultation processes associated with the amount and type of used nuclear fuel to be managed.**

### 3.3 Physical Size of the Repository

The description of *The Project in Implementing Adaptive Phased Management 2014 to 2018* provides some information about the expected physical size of the repository and associated facilities. As noted above, the specific volume of used fuel to be placed in the repository is not known. The Council recognizes that this will depend on how many fuel bundles are to be handled and that this is a difficult and probably contentious issue depending on many factors, including potential new nuclear facilities, the life of existing nuclear plants, “capacity” of the geological setting, and ultimately, the overall energy policy of the provinces and perhaps the federal government. We believe that it is essential to be absolutely transparent about these uncertainties during the ongoing site selection process.

<sup>20</sup> For background on this concern, please see the Advisory Council reports ([www.nwmo.ca/uploads\\_managed/MediaFiles/341\\_NWMO\\_Final\\_Study\\_Nov\\_2005\\_E.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/341_NWMO_Final_Study_Nov_2005_E.pdf) and [www.nwmo.ca/uploads\\_managed/MediaFiles/1721\\_triennialreport2008to2010.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/1721_triennialreport2008to2010.pdf)) and the Ethical and Social Framework set out by the Ethics Round Table in 2005 ([www.nwmo.ca/ethicalandsocial\\_framework](http://www.nwmo.ca/ethicalandsocial_framework)).

### 3.4 Environmental Integrity

One of the values identified by Canadians during the study phase was environmental integrity: to ensure that environmental integrity is maintained over the long term. In the section on *Governance and Accountability* in the draft *Implementing Adaptive Phased Management 2014 to 2018*, the NWMO notes that in 2012, the Organization received certification that its environmental governance is in accordance with ISO 14001:2004 Environmental Management Systems. In the section on *Build Sustainable Relationships*, the NWMO states that in 2014, it will “continue to participate in regional and national environmental initiatives.”

The Advisory Council asked the NWMO for more information on its plans to ensure environmental integrity. We heard that the NWMO is beginning to design the environmental work that will be undertaken in Phase 2 of Step 3. This will include exploring local Aboriginal Traditional Knowledge and walking the land to gain information about specific environmental features, including sensitive areas. The Council suggested that the NWMO should also consider ways to contribute to environmental sustainability and an environmentally attuned culture, for the willing communities and regions, as well as in the NWMO's own operations. This would complement the social and economic well-being studies that the NWMO is already conducting. It would also allow the NWMO to move beyond regulatory compliance and harm avoidance to contribute environmental benefits throughout its plans, actions and partnerships. A Council member provided some relevant Canadian and international strategies and case studies to show how environmental sustainability benefits are being incorporated in the municipal and industry sectors.

**The Advisory Council recommends that the NWMO provide more details on its plans to incorporate environmental considerations in its next five years of work.**

### 3.5 Transportation

The draft *Implementing Adaptive Phased Management 2014 to 2018* includes several activities related to potential routes and modes of transportation of used nuclear fuel. This work will be undertaken in a context that reflects a significant shift in public perceptions of rail safety due to recent rail accidents in Canada. In addition, there are many examples of communities opposing the shipment of radioactive material in other jurisdictions (e.g., shipment of Bruce steam generators to Sweden, transportation to the U.S. of highly enriched uranium from Chalk River).

The Advisory Council has frequently raised transportation issues, and the NWMO's responses have generally focused on technical safety through compliance with the regulatory requirements of Transport Canada and international standards. The Council agrees that it will be essential to demonstrate the safety and security of any transportation system to the satisfaction of regulatory authorities. However, we emphasize that the discussions about transportation must focus on social acceptance as much as on technical considerations, and this needs to be addressed as a key priority in the next five years.

The engagement program outlined in the draft *Implementing Adaptive Phased Management 2014 to 2018* refers to the transportation community as “a group with a shared interest.” One of the actions is to “brief Canada's nuclear host communities about progress with Adaptive Phased Management, including planning for transportation of used nuclear fuel.”

**The Advisory Council recommends that the NWMO move quickly to involve Canadians and Aboriginal peoples in a comprehensive dialogue about transportation. This process should be designed to probe public**

**perceptions and concerns regarding transportation and gather suggestions for ways to address them.**

### 3.6 Multi-Generational Engagement

The Council emphasizes that one of the unique features of the Adaptive Phased Management project is that it spans many generations, today and in the future. We believe that it is essential to involve today's youth as they will be responsible for continuing the work to manage Canada's used nuclear fuel in the future. Youth engagement should be encompassed in a multi-generational approach that ensures the exchange of knowledge, values and ideas across all age groups.

In 2009, the Youth Roundtable made a number of recommendations to promote involvement of young people in the Adaptive Phased Management project<sup>21</sup>. The NWMO has begun to implement a number of activities in response (see section on *Engaging With Young Canadians* in the NWMO's *Triennial Report 2011 to 2013, Learning More Together*).

The section on *Build Sustainable Relationships* in the draft *Implementing Adaptive Phased Management 2014 to 2018* states that the NWMO plans to “build a multi-generational view of the long-term management of used nuclear fuel through engagement, education and outreach involving young Canadians, including Aboriginal youth” and to “continue to develop and implement an NWMO education, outreach and capacity-building strategy for young Canadians and Aboriginal youth that incorporates both technical and social disciplines.”

**The Advisory Council recommends that the NWMO place a high priority on multi-generational engagement by developing and implementing a detailed work plan to integrate youth involvement and capacity building throughout the Adaptive Phased Management project.**

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### 3.7 Aboriginal Engagement

The section on *Build Sustainable Relationships* in the draft *Implementing Adaptive Phased Management 2014 to 2018* states that the NWMO will “continue to seek the advice of Elders and Aboriginal youth...about cultures, traditional practices, protocols and governance of Aboriginal peoples.” The NWMO gained valuable input from the former Elders Forum, Niigani and Youth Roundtable in the past. Aboriginal involvement will be particularly important in the next phase of the site selection process.

The site selection process includes an action to “refine tools and methods for assessment of sites in terms of environmental, social, cultural and economic factors, including factors identified by Aboriginal Traditional Knowledge.” The Advisory Council observes that the NWMO's understanding of opportunities to incorporate Aboriginal perspectives is evolving to include cultural values and spirituality, as well as Aboriginal Traditional Knowledge. However, we continue to seek more details on the integration of these elements in the NWMO's work on site selection and transportation. For example, the use of Aboriginal Traditional Knowledge has not been clearly shown in the screening process and preliminary environmental impact assessments.

**The Advisory Council recommends that the NWMO provide more details on how Aboriginal Traditional Knowledge, cultural values, law and spirituality will be integrated in the next five years of work.**

<sup>21</sup> [www.nwmo.ca/uploads\\_managed/MediaFiles/1067\\_advisorycouncilpresentation-fi.pdf](http://www.nwmo.ca/uploads_managed/MediaFiles/1067_advisorycouncilpresentation-fi.pdf)

### 3.8 Regional Perspective

The draft *Implementing Adaptive Phased Management 2014 to 2018* notes that there will be a more regional perspective as the site selection process unfolds. In the section *Collaboratively Implement the Site Selection Process*, the NWMO states that “the deep geological repository and centre of expertise involve a large project that has the potential to benefit a large area.” The Council emphasizes that it is critical to understand the likely opportunities and challenges for each region surrounding potential host communities. Regional aspirations and relationships could have significant influences on the site selection process, as well as the entire Adaptive Phased Management program.

### 3.9 Learn More Program

In the section *Collaboratively Implement the Site Selection Process* in the draft *Implementing Adaptive Phased Management 2014 to 2018*, the NWMO acknowledges that there is a “low level of familiarity with and understanding of used nuclear fuel, which leads to fear among some people.” In the *Learn More Program*, the NWMO staff and contractors have applied considerable efforts to information and communications.

**The Advisory Council recommends that additional specialists in radiation protection, such as a health physicist and a medical doctor specializing in nuclear medicine, should be involved in the *Learn More Program* to provide increased information about the health implications of the transportation and management of used nuclear fuel.**

### 3.10 Adapting Plans

In the section *Adapt Plans* in the draft *Implementing Adaptive Phased Management 2014 to 2018*, the NWMO states that it will adapt its plans in response to new knowledge, international best practices, advances in technical learning, evolving societal expectation and values, and changes in public policies. The Council agrees that these are all important influences that should be taken into account. However, we think that several others should be included.

For example, it will be important to evaluate and learn from the NWMO’s experiences with the Ontario Power Generation project for a deep geologic repository for low- and intermediate-level waste. The Joint Review Panel hearings for this project concluded at the end of October 2013. The NWMO has provided the Council with some initial observations from its experience to date with the Ontario Power Generation project. When the Panel publishes its report, it will be useful to examine the entire process to identify lessons that may be applicable to the Adaptive Phased Management project.

**The Advisory Council recommends that the NWMO undertake a systematic review of the lessons learned from experience with the Ontario Power Generation project for a deep geologic repository for low- and intermediate-level waste.**

In addition, the NWMO is now in a position to learn from the experiences gained in Phase 1 of Step 3 of the Adaptive Phased Management program, including learning from the interested communities and Aboriginal peoples that have been engaged in this phase of the Adaptive Phased Management program. An independent evaluation of the NWMO’s work using the questions in the Ethical and Social Framework (see our recommendation in Section 3.1 of this Triennial Report) could be used to inform adaptations that the NWMO can make to improve its plans for future work.



### 3.11 Governance and Accountability

During the next four years, as the NWMO begins to work more intensively with a smaller number of potential host communities, it will become increasingly important to focus on governance and accountability at the local level. The Advisory Council believes that it will be important to ensure that these communities share the five fundamental values of the NWMO: integrity, excellence, engagement, accountability and transparency. It will also be important to continue to apply the Ethical and Social Framework.

**The Advisory Council recommends that the NWMO emphasize the Ethical and Social Framework and the five fundamental values in its communications and partnerships with potential host communities, regions, Aboriginal organizations, contractors and other partners.**

## 4 Conclusions and Recommendations

### 4.1 Conclusions

In November 2013, the NWMO announced the conclusions of the preliminary assessments undertaken in Phase 1 of Step 3 of the siting process with the first eight of the 21 communities that have expressed an interest in learning more about the Adaptive Phased Management project<sup>22</sup>. The Advisory Council commends the NWMO for its leading edge work with these eight communities. The preliminary assessments were well-executed, and the findings were clearly communicated to communities and the media.

The NWMO is now continuing Phase 1 of Step 3 with the remaining communities while it embarks on a new phase of work with a small number of the communities that have completed Phase 1. Phase 2 of Step 3 will involve much more detailed investigations, including field assessments, leading to the selection of one or two communities for further evaluation. The participating communities, regions and Aboriginal communities will need to take on a higher level of commitment than in Phase 1. We anticipate that work undertaken in Phase 2 will be vulnerable to an increasing level of potential risks as the stakes become higher. It will be easier for opponents to focus their concerns as the targets become clearer and more specific.

As the NWMO makes the transition to Phase 2 of Step 3, it will need to maintain a clear focus on its fundamental values and the questions in the Ethical and Social Framework. This applies to the NWMO's work with potential host communities, as well as the complexities of regional and Aboriginal relationships. In addition, we expect that local, regional and Aboriginal stakeholders will begin to seek more information about potential models for partnership agreements and co-management of the project. They will also need a range of opportunities to develop the capacity to interact with the NWMO and participate fully in the Adaptive Phased Management project. The community liaison committees will play an increasingly important role and will need ongoing support to function effectively. Recognizing the multi-generational nature of the Adaptive Phased Management project, the NWMO will need to increase its efforts to engage with youth in general, and Aboriginal youth in particular.

<sup>22</sup> The nine-step siting process is summarized at [www.nwmo.ca/sitingprocess\\_overview5](http://www.nwmo.ca/sitingprocess_overview5).

One of the most challenging aspects of the Adaptive Phased Management process is the identification of a “willing” host community. Up to this point, 20 communities have been willing to “learn more” about the project. As Step 3 progresses, the definition of willingness will shift, with a spotlight on willingness to actually host the project. An important area of activity will therefore include engagement with local, regional and Aboriginal interests to determine how a willing host will be defined and identified.

As we observed in Section 3.2 of this report, while the NWMO sharpens its focus on detailed work with a small number of potential host communities, Phase 2 must also include engagement and clear communications with potential transportation communities and with Canadians generally. Discussions of transportation will necessarily involve many new players, such as government agencies and companies with responsibilities for transportation planning, building infrastructure, emergency response and operations. The NWMO will need to be vigilant to ensure that the Ethical and Social Framework and the NWMO’s five fundamental values are accepted and used by all partners.

The NWMO should also ensure that it continues to provide information and engage with the international community, to ensure that its work is informed by experiences elsewhere, and to understand concerns that may arise beyond Canadian borders, for example in Great Lakes communities in the United States. It is also worthwhile to show Canadians how the NWMO’s work fits within the international context and to demonstrate that experts and institutions in other countries recognize the soundness of the NWMO’s approach.

The Joint Review Panel hearings for the Ontario Power Generation project to develop a deep geologic repository for low- and intermediate-level waste were very instructive in elucidating many of the public perceptions and concerns that the NWMO needs to address during the Adaptive Phased Management process. The Council looks forward to exploring with the NWMO the lessons learned from this experience.

## 4.2 Recommendations

In this section, we list our recommendations from Section 3. We conclude that the NWMO is generally meeting the Council’s criteria: comprehensiveness, fairness and balance, integrity, transparency, technical strength, financial capacity, and culture of learning. Our recommendations are intended to highlight some areas that we think will be particularly important for the NWMO’s next phase of work.

For explanatory text about the recommendations, please refer to the section noted in parentheses after each one.

### Ethical and Social Framework

1. The Council recommends that the NWMO updates the Ethical and Social Framework to increase its relevance to the site selection phase of the Adaptive Phased Management process (Section 3.1).
2. The Council recommends that the NWMO consider options for independent evaluation of its work, using the questions in the Ethical and Social Framework, commencing at the end of Phase 1 of Step 3. We recommend that any evaluation include an assessment of communities’ perceptions of the site selection process and how they have been treated to date (Section 3.1).
3. The Council recommends that the NWMO emphasize the Ethical and Social Framework and the five fundamental values in its communications and partnerships with potential host communities, regions, Aboriginal organizations, contractors and other partners (Section 3.11).

#### Amount of Used Nuclear Fuel

4. The Council recommends that the NWMO prepare a “road map” showing the political, regulatory and consultation processes associated with the amount and type of used nuclear fuel to be managed (Section 3.2).

#### Environmental Integrity

5. The Council recommends that the NWMO provide specific information about how the NWMO plans to incorporate environmental considerations in its next five years of work (Section 3.4).

#### Transportation

6. The Council recommends that the NWMO move quickly to involve Canadians and Aboriginal peoples in a comprehensive dialogue about transportation options and routes. This process should be designed to probe public perceptions and concerns regarding transportation and gather suggestions for ways to address them (Section 3.5).

#### Engagement

7. The Council recommends that the NWMO place a high priority on multi-generational engagement by developing and implementing a detailed work plan to integrate youth involvement and capacity building throughout the Adaptive Phased Management project (Section 3.6).
8. The Council recommends that the NWMO provide more details on how Aboriginal Traditional Knowledge, cultural values, law and spirituality will be integrated in the next five years of work (Section 3.7).

#### Learn More Program

9. The Council recommends that additional specialists in radiation protection, such as a health physicist and a medical doctor specializing in nuclear medicine, should be involved in the *Learn More Program* to provide increased information about the health implications of the transportation and management of used nuclear fuel (Section 3.9).

#### Adapting Plans

10. The Council recommends that the NWMO undertake a systematic review of the lessons learned from experience with the Ontario Power Generation project for a deep geologic repository for low- and intermediate-level waste (Section 3.10).

## Appendix 1: Sample Advisory Council Agenda

### ADVISORY COUNCIL AGENDA

Meeting No. 2013-4

**Wednesday, November 27 – 9:00 a.m. – 4:00 p.m. EDT**

(Advisory Council will continue in camera until 5:30 pm)

**Thursday, November 28 – 8:30 am – 3:30 p.m. EDT**

#### Location:

NWMO, 22 St. Clair Avenue East, Toronto, Ontario

#### Wednesday, November 27, 9:00 am – 4:00 pm

Time	Item
<b>Advisory Council Business</b>	
<b>09:00 am</b>	1. Constitution of Meeting / Approval of Agenda
<b>09:00 am</b>	2. Minutes of Previous Meetings
<b>Standing Items and Updates</b>	
<b>09:05 am</b>	3. President's Report
<b>09:45 am</b>	4. APM Program Overview and Risk Assessment
<b>Site Selection Process: Phase 1 Assessments</b>	
<b>10:00 am</b>	5. Status of Site Selection Process and Release of First Eight Assessments
<b>10:40 am</b>	Break
<b>10:50 am</b>	6. Building Relationships
<b>11:10 am</b>	7. Report on Youth Engagement
<b>Phase 2 Preliminary Assessments</b>	
<b>11:30 am</b>	8. Phase 2 Preliminary Assessments: Early Activities
<b>12:00 pm</b>	9. Capacity Building for Phase 2
<b>12:15 pm</b>	Lunch
<b>Technical Updates</b>	
<b>01:15 pm</b>	10. Independent Technical Review Group (ITRG) Report
<b>01:45 pm</b>	11. APM Transportation Technical Plan and APM Technical Program Update
<b>02:15 pm</b>	12. Environmental Integrity
<b>OPG Low &amp; Intermediate Level Waste DGR Updates</b>	
<b>02:45 pm</b>	13. Observations from the L&ILW DGR Hearings
<b>03:15 pm</b>	14. Review of NWMO Support to OPG
<b>Other Business</b>	
<b>03:25 pm</b>	15. Topics of Interest for Future Sessions
<b>In Camera Meeting</b>	
<b>03:30 pm</b>	The Advisory Council will meet in camera
<b>Termination of Meeting by 5:30 pm (Council meets in camera from 3:30-5:30)</b>	

**Thursday, November 28, 8:30 am – 3:30 pm**

**Advisory Council members will meet in camera to continue preparations on their comments for inclusion in the 2011-2014 Triennial Report.**

<b>Time</b>	<b>Item</b>
<b>08:30 am</b>	1. Meet with NWMO staff to discuss Council's key conclusions and recommendations
<b>10:30 am</b>	2. Discuss changes to Advisory Council draft triennial report in response to (1) information and discussion from November 27th Advisory Council meeting and (2) November 28th meeting with NWMO staff
<b>11:30 am</b>	3. Review NWMO's draft triennial report
<b>12:30 pm</b>	Lunch
<b>1:00 pm</b>	4. Review second draft of Section 3 of Advisory Council triennial report
<b>2:00 pm</b>	5. Review first draft of Section 4
<b>3:30 pm</b>	6. Adjourn



# Appendices





# **Implementing Adaptive Phased Management 2014 to 2018**



NUCLEAR WASTE  
MANAGEMENT  
ORGANIZATION

SOCIÉTÉ DE GESTION  
DES DÉCHETS  
NUCLÉAIRES

# Implementing Adaptive Phased Management 2014 to 2018

MARCH 2014



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## The NWMO is guided by five fundamental values:

### » Integrity

We will conduct ourselves with openness, honesty and respect for all persons and organizations with whom we deal.

### » Excellence

We will pursue the best knowledge, understanding and innovative thinking in our analysis, engagement processes and decision-making.

### » Engagement

We will seek the participation of all communities of interest and be responsive to a diversity of views and perspectives. We will communicate and consult actively, promoting thoughtful reflection and facilitating a constructive dialogue.

### » Accountability

We will be fully responsible for the wise, prudent and efficient management of resources, and be accountable for all our actions.

### » Transparency

We will be open and transparent in our process, communications and decision-making, so that the approach is clear to all Canadians.





# Preface

The Nuclear Waste Management Organization (NWMO) is responsible for the implementation of Adaptive Phased Management, Canada's plan for the safe, long-term care of used nuclear fuel. Adaptive Phased Management involves the development of a large infrastructure project that will include a deep geological repository and a centre of expertise for technical, environmental and community studies.

The NWMO invites all Canadians and Aboriginal peoples of Canada to learn more and become involved in the management of Canada's used nuclear fuel. To support this involvement and demonstrate our commitment to transparency and accountability, the NWMO publishes an annual update to its five-year strategic plan, titled *Implementing Adaptive Phased Management*. The plan is regularly assessed, strengthened and redirected as appropriate in the face of new information and comments we receive through our engagement initiatives.

*Implementing Adaptive Phased Management 2014 to 2018* was released in draft for public review between September and December 2013. Following the review period, the Plan was revised to reflect comments received. An overview of comments received about the Draft Plan and how they helped to refine the plan is available for review at [www.nwmo.ca](http://www.nwmo.ca).

The NWMO welcomes all suggestions and ideas about our work and how we can help you learn more about Adaptive Phased Management.

You can reach the NWMO by mail:

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Or through our website at:

[www.nwmo.ca](http://www.nwmo.ca)

# Executive Summary

**The Nuclear Waste Management Organization (NWMO) is responsible for the long-term care of Canada's used nuclear fuel. *Implementing Adaptive Phased Management 2014 to 2018* describes our five-year work program.**

Adaptive Phased Management, Canada's long-term plan for used nuclear fuel, is a management system and a technical method. The management system is based on phased and adaptive decision-making supported by public engagement and continuous learning. The end point of the technical method is a repository that will contain and isolate Canada's used nuclear fuel deep underground in a suitable rock formation. A safe and secure transportation system will be developed to transport used nuclear fuel from the facilities where it is currently stored on an interim basis to the centralized site. The NWMO's primary motivation is safety – to protect people and the environment from Canada's highly radioactive used nuclear fuel. This objective and common vision underpins all the work of the NWMO. All aspects of the NWMO's work will meet or exceed all applicable federal, provincial and international regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

The focus of the 2014 to 2018 period will be on siting and working with potentially interested communities as they move through the many steps of the siting process. For communities that move forward in the process, the NWMO will be ready to implement activities such as learning more, site evaluation and engagement. Twenty communities have successfully passed an initial screening and elected to advance to preliminary assessments (Step 3, Phase 1) of the site selection process. A narrowing down process has since taken place based on findings from the first phase of preliminary assessments. Currently, 15 communities continue to explore their interest in hosting Adaptive Phased Management, and Aboriginal peoples and communities in the surrounding area are progressively being engaged in learning and decision-making. We expect that the site selection process will advance over the five-year period such that the NWMO will have completed preliminary assessments to support identification of one or possibly two areas to proceed to site characterization (Step 4). The NWMO will continue to refine conceptual designs and postclosure safety assessments for a repository in both crystalline and sedimentary rock formations, and submit these to the Canadian Nuclear Safety Commission for a pre-project

review. Throughout the planning period, engagement and social research will continue. Attention to sound governance and assurances around program funding will be maintained. Investing in people and the skills key to program success and continuity will remain a priority.

Key milestones for the next five-year planning period include:

- » Completing desktop preliminary assessments for communities that have passed an initial screening and elect to proceed in the site selection process;
- » Engaging the surrounding communities and Aboriginal peoples in learning and consideration of the project;
- » Based on the results of this work, identifying the communities with strong potential to be suitable for the project to progress with the next phase of work involving preliminary field studies and engagement of Aboriginal peoples and surrounding communities in order to establish a foundation to proceed to implement the project together;
- » Conducting this work collaboratively with the communities involved;
- » Completing preliminary field studies and assessments to support identification of one or two communities to progress to the detailed site characterization phase of work;
- » Designing and manufacturing physical prototypes of the used nuclear fuel container;
- » Establishing a container, engineering, and test facility for both the repository and transportation containers;
- » Completing an integrated review of microbiological processes that could occur within the repository environment;
- » Working with waste owners in planning for future transport of used nuclear fuel from the interim storage facilities where it is currently stored; and
- » Completing an update to the conceptual design and cost estimate for Adaptive Phased Management.

The plan for the next five years is organized along seven strategic objectives outlined in the following pages. This 2014 to 2018 strategic plan is a ‘living’ document that is regularly assessed, strengthened and redirected in the face of new information, advances in science and technology, insight from Aboriginal Traditional Knowledge, changes in societal values, and evolving public policy. Adaptive Phased Management will only proceed as quickly as Canadians, successful technology development and demonstration, and the regulatory authorities allow.

The NWMO approaches its work with the following vision: the long-term management of Canada's nuclear waste in a manner that safeguards people and respects the environment, now and in the future.

## Strategic Objectives

The NWMO will:

- » Build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.
- » Implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.
- » Refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.
- » Ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.
- » Adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, insight from Aboriginal Traditional Knowledge, evolving societal expectations and values, and changes in public policies.
- » Maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.
- » Build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.

# Progress Since Last Implementation Plan

The NWMO reports in detail on its progress in achieving the activities outlined in the Implementation Plan each year in its Annual Report and every three years in its Triennial Report. Selected highlights are outlined below.

## Building Sustainable Relationships

The NWMO continued to engage with the many groups involved in the long-term management of Canada's used nuclear fuel at this early phase of work. The NWMO:

- » Continued to work with the Municipal Forum to develop a better understanding of the needs and processes of municipalities involved in the site selection process and of the communities in the surrounding area.
- » Worked closely with the Council of Elders to incorporate Aboriginal Traditional Knowledge in the NWMO's work.
- » Continued to strengthen relationships with federal and provincial governments and to brief elected representatives about the project and the site selection process.
- » Supported initiatives designed to increase youth interest and participation in science, including Youth Science Canada, Shad Valley, the Science North School Outreach Program, and Scientists in School.
- » Used a wide variety of communications media to keep communities and the public at large informed about the NWMO, its work, and the site selection process.

## Collaboratively Implementing the Site Selection Process

Working with communities, the NWMO continued to advance the site selection process. The NWMO:

- » Continued to support the formation of community liaison committees by Step 3 communities to facilitate learning in each community and to provide guidance in such areas as preliminary assessments and engagement with neighbouring communities.
- » Completed Phase 1 preliminary assessments (Step 3) in eight communities, four of which were identified for further study.
- » Continued to provide resources to communities to support reflection on their interest in the project and to facilitate dialogue and learning in the community about the project.
- » Continued to support community learning through facilitating visits to facilities where used nuclear fuel is currently stored on an interim basis, meetings and resources to contract independent expert advice.

### Optimizing Repository Designs and Further Increasing Confidence in Safety

The NWMO's technical program continued research and development in the key areas of repository engineering, geoscience and repository safety. Research and development work is ongoing regarding the transportation of used nuclear fuel. The NWMO:

- » Maintained and advanced geoscientific research specific to the long-term behaviour and evolution of deep-seated, low-permeability groundwater systems in crystalline and sedimentary bedrock settings.
- » Worked collaboratively with Switzerland's nuclear waste management organization (Nagra) to develop copper coatings for repository containers using Canadian technologies developed by the National Research Council, the University of Ottawa, the University of Windsor, and the University of Toronto.
- » Prepared conceptual designs for the handling, transfer, loading, and sealing of used nuclear fuel containers.
- » Continued to collaborate with other nuclear waste management organizations in repository-related research activities at underground rock laboratories in sedimentary and crystalline rock formations.
- » Completed an illustrative postclosure safety assessment; the NWMO has now completed one in crystalline rock, the other in sedimentary rock.
- » Conducted analyses specific to the safe and secure transportation of used nuclear fuel, including work that resulted in a significant improvement in the neutron shielding performance of a conceptual used nuclear fuel transportation package.
- » Acquired the used nuclear fuel transportation package and upgraded the Canadian Nuclear Safety Commission licence for that package to current standards. A mobile transportation exhibit was developed and was taken to a number of events in communities involved in the site selection process and at a number of municipal conferences.

### Providing Financial Surety

The NWMO, in compliance with the *Nuclear Fuel Waste Act*, continued to monitor the segregated funds whose sole purpose is to fund the implementation of the Deep Geological Repository and Centre of Expertise once a construction licence has been granted by the Canadian Nuclear Safety Commission, many years in the future. This included updating trust fund contributions to reflect the latest lifecycle cost estimates and trust fund balances.

### Adapting Plans

The NWMO engaged in continuous learning so as to be able to adapt its plans in response to new knowledge, international best practices, advances in technical learning, evolving societal expectations and values, changes in public policies and insight from Aboriginal Traditional Knowledge. The NWMO continued to work with specialists across Canada, as well as internationally. The NWMO:

- » Continued to solicit public input, including review of the NWMO's strategic objectives and implementation plan, so that evolving societal expectations are reflected in Adaptive Phased Management.
- » Continued to monitor any developments in reprocessing used nuclear fuel and report findings to the public on an annual basis.
- » Continued to partner with universities and other nuclear waste management organizations to keep abreast of the latest advances in the field.

### Ensuring Governance and Accountability

Multiple layers of oversight and peer review, complemented by externally audited international certifications, helped ensure that the NWMO's work was both transparent and guided by the highest scientific and professional standards. The NWMO:

- » Continued to seek independent review of the organization's work through an Independent Technical Review Group, Advisory Council, and a forum of Aboriginal Elders.
- » Continued to update the Canadian Nuclear Safety Commission (CNSC) and seek feedback as part of the organization's agreement to obtain CNSC review of illustrative safety assessments for a used nuclear fuel repository in both crystalline and sedimentary rock formations.
- » Continued to report annually to the Minister of Natural Resources Canada, as required by the *Nuclear Fuel Waste Act*.

### Building and Sustaining a High-Performing Organization

The NWMO continued to enhance its staffing and contractor capability through a variety of initiatives, including research partnerships with universities, staff training and development, and investment in business systems and processes. The NWMO:

- » Supported the site selection process by continuing to recruit specialists in such areas as repository design and construction, environmental assessment, Aboriginal Traditional Knowledge, social research, ethics, finance, communications, and public engagement.
- » Opened community offices in Step 3 communities.
- » Continued to promote knowledge transfer to future generations by encouraging youth involvement in science and by providing financial support to graduate students through the Natural Sciences and Engineering Research Council's Industrial Postgraduate Scholarships Program.



# NWMO Organization

**NWMO Vision:** The long-term management of Canada's nuclear waste in a manner that safeguards people and respects the environment, now and in the future.

The Government of Canada, through the *Nuclear Fuel Waste Act* (2002), assigned responsibility for the long-term management of Canada's used nuclear fuel to the NWMO. The NWMO was established to operate on a not-for-profit basis by Canada's major nuclear fuel waste owners, Ontario Power Generation (OPG), Hydro-Québec and NB Power<sup>1</sup>. The NWMO's 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<sup>2</sup>.

Over the period 2002 to 2005, the NWMO engaged a broad cross-section of citizens in a study to examine options for the long-term care of Canada's used nuclear fuel. The study and the NWMO's recommendation to the Government of Canada are available on the NWMO website at [www.nwmo.ca](http://www.nwmo.ca).

In 2007, the Government of Canada, based on the NWMO's recommendations, selected Adaptive Phased Management as the best plan for Canada for safeguarding both the public and the environment over the very long time in which used nuclear fuel must be managed. Implementation of a deep geological repository under Adaptive Phased Management will be regulated by the Canadian Nuclear Safety Commission (CNSC) under the *Nuclear Safety and Control Act* and its associated regulations.

In 2010, the NWMO initiated the site selection process, following a two-year dialogue with Canadians to design a community-driven process for identifying the location for the deep geological repository. In 2011, 2012 and 2013, many of the NWMO's activities focused on working with communities that chose to become involved in the site selection process through the early steps of learning more about Adaptive Phased Management, the site selection process and the project.

The NWMO continues to build a multidisciplinary team with a range of experience in the fields of social research, technical research and development, public engagement, communications, finance and governance. We continue to collaborate with an extensive network of consultants, practitioners and academics from across Canada and around the world to ensure that our work benefits from the best available knowledge.

In addition to its responsibility for implementing Canada's plan for the long-term management of used nuclear fuel, the NWMO is assisting OPG in seeking regulatory approval for construction of a proposed deep geologic repository (DGR) for the long-term management of low- and intermediate-level waste (L&ILW) from OPG-owned or -operated reactors. The NWMO has provided expertise in repository design and implementation to OPG's project.

<sup>1</sup> In 2004, through a transfer order, the Government of New Brunswick assigned responsibility for all aspects of the provincially owned nuclear generating assets to a new subsidiary corporation, NB Power Nuclear.

<sup>2</sup> In addition to used nuclear fuel, the operation of nuclear reactors produces low and intermediate level waste that is managed at the reactor sites and Ontario Power Generation's Western Waste Management Facility. See glossary for more information about low and intermediate level waste.

## Regulatory Oversight of Adaptive Phased Management

All aspects of the NWMO's work will meet or exceed all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

Implementation of a deep geological repository under Adaptive Phased Management falls within federal jurisdiction and will be regulated under the *Nuclear Safety and Control Act (NSCA)* and its associated regulations. The Canadian Nuclear Safety Commission (CNSC), as Canada's independent regulatory authority, regulates the use of nuclear energy and materials to protect the health, safety and security of Canadians and the environment; and to implement Canada's international commitments on the peaceful use of nuclear energy.

Under section 26 of the *NSCA*, activities associated with a nuclear facility, such as preparing a site, construction, operation or decommissioning, can occur only in accordance with a licence issued by the CNSC. The Adaptive Phased Management repository will be subject to the CNSC's comprehensive licensing process, which covers the entire life cycle of the repository. This stepwise approach will require a licence for each phase of the repository life cycle. A licensing decision by the CNSC on a repository can be taken only after the successful completion of the environmental assessment process.

The transportation of used nuclear fuel is jointly regulated by the CNSC and Transport Canada.

Although the CNSC is the main licensing authority, the CNSC administers its licensing system in co-operation with other federal and provincial government departments and agencies in areas such as health, environment, transport and labour.

Although Canada's constitutional division of powers confers the authority to regulate nuclear energy to the federal government, it does not exclude provincial and territorial authority to regulate related matters within their domain. All aspects of the NWMO's work will comply with all applicable provincial regulatory requirements. For example, some aspects of siting or construction of the project and the transportation of used nuclear fuel may be governed by provincial legislation:

- » Most provinces and territories include nuclear substances in legislation and regulations addressing the transportation of dangerous goods within that province or territory.
- » Provincial governments are responsible for protecting public health and safety, property and the environment within their borders, which often includes provincial emergency preparedness legislation.
- » Provincial governments are responsible for the regulation of resource exploration and/or extraction (e.g., drilling and underground mining) and Crown land management (e.g., disposition of provincial lands).
- » Provincial legislation requiring the assessment of potential environmental effects of an activity, plan or program may apply to some aspects of this work. Legislation governing endangered species, environmental protection, heritage protection or preservation, water resources protection, occupational health and safety, employment standards or labour relations may be relevant.
- » Various permits, licences and approvals will be required, and provincial policies and guidelines may be applicable at the site selection stage.
- » Municipalities, which derive their authority from provincial legislation, may have requirements such as permits, codes, standards and/or bylaws that also need to be addressed.

# Canada's Plan for Used Nuclear Fuel

Canada's plan for the long-term care of used nuclear fuel is known as Adaptive Phased Management. Used nuclear fuel will be safely and securely contained and isolated from people and the environment in a deep geological repository in a suitable rock formation using a multiple-barrier system. A fundamental tenet of Canada's plan is the incorporation of learning and knowledge at each step to guide a process of phased decision-making. Adaptive Phased Management is designed to be flexible and respond to new learning, social priorities and evolving public policy.

The development of the long-term management facility for Canada's used nuclear fuel is a national infrastructure project (see *The Project*). The facility is to be sited in an informed, willing host community. The process for identifying the site reflects the ideas, experience and best advice of a broad cross-section of Canadians who participated in dialogues conducted over a two-year period to design the process to select a site.

Adaptive Phased Management moves towards a goal that Canadians themselves identified: safe, secure, long-term containment and isolation of used nuclear fuel produced in Canada with flexibility for future generations to make their own decisions and adapt to experience and societal changes.

## Adaptive Phased Management

- » Centralized containment and isolation of used nuclear fuel in a repository deep underground in a suitable rock formation
- » A series of steps and clear decision points that can be adapted over time
- » An open, inclusive and fair siting process to identify an informed and willing host community
- » Opportunities for people and communities to be involved throughout the implementation process
- » Provision of optional temporary shallow storage at the central site, if needed<sup>3</sup>
- » Long-term stewardship through the continuous monitoring of used fuel
- » Ability to retrieve the used fuel over an extended period should there be a need to access the waste or take advantage of new technologies
- » Financial surety and long-term program funding to ensure the necessary money will be available for the long-term care of used nuclear fuel

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<sup>3</sup> Temporary shallow storage at the deep geological repository is optional and not currently included in the NWMO's implementation plan.

### Canadians' objectives for the long-term management of used nuclear fuel, as identified during the study phase:

- » **Fairness:** To ensure fairness (in substance and process) in the distribution of costs, benefits, risks and responsibilities, within this generation and across generations.
- » **Public Health and Safety:** To protect public health from the risk of exposure to radioactive or other hazardous materials and from the threat of injuries or deaths due to accidents.
- » **Worker Health and Safety:** To protect workers from and minimize hazards associated with managing used nuclear fuel.
- » **Community Well-Being:** To ensure the well-being of all communities with a shared interest.
- » **Security:** To ensure the security of facilities, materials and infrastructure.
- » **Environmental Integrity:** To ensure that environmental integrity is maintained over the long term.
- » **Economic Viability:** To ensure the economic viability of the used nuclear fuel management system, while simultaneously contributing positively to the local economy.
- » **Adaptability:** To ensure a capacity to adapt to changing knowledge and conditions over time.

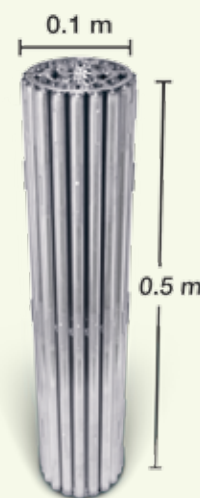
## Used Nuclear Fuel

Used nuclear fuel is a by-product of the generation of electricity by nuclear power plants. It remains radioactive for a long period of time, and the material must be contained and isolated from people and the environment essentially indefinitely. Canada's used nuclear fuel is currently safely managed in facilities licensed for interim storage at nuclear reactor sites in Ontario, Quebec and New Brunswick, and at Atomic Energy of Canada Limited's nuclear research sites in Whiteshell, Manitoba, and Chalk River Laboratories in Ontario.

Canadian nuclear power plants are fuelled by natural uranium, formed into ceramic pellets which are encased in Zircaloy tubes welded together in the shape of a fireplace log weighing approximately 24 kilograms. Once the fuel bundle has been used to generate electricity, it is removed from the reactor. Physically, the bundle looks the same as when it was placed in the reactor. When used nuclear fuel is removed from a reactor, it is considered a waste product, is radioactive and requires careful management. It is first placed in a water-filled pool where its heat and radioactivity decrease. After seven to 10 years, the used bundles are placed in dry storage containers, silos or vaults. The containers have a minimum design life of 50 years. Although its radioactivity decreases with time, chemical toxicity persists and the used nuclear fuel will remain a potential health risk for many hundreds of thousands of years. For this reason, used nuclear fuel requires careful management.

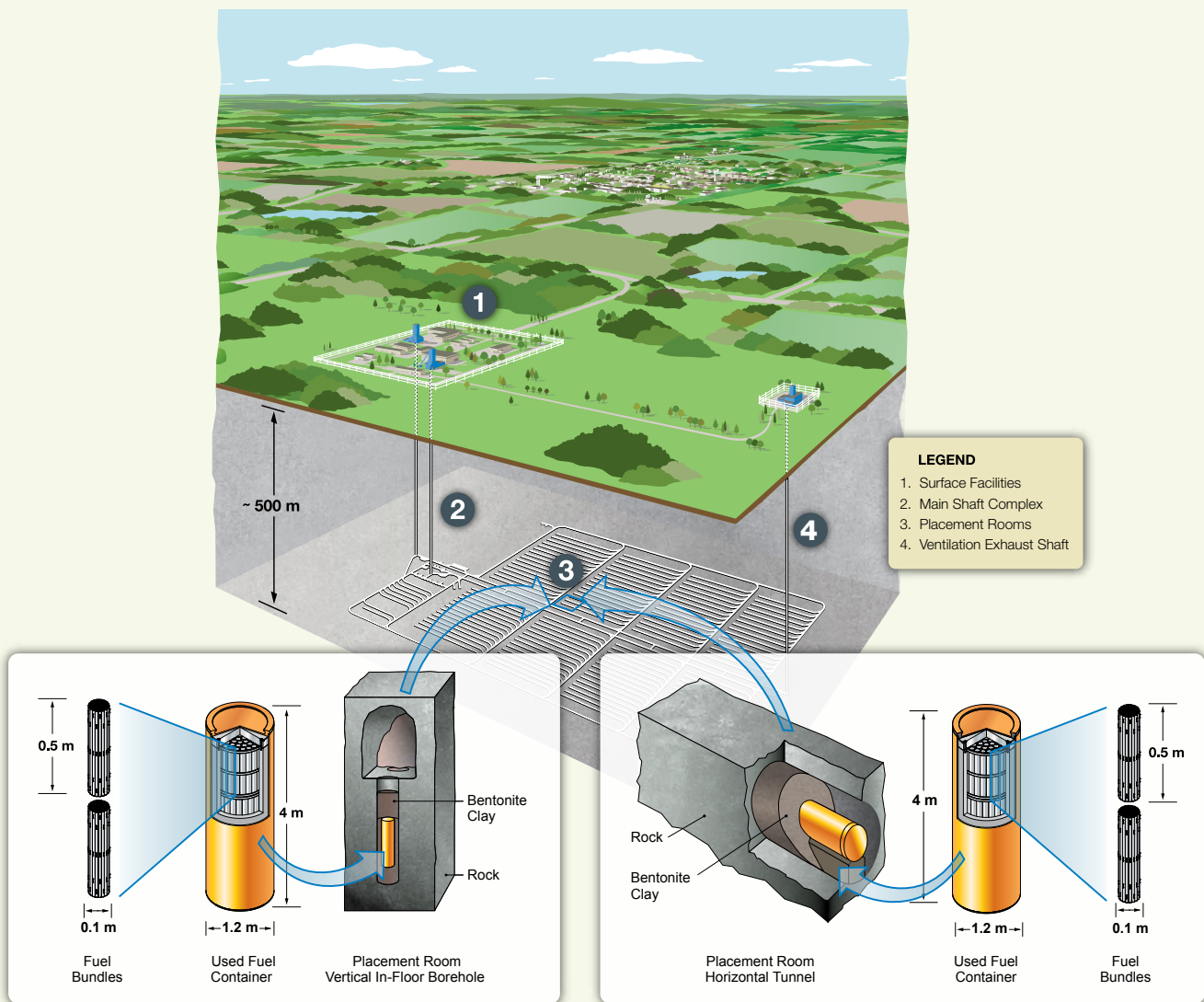
About 85,000 used nuclear fuel bundles are generated in Canada each year. Over 40 years, Canada's nuclear power program has produced over two million used nuclear fuel bundles. A small amount of used nuclear fuel, and components, is also created at research and development facilities operated by Atomic Energy of Canada Limited, and Canadian university facilities. If the entire inventory of used nuclear fuel bundles could be stacked end-to-end like cordwood, it would fit into a space the size of six hockey rinks, from the ice surface to the top of the boards. The NWMO publishes an annual update on the number of fuel bundles currently in storage along with a range of projections for future quantities. This report is available on the NWMO website at [www.nwmo.ca/technicalresearch](http://www.nwmo.ca/technicalresearch).

The NWMO has a legal obligation to provide long-term management of all Canada's used nuclear fuel, that which exists now and that which will be produced in the future.



## The Project

This national infrastructure project will include the development of a deep geological repository and used nuclear fuel transportation system, and a national centre of expertise.



The containers will be placed in vertical boreholes drilled in the floor along the axis of a placement room, or placed horizontally within the confines of a placement room, depending on the nature of the rock and characteristics of the site.

## Deep Geological Repository

The deep geological repository is a multiple-barrier system designed to safely contain and isolate used nuclear fuel over the long term. It will be constructed at a depth of approximately 500 metres, depending upon the geology of the site, and consist of a network of placement rooms for the used nuclear fuel (see diagram). The surface facilities require a dedicated surface area of about 600 metres by 550 metres for the main buildings and about 100 metres by 100 metres for the ventilation exhaust shaft. Land above the underground footprint that is not required for the surface facilities or to meet regulatory requirements could be available for other uses. Based on current inventory projections, the underground repository requires a subsurface area in suitable host rock of about 2 kilometres by 1 kilometre (375 hectares/930 acres). As well, regulatory or other requirements may limit activities in the immediate area surrounding the surface facilities.

In addition to the surface area described above, the excavated rock from the underground repository will need to be managed for use in backfilling and sealing the repository. Any remaining excavated rock may have a public or commercial use by the community and surrounding region as aggregate for construction. Storage of this rock during operation of the facility is expected to require an area of about 700 metres by 700 metres, with a height between 3 metres and 6 metres. The area will include a storm water runoff pond, to collect and manage surface water. The excavated rock management facility is assumed to be located off-site. The location of the excavated rock would be selected in consultation with the community and surrounding region.

Used nuclear fuel will be loaded into specially designed and certified containers at the reactor sites and transported to the repository site where it will be repackaged in corrosion-resistant containers for placement in the repository. The containers will be transported underground to one of many placement rooms. The containers will be placed in vertical or horizontal boreholes drilled into the rock and sealed with an effective sealing material such as bentonite clay.

The used nuclear fuel will be monitored and retrievable throughout all phases of implementation consistent with the direction from Canadians. Once the host community and the NWMO decide to close the site, the NWMO will backfill and seal the access tunnels, and seek the appropriate regulatory approvals prior to decommissioning. Following successful decommissioning, the NWMO will seek appropriate regulatory approvals for postclosure monitoring.

A robust safety case must be developed to demonstrate that the project can be safely implemented at the site, including transportation, and that it can meet or exceed the requirements of regulatory authorities and the host community.

No foreign waste (used nuclear fuel from outside Canada) will be placed in this facility.

For a fuller description of the project, please see *Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise* at [www.nwmo.ca/brochures](http://www.nwmo.ca/brochures).

## Transportation of Used Nuclear Fuel

Used nuclear fuel is currently safely stored in facilities licensed by the CNSC at sites where it is produced. Placing all Canada's used nuclear fuel in a single central location will require transportation from these interim storage facilities to the deep geological repository. Depending on the location of the site, this may involve road, rail, or water transport, or a combination of the three. The NWMO will need to demonstrate to regulatory authorities and citizens the safety and security of any transportation system before transport of used nuclear fuel to the repository can begin. Transportation of the used nuclear fuel will have to meet the stringent packaging and transport requirements of the Canadian Nuclear Safety Commission (CNSC) and Transport Canada regulations prior to obtaining the certificate for the design of the package and a licence to transport being issued. For more information, please see *Safe and Secure Transportation of Canada's Used Nuclear Fuel* at [www.nwmo.ca/brochures](http://www.nwmo.ca/brochures).



## Centre of Expertise

A centre of expertise will be established for the one or more communities in which a site has been selected for detailed evaluation (Step 4 of the site selection process). The centre will be located in or near the community, as determined with the community. Its purpose will be to support the multi-year testing and assessment of the site on technical safety and community well-being related dimensions, which are key components of the site selection process. It will be the home for an active technical and social research and technology demonstration program during this period, involving scientists and other experts in a wide variety of disciplines, including geoscience, engineering, and environmental, socioeconomic and cultural impact assessment.

The design details of the centre of expertise would be developed with the community, affected Aboriginal peoples and surrounding communities, with their preferences in mind. Discussion of the design details is also an important opportunity for involvement of youth. The centre of expertise could be designed as a focus for engaging members of the community to learn more about the project, and to view the scientific and engineering work-in-progress involved in site assessment, through public viewing galleries and interactive displays. The centre could be created as a small science centre, highlighting and demonstrating the science and technology being used to determine whether the site is suitable. It may be developed as a meeting place and learning centre for the community, and as a destination that welcomes interested visitors from the region and beyond.

Should the site ultimately be selected to host the deep geological repository, the centre of expertise would be expanded to include and support the construction and operation of an underground facility designed to confirm the characteristics of the site. The centre of expertise would become a hub for knowledge sharing across Canada and internationally.

## A Partnership Approach

The deep geological repository and centre of expertise will have a significant impact on any community and region in which they are located. It is a multi-generational project that will be developed in phases. The repository will be sited and constructed over two to three decades. The used nuclear fuel will be placed in the facility over a period of three decades or more, and then monitored for an extended period of time prior to decommissioning.

The project will provide significant economic benefits. It offers direct employment for hundreds of people at the facility for many decades and many more indirect jobs in the host area and host province, with the opportunity to develop transferable skills and capacities. Implementation of the project will involve scientists, engineers, tradespeople and many others. The project may contribute to social and economic pressures that will need to be carefully managed to ensure the long-term health and sustainability of the community. For example, the potential influx of temporary construction workers may increase demand for social and physical infrastructure. To minimize social costs and help communities adapt to the opportunities and challenges of the project, the need for assistance, such as job training, affordable housing and infrastructure, would be examined.

Project implementation will require a long-term partnership among the community, Aboriginal peoples and surrounding communities, and the NWMO to ensure the project fosters well-being and sustainability of the area, consistent with its vision for the future. The project will only proceed with the involvement of the interested community, potentially affected First Nations and Métis peoples, and other communities in the surrounding area working in partnership to implement the project.

# Planning Priorities for 2014 to 2018

**To guide implementation of Adaptive Phased Management, the NWMO established seven strategic objectives. The objectives identify program areas in the implementation of Adaptive Phased Management and the planning priorities for 2014 to 2018.**

First developed in 2007, the objectives were the subject of public review and discussion in 2007 and 2008. Subsequent evolution of the strategic objectives reflects advancement in the implementation of Adaptive Phased Management, as planning milestones are met and major areas of focus for the used nuclear fuel program evolve.

On an annual basis, the NWMO publishes for review and comment the rolling five-year implementation plan for Adaptive Phased Management, to confirm support for the strategic direction and to invite suggestions on the associated work programs. The strategic objectives also provide the framework for the annual planning and reporting on our activities. The seven strategic objectives are briefly outlined in the table that follows.

In May 2010, the NWMO initiated a multi-year process for selecting an informed, willing community to host a national facility for the long-term care of used nuclear fuel.

Over the period 2014 to 2018, the NWMO will continue to implement the process to decide where to contain and isolate Canada's used nuclear fuel for the long term.

The site selection process is described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel*, May 2010, available on the NWMO website at [www.nwmo.ca](http://www.nwmo.ca). The process is the product of a two-year dialogue with Canadians and is designed to guide the selection of an informed, willing host community.

The nine-step site selection process spans from communities learning about the project to construction and operation. The process is designed to be driven by the interest of communities, the progressively more detailed conduct of scientific and technical studies, and the involvement of surrounding communities and Aboriginal peoples. In the planning period, the NWMO will

## Strategic Objectives 2014–2018

The NWMO will:

- » Build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.
- » Implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.
- » Refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.
- » Ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.
- » Adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, insight from Aboriginal Traditional Knowledge, evolving societal expectations and values, and changes in public policies.
- » Maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.
- » Build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.

support communities and Aboriginal peoples in learning about the project and how long-term well-being or quality of life of the area might be fostered through participation in the project.

The NWMO is committed to reviewing and refining the process with Canadians, and in particular the communities involved in the site selection process, to ensure that it continues to meet needs and expectations. The NWMO is committed to stepwise decision-making and will only proceed to the next step after careful consideration and with the support of communities participating in the process.

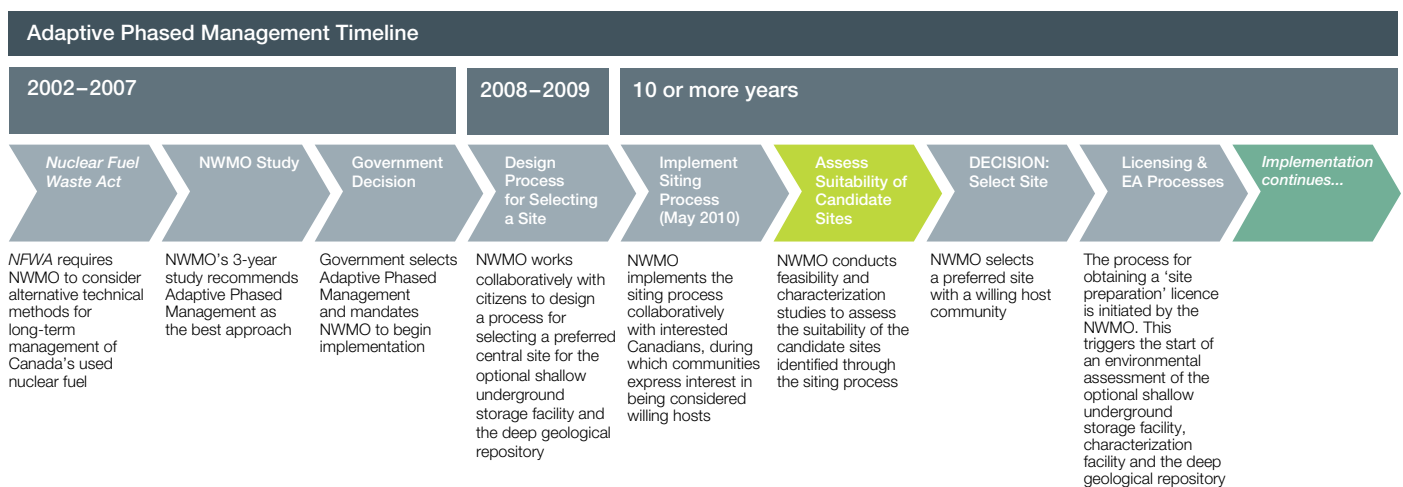
The NWMO will continue to build the organization to strengthen internal resources and capabilities, and support technical and social research programs to ensure continuous improvement and adaptation to new knowledge and best practices. The NWMO will continue to engage Canadians in these activities.

To ensure resources are available when required to manage requests for information and knowledge building, the NWMO has identified a number of milestones for the next five-year planning period.

These milestones include:

- » Completing desktop preliminary assessments for communities that have passed an initial screening and elect to proceed in the site selection process;
- » Engaging the surrounding communities and Aboriginal peoples in learning and consideration of the project;
- » Based on the results of this work, identifying the communities with strong potential to be suitable for the project to progress with the next phase of work involving preliminary field studies and engagement of surrounding communities and Aboriginal peoples in order to establish a foundation to proceed to implement the project together;
- » Conducting this work collaboratively with the communities involved; and
- » Based on the findings from preliminary field studies and assessments, identifying preferred site(s) to be the focus of the detailed site characterization phase of work.

Site selection for the Adaptive Phased Management Project is, by design, a community-driven process in which potentially interested communities decide to engage with the NWMO to learn more and explore their potential suitability to host the project. Progress through the site selection process will necessarily evolve on timelines shaped by communities rather than schedules prescribed by the NWMO. For planning purposes, the organization has set out activities for the next five years to ensure that the NWMO is in a state of readiness to advance program implementation as communities move forward through different phases of the site selection process. A breadth of work programs and activities are planned for 2014 to 2018 to ensure the organization is prepared for future phases of field investigations and detailed assessments, transportation planning, and refined repository design and safety case development.



## » Build Sustainable Relationships

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### **The NWMO will build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada, and involve them in setting future directions for the safe, long-term management of used nuclear fuel.**

Engagement is one of the five fundamental values that guide the work of the NWMO. Involving Canadians and Aboriginal peoples of Canada at all stages and in key decisions is critical to meeting the challenges of the long-term management of used nuclear fuel. Through open, transparent and inclusive engagement processes, the NWMO will continue to build awareness and understanding of Adaptive Phased Management and will seek and respond to a diversity of views and perspectives. Interweaving of Aboriginal worldviews and knowledge systems with Adaptive Phased Management will strengthen the long-term management of used nuclear fuel. Our commitment to engagement and shared decision-making helps ensure that Adaptive Phased Management continues to respond to the values and concerns of Canadians. Building awareness and confidence in Adaptive Phased Management, and the NWMO as implementer, will continue throughout the planning period.

During the period 2014 to 2018, engagement will focus on strengthening established relationships to sustain program momentum. This includes engagement activities, such as information sessions, briefings, and joint projects and partnerships, which will be undertaken with municipal, provincial, federal and Aboriginal governments, and interested individuals and organizations. The organization will continue to work with the NWMO Council of Elders and Municipal Forum. The NWMO will also work together with affected Aboriginal peoples as holders of Traditional Knowledge, users of environmental resources and environmental stewards, to be active participants in the site selection process and to

share that knowledge with the NWMO to the extent they wish. The NWMO will also continue to build knowledge and understanding and establish relations with a broader audience through expanding its outreach to organizations, and the broader public at large, with engagement, provision of information and dialogue.

Over the past several years, much of the NWMO's work has focused on developing plans, policies and processes collaboratively with Canadians to support the implementation of Adaptive Phased Management. Our engagement activities related to the broad Canadian public. As the siting phase of the implementation of Adaptive Phased Management progresses, the engagement program is evolving to focus more directly on the communities interested in hosting the project in the area, Aboriginal peoples and surrounding communities, as well as transportation communities as a group with a shared interest. Engagement of youth is also a continuing priority given the long-term nature of the project and the need for intergenerational transfer of knowledge to support project implementation.

In building and sustaining relationships, the NWMO is mindful of its obligations throughout the conduct of its work. These obligations include: to Canadians and Aboriginal peoples, to manage used nuclear fuel over the long term; to the local communities and Aboriginal peoples in potential host communities and regions, to identify an appropriate site for a deep geological repository; and to communities and Aboriginal peoples along transportation routes and in transportation hubs, to ensure that used nuclear fuel is transported responsibly and safely.

The NWMO recognizes that there are Aboriginal peoples in all areas of Canada where the NWMO's work will take place. The organization wishes to build long-term relationships with Aboriginal peoples that may be affected by the implementation of Adaptive Phased Management. The NWMO acknowledges, respects and honours that Aboriginal peoples – Indian, Métis and Inuit peoples of Canada – have unique status and rights as recognized and affirmed in s.35 of the *Constitution Act* (1982). Understanding the nature of any impacts of the implementation of Adaptive Phased Management on Aboriginal rights, treaties and land claims and how Aboriginal peoples should be accommodated as a result of any impacts is an important component of the NWMO's work. The NWMO needs to ensure effective consultation with Aboriginal peoples and that all those affected have the opportunity for meaningful involvement. The NWMO acknowledges that the Crown has a legal duty to consult and accommodate and will support the Crown's work to meet its obligations. Through all stages of program implementation, the NWMO seeks to work with Traditional Knowledge holders to bring this important and necessary complement to the project.

## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Continue work to increase awareness among Canadians and Aboriginal peoples of Canada about Adaptive Phased Management, the site selection process and the NWMO;
- » Implement communications and media relations programs to help interested individuals and organizations understand Adaptive Phased Management;
- » Seek comment from interested individuals and organizations on the NWMO's plans and the implementation of Adaptive Phased Management;
- » Brief waste owners on plans for the implementation of Adaptive Phased Management so they may ensure their used nuclear fuel strategies are aligned with the implementation of Adaptive Phased Management;
- » Brief Canada's nuclear host communities about progress in implementing Adaptive Phased Management, including planning for eventual transportation of used nuclear fuel from their communities to the deep geological repository;
- » Develop and sustain relationships with communities that choose to engage in the site selection process, surrounding communities and Aboriginal peoples. This is expected to include working together in the conduct of studies;
- » Develop and sustain relationships with municipal associations to better understand local governments' points of view, and work with them to implement Adaptive Phased Management;
- » Develop and maintain relationships with the federal government, and provincial and local governments in nuclear provinces to help coordinate and support their roles in the implementation of Adaptive Phased Management;
- » Develop and maintain relationships with national, provincial and regional Aboriginal organizations, and keep them apprised of progress in the implementation of Adaptive Phased Management and the site selection process;
- » Continue to seek the advice of Elders and Aboriginal youth, and develop awareness and learning opportunities for NWMO staff about cultures, traditional practices, protocols and governance of Aboriginal peoples;
- » Continue to build the foundation of knowledge to ensure that informed choices can be made by Aboriginal communities;

- » Continue to work with affected Aboriginal peoples, including Traditional Knowledge holders, recognizing the diversity of cultures and languages, practices and approaches among Aboriginal communities; the identification of sacred areas; understanding traditional laws, practices and use of land; and protection of species to sustain community life;
- » Continue to work with Natural Resources Canada to implement the memorandum of understanding on the NWMO's obligations with respect to the Crown's constitutional duty to consult;
- » Build a multi-generational view of the long-term management of used nuclear fuel through engagement, education and outreach involving young Canadians, including Aboriginal youth;
- » Assess the effectiveness of the NWMO website and other communication vehicles to identify opportunities for improvement and make refinements;
- » Assess effectiveness of NWMO engagement activities and continue to make refinements; and
- » Continue to report publicly on the input that the NWMO receives and how this advice has been considered.

In 2014, the NWMO will:

- » Provide briefings and information upon request to interested individuals and organizations about Adaptive Phased Management and the site selection process;
- » Continue to support communities and regions as they explore their early interest in the project and the siting process, including facilitating engagement of third-party knowledge specialists to assist in community learning about the project; the form of support provided will be determined in collaboration with these communities;
- » Provide briefings and information to governments to support their participation in the implementation of the site selection process and to ensure that they have the information needed to address inquiries from communities;
- » Meet on request with nuclear community organizations and their committees, such as the Canadian Association of Nuclear Host Communities (CANHC), and regional health committees;
- » Convene with municipal associations individually and as a forum through meetings, briefings, conferences, trade shows and special events;
- » Continue to seek advice on interweaving Aboriginal Traditional Knowledge into the NWMO's work and on respectful engagement of Aboriginal peoples;
- » Continue broad-based briefings for Aboriginal organizations and engagement of Elders;
- » Continue to develop communications materials, DVDs, exhibits and information kits to support the siting process and for a range of audiences;
- » Continue to implement the NWMO Corporate Social Responsibility Program;
- » Continue to develop and implement a NWMO education, outreach and capacity-building strategy for young Canadians and Aboriginal youth that incorporates both technical and social disciplines;
- » Continue to seek the perspective of Canadians with the use of web-based tools and other activities; and
- » Continue to participate in regional and national environmental initiatives.



## » Collaboratively Implement the Site Selection Process

**The NWMO will implement collaboratively with Canadians the process for siting a deep geological repository for the safe, long-term management of used nuclear fuel in an informed, willing host community.**

In 2010, the NWMO initiated the site selection process. The development of the process began in 2008 with a variety of engagement activities to ensure that a diversity of perspectives was considered. The product of this collaborative process is described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel*, May 2010, available on the NWMO website at [www.nwmo.ca](http://www.nwmo.ca). Implementation of the process, including the selection of an informed and willing host community and demonstration of a safe and secure transportation system, must meet the expectations of Canadians. It must also address their key issues, such as the protection of humans and the environment, fairness and regulatory oversight. Collaboration, shared decision-making and willingness underpin the siting process.

The decision about an appropriate site will be made over a series of steps (see *Steps in the Siting Process – At a Glance*, and the complete description of the siting process cited above). It is expected that individual communities will proceed through the process at a pace and in a manner that reflect their needs and preferences. The siting process begins with a period of learning and capacity building for communities. Preliminary assessments (feasibility studies) of potential sites will be done in partnership with communities as they come forward and express interest. A community may end its involvement in the process at any point up to and until the final agreement is signed. Over time, refinements to the siting process may be necessary as experience is gained, and the process is designed to be adaptive.

As communities advance in the site selection process, a more regional perspective becomes a focus. Work can proceed only with the involvement of affected Aboriginal peoples and surrounding communities. The deep geological repository and centre of expertise involve a large project that has the potential to benefit a large area. Planning at a broader area scale will ensure benefits associated with the project are maximized. It will also help ensure that questions and concerns are addressed and that the foundation is established to move forward together through the implementation of the project.

Through working with communities that have come forward to participate in the site selection process, and through initial outreach with surrounding communities and Aboriginal peoples, the nature and shape of the partnerships required to implement the Adaptive Phased Management Project together are beginning to emerge. This project will only proceed with the involvement of the interested community, affected Aboriginal peoples and surrounding communities.

In implementing the site selection process, the NWMO is mindful of its obligations throughout the conduct of its work. These obligations include: to Canadians and Aboriginal peoples, to manage used nuclear fuel over the long term; to the local communities and Aboriginal peoples in potential host communities and regions, to identify an appropriate site for a deep geological repository; and to communities and Aboriginal peoples along transportation routes and in transportation hubs, to ensure that used nuclear fuel is transported responsibly and safely.

## Steps in the Siting Process – At a Glance

Getting Ready	<b>The NWMO publishes the finalized siting process, having briefed provincial governments, the Government of Canada, national and provincial Aboriginal organizations, and regulatory agencies on the NWMO's activities.</b> The NWMO will continue briefings throughout the siting process to ensure new information is made available and requirements which might emerge are addressed.
Step 1	<b>The NWMO initiates the siting process with a broad program to provide information, answer questions and build awareness among Canadians about the project and siting process.</b> Awareness-building activities will continue throughout the full duration of the siting process.
Step 2	<b>Communities identify their interest in learning more, and the NWMO provides detailed briefing. An initial screening is conducted.</b> At the request of the community, the NWMO will evaluate the potential suitability of the community against a list of initial screening criteria.
Step 3	<b>For interested communities, a preliminary assessment of potential suitability is conducted.</b> At the request of the community, the NWMO will conduct a feasibility study collaboratively with the community to determine whether a site has the potential to meet the detailed requirements for the project. Regional engagement will be initiated, and an initial review of transportation considerations will be conducted. Interested communities will be encouraged to inform surrounding communities, including potentially affected Aboriginal communities and governments, as early as possible to facilitate their involvement. Preliminary assessments are conducted in two phases: <b>Phase 1:</b> Desktop study and engagement; <b>Phase 2:</b> Field investigations and expanded engagement.
Step 4	<b>For interested communities, potentially affected surrounding communities are engaged if they have not been already, and detailed site evaluations are completed.</b> In this step, the NWMO will select one or more suitable sites from communities expressing formal interest for regional study and/or detailed multi-year site evaluations. The NWMO will work collaboratively with these communities to engage potentially affected surrounding communities, Aboriginal governments and the provincial government in a study of health, safety, environment, social, economic and cultural effects of the project at a broader regional level (Regional Study), including effects that may be associated with transportation. Involvement will continue throughout the siting process as decisions are made about how the project will be implemented. A centre of expertise will be launched in or near the community.
Step 5	<b>Communities with confirmed suitable sites decide whether they are willing to accept the project and propose the terms and conditions on which they would have the project proceed.</b>
Step 6	<b>The NWMO and the community with the preferred site enter into a formal agreement to host the project.</b> The NWMO selects the preferred site, and the NWMO and community ratify a formal agreement.
Step 7	<b>Regulatory authorities review the safety of the project through an independent, formal and public process, and if all requirements are satisfied, give their approvals to proceed.</b> The implementation of the deep geological repository will be regulated under the <i>Nuclear Safety and Control Act</i> and its associated regulations to protect the health, safety and security of Canadians and the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy. Regulatory requirements will be observed throughout all previous steps in the siting process. The documentation produced through previous steps, as well as other documentation that will be required for a licence application, will be formally reviewed by regulatory authorities at this step through an Environmental Assessment, and if this assessment is successful, then licensing hearings related to site preparation (and possible construction) of facilities associated with the project. Various aspects of transportation of used nuclear fuel will also need to be approved by regulatory authorities.
Step 8	<b>Construction and operation of an underground demonstration facility proceeds.</b> The NWMO will develop the centre of expertise, launched in Step 4, to include and support the construction and operation of an underground demonstration facility designed to confirm the characteristics of the site before applying to regulatory authorities for an operating licence. Designed in collaboration with the community, it will become a hub for knowledge-sharing across Canada and internationally.
Step 9	<b>Construction and operation of the facility.</b> The NWMO begins construction of the deep geological repository and associated surface facilities. Operation will begin after an operating licence is obtained from regulatory authorities. The NWMO will continue to work in partnership with the host community in order to ensure the commitments to the community are addressed throughout the entire lifetime of the project.

The business plan assumes that over the five-year period, some communities will elect to move through sequential steps of preliminary assessments and site evaluations. As communities advance in the site selection process, work will proceed together with the involvement of Aboriginal peoples and surrounding communities. The NWMO may select sites for detailed characterization by the end of the planning period. Work plans for the 2014 to 2018 period will ensure that the NWMO is prepared to support all aspects of the site selection process.

Successful implementation of the siting process will require a good understanding of regional priorities, politics and key players. The NWMO will assist interested communities in engaging surrounding communities, the region, and provincial and Aboriginal governments, in a regional study of environmental, social, cultural and economic effects, and detailed site investigations. Involvement of regional representatives will help ensure that the broad range of potential effects, both positive and negative, associated with implementation at a particular site are recognized and considered. Involvement of those along the transportation route, as a large group with a shared interest, will ensure that effects associated with the transportation of used nuclear fuel are taken into account in decision-making on a preferred site. The NWMO must work to assist provincial governments to become informed and ready to support community interest, and address inquiries about Crown land, and provincial regulations and approvals.

Throughout the siting process, the NWMO will support and assist communities to build understanding of Adaptive Phased Management and to address questions and concerns, including how used nuclear fuel will be contained and isolated from groundwater, people and the environment. The NWMO also supports communities to build understanding of how the project may help or hinder a community's ability to achieve its long-term plan; to engage citizens, surrounding communities and Aboriginal peoples; and to assess community willingness to host the project. Funding and resources will be provided to support interested communities as they work through each step. To assist communities in capacity building, the NWMO will provide funding and resources through

a program collaboratively developed with communities involved in the site selection process. As the siting process advances, funding and resources will also be provided to Aboriginal peoples and communities in the surrounding area.

As communities advance in their learning about the project and in the site selection process, understanding what would constitute a 'compelling demonstration of willingness' from a community, as required by the siting process, is an important question. Those in the surrounding area would also like to better understand the nature of their involvement. Working collaboratively with those involved in the siting process to articulate expectations in this area is an important objective during the planning period.

In the next few years, technical support to the siting process will focus on assessing the suitability of potential sites through geoscientific evaluation studies in the vicinity of interested communities. Beyond ensuring safety, the NWMO's commitment is that the long-term well-being or quality of life of the community and area will be fostered through participation in this project. The technical program will be complemented by a phased and progressively more detailed assessment of the suitability of a site in terms of environmental, social, cultural and economic factors. These assessments will support a narrowing down of potential siting areas, and potentially by the end of the planning period, support selection of a preferred location to be the focus of Step 4 detailed site characterization. The NWMO expects to be ready to begin detailed site evaluations on one or more sites by the end of the planning period. Detailed site characterization (Step 4) will include further geological investigations, safety assessments, environmental assessments, and social and economic impact assessments. This work will be planned and conducted, in collaboration with interested communities, Aboriginal peoples and surrounding areas. The application of Aboriginal Traditional Knowledge throughout this work is an important objective.

Transportation is an important consideration in the assessment of any site. As part of the process of selecting a site, a transportation route must be identified,

or be capable of development, by which used nuclear fuel can safely and securely be transported to the site from the locations at which it is currently stored. Beyond safety, transportation is also an important consideration in identifying and assessing effects on community well-being. The NWMO will need to demonstrate the safety and security of any transportation system to the satisfaction of regulatory authorities, and citizens, before transportation of used nuclear fuel to the repository can begin. Work in this area will include engaging: regulatory authorities at all levels to understand their expectations; transportation experts and those working in the field to understand issues and concerns; nuclear station communities as they will be affected by any transportation plan; and communities along the transportation route as a large group with a shared interest to raise questions or concerns to be addressed in the process. Communication materials continue to be developed to support a new mobile exhibit and brochure, as well as DVDs, backgrounders and engagement activities, to respond to public and media concerns that are raised.

The NWMO continues to develop the institutional policies, practices and structures required to support the

different phases of the siting process.

The NWMO will work to ensure that implementation of the siting process is inclusive, fair and transparent, and continues to build trust and confidence in the NWMO and its operations. Any site that is selected to host this facility must be demonstrated to be able to safely contain and isolate used nuclear fuel for a very long period of time, the community must be informed and willing to host the facility, and a strong partnership must be established with local Aboriginal and non-Aboriginal communities. The objectives of the site selection process and the main site evaluation stages are outlined in the description that follows.

As we continue implementing the site selection process, we understand it will take our best knowledge and expertise and all of us working together to implement Canada's plan. Among the many challenges to be addressed along the way is the low level of familiarity with and understanding of used nuclear fuel, which leads to fear among some people becoming involved in learning about this project. Information, effective communication and dialogue are key.

## Preliminary Assessment of Potential Suitability (Step 3 in the Site Selection Process)

In 2014, many communities are expected to be involved in preliminary assessments as part of Step 3 in the site selection process.

These studies are designed to assess, in a preliminary way, the suitability of a community and associated site(s) to host the project. These studies are an opportunity for the community and the NWMO to explore suitability together.

## The Two Phases of Work

Work will be conducted in two phases during the planning period with the opportunity for stock-taking by both the community and the NWMO at the end of each phase. Some communities with relatively low potential to be suitable for the project may be screened out of the process at the end of the first phase of work. By the end of the second phase of work, one or two communities or siting areas with strong potential to meet the requirements of the project may be selected for the next step in the site selection process: detailed studies over a three- to five-year period (Step 4). Resources are available to communities participating in the site selection process to cover costs associated with participation in the project throughout all phases of work.

Eight communities completed Phase 1 studies by the end of 2013, and four of these communities were selected to be the focus of more detailed Phase 2 studies. Other communities are continuing with their Phase 1 studies, and a subset of these may be identified for more detailed Phase 2 studies by the end of 2014.

## Studies Conducted

Phase 1 preliminary assessment studies involve work in a number of areas:

- » Geoscientific studies: Is there potential to find a suitable site in the community?
- » Engineering studies: Is there potential to safely construct the facility in the community?
- » Transportation studies: Is there potential for safe and secure transportation?
- » Environment and safety studies: Is there potential to manage any environmental effects and to ensure safety of people and the environment?
- » Social, economic and cultural studies: Is there potential to foster the well-being of the community and region and to lay the foundation for moving forward?

## Focus of Phase 2 Preliminary Assessments

Phase 2 is a continuation of Step 3 in the site selection process. The objective of the multi-year studies, dialogues and learning in Phase 2 is to guide the identification of the preferred location for the Adaptive Phased Management Project.

In order to select the preferred location, the NWMO will need to be: confident that a strong safety case can be developed for the project in that location; confident that the interested community could demonstrate willingness once all siting studies are completed; confident that we can build a strong partnership with local Aboriginal and non-Aboriginal communities; and confident that we can transport used fuel to the preferred location. At the end of Phase 2 assessments, a preferred location(s) will be identified as the focus of Step 4 detailed site evaluations. Step 4 studies may require three to five years to complete, and will support confirmation of the preferred location that would be the focus of a regulatory approval process led by the Canadian Nuclear Safety Commission.

Phase 2 assessments will build upon the learning from Phase 1 studies. The multi-year program of study and engagement will facilitate further learning, deepen understanding of the project and further explore potential suitability of the area being studied. This learning and reflection is broadened to include First Nations and Métis peoples in the area and surrounding communities. In this phase:

- » Technical evaluation of potentially suitable areas continues in greater detail, focusing on geoscientific suitability, engineering, transportation, environment and safety.
- » Geological field investigations will provide site-specific information that will examine whether a suitable location can be identified for the deep geological repository that will ensure safe, secure long-term containment and isolation of used nuclear fuel. Activities will include a sequence of airborne geophysical surveys, geological field mapping and environmental surveys, and should the findings from these studies warrant, deep borehole drilling and testing. Community members and those in the area will be engaged to help identify and refine the list of potentially suitable siting areas that would be socially acceptable.
- » Environment and safety evaluations will focus on specific areas guided by input from the interested community, Aboriginal peoples and surrounding communities. Field studies and discussions with the local community and Aboriginal peoples will build understanding of the environmental conditions of the areas being studied.
- » Potential transportation routes and mode(s) to each potential repository site will be identified against technical safety criteria. Transportation planning and evaluations also need to be aligned with community input.
- » Engineering designs for the deep geological repository, safety assessments, transportation assessments and environmental assessments will be further developed and refined over the course of Phase 2 for specific study sites. The purpose is to determine whether all technical and safety criteria can be met.
- » Engagement in the community and with First Nations and Métis peoples and surrounding communities will be broadened to support more detailed reflection and assessment. Phase 2 provides the opportunity for all to develop a more detailed understanding of project benefits, opportunities to work together, and how potential negative effects of the project can be managed. Interest in the community and area will be explored while continuing to build awareness and understanding of the project.

- » The NWMO, the interested community, Aboriginal peoples in the area and surrounding communities will together reflect on the suitability of the area to host the project and whether there is the foundation to work together to implement the project. Engagement will explore the potential for these working partnerships to be established. An important outcome of Phase 2 will be to identify the terms under which a working partnership can be developed to implement the project. Phase 2 will also explore whether an implementation plan can be developed to ensure safety, align with expectations of the community and area, and be economically feasible.

Phase 2 assessments are expected to take three to four years to complete, and perhaps longer. Additional time may be required to support assessments to provide the confidence required to narrow down potential siting areas and select a preferred siting area. Not all communities that begin this phase of work will necessarily complete the full sequence of Phase 2 studies. Through regular stock-taking by the NWMO and the community as Phase 2 studies progress, a decision may be made part way through the work to conclude studies. This would be the case if studies at any point suggested the community does not have strong potential to meet the requirements of the project.

## Aboriginal Traditional Knowledge

Aboriginal peoples have a special relationship with the natural environment, and unique stewardship responsibilities that are part of this relationship. The knowledge that comes from this relationship with the land brings special understanding to the broad range of factors that should be considered in field studies, social assessments, and assessing benefits and effects to be managed.

The NWMO will work together with Aboriginal communities in potential siting areas to respectfully apply Traditional Knowledge to both technical safety and community well-being aspects of the site selection process. Traditional Knowledge will also guide the NWMO's engagement with Aboriginal communities and local Elders, providing guidance on spiritual and cultural considerations, and developing and maintaining effective and meaningful relationships between generations and within and between communities. The NWMO expects that integrating Aboriginal Traditional Knowledge into the identification and assessment of potentially suitable sites will lead to an expanded set of considerations to assess the suitability of a site, new and different approaches to data collection and interpretation, and a perspective on ways of life that will be important to informing more detailed studies.

## Review by Geoscientific Review Group

Geoscientific studies are reviewed by the Adaptive Phased Management Geoscientific Review Group (APM-GRG), and their reports are published on the NWMO website at [www.nwmo.ca/sitingprocess\\_preliminaryassessments\\_apm-grg](http://www.nwmo.ca/sitingprocess_preliminaryassessments_apm-grg). This group was established by the NWMO to provide advice and guidance on the approach, methods and findings of the geoscientific preliminary assessments that are part of the studies conducted in Step 3 of the site selection process. The five APM-GRG members are internationally recognized experts from Canada, Switzerland, Sweden and Australia. They bring a wide range of expertise and experience relevant to geoscientific site evaluations.



## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Continue work to explore technical safety considerations through illustrative postclosure safety assessments of the deep geological repository and preparation of generic used nuclear fuel transportation risk assessments, including disruptive scenarios;
- » Prepare for the development of emergency response preparedness plans;
- » Continue to support communities in developing capacity to consider their interest in the site selection process;
- » Continue to support communities in responding to the values-based requirements of the process, including appropriate engagement of citizens and transparency;
- » Continue to seek advice of municipal associations and Aboriginal organizations on materials and tools to support a community-driven siting process;
- » Continue to develop mobile exhibits and tools to support local and regional-based discussions of Adaptive Phased Management and siting;
- » Prepare generic options for transport of used nuclear fuel from interim storage sites to a long-term management facility to assess potential sites and transportation routes;
- » Refine and enhance approaches to assessing willingness;
- » Refine and enhance approaches to engaging Aboriginal peoples and those in the surrounding area in siting decision-making in the spirit of partnership;
- » Refine tools and methods for geoscientific assessment of candidate sites in both crystalline and sedimentary rock settings;
- » Provide engineering designs to support evaluation of candidate sites;
- » Provide preliminary environment and safety assessments to support evaluation of candidate sites;
- » Refine tools and methods for assessment of sites in terms of environmental, social, cultural and economic factors, including factors identified by Aboriginal Traditional Knowledge and traditional approaches to land use mapping and planning;
- » Refine tools and methods for informing and engaging citizens in decision-making;
- » Engage interested communities in more intensive learning about the project, and explore and help assess the extent to which the project might contribute to or detract from the well-being of the community;
- » Establish and sustain NWMO presence in communities that decided to enter the site selection process to provide information and support public engagement;
- » Explore the need to design and implement a property value protection program to support the implementation of the project, as has been requested by some communities;
- » Conduct preliminary assessments (Step 3 – Phase 1 Preliminary Assessment) collaboratively with the communities that pass initial screening and decide to proceed to Step 3;
- » Upon conclusion of Phase 1 work, identify a smaller number of communities eligible to be carried forward to next phase of work (Step 3 – Phase 2 Preliminary Assessment) and seek their agreement to proceed to the next phase of work;

- » Initiate and complete preliminary field investigations, and engage surrounding communities and Aboriginal peoples (Step 3 – Phase 2 Preliminary Assessment);
- » Upon conclusion of Phase 2 work, select siting area(s) to be the focus of detailed site characterization (Step 4) and seek agreement to proceed to the next phase of work;
- » Ensure readiness to begin detailed site evaluations (Step 4) and expanded regional studies in collaboration with communities;
- » Plan for future centres of expertise to support technical and social assessments and discussion of community well-being issues;
- » Identify preferred transportation modes and potential routes associated with each of these siting areas, and welcome existing nuclear station communities and communities along the transportation route as a large group with a shared interest to raise questions or concerns to be addressed in the process;
- » Conduct research on partnership and power-sharing frameworks for consideration in structuring of a formal agreement with the community, Aboriginal peoples and the area, once selected; and
- » Explore long-term knowledge transfer considerations, such as markers and archives, as part of international collaborative research efforts (Nuclear Energy Agency).

In 2014, the NWMO will:

- » Continue to refine a generic used nuclear fuel transportation risk assessment;
- » Work in partnership with communities as they proceed through the siting process;
- » Implement, support and further develop the *Learn More Program* for community capacity building to meet the needs of communities, surrounding areas and Aboriginal peoples;
- » Conduct preliminary desktop assessments upon request of interested communities with potentially suitable sites (Step 3 – Phase 1). Continue desktop work to assess geoscientific, engineering, transportation, and environment and safety factors, as well as potential to foster well-being of the community, Aboriginal peoples and surrounding area, including factors identified by Aboriginal Traditional Knowledge;
- » Conduct field studies upon request of interested communities with strong potential to meet the requirements of the project (Step 3 – Phase 2). Field studies will help advance the assessment of geoscientific, engineering, transportation, and environment and safety factors, as well as potential to foster well-being of the community, Aboriginal peoples and surrounding area, including factors identified by Aboriginal Traditional Knowledge;
- » Develop and implement local and regional outreach plans to deepen understanding of regional perspectives and build relationships in the broader area;
- » Continue to seek opportunities to engage First Nations and Métis peoples at the local and regional level through collaborative work with communities, Treaty organizations, and regional or provincial Aboriginal organizations involved in the siting area;
- » Continue to advance coordination and collaboration with provincial governments aimed at identifying mechanisms and processes to address provincial areas of interest;
- » Continue to develop communication materials to support learning and dialogue on the project description, the safety of the repository, and transportation considerations;
- » Continue to advance dialogue on transportation considerations with regulatory authorities at all levels of government, transportation experts and those working in the field;
- » Continue to seek advice from municipal associations regarding ways to communicate transportation plans and engage with communities that may be on a transportation corridor for used nuclear fuel; and
- » Continue review of experience and best practices with transportation of hazardous materials, including transportation of nuclear wastes in Canada and internationally to identify lessons that apply to Adaptive Phased Management.

## » Optimize Repository Designs and Further Increase Confidence in Safety

**The NWMO will refine and further develop the generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations, and conduct technical research and development to ensure continuous improvement, consistent with best practices.**

The ability of the deep geological repository to safely contain and isolate used nuclear fuel relies on the form and properties of the waste, the engineered barriers placed around the waste and the natural barriers provided by the rock formation in which the repository will be located. The preferred site will be in a rock formation with desirable characteristics (geological, hydrogeological, chemical and mechanical) that support containment and repository performance to meet or exceed the regulatory expectations of the Canadian Nuclear Safety Commission (CNSC), the guidance of the International Atomic Energy Agency and the experience in other countries.

The NWMO's technical program supports Adaptive Phased Management in three key areas: siting, conceptual engineering design and costing, and safety assessment. Underlying work in these key areas is a base program in which technical program activities in geosciences, safety assessment, repository engineering, environmental sciences and regulatory affairs are carried out in Canada and with international partners to ensure that the best knowledge and understanding are being applied. The NWMO's technical program objectives are reviewed and updated annually to ensure that they are consistent with the strategic direction from the NWMO Board of Directors and planning assumptions related to progress in implementing Adaptive Phased Management. The Plan incorporates feedback from the Independent Technical Review Group (ITRG). A strong technical program ensures that Adaptive Phased Management benefits from knowledge and innovation in the long-term care of used nuclear fuel from Canada and abroad, including Finland, France, Japan, Sweden, Switzerland, the United Kingdom and the United States. It also ensures that NWMO staff sustain the expertise required to implement the adaptive program.

As part of the Adaptive Phased Management technical program, the NWMO undertakes joint research projects with its counterparts in other countries, most notably those of Sweden (SKB), Switzerland (Nagra), Finland (Posiva) and France (Andra). Work includes testing and demonstration of repository engineering technology

and processes at underground research laboratories in Sweden (Äspö Hard Rock Laboratory) and Switzerland (Mont Terri), and geoscientific investigation of glacial processes. As well, the NWMO continues to participate in international projects with the European Commission and the Nuclear Energy Agency. These activities will ensure that the NWMO is employing best practices and continuing to learn during implementation of Adaptive Phased Management.

The NWMO is enhancing its technical program in engineering design and optimization. Over the next five years, physical prototypes of the long-lived repository containers will be designed and manufactured. This work is being undertaken in conjunction with Canada's universities and national research laboratories. It will incorporate the best available design practice and the state-of-the-art in manufacturing technologies, and demonstrate our ability to meet the rigorous engineering requirements of the repository environment. Further, a container engineering and test facility will be established for both the repository and transportation containers. This facility will be used to continue to investigate manufacturing technologies and for prototype testing. In the course of the conduct of preliminary assessment studies, potential routes and modes will be assessed and discussed. The NWMO will also work closely with waste owners in planning for future transport of used nuclear fuel from the facilities where it is currently stored on an interim basis. The optional temporary shallow storage at the central site component of Adaptive Phased Management is not expected to be required and is not a focus of work.

In order to support understanding and broad dialogue on safety considerations, and in particular the development of the safety case, communication materials written in plain language will be prepared. This material will include periodic reports on work to date as well as discussion of the parameters and assumptions being used in the safety assessments and how detailed information about a site, once known, will be used to refine work in the future.

## Going Forward

In the 2014 to 2018 time period, technical program activities will complete work to update repository designs and safety assessments, complete CNSC pre-project review in both crystalline and sedimentary rock, and begin a proof test plan to qualify a Canadian-engineered barrier system in advance of submission of site preparation and construction licences. Further studies, analyses and joint activities will continue with international partners to improve understanding of key processes and confidence in the safety case for a deep geological repository.

In the period 2014 to 2018, the NWMO will:

- » Complete CNSC pre-project reviews of postclosure safety assessments of a used nuclear fuel deep geological repository in crystalline and sedimentary rock;
- » Complete optimization study of repository container geometry and used nuclear fuel capacity;
- » Assess copper coating technology for repository containers;
- » Complete preliminary design, fabrication and testing of prototype repository containers;
- » Complete the update to the conceptual design and cost estimate for Adaptive Phased Management;
- » Complete an integrated review of the microbiological process that could occur within the repository environment in support of corrosion models;
- » Continue work to explore technical safety considerations through preparation of generic used nuclear fuel transportation risk assessments, including assessment of used nuclear fuel transportation modes;
- » Maintain and improve safety assessment models, including groundwater flow, containment release and transport, and coupled thermal-hydraulic-mechanical processes;
- » Further enhance scientific understanding of processes that may influence repository safety;
- » Continue the NWMO's involvement in joint research activities and international programs at the Äspö Hard Rock Laboratory in crystalline rock in Sweden and at the Mont Terri Laboratory in sedimentary rock in Switzerland; and
- » Establish a prototype test facility for engineered barrier evaluations.

In 2014, the NWMO will:

- » Complete assessment of copper coating and welding technologies for repository containers;
- » Develop an engineered barrier test and demonstration facility;
- » Review alternative repository container emplacement technologies;
- » Investigate the manufacturing process for producing buffer materials;
- » Further investigate the potential for rail transportation of used nuclear fuel; and
- » Complete annual review of the NWMO's Adaptive Phased Management Technical Program by the ITRG.

## Focus on Safety

### Used Nuclear Fuel Repository Container

The NWMO's container technology program focuses on integrating state-of-the-art manufacturing and materials technologies related to geometry (container size and shape), corrosion barrier (coating and fabrication), welding and inspection to develop and demonstrate robust containers for holding the used nuclear fuel within the repository. An extensive proof testing of the containers and the engineered barrier system is planned.

### Preparing for the Transportation of Used Nuclear Fuel

The NWMO's technical program includes planning for the transportation of used nuclear fuel in the future. This work includes testing and refinement of package design including consideration of 'beyond design basis' scenarios, development of transportation mode and route scenarios, and development of emergency management processes and plans including for the very unlikely event of a package failure.

### Health and Safety of the Public and Workers

The NWMO's repository design will protect public health and worker safety. The design will be optimized to minimize the risk of exposure to radioactive or other hazardous materials, and the risk from accidents. This will be tested in part through safety assessments, which examine the behaviour of the design under both likely and unlikely scenarios. The NWMO has recently submitted generic safety assessments to the CNSC to illustrate our methodology for assessing long-term safety. We are continuing to apply and improve our safety assessment approach, considering both operational and long-term safety.

## » Provide Financial Surety

### **The NWMO will ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.**

Canadians expect that the money necessary to pay for the long-term care of used nuclear fuel will be available when it is needed and will be fully funded by the waste producers. Financial surety has the objective of determining what costs can reasonably be expected to occur over the life of the project, along with a contingency for unexpected events, and then designing a system that collects enough money from the waste producers and protects this money to ensure that the entire cost can be covered under a variety of social and economic circumstances, and within the required time frame.

The Adaptive Phased Management Project will be implemented in phases and spanning many decades. It has an estimated cost of \$16 billion to \$24 billion (2010 \$).

The NWMO completed a full update of these estimates in 2011. The updated cost estimate covers many decades of Adaptive Phased Management lifecycle activity for the deep geological repository and related transportation of used nuclear fuel. For planning purposes, a cost estimate for the deep geological repository and used nuclear fuel transportation system has been developed which assumes an inventory of 4.6 million used CANDU fuel bundles. The specific volume of Canada's used nuclear fuel to be placed in the repository will be agreed with the community using the best information available at the time and an open and transparent consultation process involving surrounding communities and others who are interested and potentially affected. The current estimated cost is \$21.2 billion (2010 \$), with a present value of \$7.7 billion

(2010 \$). These cost estimates include costs to develop, construct and operate a central long-term facility, including a deep geological repository and transportation for the used nuclear fuel to the repository, which are carried out and funded by the NWMO. Reactor site storage is carried out and directly funded by the individual waste owners.

The eventual cost of this project may differ from these estimates, depending on a number of factors, including the location of the facility, surrounding infrastructure, the rock type and characteristics, the design of the repository, the volume of used nuclear fuel to be managed, and the period of extended monitoring following used nuclear fuel placement. The NWMO must estimate what costs can reasonably be expected to occur over the lifetime of the project, along with a contingency for unexpected events. The NWMO is committed to providing regular assessments on all these factors to ensure that sufficient funds are set aside.

The NWMO will also be monitoring any development in new reactors and new owners of used nuclear fuel, applying the appropriate principles to the update of the funding formula when the specific circumstances arise.

The Adaptive Phased Management program is implemented with waste owner funds collected from ratepayers through the sale of electricity and with funds from Atomic Energy of Canada Limited commensurate with its small volume of used nuclear fuel that will need to be managed. The NWMO is committed to the prudent use of these resources.

## The Nuclear Fuel Waste Act

The planning, development and implementation of the Adaptive Phased Management Project is funded by the major owners of used nuclear fuel in Canada: Ontario Power Generation, NB Power, Hydro-Québec and Atomic Energy of Canada Limited. The *Nuclear Fuel Waste Act (NFWA)* (2002) requires each of these four companies to establish independently managed trust funds and make annual deposits to ensure the money to fund this project will be available when needed.

The *NFWA* includes explicit provisions to ensure that the trust funds are maintained securely and used only for the intended purpose.



As required by the *Nuclear Fuel Waste Act*, the Annual Report of the NWMO must outline the funding formula for the next fiscal year to ensure funds required to cover the full cost of implementation of Adaptive Phased Management is borne by the waste producers and an explanation of assumptions is provided. Trust funds must be maintained and annual contributions made by major waste producers, reflecting the updated funding formula.

## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Annually assess all factors that impact Adaptive Phased Management cost estimating and funding requirements;
- » Update the total cost estimate for Adaptive Phased Management no later than 2017;
- » Continue to publish the audited financial statements of the Members' nuclear fuel waste trust funds as they are provided by the financial institutions (see [www.nwmo.ca](http://www.nwmo.ca)), and provide updates to confirm that the waste owners are meeting their financial obligations;
- » Estimate and publish the financial implications of potential future scenarios of varying volumes of used nuclear fuel, when available; and
- » Monitor the development of new reactors and new owners of used nuclear fuel, applying the appropriate principles to update the funding formula when the specific circumstances arise.

## » Adapt Plans

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**The NWMO will adapt plans for the management of used nuclear fuel in response to new knowledge, international best practices, advances in technical learning, insight from Aboriginal Traditional Knowledge, evolving societal expectations and values, and changes in public policies.**

A fundamental tenet of Adaptive Phased Management is the ongoing incorporation of new learning and knowledge to guide decision-making. We are committed to re-evaluating decisions where warranted, maintaining the option to change course and being prepared to act on new knowledge or information. Developments throughout the implementation of Adaptive Phased Management may pose technical and ethical challenges. The NWMO's approach and response to these challenges will be critical to the success of Adaptive Phased Management.

The NWMO has identified five fundamental values – integrity, excellence, engagement, accountability and transparency – that inform all its work. A series of principles to guide the siting process, identified in dialogue with Canadians, further builds on this framework. Through regular engagement of citizens, specialists and potentially affected communities, the NWMO monitors, reviews, reports and discusses the challenges of Adaptive Phased Management and changes in the management of used nuclear fuel, especially in the areas of technology development, societal expectations, and energy and environmental policy.

The NWMO continues to learn from best practices and experience with project implementation in Canada and other countries. Through its ongoing participation in the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD), the NWMO regularly reports on its work and participates in an exchange of best international practices in such areas as safety case development, community-based site selection processes and citizen engagement. This includes participation in the OECD Nuclear Energy Agency's Radioactive Waste Management Committee, Integration Group on the Safety Case, and Forum on Stakeholder Confidence. The NWMO also participates in international research projects.

A program that is implemented over a long time will have many opportunities to improve safety and

performance, enhance effectiveness, build understanding, reduce uncertainty and address societal concerns. One of the strengths of Adaptive Phased Management is the incorporation of new learning and knowledge.

Developments in environmental and energy policies are particularly relevant to Adaptive Phased Management. For example, nuclear reactor refurbishment projects and new nuclear reactor units would produce new quantities of used nuclear fuel, potentially with different characteristics. The NWMO has a process for ongoing monitoring, review and discussion of the potential implications of these developments on the quantities and characteristics of used nuclear fuel that the NWMO may be asked to manage in the future. During the planning period, it is anticipated that industry plans to move forward with nuclear new build may result in requests for the NWMO to confirm its understanding of and readiness to address a range of used nuclear fuel types and volumes for long-term management. The NWMO will work closely with waste owners to stay abreast of industry plans for nuclear new build. The NWMO will work cooperatively with the industry to exchange plans, best practices and experiences in managing different types of radioactive waste in Canada. As in previous years, the NWMO will continue to keep a watching brief on any new technological developments in reprocessing used nuclear fuel. The NWMO will continue to engage Canadians to ensure continued alignment with values and expectations.

Consistent with the NWMO Transparency Policy and Engagement Procedure, the NWMO reports regularly on its progress in implementing Adaptive Phased Management and especially in response to the advice of Canadians and the changing external environment.

The NWMO also seeks formal opportunities, such as House of Commons Standing Committees, for open and transparent review of the implementation of Adaptive Phased Management at key milestones and decision points.

## Continuous Learning

One of the cornerstones of the Adaptive Phased Management program is a commitment to continuous learning from new developments and experience, and adapting and refining plans for all aspects of the long-term management plan for Canada's used nuclear fuel. The NWMO continually monitors and reviews international research, experience, activities and events for lessons learned and as an opportunity to reflect on whether refinements are needed to our plans.

In addition to its responsibility for implementing Canada's plan for the long-term management of used nuclear fuel, the NWMO is assisting Ontario Power Generation (OPG) in seeking regulatory approval for construction of a proposed deep geologic repository (DGR) for the long-term management of low- and intermediate-level waste from OPG-owned or -operated reactors. The NWMO has gained important learning and experience, which is being used to refine Adaptive Phased Management design and implementation. The NWMO also continues to learn from regulatory review processes for a repository for used nuclear fuel underway in Sweden.

Tragic events in Lac Mégantic in July 2013 have increased public discussion, including among Canadian municipalities, about transportation of goods along rail lines. The NWMO will seek to learn from this ongoing discussion.

## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Support the site selection process by furthering understanding of best practices in engagement, capacity building, impact assessment and sustaining community well-being;
- » Advance learning and exchange experiences on such issues as retrievability, monitoring, and intergenerational knowledge transfer through collaboration with interested academics and organizations in Canada and internationally, including the OECD Nuclear Energy Agency's Radioactive Waste Management Committee, Integration Group on the Safety Case and Forum on Stakeholder Confidence;
- » Continue to research citizen priorities and concerns relating to Adaptive Phased Management;
- » Build understanding of the interweaving of Aboriginal Traditional Knowledge and other assessment approaches into implementation;
- » Review and update the social and ethical framework and consider emerging and potential challenges;
- » Post research papers and the results of engagement activities on the NWMO website;
- » Publish reviews of developments in used nuclear fuel reprocessing and alternative used nuclear fuel management technologies;
- » Publish an annual update on current and future potential inventories of used nuclear fuel quantities and types;
- » Publish a preliminary technical assessment of Generation III reactor (CANDU type and other) used nuclear fuel on deep geological repository design and safety;
- » Seek the input of Canadians on how the implementation of Adaptive Phased Management should be adapted in response to current and projected inventories of used nuclear fuel;
- » Continue to monitor developments in energy and environmental policy;
- » Continue to monitor, assess and discuss the impact of potential new nuclear reactor units on the long-term management of used nuclear fuel;
- » Continue to monitor, assess and plan for changes in industry waste management activities and plans; and
- » Continue work to identify and plan for a range of scenarios reflecting possible changes in societal capacity to implement Adaptive Phased Management in the future.

In 2014, the NWMO will:

- » Continue to advance the framework for preliminary assessments (feasibility studies, Step 3 – Phase 2) with advice and input from Aboriginal organizations, incorporating Aboriginal Traditional Knowledge provided by Aboriginal contractors and Traditional Knowledge holders;
- » Publish a review of developments in used nuclear fuel reprocessing and alternative used nuclear fuel management technologies; and
- » Publish an update on current and future potential inventories of used nuclear fuel quantities and types.

## » Ensure Governance and Accountability

### **The NWMO will maintain an accountable governance structure that provides confidence to the Canadian public in the conduct of the NWMO's work.**

The NWMO's governance comprises the Member organizations, the Board of Directors and its Advisory Council. The NWMO is subject to the requirements of the *Nuclear Fuel Waste Act (NFWA)* and oversight by the Minister of Natural Resources Canada. The NWMO's implementation of a repository as part of Adaptive Phased Management will be regulated under the *Nuclear Safety and Control Act (NSCA)* and its associated regulations to protect the health, safety and security of Canadians and the environment, and to respect Canada's

international commitments on the peaceful use of nuclear energy. A licensing decision by the Canadian Nuclear Safety Commission (CNSC) on an Adaptive Phased Management repository can only be taken after the successful completion of the environmental assessment process under the *Canadian Environmental Assessment Act*. All aspects of the NWMO's work will meet or exceed all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

#### **MEMBERS**

Ontario Power Generation, NB Power and Hydro-Québec are the founding Members of the NWMO. The Membership Agreement and bylaws set out Member roles and responsibilities in supporting the objectives of the *NFWA* and NWMO's implementation mandate. The NWMO regularly briefs its member organizations.

#### **BOARD OF DIRECTORS**

The Board of Directors is responsible for oversight of the organization and taking a leadership role in the development of the corporation's strategic direction. The Members appoint the Board of Directors. There are currently nine members of the Board of Directors, representing a range of perspectives from both within and outside the nuclear industry, including capabilities in ethics, Aboriginal culture and finance management. The membership of the Board is profiled on the NWMO website.

#### **ADVISORY COUNCIL**

The *NFWA* requires that the governing body of the NWMO appoint an Advisory Council to review and comment on its work as part of the NWMO's triennial reports. In addition to fulfilling its legislated reporting requirements, the Council meets regularly with the NWMO's senior management, closely following the development of the organization's plans and activities, and providing ongoing counsel and advice. At any time, the Council may choose to deliberate in camera. The Board of Directors appointed the Advisory Council in 2002, with membership renewed at regular intervals.

In 2012, the Council's membership was renewed and included the appointment of a new member, Dr. Wesley Cragg, an internationally recognized expert in applied ethics. Current membership of the Advisory Council represents a broad range of expertise, including geosciences, nuclear engineering, strategic communications, business ethics, environment, medicine, political science and Aboriginal Traditional Knowledge. This group of individuals is knowledgeable in nuclear waste management issues and experienced in working with citizens and communities on a range of public policy issues. The membership of the Advisory Council is profiled on the NWMO website.

The NWMO Board continues to ensure appointments remain consistent with the requirements of the *NFWA* and take into account the range of expertise required to support the regional and local activity associated with Adaptive Phased Management site selection. As the NWMO's work leads to the selection of an informed and willing host community, and as affected Aboriginal organizations and host region are identified, the *NFWA* requires that representatives from these communities be included in the Advisory Council. This is in addition to members with expertise in a broad range of scientific, technical and social scientific disciplines, as well as expertise in Traditional Aboriginal Knowledge, as outlined in the *Act*.

## POLICIES AND PROCEDURES

Since 2010, the NWMO has maintained ISO 9001:2008 certification covering its quality management system for activities in support of site selection and development of repositories for the long-term management of nuclear waste. In addition, NWMO governance is designed to meet the requirements of CSA N286-12, Management System Requirements for Nuclear Facilities, as they apply to the development of a deep geological repository.

In 2012, the NWMO received certification that its health and safety governance is in compliance with CSA Z1000:2006 Occupational Health and Safety Management, and that its environmental governance is in accordance with ISO 14001:2004 Environmental Management Systems. Monitoring, auditing and management review activities to maintain these certifications will occur in 2014 and beyond.

## INDEPENDENT TECHNICAL REVIEW GROUP

The Board of Directors established the Independent Technical Review Group (ITRG) in 2008 to regularly review the NWMO's technical research program on used nuclear fuel. The ITRG conducts annual reviews to inform the Board and Advisory Council whether the NWMO technical program is based on credible scientific and technical approaches and methodologies; is consistent with international practices; and will broaden and advance the NWMO's technical knowledge to adequately support implementation of Adaptive Phased Management. The four members bring extensive internationally recognized expertise in the technologies associated with nuclear waste geological repository projects acquired through experience in Canada, the United Kingdom, Sweden and Switzerland. Members of the ITRG are appointed by the NWMO Board on a three-year basis. Appointments were recently renewed for another three-year term. The members are profiled on the NWMO website. Reports of the group are also published on the NWMO website.

## PEER REVIEWS

The NWMO will continue to seek opportunities for peer review of its work and to invite independent comment. The Geoscientific Review Group, described earlier, is an example. This will benefit program design and delivery, contribute to overall program quality, and help to enhance public confidence in the NWMO's implementation plans and decision-making.

## REPORTING

The NWMO maintains high standards of reporting to demonstrate integrity, excellence, engagement, accountability and transparency in the implementation of Adaptive Phased Management. The NWMO reports regularly on its progress and especially in response to the advice of Canadians and the changing external environment.

The *NFWA* requires the NWMO to issue annual reports and triennial reports. In each case, reports are to be submitted to the Minister of Natural Resources Canada and to the public at the same time. The Minister must table the reports in Parliament and issue a statement on each report.

## INTERNATIONAL COMMITMENTS

The NWMO will continue to report internationally on its progress at meetings of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)*. Under the *Joint Convention*, Canada must demonstrate that it is meeting international commitments to manage radioactive waste and used nuclear fuel safely. The NWMO will contribute to Canada's reporting at the 2015 convention as part of the delegation led by the CNSC.



## Triennial Report

The *Nuclear Fuel Waste Act* sets out very specific reporting requirements for the triennial reports. Triennial reports were issued in 2011 and 2014, and the next triennial report will be issued in 2017. The triennial reports include:

- a)** a summary of [the NWMO's] activities respecting the management of nuclear fuel waste during the last three fiscal years, including an analysis of any significant socio-economic effects of those activities on a community's way of life or on its social, cultural or economic aspirations;
- b)** its strategic plan for the next five fiscal years to implement the approach that the Governor in Council selects under section 15 or approves under subsection 20(5);
- c)** its budget forecast for the next five fiscal years to implement the strategic plan;
- d)** the results of its public consultations held during the last three fiscal years with respect to the matters set out in paragraphs *a)* and *b)*; and
- e)** the comments of the Advisory Council on the matters referred to in paragraphs *a)* to *d)*.

## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Convene regular meetings of NWMO Members, Board of Directors, Board Committees and Advisory Council;
- » Coordinate annual reviews of the NWMO's technical program by the Independent Technical Review Group, and publish the reports of the Review Group;
- » Conduct assessments and audits of internal governance to maintain and achieve certifications to management system standards for quality, safety and environmental management;
- » Interact with the CNSC on Adaptive Phased Management in the pre-licence application period consistent with the terms of the service agreement that identifies the CNSC's early involvement in the Adaptive Phased Management Project prior to submission of a licence application. These areas include the CNSC participating in community or other meetings to provide information on the regulator's role, identifying regulatory requirements for a repository and providing regulatory review of conceptual Adaptive Phased Management safety assessments;
- » Report to Canadians on its progress in implementing Adaptive Phased Management. The NWMO will submit its Annual Report to the Minister of Natural Resources Canada and the public in the first quarter of each year, including its second triennial report in March 2014 and its third triennial report in 2017;
- » Publish the five-year strategic plan, *Implementing Adaptive Phased Management*;
- » Publish the minutes of the meetings of the Board of Directors, the Advisory Council, and the Independent Technical Review Group and their reports;
- » Report internationally on progress for the long-term management of Canada's used nuclear fuel at the 2015 meeting of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*; and
- » Undertake membership review, and make appointments to the Advisory Council to ensure members bring a broad range of expertise.

## » Build and Sustain a High-Performing Organization

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**The NWMO will build and sustain an effective organization with the social, environmental, technical and financial capabilities for the safe, long-term management of Canada's used nuclear fuel.**

Management of used nuclear fuel is a very long-term responsibility. The NWMO must be steady, stable and long term in its outlook and actions. The NWMO must have access to a sufficient and sustainable number of trained and skilled personnel. This requires investment in the organization to ensure resource capacity, capability, expertise, and sound administrative and management policies and practices, that provide a foundation for operations and demonstrate commitment to staff development.

The NWMO has a strong set of skills and competencies resident in its current staff. It will be important to ensure this expertise is retained and further developed over the years to come. The long time frames associated with management of used nuclear fuel give rise to the additional priority of intergenerational knowledge management. Qualified human resources will be required to support program implementation and operations spanning decades. The preservation and transfer of knowledge and institutional memory across generations will be integral to supporting lengthy decision-making processes and the integration of technical, scientific and social information over long periods of time.

We will require expertise and capabilities in a range of fields, including, but not limited to, repository design and construction, environmental assessment, socio-economics, ethics, finance, public engagement, Aboriginal Traditional Knowledge, siting, information management and waste management technology. Investment in human resources, skills training and networks of specialists will be important to build and sustain a capability for inquiry, assessment and decision-making to support the implementation of Adaptive Phased Management. These specialists will be critical to implementing the siting process, developing host community interest and partnerships, and undertaking the technical and socio-economic site investigations.

As the NWMO proceeds with the implementation of Adaptive Phased Management and builds partnerships to facilitate this implementation, capacity at the local and regional levels to participate in the implementation of the deep geological repository and associated facilities will become a critical component of the larger organization required to implement Adaptive Phased Management. Capacity building at the local and regional level will be important.

## Going Forward

In the period 2014 to 2018, the NWMO will:

- » Continue to grow and develop its staffing and contractor capability through initiatives, such as focused recruitment campaigns when appropriate, alliances with appropriate educational institutions, development of third-party expertise, training and development programmes, and succession planning;
- » Continue to foster NWMO values in activities and processes to grow and develop its staffing and contractor capability, including Aboriginal cultural training; and communication about corporate history, approaches, and ethical and social framework;
- » Continue to invest in business systems and processes throughout the business planning period to support the growing organization;
- » Continue to ensure hiring plans include recruitment of recent university graduates as well as those with appropriate graduate degrees, to support maintenance of institutional memory and the transfer of information to future generations;
- » Take into account future needs for regionally based staff and local information offices to support the site selection process in communities electing to enter the process; and
- » Continue to work with potential host communities and regions to build capacity to participate in the site selection process, and ultimately for the host community and region to participate in the implementation and operation of the deep geological repository and associated facilities through NWMO staff support and provision of a funding and resources program.

# The Road Ahead

The NWMO invites all Canadians and Aboriginal peoples of Canada to stay involved in Adaptive Phased Management of Canada's used nuclear fuel. *Implementing Adaptive Phased Management* is updated annually to guide the five-year planning period ahead. As such, the Plan is regularly assessed, strengthened and redirected, as needed.

Adaptive Phased Management will proceed as expeditiously as Canadians, successful technology demonstration and the regulatory authorities allow. Implementation of the site selection process for the deep geological repository for used nuclear fuel has begun. This community-led process is supported by the resources and work programs described in this plan.

# Glossary

**Deep geological repository** is a facility for the placement of used nuclear fuel deep underground where both natural and engineered barriers contain and isolate it from humans and the environment. There is the potential for retrieving the used nuclear fuel.

**Fuel bundle** for CANDU nuclear reactors is manufactured by sintering uranium oxide powder into pellets. The pellets are loaded into Zircaloy (an alloy of the metal zirconium) tubes, which are then welded into a bundle of tubes – a fuel bundle. Each bundle contains about 1,000 uranium oxide pellets.

**Intermediate-level nuclear waste** consists primarily of used reactor core components, and resins and filters used to keep reactor water systems clean. It requires shielding to protect workers during handling. Intermediate-level waste is stored mainly in steel-lined concrete containers that have been set into the ground.

**Long-term management of used nuclear fuel** involves containment and isolation of the radioactive material. The radioactivity decreases substantially with time, due primarily to the decay of short-lived radionuclides. The radioactivity of used nuclear fuel decreases to about one percent of its initial value after one year, decreases to about 0.1 percent after 10 years and decreases to about 0.01 percent after 100 years. After approximately one million years, the radioactivity in used nuclear fuel approaches that of natural uranium.

**Low-level nuclear waste** consists of common industrial items that have become contaminated with low levels of radioactivity during routine cleanup and maintenance at the nuclear generating stations. Low-level waste includes mops, rags, paper towels, temporary floor coverings, floor sweepings, protective clothing and hardware items such as tools. It consists of paper, plastics, metal, rubber, cotton and other miscellaneous materials. Low-level waste can be safely handled using normal industrial practices and equipment without any special radiation protection.

**Optional shallow underground storage facility** would involve building a shallow rock cavern storage facility at the chosen site for the deep geological repository. This is included in Adaptive Phased Management as an option, should it be needed, to provide a contingency in the event of unplanned circumstances.

**Retrievability** is the ability to remove the used nuclear fuel from where it has been placed. Retrievability is an important component of Adaptive Phased Management and was included on the direction of Canadians. It is part of a risk management approach to allow corrective action to be taken if the repository does not perform as expected or to take advantage of new technologies which may emerge in the future; for instance, technologies which might reduce the hazard associated with used nuclear fuel over the long term.

**Safety** is the protection of individuals, society and the environment, from the harmful or dangerous effects of used nuclear fuel, now and in the future.

**Used nuclear fuel** means the irradiated fuel bundles removed from a commercial or research nuclear fission reactor. Used nuclear fuel is classified as a high-level nuclear waste.



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For more information, please contact:

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NUCLEAR WASTE  
MANAGEMENT  
ORGANIZATION

SOCIÉTÉ DE GESTION  
DES DÉCHETS  
NUCLÉAIRES



# **Listing of Engagement and Research Activities, 2011 to 2013**

## A) Working With Interested Communities in the Site Selection Process

Over the past three years, the NWMO has been formally engaged with 22 communities in Ontario and Saskatchewan involved in learning more about our siting process. Twenty of those communities have proceeded to Phase 1 preliminary assessments (Step 3 of a nine-step site selection process). As a result, NWMO staff and contractors have been actively engaged in these communities. Staff and contractors have met with municipal representatives and key opinion leaders, met with community members through community liaison committee meetings and NWMO open house events, reviewed local news sources for commentary, and spent considerable time gaining a greater understanding of the thoughts and concerns of the people who call these communities home. Community activities such as these continued to provide some of the most important insight into our site selection work as documented in reports such as community well-being assessments.

In each interested community in the siting process, the NWMO has engaged with leadership and community members, as well as initiated dialogue in surrounding communities and First Nations/Aboriginal organizations through a variety of means, including:

- Several community open houses;
- Regular attendance at the community liaison committee meetings;
- Both informal and structured interviews with community members;
- Assistance to community liaison committees in establishing websites and newsletters;
- Preparation of written materials;
- Informal tours and visits with local residents;
- Participation at local community events and trade shows;
- “Ask the NWMO” columns in regional newspapers;
- Meetings with nearby First Nations;
- Attendance at regional meetings and conferences; and
- Tours of nuclear waste management facilities.

In each community, leaders were identified through desktop research, and through referrals as discussions evolved to facilitate initial discussions with a cross-section of community leaders, briefings and conversations with community groups, and conversations with residents during open houses. These discussions included:

- Local political leaders (e.g., mayor and councillors);
- Members of the community liaison committee;
- Local business owners/operators;
- Local service providers (e.g., emergency services, social services, and education);
- Community groups (e.g., clubs, associations and organizations);
- Surrounding community leaders;
- Residents; and
- First Nations and Métis communities in the vicinity.

### NWMO Open Houses

Between 2011 and 2013, the NWMO hosted an open house at least once in each of the 20 communities that chose to proceed with Phase 1 preliminary assessments. In some of the communities with longer histories of involvement in the site selection process, such as the eight communities that recently completed Phase 1 preliminary assessments, there have been numerous open houses that attracted community residents, Aboriginal peoples and others in the surrounding area.

## Chronological List of NWMO Open Houses in Siting Communities

- March 28-April 1, 2011 – English River First Nation
- April 2-5, 2011 – Pinehouse
- April 11-14, 2011 – Ignace
- May 9-12, 2011 – Ear Falls
- June 16-18, 2011 – Hornepayne
- June 18-22, 2011 – Schreiber
- June 27-30, 2011 – Creighton
- August 8-10, 2011 – Ignace
- October 24-27, 2011 – Wawa
- March 26-27, 2012 – Central Huron
- April 4, 2012 – Ignace
- April 30, 2012 – Saugeen Shores
- May 1, 2012 – Schreiber
- May 3, 2012 – Hornepayne
- May 9, 2012 – Ear Falls
- May 23-24, 2012 – Brockton
- May 30, 2012 – Wawa
- June 6, 2012 – Creighton
- June 19, 2012 – English River First Nation
- June 21, 2012 – Pinehouse
- September 11-12, 2012 – South Bruce
- September 11-12, 2012 – Huron-Kinloss
- September 17-18, 2012 – Elliot Lake
- September 17-18, 2012 – Spanish
- September 20-21, 2012 – Blind River
- September 20-21, 2012 – The North Shore
- September 27-29, 2012 – Saugeen Shores
- October 4-5, 2012 – Hornepayne
- October 10-11, 2012 – Arran-Elderslie
- October 15-16, 2012 – English River First Nation
- October 15-16, 2012 – Ear Falls
- October 17-18, 2012 – Ignace
- October 21-23, 2012 – Schreiber
- October 24-25, 2012 – Wawa
- November 13-14, 2012 – Creighton
- March 18-19, 2013 – Elliot Lake
- March 18-19, 2013 – Spanish
- March 21-22, 2013 – Blind River
- March 21-22, 2013 – The North Shore
- June 20, 2013 – Ignace
- June 20, 2013 – Ignace, Transportation Exhibit
- June 21, 2013 – Ear Falls, Transportation Exhibit
- July 14, 2013 – Hornepayne, Transportation Exhibit
- July 15, 2013 – Wawa, Transportation Exhibit
- July 16, 2013 – Schreiber, Transportation Exhibit

## NWMO Participation in Special Community Events

### Schreiber Heritage Days

- July 16, 2013

### Hornepayne Fishing Derby

- July 14, 2013

### Ear Falls Family Safety Night

- May 10, 2012
- May 16, 2013

### Pinehouse Elders Gatherings

- April 5, 2011
- June 5-7, 2012
- June 3-4, 2013

### English River First Nation Elders Gatherings

- July 10, 2012
- September 21-22, 2013

### Creighton Leisure Show

- April 26-28, 2012
- April 25-27, 2013



## Learn More Program

In 2009, the NWMO created a Learn More Program to make available resources in the form of information and funding to those communities, organizations, and individuals seeking assistance in learning more about the NWMO and the Adaptive Phased Management (APM) Project. The NWMO has seen interest in this program from communities and continues to respond to requests for both information and briefings from interested groups. Requests for more information have been received and were responded to by way of:

- Mailings of hard-copy information;
- General information briefings;
- Learn More briefings;
- Facilitating visits with the Canadian Nuclear Safety Commission (CNSC); and
- Tours of Ontario Power Generation interim waste management facilities.

To date, support made available to communities involved in the site selection process has included:

- **Funding to community for administrative expenses associated with co-ordinating community activities to Learn More:** This may include costs associated with a community working group, advertising (e.g., events and newsletters), and professional fees or part-time staff resource support. Funding is also available for a community to cover expenses of municipal staff associated with communications among staff and Council, payroll, accounts payable, tracking receipts, phone, fax, email, etc. related to the NWMO process, and travel expenses for meetings with surrounding communities or region.
- **Community planning:** Funding to community to develop and/or augment an existing long-term vision for community sustainability, integrated community sustainability plan and/or strategic plan in order to support their further consideration of the project.
- **Independent advice:** Funding to community for third-party review, hiring a consultant, studies and provision of expert advice to the community are available.
- **Support for visit to interim storage facility for community liaison committees:** The NWMO covers travel expenses for committees in communities involved in the site selection process to visit an interim waste storage facility in Ontario or other nearby facility.
- **Travel expenses associated with visit to the CNSC for community liaison committees.**

## Community Profiles

The NWMO has worked with communities to develop the following community profiles as the starting point for the community well-being assessment component of preliminary assessments:

- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Township of Ignace, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Township of Ear Falls, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Municipality of Wawa, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Township of Schreiber, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Township of Hornepayne, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Town of Creighton, Saskatchewan. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: Northern Village of Pinehouse, Saskatchewan. Toronto, Canada; and
- Nuclear Waste Management Organization (NWMO). 2013. Draft Community Profile: English River First Nation, Saskatchewan. Toronto, Canada.

All of the above are available on the NWMO website at [www.nwmo.ca](http://www.nwmo.ca).

## Community Well-Being Assessments

The NWMO has worked with communities and consultants to develop preliminary assessment of potential to foster well-being in the community through the implementation of the APM Project as part of preliminary assessments. As of the end of 2013, it had completed the following community well-being assessments:

- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Township of Ignace, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Township of Ear Falls, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Municipality of Wawa, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Township of Schreiber, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Township of Hornepayne, Ontario. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Town of Creighton, Saskatchewan. Toronto, Canada;
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: Northern Village of Pinehouse, Saskatchewan. Toronto, Canada; and
- Nuclear Waste Management Organization (NWMO). 2013. Phase 1 Preliminary Community Well-Being Assessment: English River First Nation, Saskatchewan. Toronto, Canada.

All of the above are available on the NWMO website at [www.nwmo.ca](http://www.nwmo.ca).

## Community Liaison Committees and Community Offices as of December 31, 2013

The NWMO has worked with community liaison committees in each community to facilitate learning in the community and to work collaboratively, where able, on preliminary assessment studies. This has involved participation in monthly meetings. The dates, agendas and minutes of these meetings are posted on the websites of each of the individual committees. The NWMO also established a community office in each community, with posted office hours, as a sustained presence in the community.

### Community Liaison Committees

- Blind River Community Liaison Committee
- Creighton Community Liaison Committee
- Ear Falls Nuclear Waste Community Committee
- Elliot Lake Community Liaison Committee
- English River First Nation Community Liaison Committee
- Hornepayne Nuclear Waste Community Liaison Committee
- Huron-Kinloss Nuclear Waste Community Advisory Committee
- Ignace Community Nuclear Liaison Committee
- Pinehouse Community Liaison Committee
- Schreiber Community Liaison Committee
- Spanish Community Liaison Committee
- The North Shore Nuclear Waste Community Liaison Committee
- Wawa Nuclear Waste Community Advisory Committee
- Manitouwadge Community Liaison Committee
- White River Community Liaison Committee
- Nipigon Community Liaison Committee
- Saugeen Shores Community Liaison Committee
- Arran-Elderslie Community Liaison Committee
- Brockton Community Liaison Committee
- South Bruce Community Liaison Committee

### Community Liaison Committee Websites as of December 31, 2013

- Blind River Community Liaison Committee: [www.clcinfo.ca/blindriver](http://www.clcinfo.ca/blindriver)
- Creighton Community Liaison Committee: [www.clcinfo.ca/creighton](http://www.clcinfo.ca/creighton)
- Ear Falls Nuclear Waste Community Committee: [www.clcinfo.ca/earfalls](http://www.clcinfo.ca/earfalls)
- Elliot Lake Community Liaison Committee: [www.clcinfo.ca/elliottlake](http://www.clcinfo.ca/elliottlake)
- English River First Nation Community Liaison Committee: [www.clcinfo.ca/erfn](http://www.clcinfo.ca/erfn)
- Hornepayne Nuclear Waste Community Liaison Committee: [www.clcinfo.ca/hornepayne](http://www.clcinfo.ca/hornepayne)
- Huron-Kinloss Nuclear Waste Community Advisory Committee: [www.huronkinloss.com/nuclear-waste-committee.cfm](http://www.huronkinloss.com/nuclear-waste-committee.cfm)
- Ignace Community Nuclear Liaison Committee: [www.clcinfo.ca/ignace](http://www.clcinfo.ca/ignace)
- Pinehouse Community Liaison Committee: [www.clcinfo.ca/pinehouse](http://www.clcinfo.ca/pinehouse)
- Schreiber Community Liaison Committee: [www.clcinfo.ca/schreiber](http://www.clcinfo.ca/schreiber)
- Spanish Community Liaison Committee: [www.clcinfo.ca/spanish](http://www.clcinfo.ca/spanish)
- The North Shore Nuclear Waste Community Liaison Committee: [www.clcinfo.ca/thenorthshore](http://www.clcinfo.ca/thenorthshore)
- Wawa Nuclear Waste Community Advisory Committee: [www.clcinfo.ca/wawa](http://www.clcinfo.ca/wawa)

### Community Offices With Public Office Hours as of December 31, 2013

- Wawa: 3 Maple Street, Wawa, ON
- Hornepayne: 35 Fourth Avenue, Hornepayne, ON
- Creighton: 300 1st Street East, Creighton, SK
- Schreiber: 204 Alberta Street, Schreiber, ON
- Ignace: 102 Main Street, Ignace, ON
- Ear Falls: Willow Crescent, Ear Falls, ON
- Elliot Lake: 99 Spine Road, Suite 101, Elliot Lake, ON
- Blind River: 3-5 Woodward Avenue, Suite 101, Blind River, ON
- Spanish: Gignac's Square, 107 Front Street, Unit 3, Spanish, ON
- South Bruce: 1220 Bruce Road 12, Units 1 & 3, Formosa, ON
- Huron-Kinloss: 80 Huron Street, Ripley, ON
- Saugeen Shores: 606 Goderich Street, Port Elgin, ON
- Arran-Elderslie: 258 Queen Street North, Paisley, ON
- Brockton: 324 Durham Street East, Walkerton, ON

## B) Nuclear Communities

### Canadian Association of Nuclear Host Communities

Over the past three years, the NWMO continued to work with nuclear communities which are also affected by the siting process. In particular, it continued to strengthen relations with the municipal leadership from Canada's existing nuclear communities that together form the Canadian Association of Nuclear Host Communities (CANHC). As these communities will be directly impacted by APM and the transportation of used fuel from current storage facilities located at reactor sites to the eventual host site, the NWMO has committed to maintaining an open dialogue and keeping this group well-informed. In each of the past three years, the NWMO attended the CANHC's annual general meeting in Ottawa.

The NWMO also provided regular updates to interested advisory committees in the CANHC nuclear communities.

### Durham Nuclear Health Committee (DNHC)

The NWMO provided presentations at the following regularly scheduled meetings of the Durham Nuclear Health Committee:

- April 15, 2011
- September 16, 2011
- January 13, 2012
- September 14, 2012
- April 19, 2013

## C) Planning for Dialogue on Transportation

As the site selection process advances, it will be important to engage those with an interest in transportation, as well as those who may be affected. Early activities have included attendance at the 2013 Annual Conference and Trade Show of the Transportation Association of Canada.

## D) Working With Municipal Associations in Nuclear Provinces

Throughout 2011 to 2013, the NWMO continued to involve municipal associations in the four nuclear fuel cycle provinces in learning about the implementation of Canada's plan and has sought their advice on communicating with communities.

## Municipal Forum

In 2008, with the co-operation of 18 senior leaders from provincial municipal associations and the Federation of Canadian Municipalities, the NWMO established a Municipal Forum. With their collective experience in both rural and urban municipal affairs across the nuclear fuel cycle provinces, Forum members provide valuable insight into communicating and working with local municipalities. Members also facilitate an effective link to the municipal associations and their membership, which includes hundreds of municipal governments.

Meetings of the NWMO Municipal Forum were held on the following dates:

- April 7, 2011 – Ottawa
- May 11, 2011 – Conference Call
- July 21, 2011 – Toronto
- October 27, 2011 – Ottawa
- March 29, 2012 – Toronto
- July 26, 2012 – Ottawa
- December 13, 2012 – Toronto
- April 18, 2013 – Ottawa
- July 25, 2013 – Toronto
- December 12, 2013 – Toronto

Throughout 2011 to 2013, Municipal Forum members advanced their understanding of APM and provided input to the site selection process. The NWMO's interactions with municipal associations have contributed greatly to the development of a collaborative approach to learning and development of tools to assist municipalities as they consider their interest in the project going forward and participation in the early steps of the site selection process.

## Municipal Associations

Through participation at annual conferences as trade show exhibitors, corporate sponsors, delegates and session speakers, the NWMO has developed strong working relationships with both federal and provincial municipal associations. In addition to conference participation, the NWMO has also been invited to provide briefings to the boards of directors of many of the associations. The NWMO attended annual conferences as identified below. These provided opportunities for information exchange with delegates by participating frequently as trade show exhibitors and also providing presentations and briefings as invited. In 2013, the NWMO was able to add to this program with the deployment of a mobile transportation exhibit, featuring a licensed used nuclear fuel transportation container. (See *Building Sustainable Relationships* for additional information about the exhibit.)

## Federal

### Federation of Canadian Municipalities

- 2011 Sustainable Communities Conference, Victoria, BC
- 2011 Conference and Trade Show, Halifax, NS
- 2012 Sustainable Communities Conference, Ottawa, ON
- 2012 Conference and Trade Show, Saskatoon, SK
- 2013 Conference and Trade Show, Vancouver, BC

## Provincial

### Saskatchewan

#### Saskatchewan Association of Rural Municipalities

- 2011 Annual Convention and Trade Show, Saskatoon, SK
- 2011 Midterm Convention, Regina, SK
- 2012 Annual Convention and Trade Show, Regina, SK
- 2012 Midterm Convention, Saskatoon, SK
- 2013 Annual Convention and Trade Show, Saskatoon, SK

#### Saskatchewan Urban Municipalities Association

- 2011 Annual Convention and Trade Show, Saskatoon, SK
- 2012 Annual Convention and Trade Show, Regina, SK
- 2013 Annual Convention and Trade Show, Saskatoon, SK

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### New Brunswick

#### Union of Municipalities of New Brunswick

- 2011 Annual Conference and Trade Show, Fredericton, NB
- 2012 Annual Conference and Trade Show, Fredericton, NB
- 2013 Annual Conference and Trade Show, Fredericton, NB

### Ontario

#### Association of Municipalities of Ontario

- 2011 Annual Conference and Trade Show, London, ON
- 2012 Annual Conference and Trade Show, Ottawa, ON
- 2013 Annual Conference and Trade Show, Ottawa, ON

#### Federation of Northern Ontario Municipalities

- 2011 Annual Conference and Trade Show, Timmins, ON
- 2012 Annual Conference and Trade Show, North Bay, ON
- 2013 Annual Conference and Trade Show (Transportation Exhibit included), Parry Sound, ON



#### **Northwestern Ontario Municipalities Association**

- 2011 Annual Conference and Trade Show, Toronto, ON
- 2012 Annual Conference and Trade Show, Kenora, ON
- 2013 Annual Conference and Trade Show (Transportation Exhibit included), Thunder Bay, ON

#### **Ontario Small Urban Municipalities**

- 2011 Annual Conference and Trade Show, Niagara on the Lake, ON
- 2012 Annual Conference and Trade Show, Huntsville, ON
- 2013 Annual Conference and Trade Show (Transportation Exhibit included), New Tecumseth, ON

#### **Rural Ontario Municipal Association**

- 2011 Conference and Trade Show, Toronto, ON
- 2012 Conference and Trade Show, Toronto, ON
- 2013 Conference and Trade Show, Toronto, ON

#### **Ontario Good Roads Association**

- 2011 Conference and Trade Show, Toronto, ON
- 2012 Conference and Trade Show, Toronto, ON
- 2013 Conference and Trade Show, Toronto, ON

#### **Related Municipal Conferences**

##### **Economic Development Council of Ontario**

- 2011 Conference, Toronto, ON
- 2012 Conference, Toronto, ON
- 2013 Conference, London, ON

##### **Kenora District Municipal Association**

- 2011 Conference, Red Lake, ON
- 2012 Conference, Sioux Lookout, ON

##### **Northwestern Ontario Regional Conference**

- 2011 Conference, Thunder Bay, ON
- 2012 Conference, Thunder Bay, ON
- 2013 Conference, Thunder Bay, ON

##### **Ontario West Municipal Conference**

- 2011 Conference, London, ON
- 2012 Conference, London, ON
- 2013 Conference and Trade Show, London, ON

##### **Rainy River Municipal Association**

- 2012 Conference, La Vallée, ON

## E) Sustaining Ongoing Dialogue With Interested Canadians

### Letters, Submissions and Comments

Throughout 2011 to 2013, the NWMO received hundreds of letters, comments and submissions from individuals and organizations interested in providing input to our work. These submissions included letters, faxes, and emails, as well as comments provided at open houses, trade shows, formal and informal meetings, briefings, interviews and other events. Specific comments made through the NWMO's online submission form are considered public comment and are posted in the website's Submission Library, which can be viewed at [www.nwmo.ca/submissions\\_library](http://www.nwmo.ca/submissions_library).

### NWMO Reporting on Input and Comments Received

Over the past three years, the NWMO summarized comment and input received and reported out regularly in the following publicly available documents:

- What We Heard – Comments Received About Implementing Adaptive Phased Management 2011 to 2015 (Issue No. 5);
- What We Heard – Comments Received About Implementing Adaptive Phased Management 2012 to 2016 (Issue No. 6);
- What We Heard – Report on Engagement Activities (Issue No. 7), January 2013;
- What We Heard – Comments Received About Implementing Adaptive Phased Management 2013 to 2017 (Issue No. 8); and
- What We Heard – Report on Engagement Activities (Issue No. 9), January 2014.

As noted above, Phase 1 preliminary assessment reports prepared for eight communities and published in 2013 also summarize key themes heard in working with communities.

### Ongoing Briefing and Engagement

The NWMO also provides updates and sustains a regular presence at a number of other conferences and events.

#### Canada-Wide Science Fair

- May 2012 (Charlottetown, PEI)
- May 2013 (Lethbridge, AB)

#### Canadian Nuclear Association

- 2011 Annual Conference
- September 11-14, 2011 – Waste Management, Decommissioning and Environmental Restoration Conference
- 2012 Annual Conference
- 2013 Annual Conference

#### Canadian Nuclear Society

- 2012 Annual Conference
- 2013 Annual Conference

#### Public Policy Forum

- May 3, 2012 – Toronto

The NWMO makes presentations upon request and participates on a number of specialty groups.

NWMO staff are members of:

- The Conference Board of Canada – Canadian Council for Aboriginal Affairs;
- The Nuclear Energy Agency’s Forum on Stakeholder Confidence – Core Group Meeting; and
- The International Atomic Energy Agency (IAEA) working group on Reversibility and Retrievability.

Presentations made by NWMO staff included:

- Durham College – Presentation on social considerations and engagement
  - » June 19, 2011
- IAEA
  - » December 6-10, 2011 (Workshop on Reversibility and Retrievability)
  - » December 9, 2011 (Workshop on Stakeholder Engagement)
- International High Level Radioactive Waste Management Conference
  - » April 2011 (Delivered paper)
- University of Guelph – Presentation to graduating class: Engaging Communities in Public Planning
  - » October 19, 2011

## F) Aboriginal Engagement

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### National Associations

#### Assembly of First Nations (AFN)

- APM-REP-00611-0003 – Assembly of First Nations Nuclear Waste Management Traditional Decision-Making Consensus Building – Draft Tool Kit, April 25-26, 2012
- APM-REP-00611-0004 – Assembly of First Nations Report on Alternative Exposure Groups, Characteristics and Data for the Post-Closure Safety Assessment of a Deep Geological Repository, May 2012
- APM-REP-00611-0005 – Assembly of First Nations Report on “Aboriginal Lifestyle Characterization NWMO TR-2013-08”, October 2013

### Provincial/Regional Organizations

- APM-REP-00622-0005 – Métis Nation of Ontario – Annual General Assembly Report, The Lands, Resources and Consultations Branch of the Métis Nation of Ontario, August 2011
- APM-REP-00621-0003-R000 – Federation of Saskatchewan Indian Nations, Lands and Resources Secretariat, Year-End Report 2011-2012 Information Sessions Regarding NWMO, April 30, 2012
- APM-REP-00621-0004 – Federation of Saskatchewan Indian Nations Year End Report 2012-2013, June 11, 2013
- APM-REP-00622-0004 rev-00 – Implementing the Plan for the Long-Term Management of Canada’s Used Nuclear Fuel – Meeting Report, September 2010

## Elders' Forum and Niigani

- APM-REP-00671-0004 – Elders Forum 9 Report prepared by Joanne Barnaby, Forum Facilitator and Rapporteur, July 18-20, 2011
- APM-REP-00671-0005 – Elders Forum 10 Report, prepared by Joanne Barnaby, Forum Facilitator and Rapporteur, November 8-9, 2011
- Niigani Newsletter: June 2011
- Redevelopment Process for the NWMO Elders Forum – 2012

## Council of Elders

- Council of Elders Terms of Reference, March 2012
- APM-REP-00676-0001 – Council of Elders Record of Discussion #1, June 2012
- APM-REP-00676-0002 – Council of Elders Record of Discussion #2, prepared by Joanne Barnaby, Forum Facilitator and Rapporteur, November 2012
- APM-REP-00676-0003 – Council of Elders Record of Discussion #3, March 2013
- APM-REP-00676-0004 – Council of Elders Record of Discussion #4, August 2013
- APM-REP-00676-0005 – Council of Elders Record of Discussion #5, November 2013

## Workshops and Presentations

- March 24, 2011 – Mawiw Council of First Nations Board, Fredericton, NB – APM Update
- April 13, 2011 – Chiefs of Ontario First Nation Nuclear Working Group, Toronto, ON – APM Workshop
- April 20, 2011 – Union of New Brunswick Indians, Technical Steering Committee, Moncton, NB – APM Briefing and Update
- May 3-6, 2011 – Federation of Saskatchewan Indian Nations, Treaty 4 Governance Centre, Meadow Lake, SK – Information Sessions – Meadow Lake Tribal Council, Prince Albert Grand Council and Independent First Nations – Onion Lake First Nation, Peter Chapman First Nation and Chakastapasin First Nation
- May 16-19, 2011 – Federation of Saskatchewan Indian Nations, Fort Qu'Appelle, SK – Information Sessions – Touchwood Agency Tribal Council (TATC) – Yorkton Tribal Council (YTC), File Hills Qu'Appelle Tribal Council (FHQ) and Independent First Nations Fishing Lake First Nation, South East Treaty 4 (SET4), Cowessess First Nation, Chacachas First Nation, and Pheasant Rump Nakota Nation
- May 26, 2011 – Treaty 6 Elders Gathering, Saskatoon, SK – APM Presentation
- June 30, 2011 – Union of New Brunswick Indian Nations – Chiefs Siting Update
- July 5, 2011 – Île-à-la-Crosse, SK – APM Presentation
- July 6, 2011 – Northern Village of Beauval, SK – APM Presentation
- July 7, 2011 – Youth Outdoor Wellness Conference, Île-à-la-Crosse Friendship Centre, Île-à-la-Crosse, SK – APM Presentation
- July 18-20, 2011 – NWMO Elders Forum meeting, Toronto, ON
- August 10, 2011 – Peter Ballantyne First Nation and Prince Albert Grand Council, Prince Albert, SK – APM Presentation
- August 19, 2011 – Métis Nation Ontario, Parry Sound, ON – Workshop and APM Update
- October 3, 2011 – Treaty #3 Elders Gathering, Dryden, ON – APM Presentation
- October 4, 2011 – Treaty #3 Chiefs Assembly, Wabauskang First Nation, ON – APM Presentation
- November 3-4, 2011 – Chiefs of Ontario First Nations Nuclear Working Group (FNNWG), Toronto, ON – Training session and nuclear waste management facility tour
- November 8-9, 2011 – NWMO Elders Forum meeting, Toronto, ON
- November 24-25, 2011 – Federation of Saskatchewan Indian Nations – Briefing and tour of nuclear waste management facility, Toronto, ON
- December 6-8, 2011 – Mawiw Council of First Nations – Drop-In Information Sessions – Elsibogotog First Nation, NB – December 6, Tobique First Nation, NB – December 8
- December 7, 2011 – Union of New Brunswick Indians, Moncton, NB – Chiefs Information Update
- March 13, 2012 – Black Lake First Nation, FSIN; Black Lake, SK – APM Presentation
- April 26-27, 2012 – Conference Board of Canada Council for Corporate Aboriginal Relations, Cranbrook, BC – Presentation – APM Site

## Selection Process and Aboriginal Engagement

- July 24, 2012 – Island Lake First Nation (Ministikwan), ILFN, SK – APM Presentation
- July 25, 2012 – Flying Dust First Nation, Flying Dust, SK – APM Presentation
- August 14, 2012 – Buffalo River Dene Nation, Dillon, SK – APM Presentation
- August 15, 2012 – Lac La Ronge Indian Band, SK, Lands & Resources Board, La Ronge, SK – APM Presentation
- August 16, 2012 – Missinabie Cree First Nation, ON – Community Meeting
- September 10, 2012 – Mississauga #8 First Nation, ON, Land and Resources Committee – APM Presentation
- March 19, 2012 – Yorkton Tribal Council; FSIN, Yorkton, SK – Information Session
- March 20, 2012 – Saskatoon Tribal Council; FSIN, Saskatoon, SK – Information Session
- June 10-11, 2012 – North East Superior Regional Chiefs Forum (NESRCF) at Chapleau Cree First Nation, ON, NESRCF Chiefs and Elders Council – Briefing
- June 26, 2012 – Treaty 3 Grand Chief and Environment Committee, Toronto, ON – APM Briefing
- July 26, 2012 – Treaty 4 Elders, Saskatoon SK – APM Presentation
- August 22, 2012 – Treaty 3 Youth and Elders Gathering, Kenora, ON – APM Presentation
- August 29, 2012 – Prince Albert Grand Council Chiefs Meeting, Edmonton AB – APM Presentation
- March 10, 2012 – Saskatchewan Aboriginal Women's Corporation, Regina, SK – APM Presentation and Workshop
- March 21, 2012 – AFN Traditional Knowledge Workshop – Toronto, ON
- June 26, 2012 – Union of New Brunswick Indians, Moncton, NB – Chiefs Update
- June 27-29, 2012 – NWMO Elders Forum and Council of Elders meeting, Kingbridge Conference Centre, King City, ON
- August 25-27, 2012 – Métis Nation of Ontario General Assembly, Sault Ste. Marie, ON – APM Workshop and Trade Show Exhibit
- September 14, 2012 – New North, Prince Albert, SK – APM Presentation
- October 1-2, 2012 – International Conference on Geological Repositories (ICGR), Toronto, ON, Representatives from Aboriginal organizations invited to attend; Conference included a special session titled "*Learning from Indigenous Peoples*" with panel chaired by former Assembly of First Nations National Chief, Phil Fontaine and included Elder Fred Kelly, Anishinabe, Onigaming First Nation, Joanne Barnaby, Co-Founder, Dene Cultural Institute, and Richard Arnold, Chairman, Pahrump Paiute Tribe (State of Nevada, United States)
- November 5-7, 2012 – Council of Elders meeting and tour of nuclear waste management facility, BMO Institute for Learning, Scarborough, ON
- December 1, 2012 – AFN Youth Council, Gatineau, QC – APM Presentation
- December 10-11, 2012 – Métis Nation Ontario – Regional Consultation Committees 1, 2, 3, 4, 5, Toronto, ON – Tour nuclear waste management facility and APM Presentation
- January 22, 2013 – Federation of Saskatchewan Indian Nations Lands and Resources Commission, Fort Qu'Appelle, SK – APM Update
- February 6, 2013 – Lac La Ronge Indian Band, Lac La Ronge, SK – APM Presentation
- February 6, 2013 – Montreal Lake Cree Nation, Montreal Lake, SK – APM Presentation
- February 20, 2013 – Federation of Saskatchewan Indian Nations, Regina, SK – Information Session – APM Presentation
- February 21, 2013 – Federation of Saskatchewan Indian Nations, Saskatoon, SK – Information Session – APM Presentation
- February 22, 2013 – Federation of Saskatchewan Indian Nations, Prince Albert, SK – Information Session – APM Presentation
- February 27, 2013 – AFN Environment Committee, Toronto, ON – APM Presentation
- March 4-6, 2013 – Council of Elders Meeting, Kingbridge Conference Centre, King City, ON
- March 9, 2013 – AFN Youth Council, Ottawa, ON – APM Presentation
- March 12, 2013 – Constance Lake First Nation, Constance Lake, ON – APM Presentation
- March 18-19, 2013 – Grand Council of Treaty #3, Treaty 3 Youth Executive Council – Youth and Elders Meeting, Winnipeg, MB – APM Project Presentation
- March 20, 2013 – Anglican Clergy of Northern Saskatchewan, St. Albans Cathedral, Prince Albert, SK – APM Presentation
- March 20, 2013 – Métis Nation Ontario, Sault Ste. Marie, ON – Sault Ste. Marie Regional Consultation Committee – APM Presentation and 2013 Aboriginal Relations Resource Program
- April 2, 2013 – Council of Elders, Presentation by Nagra, Toronto, ON
- April 2, 2013 – Métis Nation Ontario, Timmins, ON – Timmins, Timiskaming and Chapleau Regional Consultation Committee – APM

Presentation and 2013 Aboriginal Relations Resource Program

- April 9-10, 2013 – Wikwemikong Economic Development Conference – GreenX2 – Green Energy Conference, Sudbury, ON – APM Presentation and Trade Show Exhibit
- April 13, 2013 – Métis Nation Ontario Terrace Bay Regional Consultation Committee, Terrace Bay, ON – APM Presentation and 2013 Aboriginal Relations Resource Program
- April 20, 2013 – Métis Nation Saskatchewan – Northern Region II, Northern Region III and Eastern Region I, Prince Albert, SK – APM Update and 2013 Aboriginal Relations Resource Program
- May 8, 2013 – Métis Nation Ontario Region 5 Consultation Committee and Community Councils, Sudbury, ON – APM Presentation and 2013 Aboriginal Relations Resource Program
- May 29, 2013 – Northern Village of Buffalo Narrows, Buffalo Narrows, SK – APM Presentation
- May 30, 2013 – Peter Ballantyne Cree Nation, Prince Albert, SK – APM Presentation and 2013 Aboriginal Relations Resource Program
- May 30, 2013 – Saugeen Ojibway Nation, ON – APM Presentation
- May 31, 2013 – Northern Village of Cumberland House, SK – APM Presentation
- June 3-4, 2013 – Pinehouse Elders Gathering, Pinehouse, SK
- June 6, 2013 – Nishnawbe Aski Nation, Thunder Bay, ON – 2013 Aboriginal Engagement Resource Program
- June 13, 2013 – Peter Ballantyne Cree Nation, Southend Reserve, SK – APM Presentation
- June 24, 2013 – Northern Saskatchewan Trappers Association, Toronto, ON – Tour of nuclear waste management facility and APM Presentation
- June 27, 2013 – Wabigoon Lake First Nation, Toronto, ON – Tour of nuclear waste management facility and APM Presentation
- August 3, 2013 – Jackfish Métis Association and Ontario Coalition of Aboriginal People, Sault Ste. Marie, ON – APM Presentation
- August 9, 2013 – Native Women's Association Canada, Ottawa, ON – APM Presentation
- August 22, 2013 – Cumberland House Cree Nation, Toronto, ON – Tour of nuclear waste management facility and APM Presentation
- August 24-26, 2013 – Métis Nation Ontario AGM Assembly and Youth meeting, Ottawa, ON – APM Presentation
- August 26-28, 2013 – Council of Elders Meeting, Montreal, QC
- September 20, 2013 – Pays Plat First Nation, Toronto, ON – Tour of nuclear waste management facility and APM Briefing
- September 21-22, 2013 – English River Dene Elders Gathering, English River First Nation, SK
- October 8, 2013 – Wabigoon Lake First Nation, ON – APM Update
- October 10, 2013 – Constance Lake First Nation, ON – APM Update
- October 18, 2013 – Northern Village of Cumberland House, SK – APM Update
- October 20, 2013 – Prince Albert Grand Council Women's Commission, Prince Albert, SK – APM Briefing
- November 1, 2013 – Wabigoon Lake First Nation, ON – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 1, 2013 – Métis Nation Ontario Region 1, Dryden, ON – APM Presentation and 2013 Aboriginal Relations Resource Program
- November 13, 2013 – Métis Nation Ontario Region 2 Consultation Committee, Thunder Bay, ON – APM Presentation and 2013 Aboriginal Relations Resource Program
- November 15, 2013 – FSIN/AFN – Youth/Elder Environmental Conference – Saskatoon, SK – APM Presentation
- November 17-19, 2013 – Council of Elders Meeting, Kingbridge Conference Centre, King City, ON
- November 21, 2013 – Nishnawbe Aski Nation, Thunder Bay, ON – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 21, 2013 – Jackfish Métis Association, Schreiber, ON – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 21, 2013 – Northeast Superior Regional Chiefs Forum – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 21, 2013 – Wabigoon Lake First Nation, ON – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 21, 2013 – Hornepayne First Nation – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 21, 2013 – Nishnawbe Aski Nation – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 27, 2013 – Pays Plat First Nation – Briefing on the NWMO's announcement of communities moving to Step 3, Phase 2
- November 28, 2013 – Ojibways of Pic River First



- Nation, Heron Bay, ON – Briefing
- December 3, 2013 – Northern Village of Cumberland House, Toronto, ON – Learn More Tour and Briefing, Pickering Waste Management Facility
- December 10, 2013 – Prince Albert Grand Council Women's Commission, Toronto, ON – Learn More

- Tour and Briefing, Darlington Waste Management Facility
- December 11, 2013 – Serpent River First Nation – Ottawa, ON – Project Update
- December 19, 2013 – Northern Saskatchewan Trappers Association, Prince Albert, SK – Information Update

### Trade Shows

- 2011 AFN National Assembly, Moncton, NB
- 2011 Métis Nation of Ontario Annual General Assembly, Parry Sound, ON
- 2012 Métis Nation of Ontario Annual General Assembly, Sault Ste. Marie, ON
- 2012 Assembly of First Nations Annual General Assembly, Toronto, ON
- 2012 Assembly of First Nations Special Chiefs Assembly, Gatineau, QC
- 2013 Aboriginal Finance Officers Association Conference, Toronto, ON

- 2013 Nishnawbe-Aski Nation Embrace Life Forum, Thunder Bay, ON
- 2013 Wikwemikong Economic Development Conference – GreenX2 – Green Energy Conference, Sudbury, ON
- 2013 Nishnawbe Aski Nation Mining Conference, Timmins, ON
- 2013 Fort William First Nation Mining Conference, Fort William First Nation, ON
- 2013 Pays Plat Cultural Awareness Week, Pays Plat First Nation, ON

## G) Communications Materials

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### Implementation Plans

- Implementing Adaptive Phased Management 2011 to 2015 (2011)
- Implementing Adaptive Phased Management 2012 to 2016 (2012)
  - » Implementing Adaptive Phased Management 2012 to 2016 – Draft for Public Review (October 2011)
- Implementing Adaptive Phased Management 2013 to 2017 (2013)
  - » Implementing Adaptive Phased Management 2013 to 2017 – Draft for Public Review (October 2012)
- Implementing Adaptive Phased Management 2014 to 2018 – Draft for Public Review (September 2013)

### Reports, Brochures, Pamphlets, Other Printed Materials

- Learning More Together: Annual Report 2011
- Learning More Together: Annual Report 2012
- Description of Canada's Repository for Used Nuclear Fuel and Centre of Expertise (2012)
- Safe and Secure Transportation of Canada's Used Nuclear Fuel (2012)
- Backgrounders
  - » Developing a Community Sustainability Vision – Handbook (2011)
  - » Financial Surety and Updated Lifecycle Cost Estimate for Adaptive Phased Management (2013)
  - » Preliminary Assessment of Potential Suitability – Eight Phase 1 Assessments Completed (2013)
  - » Recognizing Community Leadership (2013)
  - » Preliminary Assessment of Potential Suitability – Phase 2 Study and Engagement (2013)

- Ask the NWMO (2012-2013)
  - » What Is Canada's Plan?
  - » Selecting a Site for Canada's National Used Fuel Repository
  - » Aboriginal Engagement
  - » Assessing the Safety of a Site
  - » Financial Surety
  - » The Multiple-Barrier System
  - » Why Is the NWMO Pursuing a Deep Geological Repository?
  - » Community Well-Being
  - » Repository Design
  - » Regulatory Framework
  - » Transportation
- Ask the NWMO compilation (2013)
- Phase 1 Preliminary Community Well-Being Assessments
  - » English River First Nation, Saskatchewan (2013)
  - » Municipality of Wawa, Ontario (2013)
  - » Northern Village of Pinehouse, Saskatchewan (2013)
  - » Town of Creighton, Saskatchewan (2013)
  - » Township of Ear Falls, Ontario (2013)
  - » Township of Hornepayne, Ontario (2013)
  - » Township of Ignace, Ontario (2013)
  - » Township of Schreiber, Ontario (2013)
- Phase 1 Preliminary Assessments: Summary Findings and Decisions (2013)
- Used Fuel Transportation Package Trailer (2013)

## Exhibits and Community Kiosks

- Mobile Transportation Exhibit (2013)
- Physical Exhibit "Safe and Secure Transportation" (2013)
- Physical Exhibit "Fostering Community Well-Being" (2013)
- Community Kiosks
  - » Creighton (2011)
  - » Schreiber (2011)
  - » Hornepayne (2011)
  - » Wawa (2011)
  - » Nipigon (2011)
  - » Brockton (2012)
  - » Saugeen Shores (2012)
  - » Huron-Kinloss (2012)
  - » South Bruce (2012)
  - » Arran-Elderslie (2012)
  - » White River (2012)
  - » Blind River (2012)
  - » Elliot Lake (2012)
  - » The North Shore (2012)
  - » Spanish (2012)
  - » Manitouwadge (2012)
  - » Central Huron (2012)

## Newsletters

- NWMO News V9.1 – June 2011
- NWMO News V10.1 – January 2012
- NWMO News V10.2 – March 2012
- NWMO News V10.3 – June 2012
- NWMO News V10.4 – October 2012
- NWMO News V11.1 – Winter 2013
- NWMO News V11.2 – Spring-Summer 2013
- NWMO News V11.3 – Summer-Fall 2013
- NWMO News V11.4 – Fall-Winter 2013

## H) Technical Reports

The technical research program supports implementation of APM, including the refinement and further development of generic designs and safety cases for a repository for used nuclear fuel in both crystalline and sedimentary rock formations. The results of this work are published and available on the NWMO website. The following is a list of NWMO technical research reports published during the period 2011–2013.

### Technical Reports

- NWMO TR-2009-02: Polaris Underground Project at Sudbury Neutrino Observatory (P.U.P.S.) Final Report
- NWMO TR-2009-35: Field Measurements of the Transfer Factors for Iodine and Other Trace Elements
- NWMO TR-2011-01: RD&D Program 2011 - NWMO's Program for Research, Development and Demonstration for Long-Term Management of Used Nuclear Fuel
- NWMO TR-2011-02: Technical Program for Long-Term Management of Canada's Used Nuclear Fuel - Annual Report 2010
- NWMO TR-2011-03: The Effect of CANDU Fuel Bundles Endplate/Endcap Weld Morphology On Computed Stress Intensity Factors at The Welds
- NWMO TR-2011-04: Used Fuel Integrity Program: Summary Report
- NWMO TR-2011-06: Status Report on The Stress Corrosion Cracking Behaviour of OFP Copper in Nitrite and Ammonia Solutions
- NWMO TR-2011-09: Far-Field Microbiology Considerations Relevant to a Deep Geological Repository - State of Science Review
- NWMO TR-2011-11: Sorption Experiments in Brine Solutions with Sedimentary Rock and Bentonite
- NWMO TR-2011-12: Sorption of Selected Radionuclides On Sedimentary Rocks in Saline Conditions - Literature Review
- NWMO TR-2011-13: Modelling Reactive Transport in Sedimentary Rock Environments - Phase II MIN3P Code Enhancements and Illustrative Simulations for a Glaciation Scenario
- NWMO TR-2011-14: Status of Corrosion Studies for Copper Used Fuel Containers under Low Salinity Conditions
- NWMO TR-2011-15: Two-Component Swelling Tests Operated for Three, Nine and Twenty-Seven Months

- NWMO TR-2011-16: Environmental Radioactivity in Canada - Measurements
- NWMO TR-2011-17: Review of Environmental Radioactivity in Canada
- NWMO TR-2011-19: Estimate of Instant Release Fractions Using ORIGEN-S and FEMAXI
- NWMO TR-2011-25: Nuclear Fuel Waste Projections in Canada - 2011 Update
- NWMO TR-2011-26: Seismic Activity in the Northern Ontario Portion of the Canadian Shield: Annual Progress Report for the Period January 01 - December 31, 2010
- NWMO TR-2012-01: Technical Program for the Long-Term Management of Canada's Used Nuclear Fuel - Annual Report 2011
- NWMO TR-2012-02: Near-Field Microbiological Considerations Relevant to a Deep Geological Repository for Used Nuclear Fuel - State of Science Review
- NWMO TR-2012-03: Used Fuel Container Retrieval from a Deep Geological Repository in Crystalline Rock Vertical Borehole Configuration
- NWMO TR-2012-04: Human Intrusion Model for the Fourth and Fifth Case Studies: Himv2.0
- NWMO TR-2012-05: Clay-Based Pellets for Use in Tunnel Backfill and as Gap Fill in a Deep Geological Repository: Characterisation of Thermal-Mechanical Properties
- NWMO TR-2012-07: Simulation of the Anaerobic Corrosion of Carbon Steel Used Fuel Containers Using the Steel Corrosion Model Version 1.0 (SCM V1.0)
- NWMO TR-2012-08: Fourth Case Study: Reference Data and Codes
- NWMO TR-2012-09: Corrosion of Nuclear Fuel (UO<sub>2</sub>) Inside a Failed Nuclear Waste Container a Review of Research Conducted under the Industrial Research Chair Agreement Between NSERC, NWMO and Western University (January 2006 to December 2010)
- NWMO TR-2012-11: Data for Radionuclide and Chemical Element Screening
- NWMO TR-2012-13: Nuclear Fuel Waste Projections in Canada - 2012 Update
- NWMO TR-2012-14: Fourth Case Study: Features, Events and Processes
- NWMO TR-2012-15: Implications of Placing High Burnup Used Fuel in a Deep Geological Repository
- NWMO TR-2012-16: Adaptive Phased Management Used Fuel Repository Conceptual Design and Postclosure Safety Assessment in Crystalline Rock Pre-Project Report
- NWMO TR-2012-17: Used Fuel Container Retrieval from a Deep Geological Repository in Sedimentary Rock Horizontal Tunnel Configuration
- NWMO TR-2012-18: Development of a Monitoring Program for a Deep Geological Repository for Used Nuclear Fuel
- NWMO TR-2012-21: SYVAC3-CC4 User Manual, Version SCC409
- NWMO TR-2012-22: SYVAC3-CC4 Theory, Version SCC409
- NWMO TR-2012-23: T2GGM Version 3.1: Gas Generation and Transport Code
- NWMO TR-2013-01: Technical Program for Long-Term Management of Canada's Used Nuclear Fuel - Annual Report 2012
- NWMO TR-2013-04: Review of the NWMO Copper Corrosion Allowance
- NWMO TR-2013-11: Nuclear Fuel Waste Projections in Canada - 2013 Update

### Adaptive Phased Management Reports

- APM-REP-00440-0001: APM Conceptual Design and Cost Estimate Update Deep Geological Repository Design Report Crystalline Rock Environment Copper Used Fuel Container
- APM-REP-00440-0003: APM Conceptual Design and Cost Estimate Update Deep Geological Repository Lifecycle Cost and Schedule Report Crystalline Rock Environment Copper Used Fuel Container
- APM-REP-00440-0005: APM Conceptual Design and Cost Estimate Update Transportation Design Report
- APM-REP-00440-0006: APM Conceptual Design and Cost Estimate Update Life Cycle Cost Estimate for Used Fuel Transportation System
- APM-REP-00440-0009: APM Conceptual Design and Cost Estimate Update Deep Geological Repository in Crystalline Rock NWMO Input to Cost Estimate
- APM-REP-00440-0011: APM Conceptual Design and Cost Estimate for a Deep Geological Repository in Crystalline Rock Summary Report
- APM-REP-00622-0005: Final Report for NWMO
- APM-REP-01520-32560: 2012-2013 Report of the NWMO Adaptive Phased Management Geoscientific Review Group (GRG) - Preliminary Geoscientific Assessments
- APM-REP-01601-0003: Enhanced Sealing Project (ESP): Seal Construction and Instrumentation Report
- APM-REP-01601-0004: Enhanced Sealing Project (ESP): Project Status and Data Report for Period Ending 31 December 2010
- APM-REP-01601-0005: Enhanced Sealing Project (ESP): Project Status and Data Report for Period Ending 31 December 2011
- APM-REP-03640-26782: Forge 1.2 Benchmark Modelling Meeting October 10 - 11 2011 Irsn Paris, France
- APM-REP-03640-26783: Forge: Wp4-5 Disturbed/Undisturbed Host Rock Formations, Progress Meeting May 17-18, 2011 Barcelona Spain
- APM-REP-04220-30157: UFTP Supporting Document Gap Analysis
- APM-REP-06143-32386: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Creighton Initial Screening Report
- APM-REP-06143-32387: Summary Report for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Creighton. Initial Screening Report
- APM-REP-06143-32388: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel Township of Ear Falls, Ontario
- APM-REP-06143-32395: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Ear Falls, Ontario
- APM-REP-06143-32396: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: English River First Nation, Saskatchewan (ERFN)
- APM-REP-06143-32397: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: English River First Nation, Saskatchewan (ERFN)
- APM-REP-06143-32398: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Hornepayne, Ontario

- APM-REP-06143-32401: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Hornepayne, Ontario
- APM-REP-06143-32403: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: The Corporation of the Township of Ignace, Ontario
- APM-REP-06143-32404: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: The Corporation of the Township of Ignace, Ontario
- APM-REP-06143-32405: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Northern Village of Pinehouse, Saskatchewan
- APM-REP-06143-32406: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Northern Village of Pinehouse, Saskatchewan
- APM-REP-06143-32407: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Schreiber, Ontario
- APM-REP-06143-32408: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Schreiber, Ontario
- APM-REP-06143-32409: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Municipality of Wawa, Ontario
- APM-REP-06143-32410: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Municipality of Wawa, Ontario
- APM-REP-06143-32753: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Nuclear Fuel: The Corporation of the Municipality of Arran-Elderslie, Ontario
- APM-REP-06143-32754: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Nuclear Fuel Municipality of Brockton, Ontario
- APM-REP-06143-32756: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Nipigon, Ontario
- APM-REP-06143-32757: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Nipigon, Ontario
- APM-REP-06143-32775: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Town of Spanish, Ontario
- APM-REP-06143-32785: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Town of Spanish, Ontario
- APM-REP-06143-32786: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of North Shore, Ontario
- APM-REP-06143-32788: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Town of Blind River, Ontario
- APM-REP-06143-32798: Summary Report Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: City of Elliot Lake, Ontario
- APM-REP-06143-32799: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: City of Elliot Lake, Ontario
- APM-REP-06143-32801: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: The Municipality of Brockton, Ontario



- APM-REP-06143-32802: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: The Corporation of the Municipality of Arran-Elderslie, Ontario
- APM-REP-06143-32804: Summary Report - Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Huron-Kinloss, Ontario
- APM-REP-06143-32808: Summary Report - Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: The Corporation of the Town of Saugeen Shores, Ontario
- APM-REP-06143-32810: Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Township of Huron-Kinloss, Ontario
- APM-REP-06143-32811: Summary Report - Initial Screening for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel: Municipality of South Bruce, Ontario
- APM-REP-06144-0002: Phase 1 Desktop Assessment Environment Report: Township of Hornepayne, Ontario
- APM-REP-06144-0010: Phase 1 Desktop Assessment Environment Report: Township of Ignace, Ontario
- APM-REP-06144-0018: Phase 1 Desktop Assessment Environment Report: Township of Ear Falls, Ontario
- APM-REP-06144-0034: Phase 1 Desktop Assessment Environment Report: Township of Schreiber, Ontario
- APM-REP-06144-0042: Phase 1 Desktop Assessment Environment Report: English River First Nation, Saskatchewan
- APM-REP-06144-0050: Phase 1 Desktop Assessment Environment Report: Town of Creighton, Saskatchewan
- APM-REP-06144-0058: Phase 1 Desktop Assessment Environment Report: Northern Village of Pinehouse, Saskatchewan

# Commonly Used Abbreviations

<b>AECL</b>	Atomic Energy of Canada Limited
<b>AFN</b>	Assembly of First Nations
<b>Andra</b>	French National Radioactive Waste Management Agency
<b>APM</b>	Adaptive Phased Management
<b>CANDU</b>	CANada Deuterium Uranium
<b>CANHC</b>	Canadian Association of Nuclear Host Communities
<b>CLC</b>	Community liaison committee
<b>CNSC</b>	Canadian Nuclear Safety Commission
<b>CSR</b>	Corporate Social Responsibility Program
<b>EDRAM</b>	International Association for Environmentally Safe Disposal of Radioactive Materials
<b>EIS</b>	Environmental Impact Statement
<b>FCM</b>	Federation of Canadian Municipalities
<b>HQ</b>	Hydro-Québec
<b>IAEA</b>	International Atomic Energy Agency
<b>ICGR</b>	International Conference on Geological Repositories
<b>ITRG</b>	Independent Technical Review Group
<b>L&amp;ILW</b>	Low- and intermediate-level waste
<b>LLM</b>	Lifecycle Liability Management
<b>MNO</b>	Métis Nation of Ontario
<b>Nagra</b>	National Cooperative for the Disposal of Radioactive Waste (Switzerland)
<b>NBPN</b>	NB Power Nuclear
<b>NEA</b>	Nuclear Energy Agency
<b>NFWA</b>	<i>Nuclear Fuel Waste Act</i>
<b>NSCA</b>	<i>Nuclear Safety and Control Act</i>
<b>NSERC</b>	Natural Sciences and Engineering Research Council of Canada
<b>NWMO</b>	Nuclear Waste Management Organization
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>ONFA</b>	<i>Ontario Nuclear Funds Agreement</i>
<b>OPG</b>	Ontario Power Generation, Inc.
<b>Posiva</b>	Finnish Nuclear Fuel Waste Management Company
<b>RP&amp;T</b>	Reprocessing, partitioning and transmutation
<b>SKB</b>	Swedish Nuclear Fuel and Waste Management Company
<b>UFTP</b>	Used fuel transportation package
<b>UNENE</b>	University Network of Excellence in Nuclear Engineering
<b>YSC</b>	Youth Science Canada







NUCLEAR WASTE    SOCIÉTÉ DE GESTION  
MANAGEMENT    DES DÉCHETS  
ORGANIZATION    NUCLÉAIRES

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